MODEL COURSE 3.05 – SURVEY OF FIRE APPLIANCES AND PROVISIONS

2004 Edition

Course + Compendium

Electronic edition
MODEL COURSE 3.05
SURVEY ON FIRE APPLIANCES AND PROVISIONS

2004 Edition

Course + Compendium

ELECTRONIC EDITION
This course on the survey of life-saving appliances and arrangements is based on material developed for IMO, under contract, by the International Association of Classification Societies (IACS).

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Foreword

Since its inception, the International Maritime Organization (IMO) has recognized the importance of human resources to the development of the maritime industry and has given the highest priority to assisting developing countries in enhancing their maritime training capabilities through the provision or improvement of maritime training facilities at national and regional levels. IMO has also responded to the needs of developing countries for postgraduate training for senior personnel in administrations, ports, shipping companies and maritime training institutes by establishing the world Maritime University in Malmö, Sweden, in 1983.

Following the adoption of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, a number of IMO Member Governments suggested that IMO should develop model training courses to assist in the implementation of the Convention and in achieving a more rapid transfer of information and skills regarding new developments in maritime technology. IMO training advisers and consultants also subsequently determined from their visits to training establishments in developing countries that the provision of model courses could help instructors improve the quality of their existing courses and enhance their implementation of associated Conference and IMO Assembly resolutions.

In addition, it was appreciated that a comprehensive set of short model courses in various fields of maritime training would supplement the instruction provided by maritime academies and allow administrators and technical specialists already employed in maritime administrations, ports and shipping companies to improve their knowledge and skills in certain specialized fields. With the generous assistance of the Government of Norway, IMO developed model courses in response to these generally identified needs and now keeps them updated through a regular revision process, taking into account any amendments to the requirements prescribed in IMO instruments and any technological developments in the field.

These model courses may be used by any training institution and, when the requisite financing is available, the Organization is prepared to assist developing countries in implementing any course.

E. E. MITROPOULOS
Secretary-General
INTRODUCTION

- Purpose of the model courses

The purpose of the IMO model courses is to assist maritime training institutes and their teaching staff in organizing and introducing new training courses or in enhancing, updating or supplementing existing training material where the quality and effectiveness of the training courses may thereby be improved.

It is not the intention of the model course programme to present instructors with a rigid "teaching package" which they are expected to "follow blindly". Nor is it the intention to substitute audio-visual or "programmed" material for the instructor’s presence. As in all training endeavours, the knowledge, skills and dedication of the instructor are the key components in the transfer of knowledge and skills to those being trained through IMO model course material.

Because educational systems and the cultural backgrounds of trainees in maritime subjects vary considerably from country to country, the model course material has been designed to identify the basic entry requirements and trainee target group for each course in universally applicable terms, and to specify clearly the technical content and levels of knowledge and skill necessary to meet the technical intent of IMO conventions and related recommendations.

- Use of the model course

To use the model course the instructor should review the course plan and detailed syllabus, taking into account the information provided under the entry standards specified in the course framework. The actual level of knowledge and skills and prior technical education of the trainees should be kept in mind during this review, and any areas within the detailed syllabus which may cause difficulties because of differences between the actual trainee entry level and that assumed by the course designer should be identified. To compensate for such differences, the instructor is expected to delete from the course, or reduce the emphasis on, items dealing with knowledge or skills already attained by the trainees. He should also identify any academic knowledge, skills or technical training which they may not have acquired.

By analysing the detailed syllabus and the academic knowledge required to allow training in the technical area to proceed, the instructor can design an appropriate pre-entry course or, alternatively, insert the elements of academic knowledge required to support the technical training elements concerned at appropriate points within the technical course.
Adjustment of the course objectives, scope and content may also be necessary if in your maritime industry the trainees completing the course are to undertake duties which differ from the course objectives specified in the model course.

Within the course plan the course designers have indicated their assessment of the time which should be allotted to each learning area. However, it must be appreciated that these allocations are arbitrary and assume that the trainees have fully met all the entry requirements of the course. The instructor should therefore review these assessments and may need to reallocate the time required to achieve each specific learning objective.

- **Lesson plans**

Having adjusted the course content to suit the trainee intake and any revision of the course objectives, the instructor should draw up lesson plans based on the detailed syllabus. The detailed syllabus contains specific references to the textbooks or teaching material proposed to be used in the course. An example of a lesson plan is shown in the instructor manual on page 53. Where no adjustment has been found necessary in the learning objectives of the detailed syllabus, the lesson plans may simply consist of the detailed syllabus with keywords or other reminders added to assist the instructor in making his presentation of the material.

- **Presentation**

The presentation of concepts and methodologies must be repeated in various ways until the instructor is satisfied that the trainee has attained each specific learning objective. The syllabus is laid out in learning objective format and each objective specifies what the trainee must be able to do as the learning outcome.

- **Evaluation or assessment of trainee progress**

Guidance on evaluation or assessment of trainees is given in Part E of the course. The group assignments in Chapter 6 (appendix 1) may be sufficient to provide the information, which will show how effective the transfer of knowledge and understanding has been.
Implementation

For the course to run smoothly and to be effective, considerable attention must be paid to the availability and use of:

- properly qualified instructors;
- support staff;
- rooms and other spaces;
- equipment;
- textbooks, technical papers; and
- other reference material.

Thorough preparation is the key to successful implementation of the course. IMO has produced Guidance on the implementation of model courses, which deals with this aspect in greater detail.
**PART A: COURSE FRAMEWORK**

**Scope**

The course is concerned with verification of compliance with the requirements in IMO conventions regarding the safety of ships, navigation and life at sea. It covers the requirements of the initial, annual, intermediate and periodical surveys, as specified in the International Convention for the Safety of Life at Sea, 1974 (SOLAS 74), as amended\(^1,2\) and related documents,\(^3\) together with the necessary procedures for verification of these requirements including:

- Suggested procedures for the carrying out of Convention requirements and detailed further in "Guidance" or "Recommendation" type documents relating to the Convention;
- Suggested acceptance criteria, i.e. standards, parameters or guidance towards acceptance of the requirements;
- Any other guidance necessary for the satisfactory determination of these survey requirements, with the aim of issuing the relevant certificates defined in the Convention.

The procedures and acceptance criteria described in the course are not to be constructed as providing an authoritative interpretation of the SOLAS convention.

This course does not cover preliminary design or plan approvals, nor does it cover the survey or inspection of chemical tankers, gas carriers, special purpose ships or mobile offshore units.

The course should be supplemented by on-the-job training under the supervision of an experienced ship surveyor.

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2) The interpretation of any convention decided by the contracting parties.

3) Guidelines on Surveys Required by the 1988 SOLAS Protocol, the International Bulk Chemical Code and the International Gas Carrier Code. (Resolution A.948(23)).
■ Objectives
The course, supplemented by appropriate on-the-job training, should enable those successfully completing it to:

- Conduct on behalf of their Administrations the surveys and inspections required by the 1974 SOLAS Convention, as amended and the 1988 SOLAS Protocol, as amended, in respect of fire protection, fire detection and fire-extinguishing appliances, including fire control plans and inert gas systems;

- Report as necessary on the results of such surveys and inspections to enable the Administration to issue or renew in respect of the ship concerned a Passenger Ship Safety Certificate or a Cargo Ship Safety Construction Certificate and Safety Equipment Certificate and its Supplement, as appropriate, taking into account reports of surveys or inspections of materials, structure and other equipment in respect of which a certificate is to be issued or renewed, and to issue, renew or endorse the attachment to the above-mentioned certificates;

- Identify, specify and require any repair or replacements in the above regards which may be necessary to permit issue or renewal of the above certificates; and

- Monitor the conduct and effectiveness of surveys and inspections of the above nature carried out on behalf of the Administration under delegated authority.

■ Entry standard
Those wishing to enter this course should be fully qualified Master Mariners, Chief Engineers, and Naval Architects/Marine Engineers or hold any equivalent qualification and have experience related to the structural survey of ships, ship construction or ship repair work.

Note: This course may also be used in cross-training experienced ship surveyors of other disciplines.

■ Course certificate, diploma or document
On successful completion of the course, a document should be issued certifying that the holder has completed a course of training at the required level of knowledge to conduct surveys of machinery. Authorization to conduct machinery surveys on ships should only be granted following successful completion of appropriate on-the-job training.

■ Course intake limitations
The ratio of trainees to instructors should not exceed 20:1 in tutorial sessions and 10:1 in practical training sessions.
**Staff requirements**

All training and instruction should be given by suitably qualified personnel. The senior instructor should be an experienced surveyor having a good knowledge of international requirements related to constructional fire protection, fire detecting and fire-fighting equipment and inert gas systems as laid down by IMO conventions, Assembly resolutions and MSC Circulars. Those teaching administrative aspects of survey control should also be experienced in these regards. At least one additional instructor with experience as a surveyor should be available if practical training sessions can be arranged.

**Teaching facilities and equipment**

For tutorial sessions ordinary classroom facilities and an overhead projector are sufficient. When audio-visual materials are used, the appropriate equipment must be available.

For practical training, visits to ships are essential. If these can be arranged, suitable protective clothing, tools and other equipment used for inspection and survey work will be required.

Separate rooms equipped with a table and chairs, to accommodate three or four groups of trainees during case studies and group assignments will be needed. Each room should be provided with a supply of paper and materials for producing overhead transparencies.

The following equipment should be available:

- Specimens of different bulkhead constructions
- Specimens of components for fixed fire-fighting installations
- Specimens of components for fire detection systems
- Specimens of portable fire extinguishers

**Teaching aids (A)**

A1  Instructor Manual (Part D of the Course including appendices)

**IMO references (R)**


R2  SOLAS Amendments 2000 (IMO Sales No. IMO - 170E).*

R2A  SOLAS Amendments 2001 and 2002 (IMO Sales No. IMO - 1171E).*
R3 Revised Resolution A.746(18) Survey Guidelines Under the Harmonized System of Survey and Certification (as amended by the draft Annex 19 to MSC.77(26) report) (IMO Sales No. IMO - 180E).

R4 Resolution A.563(14) Amendment to the Recommendation on Test Method for Determining the Resistance to Flame of Vertically Supported Textiles and Films (IMO Sales No. IMO - 120E). Original Resolution A.471(XII) (IMO Sales No. IMO - 068E ).***

R5 Resolution A.653(16) Revised Recommendation on Fire Test Procedures for Surface Flammability of Bulkhead and Deck Finish Materials (IMO Sales No. IMO - 136E).***

R6 Resolution A.565(14) Recommended Procedure to Prevent the Illegal or Accidental Use of Low Flashpoint Cargo as Fuel.** (IMO Sales No. IMO - 120E).

R7 Resolution A.754(18) Recommendation on Fire Test Procedures for “A”, ”B” and “F” Class Divisions (IMO Sales No. IMO - 180E).***

R8 Resolution A.471(XII) Recommendation on Test method for Determining the Resistance to Flame Of Vertically Supported Textiles and Film (IMO Sales No. IMO - 068E).***

R9 Resolution A.799(19) Improved Recommendation on Test Method for Qualifying Marine Construction Materials as Non-Combustible. (IMO Sales No. IMO 194E).***

R10 Resolution A.602(15) Revised Guidelines for Marine portable Fire Extinguishers.** This was updated by Res. A.948(23) which is also included in the Annex section of this document.

R11 Resolution A.123(V) Recommendations on Fixed Fire Extinguishing Systems for Special Category Spaces.**

R12 Inert Gas Systems (IMO Sales No. IMO - 860E).

R13 MSC/Circular 677 Revised standards for the design, testing and locating of devices to prevent the passage of flame into cargo tanks in oil tankers, as amended by MSC/Circular 1009.**

R14 MSC/Circular 731 Revised factors to be taken into consideration when designing cargo tanks venting arrangements.**

R15 MSC/Circular 451 Guidance concerning location of Fire Control Plans.**


* The trainees should use these references as the course reference books.
** See annex to this course for full text.
*** These references are incorporated into R17 - Code for Application of Fire Test Procedures (FTP).

■ Textbook (T)

T1 Course compendium

■ Bibliography


# Part B: Course Outline

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<td>1.6 International Association of Classification Societies</td>
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<td>1.8 Documents of compliance</td>
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<td>1.9 Reports and records</td>
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<td>1.10 Sub-standard ships</td>
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<td>5.3 Foam fire-extinguishing systems</td>
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<td><strong>6. Miscellaneous Fire-Fighting Equipment</strong></td>
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<td>6.2 Fire fighter’s outfits</td>
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<th>Hours</th>
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<th>Survey Training</th>
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<td>7. Fire Control Plans</td>
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Totals 42.0
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PART C: DETAILED TEACHING SYLLABUS

The detailed teaching syllabus has been written in learning objective format in which the objective describes what the trainee must do to demonstrate that knowledge has been transferred.

All objectives are understood to be prefixed by the words, “The expected learning outcome is that the trainee......................”

In order to assist the instructor, references are shown against the learning objectives to indicate IMO references and publications, text books, additional technical material and teaching aids, which the instructor may wish to use when preparing course material. In particular:

- Teaching aids (plates in Part D, Appendix 2 and 3)
- IMO references (indicated by R)
- Textbooks (indicated by T; referring to the course compendium)

will provide valuable information to instructors. The abbreviations used are:

- Pa. : Paragraph
- Ch. : Chapter
- Pl. : Plate
- An. : Annex

The following are examples of the use of references:


Note:
Throughout the course, safe working practices are to be clearly defined and emphasized with reference to current international requirements and regulations.

It is expected that the national institution implementing the course will insert references to national requirements and regulations as necessary.
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<th>IMO Reference</th>
<th>Textbook</th>
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<td>1.1 The role of the International Maritime Organization</td>
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<td>Ch.1.2</td>
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<tr>
<td>.1 Briefly describes the role of the IMO in promoting the safety of life at sea and the protection of the maritime environment</td>
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<td>Pl.1.102</td>
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<td>.2 Explains how the role of the IMO leads to survey and certification requirements</td>
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<td>1.2 The role of Governments</td>
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<td>.1 Describes the role of Governments by explaining the relevance of:</td>
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<tr>
<td>• Ratification of a Convention</td>
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<td>Pl.1.1</td>
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</tr>
<tr>
<td>• Providing enabling legislation</td>
<td></td>
<td>Pl.1.2</td>
<td></td>
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<tr>
<td>• Providing a maritime administration</td>
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<td>Pl.1.3</td>
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<tr>
<td>.2 Explains that becoming party to a convention confers upon a Government the duty to:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• Make the Convention’s provisions mandatory for ships flying the flag of the Government</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Make the Convention’s provisions mandatory for other maritime bodies, as appropriate, under its jurisdiction</td>
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</tr>
<tr>
<td>• Follow up deficiency reports on its ships or maritime bodies from other parties to the Convention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Institute penalties for non-observance of the Convention</td>
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<td>1.3 SOLAS and MARPOL</td>
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<td>.1 Defines SOLAS 74 and MARPOL 73/78</td>
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<td>Pl.1.106</td>
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<td>.2 States the Convention which is relevant to the survey</td>
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<td>Pl.1.110</td>
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<td>.3 Describes the arrangement of the Convention in a general way</td>
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<tr>
<td>.4 States the chapter(s) relevant to the survey</td>
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<tr>
<td>.5 Lists other IMO material relevant to the survey</td>
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<tr>
<td>1.4 Surveys and certification</td>
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<td>Ch.1.4</td>
<td>Pl.1.108</td>
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<tr>
<td>.1 States that a maritime administration is responsible for:</td>
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<td>Pl.1.1</td>
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<tr>
<td>• Surveying ships under its flag in accordance with the Convention to which its government is party</td>
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<td>Pl.1.2</td>
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<tr>
<td>• Issuing the certificates required under the Convention</td>
<td></td>
<td>Pl.1.3</td>
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<tr>
<td>• Providing detailed survey instructions and guidelines</td>
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<td>LEARNING OBJECTIVES</td>
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<tr>
<td>• Type approval of equipment</td>
<td></td>
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<td>Pl.1.107</td>
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<td>• Following up deficiency reports of its ships</td>
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<tr>
<td>.2 Describes the information a surveyor requires in addition to the IMO conventions and guidelines</td>
<td>R1-I/6</td>
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<td>.3 Describes what is covered by plan approval</td>
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<td>.4 States that inspections and surveys must be carried out by officers of the administration, surveyors nominated for the purposes or organizations recognized by the administration</td>
<td>R1-I/6</td>
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<tr>
<td>.5 Explains how surveys and certification may be delegated</td>
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<tr>
<td>.6 States what information an administration has to give to IMO with regard to inspections and surveys</td>
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<td>.7 States the guarantee given by the administration with regard to inspections and surveys</td>
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<td>.8 Describes the surveys required under SOLAS for passenger ships</td>
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<td>.11 Explains the meaning of additional surveys</td>
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<tr>
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(9.0 hours)

2 Preparation for Surveys (0.75 hours)

2.1 Requests for surveys
.1 Lists the procedures when a survey request is received
.2 Lists examples of persons or bodies requesting a survey
.2 Explains why an administration should be contacted for additional requirements and instruction

2.2 Tools and equipment
.1 Lists the personal equipment of the surveyors
.2 Lists other tools and equipment used in surveys

2.3 Safety precautions
.3 Lists general safety precautions
.4 Describes the safety measures to be taken prior to the survey of the machinery and electrical systems with respect to:
  - Electrical appliances
  - Crankcases of diesel engines
  - Boilers
.5 Describes the precautions to be taken when testing alarms
.6 Explains the measures to be taken prior to entering enclosed spaces or other spaces with dangerous atmospheres

3 Structural Fire Protection (9.0 hours)

3.1 Principles and definitions
.1 Describes the basic principles of fire protection, fire detection and fire extinction in ships as:
### Learning Objectives

- Division of the ship into main vertical zones by thermal and structural boundaries
- Separation of accommodation spaces from the remainder of the ship by thermal and structural boundaries
- Restricted use of combustible materials
- Detection of any fire in the zone of origin
- Containment and extinction of any fire in the space of origin
- Protection of means of escape or access for fire fighting
- Ready availability of fire-extinguishing appliances
- Minimisation of possibility of ignition of flammable cargo vapour
- Emergency Escape Breathing Devices

#### 2.2 Defines:

- Non-combustible materials
- Standard fire test
- "A" class divisions
- "B" class divisions
- "C" class divisions
- "F" class divisions
- Steel or other equivalent material
- Low flame spread
- Main vertical zones
- Ro - Ro cargo spaces
- Special category spaces
- Rooms containing furniture and furnishings of restricted fire risk

### 3.2 Test methods for marine construction materials

#### 2.1 Describes fire test procedures for surface flammability of bulkhead and deck finishing materials with respect to:

- Principle
- Test procedure
- Fire characteristics
- Test report

#### 2.2 Describes fire test procedures for "A", "B" and "F" class divisions with respect to:

- Information provided by manufacturer
- Light fittings and ventilation units in ceiling
- Door hinges, malting points
- Nature of tests
<table>
<thead>
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</thead>
</table>
| • Time-temperature curve of fire endurance test  
• Acceptance criteria of fire endurance test  
• Test report                |                  |              |                  |
| .3 Describes the test method for determining resistance to flame of vertically supported textiles and films with respect to:  
• Purpose  
• Mounting of specimen  
• Source of ignition  
• Test procedure  
• Test report | R8              | R17           |                  |
| .4 Describes the test method for qualifying marine construction materials as non-combustible with respect to:  
• Mounting of each specimen  
• Furnace temperature  
• Time of exposure  
• Determination of flaming  
• Number of each specimen  
• Classification  
• Test report | R9 | R17 |                  |

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<th><strong>3.3 Structure, materials and details</strong></th>
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<tr>
<td>.1 Describes the arrangement of the main vertical and horizontal zones</td>
<td>R2-II-2/9.2.2</td>
<td>Pi.3.1</td>
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<tr>
<td>.2 Describes how to check that such zones are intact</td>
<td>R2-II-2/9.2.2.4.2</td>
<td>Pi.3.2</td>
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<tr>
<td>.3 Gives examples of how the integrity of a zone can be affected</td>
<td>R2-II-2/9.2.2.3.1</td>
<td>Pi.3.3</td>
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<tr>
<td>.4 Describes the construction of &quot;A&quot;, &quot;B&quot;, &quot;C&quot; and &quot;F&quot; class divisions</td>
<td>R2-II-2/9.2.2.3.3</td>
<td>Pi.3.4</td>
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<tr>
<td>.5 Describes spaces on passenger ships classified according to their fire risk</td>
<td>R2-II-2/9.2.2.5</td>
<td>Pi.3.5</td>
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<tr>
<td>.6 Lists the methods of protection that may be adopted in accommodation and services spaces on cargo ships and gives the definitions for each type of space</td>
<td>R2-II-2/9.2.3.5</td>
<td>Pi.3.6</td>
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<td>.7 Describes materials that may be used in accommodation and spaces</td>
<td>R2-II-2/9.4</td>
<td>Pi.3.7</td>
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</table>
| .8 States the requirements applicable to:  
• Ventilation ducts  
• Pipes penetrating fire bulkheads  
• Stairways and ladders as means of escape  
• Stairways and lifts  
• Openings in "A" and "B" class divisions  
• Ventilation systems | R2-II-2/9.7.1 | Pi.3.8 |

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<tbody>
<tr>
<td>.9 States that windows and side scuttles must be so constructed as to preserve the integrity of bulkheads</td>
<td>R2-II-2/9.4.1.3</td>
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<td>.10 Lists the special arrangements required in machinery spaces to prevent fire</td>
<td>R2-II-2/9.5</td>
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<tr>
<td>.11 Lists the storage arrangements and flash point limitations applicable to oil fuel, lubricating oil and other flammable oils</td>
<td>R2-II-2/4.2.1</td>
<td>R6</td>
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</table>

### 3.4 Structure, miscellaneous items

| .1 States that where “A” and “B” class divisions are penetrated for the passage of electrical cables, pipes, trunks, ducts and similar details, the materials must be appropriate and the arrangements must ensure that the fire resistance is not impaired | R2-II-2/9.3 | | |
| .2 States that where oil and combustible liquids are conveyed through accommodation and service spaces, the administration must give approval, including for the material used, having regard to the fire risk | R2-II-2/4.2.2.5.6 | | |
| .3 States that materials affected by heat must not be used for overboard scuppers, sanitary discharges and other outlets close to the water-line where failure of material in a fire may cause flooding | R2-II-2/11.5 | | |
| .4 Lists the conditions governing the fitting of electric radiators | R2-II-2/4.4.1 | | |
| .5 States that waste receptacles must be constructed of non-combustible materials with no opening in the sides or bottom | R2-II-2/4.4.2 | | |
| .6 States that where penetration of oil products is possible, the surface of the insulation must be impervious to oil or oil vapours | R2-II-2/4.4.3 | | |

### 3.5 Fire safety measures for tankers

| .1 Lists the details of location and separation of spaces including: Machinery spaces, Pump rooms, Accommodation spaces, Means for keeping deck spills away from accommodation and service areas, Slop tanks, including requirements for slop tanks on combination carriers | R2-II-2/4.5 | | |
| .2 Lists the important features of the fire integrity of bulkheads and decks | R2-II-2/9.2.4.2 | | |

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<td>• Devices for preventing the passage of flame into the cargo tanks</td>
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<td>• Openings for pressure release and their minimum height above the deck</td>
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<td>• Pressure vacuum valves</td>
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<td>• Method of isolating slop tanks in combination carriers</td>
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<td>.4 Describes the means for the protection of cargo tank deck areas as:</td>
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<td>• A fixed inert gas system for the tanks</td>
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<td>.5 States that the inert gas system must be capable of:</td>
<td>R2-II-2/4.5.5.3</td>
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<td>• Reducing the oxygen content of each cargo tank so that combustion cannot be supported</td>
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<tr>
<td>• Maintaining the inert atmosphere in each cargo tank with an oxygen content not exceeding 8 per cent</td>
<td>R16-Ch.15.2.1.3.1</td>
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<td>• Eliminating the need for air to enter the tank during normal operation</td>
<td>R16-Ch.15.2.1.3.2</td>
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<td>• Purging empty cargo tanks of hydrocarbon gas, so that subsequent gas-freeing operations will at no time create a flammable atmosphere within the tank</td>
<td>R16-Ch.15.2.1.3.3</td>
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<td>.6 Lists the principal components of an inert gas system which include:</td>
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<td>.7 Lists the functions which must be tested on the inert gas system after installation, which include:</td>
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<tr>
<td>.8 Lists the required indicators and recording equipment of the inert gas system</td>
<td>R16-Ch.15.2.4.1 R16-Ch.15.2.4.2</td>
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<td>.9 Defines the inspection and testing requirements for the indicators and recording equipment</td>
<td>R16-Ch.15.2.4.2.5</td>
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<td>.10 Lists the required alarm systems of an inert gas system and states their function</td>
<td>R16-Ch.15.2.4.3</td>
<td>Ch.3.5</td>
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<td>.11 Lists the automatic shutdown systems of an inert gas system and states how these are tested</td>
<td>R16-Ch.15.2.3.1.5</td>
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<td>.12 Explains the use and calibration of the portable instruments for measuring oxygen and flammable vapours</td>
<td>R16-Ch.15.2.4.2.4</td>
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<tr>
<td>.13 States what detail is required in the instruction manual for an inert gas system</td>
<td>R2-II-2/14.4 R16-Ch.15.2.4.4</td>
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4 Fire Detecting Equipment (1.5 hours)

4.1 Fire detection and fire alarms

<p>| .1 States the requirements applicable to:                                            | R2-II-2/7 | Pl.4.101 |
|                                                                                   |          | Pl.4.102 |
|   • An automatic sprinkler as a fire detector and fire alarm system                | R16-Ch.8 |          |
|   • A fixed fire detection and fire alarm system with manually operated call points | R16-Ch.9 | Pl.4.2   |
|   • A fire detection and alarm system with respect to the type of construction of accommodation and service spaces | R2-II-2/7.5 |          |
|   • A fixed fire detection and fire alarm system for periodically unattended machinery spaces | R2-II-2/7.7 |
|   • A fixed fire detection and fire alarm system in machinery spaces               | R2-II-2/7.3.2 |
| .2 States, for special category spaces, the requirements applicable to manually operated call points | R2-II-2/20.4.3.2 |
| .3 States, for Ro - Ro cargo spaces, the requirements for an automatic fire detection and fire alarm system | R2-II-2/19.3.3 |
| .4 States, for cargo spaces intended for the carriage of motor vehicles, the requirements applicable to the automatic fire detection and fire alarm system | R2-II-2/20.4.1 |
| .5 States, for cargo spaces where dangerous goods are carried, the requirements applicable to the fire detection and fire alarm system | R2-II-2/19.3.3 |
| .6 Systems for accommodation, service spaces and control stations, the requirements applicable to the manual alarm system, the special alarm for the crew and the public address system | R2-II-2/7.7 |</p>
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| **5 Fixed Fire-Extinguishing Systems**
(9.0 hours) | | | |
| **5.1 Water fire-extinguishing systems**
Pumps, emergency fire pump, fire main, hydrants, hoses and nozzles | R2-II-2/10  
R2-II-2/10.2.1.3  
R2-II-2/10.2.2.3  
R2-II-2/10.2.2.4  
R2-II-2/10.4.4  
R2-II-2/10.2.1  
R2-II-2/10.2.3 | Ch.7  
Pl.5.102 | |
| .1 States the requirements applicable to capacity arrangements, pressure and location of fire pumps and emergency fire pumps | | | |
| .2 States the requirements applicable to:
- Number and position of hydrants
- Fire hoses and nozzles
- International shore connection
- Fire mains, diameter and pressure | R2-II-2/10.2.1.5  
R2-II-2/10.2.3  
R2-II-2/10.2.1.7  
R2-II-2/10.2.1.6 | | |
| Automatic sprinkler system | | | |
| .3 States the requirements for a sprinkler system | R16-Ch.8.2 | | Pl.5.103  
Pl.5.104 |
| Fixed pressure water spraying system for machinery spaces | | | |
| .4 States the requirements for this system | R16-Ch.7.2 | | Ch.7  
Pl.5.4  
Pl.5.5  
Pl.5.6  
Pl.5.107  
Pl.5.108  
Pl.5.109  
Pl.5.110  
Pl.5.111 |
| Fixed pressure water-spraying system for special category spaces and other cargo spaces for motor vehicles | R2-II-2/19.3.9  
R2-II-2/20.6.1.2 | | |
| .5 States the requirements for this system, which is operated manually | R11 | | |
| **5.2 Gas fire-extinguishing systems**
Carbon Dioxide (CO₂) systems | | | |
| .1 States the general requirement for a CO₂ system | R16 - Ch.5.2.1  
R16 - Ch.5.2.2 | Ch.4  
Pl.5.2  
Pl.5.3  
Pl.5.105  
Pl.5.106 | |
| .2 States the applications for a CO₂ system as:
- Machinery spaces
- Cargo spaces for motor vehicles
- Cargo spaces for dangerous goods
- Cargo spaces Halogenated hydrocarbon systems (Halon) | R2-II-2/10.5  
R2-II-2/20.6.1  
R2-II-2/19.2.1  
R2-II-2/10.7.1 | | |
| | | | Pl.5.107  
Pl.5.108  
Pl.5.109  
Pl.5.110  
Pl.5.111 |
| .3 States the general requirements for a Halon system | R1-II-2/5.1  
R1-II-2/5.3 | | Pl.5.4  
Pl.5.5  
Pl.5.6  
Pl.5.109  
Pl.5.110  
Pl.5.111 |
| .4 States the applications for a Halon system as:
- Machinery spaces
- Cargo spaces for motor vehicles
- Cargo spaces for dangerous goods
- Cargo spaces | R1-II-2/7.1.1  
R1-II-2/7.2.1  
R1-II-2/7.3.1  
R1-II-2/38.2.1  
R1-II-2/54.1.1  
R1-II-2/53.1.1 | | |

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<td>Low expansion foam systems</td>
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<td>.1 States the general requirements for a fixed low-expansion foam system</td>
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<td>PI.5.7</td>
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<td>.2 States the normal application for a fixed low-expansion foam system as protection of machinery spaces</td>
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<td>.3 States the general requirements for a fixed high-expansion foam system</td>
<td>R16-Ch.6.2.2</td>
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<td>.5 States the general requirements for a fixed deck foam system</td>
<td>R16-Ch.14</td>
<td>PI.3.7</td>
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<td>6.1 Portable fire extinguishers</td>
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<td>.1 States the general requirements for portable fire extinguishers</td>
<td>R16-Ch.4</td>
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<td>.2 States that portable fire extinguishers are classified according to the type of extinguishing medium as:</td>
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<td>• Water</td>
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<td>PI.6.1</td>
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<td>• Foam</td>
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<td>PI.6.2</td>
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<td>• Dry powder / dry chemical (standard)</td>
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<td>PI.6.4</td>
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<tr>
<td>• Dry powder / dry chemical (multiple or general purpose)</td>
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<td>PI.6.10</td>
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<tr>
<td>• Dry powder / dry chemical (metal)</td>
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<td>• Carbon dioxide</td>
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<td>• Halogenated hydrocarbons</td>
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<td>PI.6.6</td>
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<tr>
<td>.3 Lists fire classification letters A, B, C and D and respectively the materials undergoing combustion</td>
<td>R10-An./Pa.5</td>
<td>PI.6.8</td>
<td>PI.6.101</td>
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<td>.4 Lists in litres the various sizes of portable extinguishers</td>
<td>R16-Ch.4.3.1.1.1</td>
<td>PI.6.9</td>
<td>PI.6.102</td>
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<td>.5 Lists the spaces where portable extinguishers are required as:</td>
<td>R2-II-2/10.5.1.2.2</td>
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<td>• Accommodation</td>
<td>R2-II-2/10.3.2.1</td>
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<td>• Service spaces</td>
<td>R2-II-2/20.6.2.2</td>
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<tr>
<td>.6 States that one of the portable fire extinguishers intended for use in any space must be stowed near the entrance to that space</td>
<td>R2-II-2/10.3.2.2</td>
<td></td>
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<tr>
<td>.7 States that fire extinguishers must be periodically examined and subject to such tests as the administration may require</td>
<td>R2-II-2/14.2.2.1 R10-Pa.9</td>
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<td>6.2 Fire fighter’s outfits</td>
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<td>Pl.6.13</td>
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<tr>
<td>.1 States that a fire fighter’s outfit must consist of personal equipment and an approved type of breathing apparatus</td>
<td>R16-Ch.3 R2-II-2/10.10</td>
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<tr>
<td>.2 Lists the personal equipment required</td>
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<tr>
<td>.3 Describes the two types of breathing apparatus</td>
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<tr>
<td>.4 States that the other items of equipment are a fireproof lifeline with snap hook</td>
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<tr>
<td>.5 States that all ships must carry at least two fire fighter’s outfits</td>
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<tr>
<td>.6 States the criteria for additional fire fighter’s outfits and other equipment</td>
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<tr>
<td>.7 States the requirement for storage of all this equipment</td>
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<tr>
<td>7 Fire Control Plans (0.75 hours)</td>
<td>R2-II-2/15.2.4.1 R2-II-2/15.2.4.2</td>
<td>R15 R18</td>
<td>PL.7.101 PL.7.102</td>
</tr>
<tr>
<td>.1 Describes in detail fire control plans and their locations</td>
<td></td>
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<tr>
<td>.2 States the purpose of these plans</td>
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<tr>
<td>.3 States the alternative allowed to an administration for fire control details</td>
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<tr>
<td>.4 States the languages required on these plans</td>
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<tr>
<td>.5 States that, in addition, instructions concerning the maintenance and operation of all the equipment and installation on board for fire-fighting and containment must be kept under one cover and readily accessible</td>
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<tr>
<td>.6 States that in all ships a duplicate set of fire control plans or a wallet of them must be permanently stored in a suitable position for the use of the shore-side fire-fighting personnel</td>
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## LEARNING OBJECTIVES

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<td>8.1 Initial surveys on cargo ships</td>
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<td>Ch.8</td>
<td>Pl.8.1</td>
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<tr>
<td>.1 States that the initial survey is a complete inspection before a ship is put into service of all the items relating to the fire protection, fire suppression and fire fighting appliances to ensure that the relevant requirements are complied with by examining:</td>
<td>R3-Pa.2.1</td>
<td></td>
<td>Pl.8.101</td>
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<tr>
<td>• The plans, specifications, calculations and other technical documentation</td>
<td>R3-Pa.4.1</td>
<td></td>
<td>Pl.8.102</td>
</tr>
<tr>
<td>• The installation details of the structure, systems, and equipment are in accordance with the approved plans, specifications, and other technical documentation and the workmanship in all respects is satisfactory</td>
<td>R3-Pa.4.1.2.2.1</td>
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<tr>
<td>• The certificates, record books, operating manuals and other instructions and documentation specified in the requirements have been placed on board the ship</td>
<td>R3-Pa.4.1.2.2.2</td>
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<tr>
<td>.2 Examines and verifies that the following requirements are met:</td>
<td>R3-Pa.2.1</td>
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<tr>
<td>• Hull, superstructure, structural bulkheads, deck and deckhouses are of steel or other equivalent materials</td>
<td>R2-II-2/11.2</td>
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<tr>
<td>• “A” class divisions and insulation are appropriate for type of vessel</td>
<td>R2-II-2/11.3</td>
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<tr>
<td>• Special precautions have been taken if aluminium alloy compounds have been used</td>
<td>R2-II-2/11.4.1</td>
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<tr>
<td>• Crowns and casings of machinery spaces of category “A” are of steel construction and correctly insulated</td>
<td>R2-II-2/9.2.4.2.6</td>
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<tr>
<td>• “B” class divisions, where required extend from deck to deck and to the shell or other boundary</td>
<td>R2-II-2/9.2.2.2</td>
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<td>.3 Examines and verifies that the requirements are met for:</td>
<td>R2-II-2/9.2.2.3</td>
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<tr>
<td>• The fire integrity of bulkheads and decks</td>
<td>R2-II-2/9.2.3.3</td>
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<td>• The fire doors</td>
<td>R2-II-2/9.4.1</td>
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<tr>
<td>• Ready means of escape to open deck from all accommodation spaces and working spaces</td>
<td>R2-II-2/9.4.2</td>
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<td>• Stairways protected by “B” class divisions and self closing-doors</td>
<td>R2-II-2/9.2.3.4</td>
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<td>• Ventilation ducts of non-combustible materials</td>
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<td>• Arrangement of ventilation ducts</td>
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<td>• Restricted use of combustible materials in accommodation and other spaces</td>
<td>R3-An.1/1.1.3.9</td>
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<td>• Windows and side scuttles</td>
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<td>• Storage arrangements for oil fuel, lubricating oil and other flammable oils</td>
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<td>Structure, miscellaneous items</td>
<td>R2-II-2/4.2</td>
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<td>R6</td>
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<td>.4 Examines and verifies that the requirements are met for:</td>
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<td>R17</td>
<td>R2-II-2/9.3</td>
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<td>• The passage through “A” and “B” class divisions of electric cables, pipes,</td>
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<td>trunks, ducts and similar details</td>
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<td>• The arrangement, materials and details where oil and combustible liquids are</td>
<td>R2-II-2/11.5</td>
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<td>conveyed through accommodation and service spaces</td>
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<td>• Materials for overboard scuppers, sanitary discharges and other outlets close to</td>
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<td>the water-line</td>
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<td>• Any electric radiators fitted</td>
<td>R2-II-2/4.1</td>
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<td>• Waste receptacles</td>
<td>R2-II-2/4.2</td>
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<td>• The surface of any insulation being impervious to oil or oil vapours in spaces</td>
<td>R2-II-2/4.3</td>
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<td>where there is a possibility of oil vapour</td>
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<td>.5 Examines the approved plans and verifies the installation and testing of the</td>
<td>R3-An.1/1.1.3.1</td>
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<td>fire pumps, fire main, and related equipment for fixed water spray systems</td>
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<td>throughout the vessel, including the emergency fire pump.</td>
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<td>.6 Check the provision and disposition of the following:</td>
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<td>R3-An.1/1.3</td>
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<td>• Emergency Escape Breathing Devices (EEBDs)</td>
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<td>• Operational readiness and maintenance of fire fighting systems</td>
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<td>.7 Examines the approved fire-extinguishing and special arrangements in the</td>
<td>R3-An.1/1.1.3.6</td>
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<td>machinery spaces and confirming the remote means of control for the following:</td>
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<td>• Opening and closing of skylights</td>
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<td>• Means for release of smoke</td>
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<td>• Arrangements for closure of funnel and ventilation openings</td>
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<td>• Closure of power operated and other doors</td>
<td>R3-An.1/1.1.3.5</td>
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<td>• Stopping of forced and induced draft fans</td>
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<tr>
<td>• Stopping of oil fuel, flammable liquid pumps</td>
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<tr>
<td>8 Examines the approved fixed fire-extinguishing arrangements in the machinery,</td>
<td>R3-An.1/1.1.3.7</td>
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<tr>
<td>cargo, vehicle, special category and Ro-Ro spaces as appropriate and confirms the</td>
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<td>proper installation, including tests, has been completed and that the instructions</td>
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<td>for operation are clearly marked.</td>
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<tr>
<td>9 Examines the approved fire detection and alarm systems and automatic sprinkler</td>
<td>R3-An.1/1.1.3.8</td>
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<tr>
<td>systems (as fitted) for confirmation of equipment and that installation tests have</td>
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<td>been carried out</td>
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<tr>
<td>10 Examines the approved fire-extinguishing arrangements for spaces containing</td>
<td>R3-An.1/1.1.3.9</td>
<td>R2-II-2/4.2</td>
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<tr>
<td>paint and/or flammable liquids and deep-fat cooking equipment in accommodation and</td>
<td></td>
<td>R2-II-2/4.3</td>
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<tr>
<td>service spaces including that the operating instructions are clearly marked</td>
<td></td>
<td>R2-II-2/4.4</td>
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<tr>
<td>11 Examines the arrangements for oil fuel, lubricating oil and other flammable oils</td>
<td>R3-An.1/1.1.3.10</td>
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<td>in the machinery spaces including:</td>
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<tr>
<td>• Remote means of operation for quick-closing valves on tanks</td>
<td>R2-II-2/4.5</td>
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<td>• Spray shields for piping</td>
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<td>• Jacketed fuel oil piping for high pressure systems</td>
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<td>• Insulation of high temperature areas (≥ 220°C)</td>
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<tr>
<td>12 Examines the fire protection arrangements in cargo vehicle and Ro-Ro spaces (if</td>
<td>R3-An.1/1.1.3.11</td>
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<td>applicable) and operation of the means of closure for the various openings</td>
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<tr>
<td>13 Examining, when appropriate, the special arrangements for carrying dangerous</td>
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<td>goods, including the following:</td>
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<tr>
<td>• Electrical equipment and wiring</td>
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<td>• The ventilation arrangements</td>
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<td>• The provision of protective clothing and portable appliances</td>
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<tr>
<td>• Testing of water supply</td>
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<tr>
<td>• Bilge pumping and water spray arrangements</td>
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<tr>
<td>Additional fire safety measures for tankers</td>
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<tr>
<td>Learning Objectives</td>
<td>IMO Reference</td>
<td>Textbook</td>
<td>Teaching Aid</td>
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</table>
| .14 Examine and verify that the requirements are met for:  
- The location and separation of spaces such as machinery spaces, pump rooms, accommodation  
- Spaces, slop tanks, especially the slop tanks and other special features of combination carriers  
- The fire integrity of bulkheads and decks  
- The details for venting, purging, gas-freeing and ventilation of cargo tanks | R3-An.1/2.1.4  
R2-II-2/4.5  
R2-II-2/9.2.4.2 | | |
| .15 Examine and verify that the requirements are met for:  
- The inert gas system, including all details, instrumentation & testing as set out in chapter 15 of the FSS code  
- Instruction manuals for the inert gas system | R2-II-2/4.5.3.2  
R16-Ch.15.2.1.2 R12  
R3-An.1/1.1.4.2 | Pl.8.103  
Pl.8.104 | |
| .16 Examine and verify that the requirements are met for the cargo tank protection | R3-An.1/1.1.2.1 | | |
| .17 Examine the provision and disposition of the deck foam system, including:  
- The supply of foam concentrate  
- Operation of the proportioning and isolation valves  
- Confirmation that the minimum number of water jets are available | R3-An.1/1.1.4.1 | | |
| Fire detection and fire alarms | | | |
| .18 Examine and verify that the requirements are met for:  
- The automatic sprinkler as a fire detector & fire alarm system generally  
- Ensuring that, in a wet system for sprinklers, the sprinkler heads are suitably protected against frost in exposed positions the means for maintaining the air pressure in the sprinkler tank and the level of fresh water  
- All the instrumentation, alarms and automatic operation of the pump  
- Spare parts | R16-Ch.8  
R16-Ch.8/2.5.3  
R16-Ch.8/2 | | |
| .19 Examine and verify that the requirements are met for:  
- A fixed fire detection and fire alarm system with manually operated call points when tested  
- A fire detection and alarm system which is suitable for the type of construction of the accommodation and service spaces | R16-Ch.9.2.1  
R2-II-2/7.7 | Pl.8.2 | |
<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>IMO Reference</th>
<th>Textbook</th>
<th>Teaching Aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The fixed fire detection and fire alarm system for periodically unattended machinery space</td>
<td>R2-II-2/7.4.1.1</td>
<td></td>
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</tr>
<tr>
<td>• The fixed fire detection and fire alarm system for machinery spaces</td>
<td>R2-II-2/7.4.1.2</td>
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<tr>
<td>• Special category spaces having manually operated call points</td>
<td>R2-II-2/20.4</td>
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<tr>
<td>• Ro - Ro cargo spaces having an automatic fire detection and fire alarm system</td>
<td>R2-II-2/20.4</td>
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<tr>
<td>• Cargo spaces intended for the carriage of motor vehicles, &amp; have an automatic fire detection and fire alarm system</td>
<td>R2-II-2/20.4</td>
<td></td>
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<tr>
<td>• Cargo spaces where dangerous goods are carried and have a fire detection and fire alarm system</td>
<td>R2-II-2/19.3.3</td>
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<tr>
<td>• Accommodation, service spaces and control stations which have a manual alarm system, a special alarm for the crew and a public address system</td>
<td>R2-II-2/7</td>
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</tbody>
</table>

Pumps for fire fighting

.20 Examines and verifies that the requirements are met for:
• The number and location of fire pumps
• The certification of pumps and their capacity and pressure
• Separation of fire pumping system from oil pumping system
• Isolating valves and pump discharge valves
• Relief valve in the fire main

R2-II-2/10.2 Ch.7 Pl.8.106 Pl.8.107

Emergency fire pump

.21 Examines and verifies that the requirements are met for:
• Capacity of pump
• Minimum pressure at fire main
• Starting arrangement of diesel engine
• Arrangement of electric motor if fitted as a prime mover for the pump
• Arrangement of fuel oil
• Suction height of pump
• Protection of pipes if they pass through machinery space
• Pump room arrangement for fire protection
• Access to pump room
• Ventilation arrangements

R1-II-2/10.2.1.4.1 R16-Ch.12 R16-Ch.12.2.2.1.1 R16-Ch.12.2.2.1.1 R16-Ch.12.2.2.2.1 R16-Ch.12.2.2.1.3 R16-Ch.12.2.2.3.2.2 R16-Ch.12.2.2.3.2.3

Fire hydrants, fire mains, hoses and nozzles

.22 Examines and verifies that the requirements are met for:
<table>
<thead>
<tr>
<th>LEARNING OBJECTIVES</th>
<th>IMO REFERENCE</th>
<th>TEXTBOOK</th>
<th>TEACHING AID</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number and position of hydrants</td>
<td>R2-II-2/10.2.1.5</td>
<td></td>
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<tr>
<td>Fire hoses and nozzles</td>
<td>R2-II-2/10.2.3</td>
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<tr>
<td>International shore connection</td>
<td>R2-II-2/10.2.1.7</td>
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<tr>
<td>Fire mains, their diameter and pressure</td>
<td>R2-II-2/10.2.2.3</td>
<td></td>
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<tr>
<td>Fixed fire-extinguishing systems</td>
<td>R2-II-2/10</td>
<td></td>
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<tr>
<td>Examines and verifies that the requirements are met for:</td>
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<td></td>
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<tr>
<td>The automatic sprinkler system</td>
<td>R16-Ch.8</td>
<td>Ch.4</td>
<td>Pl.8.109</td>
</tr>
<tr>
<td>The fixed pressure water-spraying system for machinery spaces</td>
<td>R16-Ch.7</td>
<td>Ch.5</td>
<td>Pl.8.110</td>
</tr>
<tr>
<td>The fixed pressure water-spraying system for special category &amp; other cargo spaces for motor vehicles</td>
<td>R2-II-2/19.3.1</td>
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<tr>
<td>Carbon dioxide (CO₂) systems</td>
<td>R2-II-2/20.6.1</td>
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<tr>
<td>Halogenated hydrocarbon systems (Halon)</td>
<td>R11</td>
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<tr>
<td>Inert gas systems</td>
<td>R16-Ch.5</td>
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<tr>
<td>Low-expansion foam systems</td>
<td>R16-Ch.15</td>
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<tr>
<td>High-expansion foam systems</td>
<td>R16-Ch.6.2.3</td>
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<tr>
<td>Fixed deck foam systems for tankers</td>
<td>R16-Ch.6.2.2</td>
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<tr>
<td>Documentation</td>
<td>R16-Ch.14</td>
<td>Ch.6</td>
<td></td>
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<tr>
<td>Examines and verifies that requirements are met for all aspects of the fire control plans including:</td>
<td>R3-An.1/1.1.5.1</td>
<td></td>
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<tr>
<td>Use of IMO symbols</td>
<td>R2-II-2/15.2.4</td>
<td></td>
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<tr>
<td>Verification that equipment is placed as shown</td>
<td>R18</td>
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<tr>
<td>Proper distribution onboard the ship and/or to crew</td>
<td>R15</td>
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<tr>
<td>Confirms that the maintenance plans have been provided</td>
<td>R3-An.1/1.1.5.2</td>
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<tr>
<td>Confirms that the training manuals and fire safety operational booklets have been provided</td>
<td>R3-An.1/1.1.5.3</td>
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<tr>
<td>Confirms, where appropriate, that the issued document of compliance for dangerous goods is accurate and readily available</td>
<td>R3-An.1/1.1.5.4</td>
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</table>

<p>| 8.2 Mandatory annual surveys on cargo ships | | Pl.8.115 |
| .1 States that the annual survey should consist of the following: | R3-Pa.4.2.2.2.1 |
| Certificate verification and a visual examination of the ship and its equipment to confirm their condition is being maintained, with testing as necessary | R3-Pa.4.2.2.2.2 |
| Confirmation that un-approved modifications were not made to the vessel since the last survey |</p>
<table>
<thead>
<tr>
<th>LEARNING OBJECTIVES</th>
<th>IMO REFERENCE</th>
<th>TEXTBOOK</th>
<th>TEACHING AID</th>
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<tr>
<td>• The stringency of the examination should depend on the condition of the vessel and expansion of the survey should be considered if doubt arises about the ship's condition</td>
<td>R3-Pa.4.2.2.2.3</td>
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<tr>
<td>• Should any doubt arise as to the maintenance of the condition of the ship, further testing and examination should be conducted as found necessary</td>
<td>R3-Pa.4.2.2.4</td>
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<tr>
<td>.2 Confirms the validity of the Certificates onboard, including the SOLAS, MARPOL, Safety Management and Classification certificates</td>
<td>R3-An.1/1.2.1.1</td>
<td>R3-An.1/1.2.1.2</td>
<td>R3-An.1/1.2.1.3</td>
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<td></td>
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<td>R3-An.1/1.2.1.4</td>
<td>R3-An.1/1.2.1.5</td>
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<td></td>
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<td>R3-An.1/1.2.1.6</td>
<td>R3-An.1/1.2.1.7</td>
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<td></td>
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<td>R3-An.1/1.2.1.8</td>
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<tr>
<td>.3 Confirms that the vessel is properly crewed as follows:</td>
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<tr>
<td>• The vessel is carrying the proper number of officers and crew as per the Minimum Safe Manning document</td>
<td>R3-An.1/1.2.1.9</td>
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<tr>
<td>• The crew is properly certificated as required by the STCW Convention</td>
<td>R3-An.1/1.2.1.10</td>
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<tr>
<td>• That sufficient crew has been designated for the manning and supervision of the survival craft onboard</td>
<td>R3-An.1/1.2.1.11</td>
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<tr>
<td>.4 The required documentation for firefighting appliances have been updated and are available including:</td>
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<tr>
<td>• The fire control plans, with a duplicate set of the plans available in a prominently marked, external enclosure</td>
<td>R3-An.1/1.2.1.13</td>
<td>R15</td>
<td></td>
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<tr>
<td>• The maintenance plans</td>
<td>R3-An.1/1.2.1.14</td>
<td></td>
<td></td>
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<tr>
<td>• The training manuals and fire safety operational booklets</td>
<td>R3-An.1/1.2.1.15</td>
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<tr>
<td>Additional documentation for specialized service vessels (as applicable):</td>
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<tr>
<td>• Document of compliance for dangerous goods</td>
<td>R3-An.1/1.2.1.17</td>
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<tr>
<td>• Special list, manifest or stowage plans for dangerous goods</td>
<td>R3-An.1/1.2.1.18</td>
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<tr>
<td>• Instruction manuals for the inert gas system and that the proper record keeping has been performed</td>
<td>R3-An.1/1.2.1.19</td>
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<tr>
<td>.5 Checks the log book entries for an accurate and a comprehensive history including:</td>
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<tr>
<td>• Date of the last full muster for fire and boat drill</td>
<td>R3-An.1/1.2.1.20</td>
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<tr>
<td>LEARNING OBJECTIVES</td>
<td>IMOREFERENCE</td>
<td>TEXTBOOK</td>
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<tr>
<td>• The records indicating that the crew members have received the appropriate onboard training</td>
<td>R3-An.1/1.2.1.16</td>
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<tr>
<td>• Checking whether any fire has occurred onboard where the fixed fire-extinguishing system or portable fire-extinguishers where utilized since the last survey</td>
<td></td>
<td>R3-An.1/1.2.2.1</td>
<td></td>
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<tr>
<td>.6 Examines the fire pumps, fire main and other equipment for the fixed water spray system to ensure that the proper maintenance has been performed and that the system can supply at least two jets of water from separate locations simultaneously while maintaining the required pressure.</td>
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<tr>
<td>.7 Checks the provision, operational readiness of the portable, non-portable, and fixed fire-extinguishing apparatuses, including:</td>
<td>R3-An.1/1.2.2.2</td>
<td>R3-An.1/1.2.2.4</td>
<td>R16-C h.4 R10</td>
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<tr>
<td>• Random examination of the condition of their containers</td>
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<td>• Random confirmation that the containers are properly charged</td>
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<tr>
<td>• Confirmation of spares or recharges (as applicable)</td>
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<tr>
<td>.8 Checks that the fire-extinguishing appliances have been properly serviced by qualified personnel</td>
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<tr>
<td>.9 Checks that the appropriate number of fire fighter’s outfits and EEBDs are onboard, complete, in good condition and that the cylinders (including spares) are properly charged</td>
<td>R3-An.1/1.2.2.3</td>
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<tr>
<td>.10 Examines the approved fire-extinguishing and special arrangements in the machinery spaces and confirming the arrangement for the remote means of control for the following:</td>
<td>R3-An.1/1.2.2.6</td>
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<tr>
<td>• Opening and closing of skylights</td>
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<td>• Means for release of smoke</td>
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<td>• Closure of funnel and ventilation openings</td>
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<td>• Closure of power operated and other doors</td>
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<td>• Stopping of forced and induced draft fans</td>
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<tr>
<td>• Stopping of oil fuel, flammable liquid pumps</td>
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<tr>
<td>.11 Examining the fixed fire-extinguishing system (as fitted) for the cargo, vehicle, special category and Ro - Ro spaces and confirming that its means of operation are clearly marked</td>
<td>R3-An.1/1.2.2.5</td>
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<tr>
<td><strong>LEARNING OBJECTIVES</strong></td>
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<tr>
<td>.12 Examines the approved fire-extinguishing arrangements for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces including that the operating instructions are clearly marked</td>
<td>R3-An.1/1.2.2.8</td>
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<tr>
<td>.13 Examination and testing of the fire detection and alarm system to confirm the proper operation of alarms and power supply</td>
<td></td>
<td>R3-An.1/1.2.2.7</td>
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<tr>
<td>.14 Examines the arrangements for oil fuel, lubricating oil and other flammable oils in the machinery spaces including:</td>
<td></td>
<td>R3-An.1/1.2.2.10</td>
<td>R2-II-2/4.2.2</td>
</tr>
<tr>
<td>• Testing the remote means of operation for quick-closing valves on tanks</td>
<td></td>
<td>R2-II-2/4.2.3</td>
<td>R2-II-2/4.2.4</td>
</tr>
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<td>• Spray shields for piping</td>
<td></td>
<td>R2-II-2/4.2.5</td>
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<td>• Jacketed fuel oil piping for high pressure systems</td>
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<tr>
<td>• Insulation of high temperature areas (≥ 220°C)</td>
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<tr>
<td>.15 Examination and testing of the public address and general alarm system including volume control and interruption of non-essential sounds for alarm throughout the vessel</td>
<td></td>
<td>R3-An.1/1.2.2.11</td>
<td></td>
</tr>
<tr>
<td>.16 Examines the fire protection arrangements in cargo vehicle and Ro-Ro spaces (if applicable) and operation of the means of closure for the various openings</td>
<td></td>
<td>R3-An.1/1.2.2.12</td>
<td></td>
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<tr>
<td>.17 Examining, when appropriate, the special arrangements for carrying dangerous goods, including the following:</td>
<td></td>
<td>R3-An.1/1.2.2.13</td>
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<tr>
<td>• Electrical equipment and wiring,</td>
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<tr>
<td>• The provision of protective clothing and portable appliances</td>
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<tr>
<td>• Testing of water supply</td>
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<td>• Bilge pumping and water spray arrangements</td>
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<tr>
<td>• Additional arrangements for tankers</td>
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<tr>
<td>.18 Examination and testing of the deck foam system including:</td>
<td></td>
<td>R3-An.1/1.2.3.1</td>
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<tr>
<td>• Checking the condition of the foam concentrate</td>
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<tr>
<td>• Free movement and maintenance of the foam monitors</td>
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<tr>
<td>• Testing of the isolation valves</td>
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<tr>
<td>• Confirmation of the minimum number of water jets available</td>
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</tbody>
</table>
### Learning Objectives

<table>
<thead>
<tr>
<th>.19</th>
<th>Examination of the inert gas system for:</th>
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<tbody>
<tr>
<td></td>
<td>- External examination for signs of gas or effluent leakage</td>
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<td></td>
<td>- Operation of both inert gas blowers</td>
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<tr>
<td></td>
<td>- Operation of scrubber room ventilation</td>
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<td></td>
<td>- Operation of automatic level control for deck water seal</td>
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<td></td>
<td>- Operation of all remote or automatically controlled valves, and in particular, the flue gas isolation valves</td>
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<td></td>
<td>- Operation of the soot blower interlocking feature</td>
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<td></td>
<td>- Operation of the gas pressure regulating valve</td>
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<td></td>
<td>- Calibration of the sensors with an appropriate span gas</td>
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<td></td>
<td>Testing the alarms and/or shut downs as follows:</td>
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<tr>
<td></td>
<td>- High oxygen content</td>
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<td></td>
<td>- Low gas pressure in inert gas main</td>
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<td></td>
<td>- Low pressure in water supply to deck water seal</td>
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<td></td>
<td>- High temperature of gas supply to inert gas main</td>
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<td></td>
<td>- Low water pressure or low water flow rate to the flue gas scrubber</td>
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<td></td>
<td>- High water level in the flue gas scrubber</td>
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<td></td>
<td>- Failure of the inert gas blowers</td>
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<td></td>
<td>- Failure of the power supply</td>
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<tr>
<td></td>
<td>- High inert gas main pressure</td>
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<tr>
<td></td>
<td>Examine the fixed fire-fighting system for the cargo pump rooms and confirming as far as possible the operation of the means of closure for the various openings</td>
</tr>
</tbody>
</table>

### IMO Reference

- R3-An.1/1.2.3.2
- R3-An.1/1.2.3.3

### Teaching Aid

- Pl.8.1
- Pl.8.2
- Pl.8.111
- Pl.8.112

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### 8.3 Periodical surveys on cargo ships

| .1 | States that the "Fire Appliances and Provisions" part of the 'Periodical Survey' means a more thorough examination, at specified regular intervals, of the fire fighting appliances, fire detection and structural fire protection details to ensure that they are in accordance with the requirements of the appropriate conventions. This examination should include additional testing of the fire fighting appliances |

### IMO Reference

- R3-Pa.4.4.2
<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>IMO Reference</th>
<th>Textbook</th>
<th>Teaching Aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>.2 States that the periodical survey should be carried out as per the mandatory annual survey with additional requirements</td>
<td>R3-An.1/1.3.1</td>
<td>R3-An.1/1.3.2</td>
<td></td>
</tr>
<tr>
<td>.3 Verifies that since the last survey no modifications have been made, and/or defects or deterioration occurred, which would adversely affect the fire integrity of bulkheads and decks</td>
<td>R2-II-2/9.2.2.3</td>
<td>R2-II-2/9.2.3.3</td>
<td>R2-II-2/9.2.4.2</td>
</tr>
<tr>
<td>.4 Checks that means of escape to the open deck from all accommodation and working spaces are effective</td>
<td>R2-II-2/13</td>
<td></td>
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</tr>
<tr>
<td>.5 Confirmation that any foam compound, or CO2 capacity has been verified for the fixed fire extinguishing system serving the machinery, cargo, special category and Ro - Ro spaces (as applicable) and that the distribution piping has been proven clear.</td>
<td>R3-An.1/1.3.2.2</td>
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<tr>
<td>.6 Examines the approved fire-extinguishing and special arrangements in the machinery spaces and testing the remote means of control and operation for the following: • Opening and closing of skylights • Means for release of smoke • Closure of funnel and ventilation openings • Closure of power operated and other doors • Stopping of forced and induced draft fans • Stopping of oil fuel, flammable liquid pumps</td>
<td>R3-An.1/1.3.2.3</td>
<td></td>
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<tr>
<td>.7 Testing any fire detection and alarm system fitted onboard the vessel</td>
<td>R3-An.1/1.3.2.4</td>
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</tr>
<tr>
<td>.8 Testing, as feasible, the fire-extinguishing system for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces</td>
<td>R3-An.1/1.3.2.5</td>
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<tr>
<td>.9 Testing the operation of the remote means of closing valves fitted on tanks that contain oil fuel, lubricating oil, or other flammable liquids</td>
<td>R3-An.1/1.3.2.6</td>
<td></td>
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</tr>
<tr>
<td>.10 Testing the operation of the means of control provided for closing the various openings for the cargo, vehicle, special category, and Ro - Ro spaces (as applicable)</td>
<td>R3-An.1/1.3.2.7</td>
<td></td>
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<tr>
<td>.11 Testing, as feasible, the fire fighting arrangements for helicopter facilities if fitted</td>
<td>R3-An.1/1.3.2.8</td>
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<tr>
<td>LEARNING OBJECTIVES</td>
<td>IMO REFERENCE</td>
<td>TEXTBOOK</td>
<td>TEACHING AID</td>
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<tr>
<td>Additional requirements for tankers</td>
<td>R3-An.1/1.3.3.1</td>
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<tr>
<td>.12 States that the periodical survey should be carried out as per the mandatory annual survey with additional requirements for tankers</td>
<td>R3-An.1/1.3.3.2</td>
<td></td>
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<tr>
<td>.13 Confirmation that any foam compound, or CO2 capacity has been verified for the fixed fire-extinguishing system serving the cargo pump room and that the distribution piping has been proven clear</td>
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</table>

8.4 Renewal surveys on cargo ships

| .1 States that the renewal survey should consist of a thorough and complete examination of the items detailed in the mandatory annual survey and periodical survey with testing of systems as far as practicable | R3-An.1/1.4.2.1     |          |              |
| .2 If there is any doubt to their condition, an internal examination of the pumps, systems and fire fighting appliances should be considered | R3-An.1/1.4.3.1     |          |              |
| .3 States that in addition, an internal examination of the deck water seal (for tankers) should be carried out | R3-An.1/1.4.3.2     |          |              |

8.5 Initial surveys on passenger ships

<p>| .1 States that the initial survey is a complete inspection before a ship is put into service of all the items relating to the fire protection, fire suppression and fire fighting appliances to ensure that the relevant requirements are complied with by examining: | R3-Pa.2.1           |          |              |
| • The plans, specifications, calculations and other technical documentation | R3-Pa.4.1.2.2.1     |          |              |
| • The installation details of the structure, systems, and equipment are in accordance with the approved plans, specifications, and other technical documentation and the workmanship in all respects is satisfactory | R3-Pa.4.1.2.2.2     |          |              |
| • The certificates, record books, operating manuals and other instructions and documentation specified in the requirements have been placed on board the ship | R3-Pa.4.1.2.2.3     |          |              |
| .2 Examines the plans and verifies the installation and testing of the fire pumps, fire main, and related equipment for fixed water spray systems throughout the vessel, including the emergency fire pump. | R3-An.1/5.1.2.66    |          |              |</p>
<table>
<thead>
<tr>
<th>Learning Objective</th>
<th>IMO Reference</th>
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<tr>
<td>3</td>
<td>R3-An.1/5.1.1.12</td>
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<td>R3-An.1/5.1.2.67</td>
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<td>4</td>
<td>R3-An.1/5.1.1.15</td>
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<td>R3-An.1/5.1.2.73</td>
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<td>R3-An.1/5.1.1.17</td>
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<td>R3-An.1/5.1.2.80</td>
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<td>6</td>
<td>R3-An.1/5.1.2.68</td>
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<td>7</td>
<td>R3-An.1/5.1.2.69</td>
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<td>8</td>
<td>R3-An.1/5.1.2.70</td>
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<td>LEARNING OBJECTIVES</td>
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<tr>
<td>.10 Examines the arrangements for oil fuel, lubricating oil and other flammable oils in the machinery spaces including:</td>
<td>R3-An.1/5.1.2.71</td>
<td>R2-II-2/4.2.2</td>
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<td></td>
<td>R2-II-2/4.2.3</td>
<td>R2-II-2/4.2.4</td>
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<td>R2-II-2/4.2.5</td>
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<tr>
<td>• Remote means of operation for quick-closing valves on tanks</td>
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<td>• Spray shields for piping</td>
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<tr>
<td>• Jacketed fuel oil piping for high pressure systems</td>
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<tr>
<td>• Insulation of high temperature areas (≥ 220°C)</td>
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<tr>
<td>.11 Examining the installation of any fire detection and alarm system fitted onboard and confirming that the installation tests have been carried out</td>
<td>R3-An.1/5.1.2.72</td>
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<tr>
<td>.12 Examines the installation and testing of any manual or automatic fire doors including the means of closing any openings in &quot;A&quot; or &quot;B&quot; class divisions</td>
<td>R3-An1/5.1.2.74</td>
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<tr>
<td>.13 Examines and tests the installation of the means of closing the main inlets and outlets of the all ventilation smoke extraction systems and proving that the power ventilation systems are capable of being stopped from outside the space</td>
<td>R3-An.1/5.1.2.75</td>
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<tr>
<td>.14 Examines the approved fixed fire-extinguishing arrangements in the machinery, cargo, vehicle, special category and Ro - Ro spaces as appropriate and confirms the proper installation, including tests, has been completed and that the instructions for operation are clearly marked.</td>
<td>R3-An.1/5.1.2.76</td>
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<tr>
<td>.15 Examining, when appropriate, the special arrangements for carrying dangerous goods, including the following:</td>
<td>R3-An.1/5.1.2.81</td>
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<tr>
<td>• Electrical equipment and wiring</td>
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<tr>
<td>• The ventilation arrangements</td>
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<tr>
<td>• The provision of protective clothing and portable appliances</td>
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<tr>
<td>• Testing of water supply</td>
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<tr>
<td>• Bilge pumping and water spray arrangements</td>
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<tr>
<td>.16 Examines the plans and installation of the helicopter facilities (as applicable), including testing as feasible the fire fighting arrangements and appliances</td>
<td>R3-An.1/5.1.2.96</td>
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<tr>
<td><strong>LEARNING OBJECTIVES</strong></td>
<td><strong>IMO REFERENCE</strong></td>
<td><strong>TEXTBOOK</strong></td>
<td><strong>TEACHING AID</strong></td>
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<tr>
<td><strong>Documentation</strong></td>
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</tbody>
</table>
| .17 Confirmation that the following approved plans, booklets and manuals are readily available onboard:  
  • Stability information and damage control plans  
  • Manoeuvring booklet (also required to be displayed on the navigational bridge) | R3-An.1/5.1.3.1 |              |                 |
| .18 Examines and verifies that requirements are met for all aspects of the fire control plans including:  
  • Use of IMO symbols  
  • Verification that equipment is placed as shown  
  • Proper distribution onboard the ship and/or to crew | R2-II-2/15.2.4 | R3-An.1/5.1.3.3 | R15 |
| .19 Confirms that the maintenance plans are readily available onboard the vessel | R3-An.1/5.1.3.4 |              |                 |
| .20 Confirms that the training manuals and fire safety operational booklets have been provided | R3-An.1/5.1.3.5 |              |                 |
| .21 Confirms, where appropriate, that the issued document of compliance for dangerous goods is accurate and readily available | R3-An.1/5.1.3.6 |              |                 |

<table>
<thead>
<tr>
<th><strong>8.6 Renewal surveys on passenger ships</strong></th>
<th><strong>IMO REFERENCE</strong></th>
<th><strong>TEXTBOOK</strong></th>
<th><strong>TEACHING AID</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 Confirms the validity of the Certificates onboard, including the SOLAS, MARPOL, Safety Management and Classification certificates</td>
<td>R3-An.1/5.2.1.1</td>
<td>R3-An.1/5.2.1.2</td>
<td>R3-An.1/5.2.1.3</td>
</tr>
</tbody>
</table>
| .2 Confirms that the vessel is properly crewed as follows:  
  • The vessel is carrying the proper number of officers and crew as per the Minimum Safe Manning document  
  • The crew is properly certificated as required by the STCW Convention  
  • That sufficient crew has been designated for the manning and supervision of the survival craft onboard | R3-An.1/5.2.1.1 | R3-An.1/5.2.1.4 | R3-An.1/5.2.1.5 |
<p>| .3 Checks that un-approved modifications have not been made to the structural fire protection, fire-extinguishing appliances or fire fighting equipment since the last survey, and that the record of equipment is accurate | R3-An.1/5.2.1.6 | R3-An.1/5.2.1.7 | R3-An.1/5.2.1.8 |</p>
<table>
<thead>
<tr>
<th><strong>Learning Objectives</strong></th>
<th><strong>IMO Reference</strong></th>
<th><strong>Textbook</strong></th>
<th><strong>Teaching Aid</strong></th>
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</table>
| .4 The required documentation for firefighting appliances have been updated and are available including:  
  - The fire control plans, with a duplicate set of the plans available in a prominently marked, external enclosure  
  - The maintenance plans  
  - The training manuals and fire safety operational booklets  
  Additional documentation for specialized service vessels (as applicable):  
  - Document of compliance for dangerous goods  
  - Special list, manifest or stowage plans for dangerous goods | R3-An.1/5.2.1.16  
  R15 | | |
| .5 Checks the log book entries for an accurate and a comprehensive history including:  
  - Date of the last full muster for fire and boat drill  
  - The records indicating that the crew members have received the appropriate onboard training  
  - Checking whether any fire has occurred onboard where the fixed fire-extinguishing system or portable fire-extinguishers where utilized since the last survey | R3-An.1/5.2.1.20  
  R3-An.1/5.2.1.21 | R3-An.1/5.2.1.19 | |
| .6 Examines and tests the fire pumps, fire main and other equipment for the fixed water spray system to ensure that the proper maintenance has been performed and that the system can supply at least two jets of water from separate locations simultaneously while maintaining the required pressure. | R3-An.1/5.2.2.56 | | |
| .7 Checks the provision, operational readiness of the portable, non-portable, and fixed fire-extinguishing apparatuses, including:  
  - Random examination of the condition of their containers  
  - Random confirmation that the containers are properly charged  
  - Confirmation of spares or recharges (as applicable) | R3-An.1/5.2.2.57  
  R3-An.1/5.2.2.58 | R16-Ch.4  
  R10 | |
<p>| .8 Checks that the fire-extinguishing appliances have been properly serviced by qualified personnel | | | |</p>
<table>
<thead>
<tr>
<th><strong>LEARNING OBJECTIVES</strong></th>
<th><strong>IMO REFERENCE</strong></th>
<th><strong>TEXTBOOK</strong></th>
<th><strong>TEACHING AID</strong></th>
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</table>
| .9 Examines the approved fire-extinguishing and special arrangements in the machinery spaces and confirming the arrangement for and testing the remote means of control for the following:  
• Opening and closing of skylights  
• Means for release of smoke  
• Closure of funnel and ventilation openings  
• Closure of power operated and other doors  
• Stopping of forced and induced draft fans  
• Stopping of oil fuel, flammable liquid pumps | R3-An.1/5.2.2.59 | | |
| .10 Examines the fire-extinguishing arrangements in control stations, accommodation and service spaces | R3-An.1/5.2.2.60 | | |
| .11 Examines the plans and installation of the automatic sprinkler system in each main vertical zone including testing as feasible of the isolation valves, distribution piping, sprinklers, pressure tanks and pumps | R3-An.1/5.2.2.61 | | |
| .12 Examines the approved fire-extinguishing arrangements for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces including that the operating instructions are clearly marked | R3-An.1/5.2.2.62 | | |
| .13 Examines the arrangements for oil fuel, lubricating oil and other flammable oils in the machinery spaces including:  
• Testing the remote means of operation for quick-closing valves on tanks  
• Spray shields for piping  
• Jacketed fuel oil piping for high pressure systems  
• Insulation of high temperature areas (≥ 220°C) | R3-An.1/5.2.2.63 | | |
<p>| .14 Examination and testing as far as practicable of the fire detection and alarm arrangements in the machinery spaces and if applicable, accommodation, service spaces and control stations to confirm the proper operation of alarms and power supply | R3-An.1/5.2.2.64 | | |
| .15 Checks that the appropriate number of fire fighter's outfits and EEBDs are onboard, complete, in good condition and that the cylinders (including spares) are properly charged | | | |</p>
<table>
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<tr>
<th>Learning Objectives</th>
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<th>Teaching Aid</th>
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</table>
| .16 Confirms that changes have not been made to all aspects of the structural fire protection including:  
  • The Structure  
  • Fire integrity  
  • Protection of stairways and lifts  
  • Means of escape  
  • The passage through "A" and "B" class divisions of electric cables, pipes, trunks, ducts and similar details  
  • Ventilation systems  
  • Windows and side scuttles  
  • The use of combustible material                                                                 | R3-An.1/5.2.2.66    |          |              |
| .17 Confirmation that no changes have been made to the structural fire protection in cargo spaces intended for the carriage of dangerous goods                                                                 | R3-An.1/5.2.2.67    |          |              |
| .18 Examines and testing of any manual or automatic fire doors including the means of closing any openings in "A" or "B" class divisions                                                                 | R3-An.1/5.2.2.68    |          |              |
| .19 Examines and tests the installation of the means of closing the main inlets and outlets of the all ventilation smoke extraction systems and proving that the power ventilation systems are capable of being stopped from outside the space                                                                 | R3-An.1/5.2.2.69    |          |              |
| .20 Examines the fixed fire-extinguishing arrangements including fire detection, in the cargo spaces for general cargo, and dangerous goods as appropriate and testing as far as practicable the means of closure for the various openings                                                                 | R3-An.1/5.2.2.73    |          |              |
| .21 Examines the fixed fire-extinguishing arrangements including fire detection, in vehicle, special category and Ro - Ro spaces as appropriate and testing as far as practicable the means of closure for the various openings                                                                 | R3-An.1/5.2.2.74    |          |              |
| .22 Examines the crew alarm, general alarm, public address system or other effective means of communication including testing as far as feasible, the volume control and interruption of non-essential sounds for alarm throughout the vessel                                                                 | R3-An.1/5.2.2.75    |          |              |
| .23 Examining, and testing when appropriate, the special arrangements for carrying dangerous goods, including the following:  
  • Electrical equipment and wiring  
  • The ventilation arrangements  
  • The provision of protective clothing and portable appliances  
  • Testing of water supply  
  • Bilge pumping and water spray arrangements                                                                 | R3-An.1/5.2.2.76    |          |              |
<table>
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<tr>
<th>Learning Objectives</th>
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<tbody>
<tr>
<td>.24  Examines the helicopter facilities (as applicable), including testing as</td>
<td>R3-An.1/5.2.2.77</td>
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<td>feasible, the fire fighting arrangements and appliances</td>
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<td>.25  Examines the vessel for compliance with the retro-active requirements for</td>
<td>R3-An.1/5.2.2.78</td>
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<td>vessels carrying more than 36 passengers constructed before 1 October 1994 (if</td>
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<tr>
<td>applicable)</td>
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<tr>
<td>8.7  Additional surveys</td>
<td>R2-I/7</td>
<td>R2-I/8</td>
<td>R3-Pa.4.7.1</td>
</tr>
<tr>
<td>Whenever an accident occurs to a ship or a defect is discovered which affects</td>
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<tr>
<td>the safety or the efficiency or completeness of its equipment, the administration,</td>
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<td>the nominated surveyor or recognized organization responsible for issuing the</td>
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<tr>
<td>relevant certificate should then initiate an investigation to determine whether a</td>
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<tr>
<td>survey is necessary. The additional survey, which may be general or partial</td>
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<tr>
<td>according to the circumstances, should be such to ensure that the repairs and</td>
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<td>renewals have been effectively made and that the ship and its equipment continue</td>
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<td>to be fit for the service for which the ship is intended.</td>
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<tr>
<td>9    Review and Final Assessment</td>
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<td>(3.0 hours)</td>
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</table>
Part D: Instructor Manual

■ Introduction

The instructor manual provides guidance on the material that is to be presented during the course. The course material reflects the requirements for the training of masters, chief engineers and suitably qualified shore staff to be surveyors who can act on behalf of their Administrations.

The material has been arranged under nine main headings:

1. Introduction
2. Preparation for Surveys
3. Structural Fire Protection
4. Fire Detecting Equipment
5. Fixed Fire-Extinguishing Systems
6. Miscellaneous Fire-Fighting Equipment
7. Fire Control Plans
8. Survey Training
9. Review and Final Assessment

The 2001 consolidated text of the 1974 SOLAS Convention, the 1978 SOLAS Protocol and the 2000 amendments (R1 and R2 respectively), have been used as a basic reference throughout the course. The trainee is expected to acquire a good knowledge of SOLAS, and to become broadly familiar with the contents of each chapter so that references can easily be found.

Of the three appendices in the instructor manual, Appendices 2 and 3 may be used for making transparencies for the overhead projector.

■ Course Compendium

Included with this course is a compendium (T1) designed to provide material for the instructor and to serve as a textbook. It contains survey procedures, information on surveys in general and guidance on the installation of some fixed fire-extinguishing systems. The textbook references in the detailed teaching syllabus indicate the compendium.

It is possible to prepare diagrams and drawings of the compendium and its appendices for use with an overhead projector. If additional material is prepared the preparation of handouts to trainees must also be considered.

The material in the compendium has been arranged under eight main headings. As regards the detailed survey procedures it should be noted that these have been based on the requirements of SOLAS 74. The material includes proprietary instruction books prepared by manufacturing companies for their customers.
IMO is fortunate in being allowed to use these for classroom teaching purposes only and not for any practical or commissioning use. Examples are the Heien-Larssen Fire-Extinguishing instruction books for carbon dioxide and Halon, which form chapter 4 section 2, and chapter 5 section 2 of the compendium.

**Preparation**

The course outline and timetable provide guidance on the time allocation of the course material, but the instructor is free to make adjustments as necessary. The detailed teaching syllabus must be studied carefully and lesson plans or lecture notes compiled where appropriate. An example of a lesson plan is attached at the end of Part D.

Preparation is essential if the course is to be effective and successful. Evaluation covers practical exercises and theoretical knowledge. Guidance in evaluation of the theoretical part of the course is given in Part E of the course.

Throughout the course it is important to stress that, aboard ship, rule and regulations must be strictly observed and all precautions taken to maximize safety with minimum effect on the environment. Where appropriate, trainees should be given advice on the avoidance of accidents.

For several subject areas, the guidance notes are supplemented by the compendium, which explains in detail some of the points made.

Do not use the method of dictation and note taking, but rather distribute handouts for further study.

When demonstrating or discussing a subject, use appropriate overhead transparencies by way of illustration. Hard copies of overhead transparencies that are effective in concentrating attention on important aspects through key words and phrases are included in appendix 2 to this manual. Appendix 3 contains supporting material for the use of the instructor when delivering the lectures.
Guidance notes

1. Introduction 3.75 hours
This chapter deals with survey and certification requirements in general and explains their connection with the IMO conventions. Stress the importance of the administration in a number of survey related areas such as:

- Carrying out plan approvals,
- Issuing information on the acceptance of type tested equipment,
- Making known their degree of compliance with IMO Codes,
- Issuing guidelines to surveyors.

Trainees should also be instructed in the harmonized system of survey and certification, adopted by a Diplomatic Conference in November 1988 and contained in the Protocol of 1988 Relating to the Convention for the Safety of Life at Sea, 1974. It is not yet possible to predict its entry into force as this depends on the date when the required ratifications have been reached. It should be pointed out that the harmonized system generally continues present day practice of carrying out surveys but that it affects the names of the different surveys.

2. Preparation for surveys 0.75 hours
This chapter concerns the work and measures necessary preparatory to surveys. Of great importance are the safety precautions associated with the entry into and the use of tools and equipment in spaces where the atmosphere may be hazardous due to possible toxicity, explosivity or oxygen deficiency.

3. Structural fire protection 9.0 hours
The principles, definitions and some test methods are included so that the trainee can understand them and be better able to exercise good judgement when necessary and also ascertain where any tests he requires as a surveyor can be carried out. The requirements for structural fire protection are particularly important as many details will have to be checked during an initial survey and, in some parts of the ship, before the linings and other coverings are fitted. In some designs, pre-planned inspection areas are designated with removable access panels for future surveys.

Specimens of bulkhead constructions, particularly “B - class”, in its various forms, should be available for the trainees to see. However, sketches from manufacturers may also be used.

It should be pointed out that some initial surveys may occur as a result of a change of flag and that more dismantling of linings may be required than is necessary for a new ship. The surveyor/trainee must verify that the details of construction and all equipment meet the requirements of the administration.
Please refer to chapter 3 of the course compendium for inert gas system details.

4. **Fire detecting equipment** 1.5 hours

It would be helpful for the trainees to see and handle the various types of detecting equipment available and be shown the best safe means of testing. This is particularly important for equipment intended for unattended machinery spaces. They should also be instructed in the correct installation positions, particularly for any engine room detection equipment placed below the floor plates, and should be made aware that some ionisation types of detection do not function well if placed in an air stream, e.g. near the air inlet of turbochargers.

For sprinkler systems, the trainees should be warned of the danger of frost and how some protection can be given. The bursting temperature of sprinkler heads varies, depending on the space being protected.

5. **Fixed fire-extinguishing systems** 9.0 hours

It is important that trainees should find out whether an Administration restricts the use of the fire main to supplying water to fire hydrants and, possibly, the water supply for washing the anchors and anchor cables. The checks made at the initial and periodical surveys for other systems being supplied will depend on this information.

The other fixed systems require careful checking. Details of CO₂, Halon and fixed deck foam systems for tankers are given in chapters 4, 5 and 6 and appendices of the course compendium.

The trainees should be shown how to check that the ingredients for foam-making are viable.

6. **Miscellaneous fire-fighting equipment** 2.25 hours

The trainees should be shown the components, or at least diagrams, of portable fire extinguishers, what the test procedures are and how the tests are recorded to satisfy an Administration.

The location of portable fire extinguishers should be dealt with thoroughly, each category being positioned according to its purpose, e.g. a powder-on-gas type being located near a switchboard and, when necessary, the position marked for easy sighting.

Those trainees who have been senior sea-going officers should be familiar with the fireman's outfits, their maintenance and storage.

Some attention should be given to the criteria for the number of outfits carried on board the various classes of ships.
Details for checking for fire pumping arrangements are given in chapter 7 of the course compendium.

7. Fire control plans 0.75 hours

The trainees should be shown typical fire control plans for passenger and cargo ships, including those contained in a wallet for use by shore fire-fighting organizations. Specimen instructions concerning maintenance and operation of the fire-fighting equipment and installations should also be shown.

8. Survey training 12.0 hours

Although the details of the various surveys have been explained in the introduction to this course, it is advisable to restate the purpose of each survey.

Initial survey - is to ensure that the ship has been built to comply fully with the Convention requirements as interpreted by an administration and laid down in its instructions to surveyors; it is intended to be a thorough and complete survey. The surveyor has also to be satisfied that the workmanship and the equipment are in all respects satisfactory.

Periodical survey - is also a thorough and complete examination to ensure that all equipment and structural details have been properly maintained, that no unauthorized modifications have been carried out, and that the requirements of the Convention are met.

Mandatory annual survey - is a general examination of the ship and its equipment to ensure that it meets the requirements of the Convention.

Intermediate survey - is an examination of a ship and its equipment within specified periods between periodical surveys.

Conducting an initial survey requires great vigilance on the part of the surveyor/trainee to ensure that the structural protection is intact and that all the detailed requirements have been properly carried out. The trainee should be shown how best to prepare, checklist, complete with those details which require special attention during the survey. For example, he should check that on a W class bulkhead no wood panels or similar combustible materials or 'B' class panels are fitted in place of steel for reasons of expediency, that the continuity of a W class bulkhead on a stairway is complete, that fire doors are correctly positioned and fitted and that they have no unauthorized hold-open arrangements, as is frequently the case, on fire doors between galley and dining areas. For the periodical, mandatory annual and intermediate surveys, similar training should be given and, additionally, instruction given on how the trainees can use their professional judgement to decide whether the condition of equipment and installations is satisfactory. An example of a checklist is given in chapter 8 of the course compendium. A more detailed checklist may be made using the learning objectives of chapter 8 of the teaching syllabus.
Since in practice, it will only rarely be possible to find a ship suitable for a
survey of its fire appliances and provisions, the twelve hours allotted to survey
training should be used to have trainees carry out group assignments.

Where it is possible to do so, trainees should be presented with some case studies,
which they can consider and discuss as means of consolidating what has been
covered. Such case studies can be used as an introduction to this part of the
course.

The trainees should be formed into small groups, which should work through
inspection and survey assignments using material from the course. When the
assignments are completed, all trainees should assemble and each group should
present its results for discussion.

To complete this section of the course, a visit should be made to a ship or ships,
not to carry out a survey, but to review any difficulties or misconceptions on the spot.

In order to arrange a visit to an appropriate ship or ships, some flexibility must be
applied over this section of the course. This will require good co-ordination and co-
operation between all concerned so that maximum benefit is gained by the trainees.

Further guidance on these group assignments is contained in appendix 1 to the
instructor manual, which should be restricted to the instruction staff.

9. **Review and final Assessment** 3.0 hours

The instructor should briefly review the course content, stressing the main aspects
of each subject area and encouraging informal discussion where appropriate. A
final evaluation of the trainees' attainment of the learning objectives should be
conducted, preferably by means of a written test and any practical demonstrations
of their acquired skills as are considered necessary.
# EXAMPLE OF A LESSON PLAN

**COURSE:** Survey of Fire Appliances and Provisions  
**TRAINING AREA:** Fire Detecting Equipment  
**LESSON No.:** ..........  
**DURATION:** 1.5 hours

<table>
<thead>
<tr>
<th>Main Element</th>
<th>Teaching Method</th>
<th>Textbook Ref.</th>
<th>IMO</th>
<th>AVV</th>
<th>Instructor Guidelines</th>
<th>Time Mins</th>
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</thead>
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<td>Specific Learning Objective (in teaching sequence with memory keys)</td>
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<tr>
<td>4. Fire Detecting Equipment</td>
<td>Classroom Lecture</td>
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<tr>
<td>4.1 Fire detection and fire alarms</td>
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<tr>
<td>.1 sprinklers; various types of fixed fire detection and alarms for different spaces with and without manual call point; give advantages for zoned systems; sprinkler and unattended machinery spaces at least; also cargo spaces with smoke detecting systems</td>
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<tr>
<td>.2 special category spaces for cars; manually-operated call points provided as necessary and one close to each exit.</td>
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<td>.3 Ro - Ro spaces - describe typical system; discuss effect of ventilation system</td>
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<tr>
<td>.4 cargo spaces for cars - describe typical system; discuss effect of ventilation system</td>
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<td>.5 cargo spaces for dangerous goods - describe system and provisions for exhaust of sample if detection is by sampling</td>
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<tr>
<td>.6 accommodation, service spaces, control stations - describe equipment required</td>
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| | | | | | | |
| | | | | | | | | A1-Ch.4 | 45 |
| | | | | | | | | R2-II-2/ | 7, 8 and 9 |
| | | | | | | | | R17-Ch.8 and 9 |
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| | | | | | | | | 20.4.1 and 20.4.2 | 5 |
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APPENDIX 1

Guidance on Case Studies
and
Group Assignments
(Learning objective 8)
1. **Introduction**

Learning objective 8 of the syllabus and the compendium deal with the survey training. This appendix has been produced to provide more detailed guidance to the instructors who will be implementing and presenting the course.

As mentioned in the instructor manual, it is not normally possible to undertake any actual on-the-job supervised training in a short course such as this; such training must be left to the administration or other organization that will employ the trainee surveyor.

In the course, practical application of the course material is covered by means of:

- Case studies
- Small group assignment tasks
- Presentation of assignment results
- Field visit to an appropriate ship(s)

At an early stage in the course the trainees should be formed into small groups in which the size would be in the range of 5 to 9 people.

When forming the small groups an aim should be for a reasonable balance not only for size in numbers, but also in professional experience, ability, and job of the trainees and allowing for any special communication difficulties, such as language.

There is a need to maintain flexibility in learning objective 8 in order to adapt to any constraints, such as an appropriate ship for the visit only being available at a time and day different to that which has been provisionally planned.

2. **Case studies**

Case studies are useful in focussing attention on specific important aspects of the course and in assisting the consolidation of the information, which the instructor is transferring to the trainees. If it is possible to do so, case studies should be introduced early in the course to cover aspects of, for example:

- Types of survey
- Documentation involved
- Preparation for survey
- Tools and equipment needed
3. **Small group assignment tasks**

This will be used at the end of the presentation of the main part of the course dealing with inspection and survey, with the trainees working in small groups. For this section the trainees should choose for each group:

- A group leader or 'chairman'
- A secretary
- A spokesman

The group leader would co-ordinate the work of the group and should preferably be a person with some experience of survey work (either aboard ship or in a shore position).

The secretary should keep notes of discussions etc., and construct a report of the work of the group.

The spokesman will present a report on the assignment task to the trainees in joint session.

In carrying through the assignment task, the trainees will make use of the knowledge gained from the lectures and case studies, and use the syllabus, compendium, and for this course, a copy of SOLAS, as supporting material.

Prior to commencing the assignment tasks, the trainees should be given only the minimum of information, for example,

- Title of task to be carried out,
- Size and type of vessel involved,
- Type of survey, i.e.
  - Initial
  - Periodic
  - Annual

The instructors may provide further information if it is available, but only if asked for it by a group spokesman.

Possible additional details might be, for example:

- Who has requested the survey, such as:
  - Owners
  - Flag state
  - Under port state control regulations, etc.
- Engine size and type
• Machinery units of importance, or important information, such as:
  • Type of steam boiler used
  • Type of fuel used
  • Prime mover type for auxiliary machinery
  • Voltage of electrical system
  • Line diagram of layout of systems etc.
  • Attended or unattended machinery space
• Which extinguishing gas is used
  • Type of inert gas system.

The small groups carry through their assignments making use of:
• Course syllabus
• Course compendium
• Copy of SOLAS
• Further information provided by instructors.

The planning for these assignments needs to be commenced at an early stage in the course, so that when the time comes, everything is prepared and ready, such as:
• Separate room with a large table and sufficient chairs for each group
• Supply of paper and overhead transparency film for preparing report.

4. Presentation

The report should be able to be presented in a period of, say, 15 minutes, making use of overhead transparencies giving the main information in terms of key words and phrases, which can be amplified as necessary by the spokesman for the group. The trainees should then be allowed a period of say 5 to 10 minutes for any questions or comments on the report.

Typical presentations are annexed to this appendix as samples (for instructor staff use only).

5. Ship visit(s)

The instructors should endeavour to find a suitable merchant ship or ships which can be visited by the trainees, and any specific points or aspects raised as a result of the course material, the case studies, or the small group assignments, can be explained or demonstrated.

For this to be successful, the arrangements and pre-planning must commence at an early stage in the course.
6. Guidance for group assignments

6.1 Selection of surveys

These may be chosen by the instructor from any part of learning objective 8 but, initially, the subjects should be confined to those familiar to a majority of the trainees. The subjects can be conveniently grouped under the following headings:

Structural fire protection, Fire safety measures for tankers, Fire detection and fire alarms, Water fire-extinguishing systems (fixed), Gas fire-extinguishing systems (fixed), Foam fire-extinguishing systems (fixed), Portable fire extinguishers, Fire fighter’s outfits, Fire control plans, Initial surveys, Periodical surveys, Mandatory annual surveys, Intermediate surveys

6.2 Method for planning study

It is suggested that when a subject is chosen and the type of survey it requires, the trainees should study the SOLAS references on it and the appropriate section of resolution A.560(14) Guidelines on Surveys (as amended by MSC.84(70)). This will give them a general idea of the IMO requirements and in some cases enough information to enable them to pursue the study and write the report. Other references in the course may provide more detailed knowledge of the subject. In practice, an administration may have its own guidelines on surveys and these should be used if available.

All this information should assist in the compiling of a checklist for carrying out the survey and another for listing possible faults to look for.

On completion of this part of the study, the form of certificate to be issued should be considered.

6.3 Reporting

The report on the survey exercise should include the following:

Additional information required

1. Request for survey made by ……
2. Particulars of ship and equipment
3. Regulations for safety equipment of ……
4. National regulations
5. Reporting procedure
6. Drawings, past records if relevant etc.
Safety precautions

.7 Personal safety
.8 Authorized representative of the owners must accompany surveyor
.9 General safety aboard ship

Specific equipment and other needs

.10 Personal effects, e.g. safety shoes, boiler suit, torch etc.
.11 Documentation
   • Drawings of the system requiring survey
   • Valid statutory certificate
   • Official logbooks
   • Certificates of type tests

12 Assistance
   • Co-operation of the shipyard
   • Owners or agent
   • Ship's staff

General condition checklist

.13 Cleanliness, lighting
.14 Alterations, modifications, repairs
.15 State of maintenance
.16 Marking of items
.17 Fastening
.18 Accessibility

Planning the survey

.19 Visit the ship at the appointed time
.20 Discuss the survey with the master or his deputy
.21 Examine documents and drawings
.22 Visit the area of survey
.23 Progress through checklist
.24 Note deficiencies

Survey checklist

.25 Items (parts) to be opened up or dismantled for inspection
.26 Items (parts) requiring measurement
.27 Items requiring testing
.28 Items (parts) changed and reasons for change
.29 Condition of items
.30 Ease of handling of items
.31 Preparation prior to inspection (i.e. cleaning, removal, fitting lifting tackle etc.  
• Appropriate checks in accordance with Learning objective 8 of the syllabus.

Procedure for reporting

.32 Endorse the certificate/Inform the certificate issuing office if survey is satisfactory
.33 If major deficiencies are found inform the master and the certificate issuing office
.34 Unless deficiencies are rectified, vessel may be detained
Appendix 2

Plates that can be used to make overhead projector transparencies
This Appendix contains plates, diagrams etc. for use in producing overhead projector transparencies or as master copies for producing handouts.

The first number of the plate refers to the section of the Instructor Manual and the second number gives its position in numerical sequence.

For example, 2-5 means the fifth diagram relating to section 2 of the Instructor Manual.

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<td>Halon 1301 fire-extinguishing system</td>
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<td>5-5</td>
<td>Halon de-centralized system</td>
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<td>Halon centralized system</td>
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<td>5-7</td>
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<td>105</td>
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<tr>
<td>6-1</td>
<td>Portable 9 litre water fire extinguisher</td>
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<td>6-2</td>
<td>Portable 9 litre aqueous-film-forming-foam (AFFF) fire extinguisher</td>
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<td>6.3</td>
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<td>6-4</td>
<td>Portable 6kg sodium bicarbonate (BC) dry powder fire extinguisher</td>
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<td>6-5</td>
<td>Portable 6kg ABC dry powder fire extinguisher</td>
<td>110</td>
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<tr>
<td>6-6</td>
<td>Portable 10kg ABC dry powder fire extinguisher</td>
<td>111</td>
</tr>
<tr>
<td>6-7</td>
<td>Portable 12kg BC dry powder fire extinguisher</td>
<td>112</td>
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<tr>
<td>6-8</td>
<td>Portable 6kg carbon dioxide gas fire extinguisher</td>
<td>113</td>
</tr>
<tr>
<td>6-9</td>
<td>Portable 7kg Halon 1211 fire extinguisher</td>
<td>114</td>
</tr>
<tr>
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<td>Wheeled 50kg BC dry powder fire extinguisher</td>
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<tr>
<td>6-11</td>
<td>Wheeled 9kg BC carbon dioxide gas fire extinguisher</td>
<td>116</td>
</tr>
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<td>6-12</td>
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<td>117</td>
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<td>8-2</td>
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</tr>
</tbody>
</table>
Applicable Requirements

SOLAS regulations

National regulations

Other regulations

Plate 1-1
Clarify Applicability
(with the Administrator responsible)

National Requirement
Exemption from Convention
Alternative Survey Methods
Report Procedures
Background of Port State Surveys

Plate 1-2
“Instruments” for Surveyor’s Guidance

- Rules
- Instructions
- Circular Letters
- Checklists
- Sprint
- Acceptance Criteria
  - Only covered to a limited extent by rules and instructions
  - Rest: “To Surveyor’s satisfaction”
    - Professional Judgement
    - Technological Know-how
    - Ethics
    - Experience

*Plate 1-3*
Statutory Surveys of Ships in Service

- Owner/Master requests surveys at the local station

- Before going on board the surveyor checks the following
  - Certificate status of the ship in question
  - Possible recommendations
  - Extent of authorization by the flag state
  - Special national requirements to be observed

By using the Sprint Information System

*Plate 1-4*
**Typical 5-Year Cycle of Surveys**

<table>
<thead>
<tr>
<th>Classification</th>
<th>MONTHS</th>
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<tr>
<td>Annual Surveys</td>
<td>0 9 12 15 21 24 27 33 36 45 48 51 57 60</td>
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<tr>
<td>Intermediate Surveys</td>
<td>1</td>
</tr>
<tr>
<td>Dry docking Surveys</td>
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</tr>
<tr>
<td>Special Survey</td>
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</tr>
<tr>
<td>Statutory Annual/Periodical/ Renewal</td>
<td></td>
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<td>Safety Construction (SLC)</td>
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<tr>
<td>Safety Equipment (SLE)</td>
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<tr>
<td>Safety Radio (SLR)</td>
<td>P</td>
</tr>
<tr>
<td>Loadline</td>
<td></td>
</tr>
<tr>
<td>MARPOL</td>
<td></td>
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<tr>
<td>ISM DOC</td>
<td></td>
</tr>
<tr>
<td>Intermediate MARPOL</td>
<td></td>
</tr>
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<td>SLC</td>
<td>3</td>
</tr>
<tr>
<td>ISM SMC</td>
<td>3</td>
</tr>
</tbody>
</table>

---

(1) Survey can be performed either at the second or third annual survey or in between and in addition to the annual survey requirements, a one-month period on either side of the mid-point.

(2) Survey can be performed between 2nd and 3rd year. The SOLAS convention requires two drydockings in a 5-year period with 3 years minimum interval.

(3) The Intermediate Survey takes place of either the second or third annual survey.

**Typical Survey Cycle**

*Plate 1-5*
Rules Basis

- Research and development
- International standards and codes (ISO, IEC, ETC)
- Statutory Regulations (IMO)
- Rules of other class societies
- IACS Work
- Feedback of experience

Plate 1-6
Retention of Class

Owners Shall:

- Inform about condition of the vessel of significance to class
- Subject the vessel to periodical surveys, surveys of damages, repairs, conversions
- Carry out recommendation

Plate 1-7
Not normally covered by the Rules:

- Stability and survival capability
- Life-saving equipment
- Radio communication installations
- Navigation equipment

Assumed controlled by national authorities

Plate 1-8
Scope of Rules

- *Strength and performance of*:
  - Hull
  - Machinery
  - Equipment

- *Protection against fire and explosions (dependant on engagement by national authorities)*

*Plate 1-9*
OVERLAPPING CLASS

RES  SOLAS  MARPOL  LOAD LNE  GAS CODE  CHEM CODE  MODU CODE

VARIOUS REQ.
- SAF. EQ.  - RADIO  - NAV.

- HULL  - MACH  - FIRE  - STEER.  - BLGE  - INERT  - ELECTR.
- DAMAG. STAB.  - OP. REQ.  - OIL MON.
- ARRANG.  - COW  - TANKCAP.  - SBT  - PL.
- FREEB. STAB.  - DAMAG. STAB.
- COND. OF ASSIGN.
- CONSTR. AND SYSTEM
- AS FOR GAS  - DAMAG. STAB.  - PERS. SAFETY  - OP. REQ.
- AS FOR SOLAS
- AS FOR GAS
- STAB. ELSE AS FOR SOLAS

DELEG. AUTHORITY

ADDITIONAL CLASS
- EXISTING SYSTEM
- NEW TECHNOLOGY
- NEW DEMANDS
- OPTIONAL SAFETY

ADDITIONAL NATIONAL REQ. (NOT FLAG STATE)
- USA
- CANADA
- NEWFOUNDL.
- UK
- PANAMA
- SUEZ
- NORWAY
- ETC.
- VARYING EXT. OF DEL. AUTH.

IMO CONVENTIONS & CODES OUTSIDE SCOPE OF CLASS

TONNAGE
- COMP. OF TONN.
- DELEG. AUTH.  NOT DELEGATED

STCW
- TRAIN.
- CREW QUAL.
- WATCH

OTHER CONVENTIONS OUTSIDE SCOPE OF CLASS

LO
- CREW ACCOM.
- DELEG. AUTH.
- CARGO GEAR

DELEG. AUTH.

Class and statutory requirements

Plate 1-10
Member societies of IACS and the structure of its organization - Plate 1-11
Statutory Surveys of Ships in Service-Reporting

Upon completion of a survey the surveyor will:

- Submit the Veritas form RPS 11.1
- Send copies of the short term certificate to head office (SD)
- Complete the main report (checklist) submittal to head office
- Each certificate has its own form, e.g.
  - Load lines
  - Safety construction
  - Safety equipment
  - Safety radio
  - Passenger safety
  - MARPOL

Plate 1-12
The Professional Way

- Condition of maintenance and test records
- Type of ship/additional class notations (ex. EO/passenger ship)
- Age of hull and equipment
- History
- Knowledgeable staff?
- See Captain
- Personal safety
- No Handling/operating of equipment
- Survey equipment

Plate 2-1
Authorized Request

*Periodical surveys:*  
Owner/Master/Agent

*Damage surveys:*  
Owner/Master/Agent

*Non Compliance:*  
Port State

*Ship Condition:*  
Flag State

**Authorized Surveyor**

Extent of Responsibility/Obligation

*Plate 2-2*
Preparation for Survey (1)

- Preparation
  - Collect information
  - Professional Conduct
  - Personal Safety
  - Survey Equipment

*Plate 2-3*
Preparation for Survey (2)

- Conditions
  - Time usually limited
  - Rules specify when and what to survey – but not how
  - Results of satisfactory survey depends on:
    - Surveyor's education
    - Surveyor's experience
    - Available applicable guidance
    - Proper preparation by the officers and crew

Plate 2-4
Personal Equipment

- Clothing
- Recording

Tools

- Flashlight
- Testing hammer
- Measurement tools
- Gas Meter
- Magnifying Glass
- Thickness Measurement Instrument
- Tachometer (Stroboscope)
- EL. Tester/megger
- Vibration Measurement equipment
- Water Contamination Kit
- Camera

Plate 2-5
Safety Precautions

*Ship's Officer responsible for moving parts:*

- Disconnect EL. Starter panel/turning device
- Remove fuses starter
- Close starting air supply
- Signboard

**Heat:**

- Isolate Boiler

**Electricity:**

- Access & Staging

*Plate 2-6*
Safe Atmosphere

Oxygen (21% vol.)

Cargo holds/tanks/boiler drums

Hydro carbon (1%LFL)

Toxic Gases: (TLV-TWA PPM)

Plate 2-7
Vertical and horizontal insulation

*Plate 3-1*
Arrangements when 'B' Class corridor bulkheads are fitted (a) deck to deck and (b) and (c) stopped short of the deckhead

Arrangement of 'B' class corridor bulkheads

Plate 3-2
Methods of erecting 'B' class bulkheads

Plate 3-3
Methods of attaching 'B' class bulkheads to two types of overdeck insulation - *Plate 3-4*
Two typical metal vapour barriers

Plate 3-5
Arrangements of stairways

*Plate 3-6*
Typical arrangement for an inert gas system

Plate 3-7
Figure 3.1 Inert gas system – basic layout
Inert gas system – deck layout

*Plate 3-9*
Emergency Escape Breathing Device

*Plate 3-10*
Sprinkler system

Plate 4-1
Fire detection and alarm

*Plate 4-2*
Fire detectors

Plate 4-3
A fire-main system

Plate 5-1
Carbon dioxide fire-extinguishing system

Plate 5-2
CO₂ release locker for engine room, pump room, etc

Plate 5-3
Halon 1301 fire-extinguishing system

Plate 5-4

A Start cylinders (2 x 1.3 kg CO₂)
B Start cylinder valve
C 1/4" Starting valve for halon 1301 cylinder release valve (valve No. 1)
D 1/4" Starting valve for halon 1301 cylinder release valve (valve No. 2)
E Electrical switch to start alarm siren and stop ventilation
F Pressure gauge (0-100 bar)
G Pressure switch (leakage/discharge)
H Padlock

Note: Activation lines to be laid at safe distance from each other due to risk of damage by explosions etc.
Halon decentralized system

*Plate 5-5*
Halon centralized system

*Plate 5-6*
Use of low-expansion foam

Plate 5-7
The right to make engineering refinements on all products is reserved. Dimensions and other details are subject to change.

When dimensions are critical, up-to-date drawings should be obtained from UNITOR.

**Portable 9 litre water fire extinguisher**

*Plate 6-1*
Portable 9 litre aqueous-film-forming-foam (AFFF) fire extinguisher - *Plate 6-2*
Portable 2.25kg ammonium phosphate/ammonium sulphate (ABC) dry powder fire extinguisher - Plate 6-3
The right to make engineering refinements on all products is reserved. Dimensions and other details are subject to change.

When dimensions are critical, up-to-date drawings should be obtained from UNITOR

Portable 6kg sodium bicarbonate (BC) dry powder fire extinguisher - Plate 6-4
Portable 6kg ABC dry powder fire extinguisher -

Plate 6-5
Portable 10kg ABC dry powder fire extinguisher

Plate 6-6
PORTABLE 12KG BC DRY POWDER FIRE EXTINGUISHER -
Plate 6-7
Portable 6kg BC carbon dioxide gas fire extinguisher

Plate 6-8
Portable 7kg halon 1211 fire extinguisher

*Plate 6-9*
The right to make engineering refinements on all products is reserved. Dimensions and other details are subject to change. When dimensions are critical, up-to-date drawings should be obtained from UNITOR.

### Wheeled 50kg BC dry powder fire extinguisher

**Plate 6-10**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BC Powder</td>
<td>50 kg</td>
</tr>
<tr>
<td>2</td>
<td>Powder Lance &amp; Swivel</td>
<td>293-553320</td>
</tr>
<tr>
<td>3</td>
<td>Discharge Hose</td>
<td>293-553198</td>
</tr>
<tr>
<td>4</td>
<td>Rotary &amp; Headblock</td>
<td>293-553180</td>
</tr>
<tr>
<td>5</td>
<td>CO2 Valve</td>
<td>293-553149</td>
</tr>
<tr>
<td>6</td>
<td>CO2 High Pressure Hose</td>
<td>293-553172</td>
</tr>
<tr>
<td>7</td>
<td>CO2 Cylinder, Complete</td>
<td>294-553693</td>
</tr>
<tr>
<td>8</td>
<td>Headblock O-Ring</td>
<td>293-552927</td>
</tr>
<tr>
<td>9</td>
<td>Instruction Label, Use</td>
<td>293-553222</td>
</tr>
<tr>
<td>10</td>
<td>Syphon Tube</td>
<td>293-553032</td>
</tr>
</tbody>
</table>

**TECHNICAL DESCRIPTION:**

- **Class:** BC
- **Capacity:** 50 kg
- **Discharge Time:** 42 sec.
- **Discharge Range (Minimum):** 1 m
- **Test Pressure:** 116 bar
- **CO2 Cylinder Size:** 2.0 kg
- **Height:** 1015 mm
- **Diameter:** 560 x 610 mm (W x D)
- **Height Empty:** 52 kg
- **Height Full:** 104 kg
- **Colour:** Blue
**TECHNICAL INFORMATION**

<table>
<thead>
<tr>
<th>CLASS</th>
<th>BC</th>
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<tbody>
<tr>
<td>CAPACITY</td>
<td>9 KG</td>
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<tr>
<td>DISCHARGE TIME</td>
<td>40 SEC.</td>
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<tr>
<td>TEST PRESSURE</td>
<td>250 BAR</td>
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<tr>
<td>HEIGHT</td>
<td>1255 MM</td>
</tr>
<tr>
<td>DIAMETER</td>
<td>0 150 MM</td>
</tr>
<tr>
<td>WEIGHT EMPTY</td>
<td>34 KG</td>
</tr>
<tr>
<td>WEIGHT FULL</td>
<td>45 KG</td>
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<tr>
<td>COLOUR</td>
<td>BLACK</td>
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<table>
<thead>
<tr>
<th>ITEM</th>
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<td>9 kg CO₂ CYLINDER COMPL.</td>
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<td>INSTRUCTION LABEL, USE</td>
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</tr>
<tr>
<td>3</td>
<td>CO₂ NOZZLE W/ HOSE</td>
</tr>
<tr>
<td>2</td>
<td>CLOSING VALVE</td>
</tr>
<tr>
<td>1</td>
<td>SYPHON TUBE</td>
</tr>
</tbody>
</table>

The right to make engineering refinements on all products is reserved. Dimensions and other details are subject to change. When dimensions are critical, up-to-date drawings should be obtained from UNITOR.

Wheeled 9kg BC carbon dioxide gas fire extinguisher

*Plate 6-11*
TECHNICAL INFORMATION:

CLASS: BC
CAPACITY: 45 KG
DISCHARGE TIME: 75 SEC.
TEST PRESSURE: 250 BAR
HEIGHT: 1620 MM
DIAMETER: 4265 MM / D X H = 470 X 510
WEIGHT EMPTY: 100 KG
WEIGHT FULL: 154 KG
COLOUR: BLACK

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<th>ITEM</th>
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<td>1</td>
<td>SYMPH TUBE</td>
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<td>2</td>
<td>CLOSING VALVE</td>
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<td>3</td>
<td>HIGH PRESSURE HOSE</td>
<td>293-553131</td>
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<td>4</td>
<td>ON - OFF VALVE</td>
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<td>5</td>
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</table>

INSTRUCTION LABEL | USE
293-553154

The right to make engineering refinements on all products is reserved. Dimensions and other details are subject to change. When dimensions are critical, up-to-date drawings should be obtained from UNITOR

Wheeled 45kg BC carbon dioxide gas fire extinguisher

Plate 6-12
Fireman's outfit

*Plate 6-13*
Sign on the enclosure

Alternative styles of guide signs
The arrows show the direction where the enclosure can be found

Location of fire control plans (guide signs)

*Plate 7-1*
<table>
<thead>
<tr>
<th>No.</th>
<th>Graphical symbol</th>
<th>Reference</th>
<th>Comments on use</th>
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<td><img src="image" alt="Fire Plan" /></td>
<td>Fire protection appliances or Structural fire protection plan</td>
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</tr>
<tr>
<td>2.2</td>
<td><img src="image" alt="Remote control for fire pump(s)" /></td>
<td>Remote control for fire pump(s)</td>
<td>The type, quantity of water delivered per time unit, and pressure head shall be indicated either at the right side of the symbol or in the legend.</td>
</tr>
<tr>
<td>2.3</td>
<td><img src="image" alt="Fire pump(s)" /></td>
<td>Fire pump(s)</td>
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<tr>
<td>2.4</td>
<td><img src="image" alt="Remote control for emergency fire pump or fire pump supplied by the emergency source of power" /></td>
<td>Remote control for emergency fire pump or fire pump supplied by the emergency source of power</td>
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</tr>
<tr>
<td>2.5</td>
<td><img src="image" alt="Emergency fire pump" /></td>
<td>Emergency fire pump</td>
<td>The type, quantity of water delivered per time unit, and pressure head shall be indicated either at the right side of the symbol or in the legend.</td>
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<td>2.6</td>
<td><img src="image" alt="Fuel pump(s) remote shut-off" /></td>
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<tr>
<td>2.7</td>
<td><img src="image" alt="Lube oil pump(s) remote shut-off" /></td>
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<tr>
<td>2.8</td>
<td><img src="image" alt="Remote control for bilge pump(s)" /></td>
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<tr>
<td>2.9</td>
<td><img src="image" alt="Remote control for emergency bilge pump" /></td>
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</tr>
</tbody>
</table>

Example of graphical symbols for fire control plans

*Plate 7-2*
Traditional Survey

*Internal inspection (overhaul)*
- Wear
- Tear
- Damage
- Corrosion
- Erosion
- Pressure testing

*External Inspection*
- Performance test
- Parameter – Nom. Value

*Function test*
- Control – result

*Visual Examination*

*Abnormality – overhaul inspection*

*Plate 8-1*
Testing Alarm System

General Alarm

Fire Alarm

$\text{CO}_2$ Extinguish gas discharge Alarm

Black out Test

Plate 8-2
Appendix 3

Plates giving supporting material for the Instructor
These plates and diagrams are supporting material for the instructor when he presents the course. The first number of the plate refers to the section of the Instructor Manual and the second number gives its position in numerical sequence. In order to distinguish between the plates in appendices 2 and 3 those in appendix 2 are numbered from 1 upwards whereas those in appendix 3 are numbered from 101 upwards for each section.

For example, 3.5 in appendix 2 and 3.105 in appendix 3 means the fifth plate relating to section 3 of the Instructor Manual.

### List of Plates

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<th>Plate</th>
<th>Title</th>
<th>Page</th>
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<tr>
<td>1.101</td>
<td>Model Course 3.05 - Survey of Fire Appliances and Provisions</td>
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<td>1.102</td>
<td>International Maritime Organization (IMO)</td>
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<td>1.103</td>
<td>Maritime Safety Committee (MSC)</td>
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</tr>
<tr>
<td>1.104</td>
<td>The role of governments</td>
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<td>1.105</td>
<td>SOLAS and MARPOL</td>
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<td>1.107</td>
<td>Verification of compliance</td>
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<td>Certificates for passenger ships, cargo ships and oil tankers</td>
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<td>MARPOL 73/78</td>
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1. Introduction
2. Preparation for surveys
3. Structural fire protection
4. Fire detecting equipment
5. Fixed fire-extinguishing systems
6. Miscellaneous fire-fighting equipment
7. Fire control plan
8. Survey training
9. Review and final assessment

Plate 1.101
International Maritime Organization (IMO)

Assembly
All member states

Council:
Thirty Two member governments

Committees:
- Maritime Safety Committee (MSC)
- Marine Environment Protection Committee (MEPC)
- Legal Committee
- Committee on Technical Co-operations

Plate 1.102
Maritime Safety Committee (MSC)

Sub-Committees:
- Safety of Navigation
- Radio Communications
- Life-saving, search and rescue
- Standards of training and watchkeeping
- Carriage of dangerous goods
- Ship design and equipment
- Fire Protection
- Stability and load lines and fishing vessel safety
- Containers and cargoes
- Bulk chemicals

Plate 1.103
The Role of Governments

- Ratification
- "Period of Grace"
- National Law
- Implementation

*Plate 1.104*
SOLAS and MARPOL

International Convention for the Safety of Life at Sea (SOLAS)

International Convention for the Prevention of Pollution from Ships (MARPOL)

Plate 1.105
Conventions and Administrations

**Conventions:**
- Include provisions on design, construction, equipment, operation

**Administration:**
- Incorporate provisions into national legislation
- Institute effective control (surveys, issue of certificates)
- May delegate to classification societies

**Additional Guidance:**
- Guidelines
- Recommendations
- Specifications
- Resolutions

*Plate 1.106*
Verification of Compliance:

- Type-testing of equipment
- Approval of plans and drawings

Check
- Applicability of the provisions
- Compatibility with other provisions
- Calculations
- Equivalences, exemptions

*Plate 1.107*
Certificates for Passenger Ships, Cargo Ships and Oil Tankers

*Passenger Ship Safety Certificate (PSV)*
- Max. 12 month period

*Cargo Ship Safety Construction Certificate (CCC)*
- Max. 5 year period

*Cargo Ship Safety Equipment Certificate (CEC)*
- Max. 5 year period

*Cargo Ship Safety Radio Certificate (CRC)*
- Max. 5 year period

Oil Tankers:
Attachment to CCC and CEC is to be endorsed at the mandatory annual surveys.

*Plate 1.108*
MARPOL 73/78

International Oil Pollution Prevention Certificate (IOPP)

- Annex I (Oil Pollution)

International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk (NLS)

- Annex II (Noxious Liquids)

Plate 1.109
Classification Societies

- Classification rules are basis for the issue of a
- Classification Certificate

Through supervision during construction or major repairs and through periodical surveys

Class Surveys – Statutory Surveys

Plate 1.110
International Association of Classification Societies (IACS)

Members
American Bureau of Shipping
Bureau Veritas
China Classification Society
Det Norske Veritas
Germanischer Lloyd
Korean Register of Shipping
Lloyds Register
Nippon Kaiji
Registro Italiano Navale
Russian Maritime Register of Shipping

Associate Members of IACS
Croatian Register of Shipping
Indian Register of Shipping

Plate 1.111
Survey of Fire-Fighting Appliances and Installations

*Passenger Ship Safety Certificate (PSV)*
- Max. 12 month period

*Cargo Ship Safety Equipment Certificate (CEC)*
- Initial Survey
- Mandatory Annual Surveys
- Periodical Survey in place of the second or third annual
- Renewal Survey every 5 years

*Cargo Ship Safety Construction Certificate*
- Initial Survey
- Mandatory Annual Surveys
- Periodical Survey in place of the second or third annual
- Renewal Survey every 5 years

**Tankers of Ten Years of Age and Over**
- Intermediate Survey

**Short Term Certificate (Max. 3 Months)**

**Exemption Certificate**

*Plate 1.112*
Harmonization of Surveys and Certification

- Initial Surveys
- Renewal Surveys
- Periodical Surveys (CRC, CEC)
- Annual Survey (LL)
- Intermediate Survey (CCC, IOPP, NLS)

Plate 1.113
Harmonization of Surveys and Certification

- Regulation 1/6 of SOLAS 74
- Regulation 4, Annex I of MARPOL 73/78
- Regulation 10, Annex II of MARPOL 73/78

Plate 1.114
Preparation for Surveys (1)

1. Who requests the survey?

2. What is the extent of the surveyor's responsibility?

3. What is the regulatory basis for the survey?

4. Check any special requirements or instructions by the Administration.

5. Check documentation, past survey records and reports.

Plate 2.101
Tools, Equipment and Safety Precautions

Tools and Equipment
- Personal equipment
- Survey tools & equipment

Safety Precautions
- Accompanied by ship’s officer
- Proper access
- Aware of equipment in operation
- Disconnection of electrical systems
- Check atmosphere of enclosed spaces

Plate 2.102
Preparation for Surveys (2)

- Preparation
  - Collect Information
  - Professional Conduct
  - Personal Safety
  - Survey Equipment

Plate 2.103
Some Basic Expressions

- Survey

Purpose: Check of condition at specified time or under specific condition and decide on corrective action to meet/establish a certain standard.

Method: - Visual inspection
- Function testing
- Measurement
- Non-destructive checking

*Plate 2.104*
The Professional Way

- Condition of maintenance and test records
- Type of ship/additional class notations (e.g. EO/Passenger ship)
- Age of hull/equipment
- Knowledgeable staff?
- History
- See the Captain
- Personal safety
- No handling/operating of equipment
- Survey equipment

Plate 2.105
Professional Conduct

*Important items for any survey:*

- Rule requirements
- Intention behind the rules
- Alternative arrangements
- Surveyor’s Attitude

*Plate 2.106*
Miscellaneous tasks

*Plate 2.107*
Fire Protection, Detection and Extinction

Basic Principles
- Division of the ship
- Separation of spaces
- Restricted use of combustible materials
- Detection of fire
- Containment
- Extinction
- Protected means of escape
- Ready availability of fire-extinguishing appliances

Plate 3.101
Definitions

- Non-combustible materials
- Standard fire test
- "A" class divisions
- "B" class divisions
- "C" class divisions
- "D" class divisions
- "F" class divisions
- Steel or other equivalent materials
- Low flame speed

Plate 3.102
Fire Test Procedures

*Code for Application of Fire Test Procedures (FTP) 1988 Ed.* incorporates:

- Recommendations on test method for determining the resistance to flame of vertically supported textiles and films. Resolution A.471(12)

- Amendment to the recommendation on test method for determining the resistance to flame of vertically supported textiles and films. Resolution A.563(14)

- Revised recommendations on fire test procedures for surface flammability of bulkhead and deck finish materials. Resolution A.653(16)

- Recommendation on fire test procedure for “A”, “B” and “F” class divisions. Resolution A.754(18)

- Improved recommendations on test method qualifying marine construction materials as non-combustible. Resolution A.799(19)

*Plate 3.103*
Arrangements when "B" Class corridor bulkheads are fitted
(a) deck to deck (b) and (c) stopped short of the deckhead

Arrangements of "B" class corridor bulkheads

*Plate 3.104*
Methods of erecting 'B' Class bulkheads: (a) and (b) fitted deck to deck, (c) stopped short of deckheads and (d) fitted deck to deck incorporating a curtain plate

Methods of erecting "B" class corridor bulkheads

Plate 3.105
Methods of insulating

*Plate 3.106*
Inert Gas System

➢ The Consolidated text of SOLAS 74

➢ 1978 SOLAS Protocol

➢ 1981 and 1983 Amendments

➢ Inert Gas Systems

➢ SOLAS Regulation II-2/62

➢ Guidelines for Inert Gas Systems (MSC/Circ. 353)

Plate 3.107
Inert Gas System Details

1. Scrubber
2. Blowers
3. Non-return devices
4. Inert gas distribution system
5. Arrangement for venting
6. Arrangement for purging and gas freeing
7. Gas pressure regulating valve
8. Effluent and drain piping
9. Seawater supply

Plate 3.108
Inert Gas System – Function Test After Installation

1. System capacity at 200mm water gauge oxygen content max. 5% by volume
2. Interlocking system
3. Gas recirculation valve
4. Recirculation line
5. Vent Valve
6. Gas Tightness

*Plate 3.109*
Inert Gas System – Indicators and Recorders

1. Gas temperature and pressure at the discharge side
2. Pressure at inert gas supply main
3. Oxygen content
4. Pressure in the slop tank
5. Monitoring for scrubber

Plate 3.110
Inert Gas System – Alarm Systems

1. Water supply to scrubber
2. Water level
3. High gas temperature
4. Failure of blower
5. Oxygen content
6. Failure of power supply
7. Water supply to water seal
8. Gas pressure at inert gas main

Plate 3.111
Inert Gas System – Automatic Shut-Down Systems

1. Shut down of Blowers
2. Shut down of regulating valve
3. Shut down of Cargo Pumps

Portable gas indicators

Inert gas system instruction manual

Plate 3.112
Fire Detection and Alarm

- Automatic Sprinkler System
- Fixed Fire Detection and Fire Alarm Systems

*Plate 4.101*
Smoke Detection and CO₂ Fire-Extinguishing system

*Plate 4.102*
Fixed Fire-Extinguishing Systems

- CO$_2$ Fire Extinguishing Systems (high & low Pressure)
- Halon 1301 Fire-Extinguishing Systems (not allowed on newbuilding vessels on or after 1$^{st}$ October 1994)
- High Expansion Foam Systems
- Water Spray Systems
  - Total Flooding system
  - Local Application system

*Plate 5.101*
Water Fire-Extinguishing System

Fire pumps, emergency fire pumps

- Capacity
- Arrangements
- Pressure
- Location

Fire mains, hydrants, hoses & nozzles

- Diameter & pressure
- Number & position

Plate 5.102
Automatic Sprinkler System

- Wet pipe
- Pressurized
- Automatic Alarm
- Indication of section activated
- Indication bridge or in fire control station
- Activation temperature
- Application rate
- Sprinkler tank
- Pumping and piping system
- Test valve

Plate 5.103
Automatic sprinkler, fire detection, fire alarm and water spray system diagram - *Plate 5.104*
Fixed CO₂ fire-extinguishing systems


System Types:

- High Pressure System (Storage bottles, above 60 bar)
- Low Pressure System (Storage Tank, at or below 20 bar, Refrigerated system)

Used for protection of the following spaces:

- Machinery Spaces
- Pump Rooms
- Dry Cargo Holds

Plate 5.105
Details of CO₂ cylinder valve

Plate 5.106
Fixed Halon 1301 – Fire-Extinguishing Systems

*Used in:*

- Machinery spaces
- Pump rooms
- Cargo spaces for new cars

*System types:*

- Centralized (42 Bar)
- Modular (42 Bar)

*Plate 5.107*
Typical high pressure Halon or CO₂ systems

*Plate 5.108*
Central Storage System for single space protection, pneumatically operated with manual release.

The halon cylinders are installed in a separate room located outside the protected space. Hydraulic flow calculations and choice of nozzle dimensions are done by our computer, according to existing rules. By opening the pilot release valve (1) inside the release box the compressed gas opens the valve (2) on each cylinder and halon will be discharged. The door switches (3) inside the release box will activate all halon alarms (4) and stops. The system can also be released by a mechanically operated plunger (5) located on top of each cylinder (emergency release). Advantages: Easy cylinder installation, All equipment centralized for service purposes.

Halon central storage system

*Plate 5.109*
Modular System for single space protection, pneumatically operated with manual release.

The halon cylinders are installed inside the protected space. Hydraulic flow calculations and choice of nozzle dimensions are done by our computer, according to existing rules. By opening the pilot release (1) inside the release box the compressed gas opens the valve (2) on each cylinder through a piping system and halon will be discharged. From safety aspects the release arrangement is doubled (in case of line failure).

The door switches (3) inside the release box will activate all halon alarms (4) and stops.

Advantages: No special halon room is necessary.
Only short piping normally required.
Each module consisting of cylinder, valve, bracket and pipe, can be prefabricated for easy mounting.

Halon modular system
Plate 5.110
Halons: Ozone Depleting Substances

IMO urges member governments to:

- Restrict the use of halons
- Use other equivalent fire-extinguishing media
- Reduce release testing
- Consider alternative fire-extinguishing media

*Plate 5.111*
Fixed Deck Foam Systems Monitor Test

- Throw of foam in calm weather
- Instructions
- Valves
- Foam concentrate
- Monitors

Plate 5.113
Diagram of fixed deck foam system

Plate 5.114
Potential Fire and Explosion Hazard

Source of ignition:

- Hot Surface
- Electrical Ignition
- Hot work (open flame)
- Crankcase Explosions

Plate 6.101
Combustibles

- A burst pipe
- Leakage of fuel oil
- Overflow
- Malfunction of components/system
- Lubrication oil and hydraulic oil
- General spillage and accumulated sludge

Plate 6.102
Fire Control Plans

*Regulation II-2/15.2.4 of the SOLAS 2000 amendments*

Shows the location and particulars of:

- Control Stations
- Fire Sections enclosed by “A” classed divisions
- Fire Sections enclosed by “B” classed divisions
- Fire Detection and Alarm Systems
- Sprinkler Installations
- Fire-extinguishing Appliances
- Emergency Escape Breathing Devices (EEBDs)
- Means of access to different decks, spaces, etc.
- Ventilation Systems – (including particulars of the fan control positions, the position of dampers, and identification numbers of fans supplying different sections)

*Fire Control Plans are required to use the symbols from Resolution A.654(16)*

Plate 7.101
Checklist – Surveys of structural fire protection, fire-detecting and fire-fighting equipment

1. Validity of safety certificates
2. Periodical surveys were carried out
3. Check for changes in equipment against record
4. Fire drills and fire training sessions were carried out at the proper intervals
5. Reports of any actual fires onboard
6. Fire Control Plans were in the proper locations and updated
7. Check for changes in structural fire protection (repairs or modifications)
8. Fire doors were properly maintained and available for use
9. Fire and smoke detections system were properly maintained
10. Fire main system was properly maintained
11. Fire hoses, nozzles and applicators were properly maintained and available for use
12. Fixed fire-fighting system was properly maintained
13. Portable Fire Extinguishers were properly maintained
14. Remote controls were properly maintained
15. Ventilation dampers and closing appliances were properly maintained
16. Fireman’s outfits were properly maintained, complete and widely separated
17. Emergency Escape Breathing devices (EEBDs) were properly maintained

Plate 8.101
A Saying of Confucius
What I hear, I forget
What I see, I remember
What I do, I understand

Plate 8.102
Inert Gas System – Mandatory Annual Survey

*Periodical Survey*

1. Internal Examination

2. Rest of all alarm systems and automatic shut down systems

*Plate 8.103*
Inert Gas System – Checklist for Mandatory annual survey

▷ External examination
▷ Operation of inert gas blowers
▷ Operation of scrubber-room ventilations
▷ Checking of deck water seal
▷ Examination of valves
▷ Test soot blowers
▷ Gas pressure regulating valve
▷ Checking alarms and safety devices

Plate 8.104
Initial Survey of Passenger Ship

Total required capacity of the fire pumps
Number of fire pumps located in separate compartments

Operating Test of Fire Pump

➢ Two pumps running simultaneously
➢ Two adjacent hydrants in use
➢ Check the pressure

Ready Availability of Water Supply

➢ Automatic starting of pump

Plate 8.105
Initial Survey of Fire Pumping Arrangements

- Check the certificate
- Capacity of each pump
- Separation from the oil system
- Centrifugal pump fitted with non return valve
- Position of isolating valves
- Pressure test of relief valve

Plate 8.106
Initial Survey of Cargo Ship (1)

Total capacity of the fire pumps
Number of pumps

_Periodically Unattended Machinery Space:_
Ready availability of the water supply

_Tanker:_
Additional isolating valves
Operation test of main fire pump
Two pumps running simultaneously
Two adjacent hydrants in use

Plate 8.107
Initial Survey of Cargo Ship (2)

**Emergency Fire Pump:**
- Capacity
- Operation test
- Diesel-driven power supply
- Means of starting
- Test of starting arrangement
- Capacity of the battery
- Charging system for the battery
- Capacity of an air receiver
- Power supply from emergency generator
- Protection of suction/discharge piping

**Room Arrangements, Access, Ventilation, Self-Closing Door-Tanker**
- Gas-safe space
- Spark arrester

*Plate 8.108*
Initial Survey of CO$_2$ Systems

- Pressurized components
- Location & access
- CO$_2$ cylinders
- Refrigerated bulk CO$_2$ System
- Leakage tests
- Release tests

Plate 8.109
Initial Survey of Halon 1301 Systems

- Pressurized components
- Location & access
- Halon Containers
- Leakage tests
- Release tests

Plate 8.110
Periodical Survey (1)

*Passenger Ship Safety Certificate Renewal*
- Every 12 months

*Cargo Ship Safety Equipment Periodical Survey*
- In place of either the second or third mandatory annual survey

*Cargo Ship Safety Equipment Renewal Survey*
- Every five years

The fire pumping system is required to be surveyed and tested by a Surveyor every year under the classification rules

**Checklist:**
- Fire pumping arrangement was not altered
- Visual examination of the pumping arrangements
- Relief valve was externally examined (if fitted)
- Fire pump opened for internal inspection (as necessary)

*Plate 8.111*
Periodical Survey (2)

Passenger Ship: Test of fire pumping system
- Check the pressure
- Close the isolating valves
- Ready availability
- Automatic start

Cargo Ship: Test of fire main system
- Check the pressure
- Close isolating valve
- Periodically unattended machinery space
- Remote start
- Automatic start
- Low pressure alarm

Tanker
- Isolating valves

Plate 8.112
Periodical Survey of CO₂ Systems

- Review of documentation on board
- Visual inspection of CO₂ bottles or CO₂ tank and pipelines
- Visual inspection of release mechanism
- Testing of alarms
- Inspection of instructions posted

Plate 8.113
Periodical Survey of Halon 1301 Systems

➢ Examination of documents
➢ Visual inspection
➢ Testing of alarms and instruments

Plate 8.114
Cargo Ship - Mandatory Annual Survey

Visual Examination

Operation Test of Main Fire Pump and Emergency Fire Pump

Plate 8.115
Part E: Evaluation

Introduction

- The effectiveness of any evaluation depends upon the accuracy of the description of what is to be measured.
- The learning objectives used in the detailed syllabus will provide a sound base for the construction of suitable tests for evaluating trainee progress.

Method of evaluation

The methods chosen to carry out an evaluation will depend upon what the trainee is expected to achieve in terms of knowing, comprehending and applying the course content.

The methods used can range from a simple question-and-answer discussion with the trainees (either individually or as a group), to prepared tests requiring the selection of correct responses from given alternatives, the correct matching of given items, the supply of short answers or the supply of more extensive written responses to prepared questions.

Where the course content is aimed at the acquisition of practical skills, the test would involve a practical demonstration by the trainee making use of appropriate equipment, tools, etc.

The responses demanded may therefore consist of:

- The recall of facts of information, viva-voce or objective tests
- The practical demonstration of an attained skill
- The oral or written description of procedures or activities
- The identification and use of data from sketches, drawings, maps, charts, etc.
- Carrying out calculations to solve numerical problems
- The writing of an essay or report

Validity

The evaluation must be based on clearly defined objectives, and it must truly represent what is to be measured. There must be a reasonable balance between the subject topics involved and also in the testing of trainees’ KNOWLEDGE, COMPREHENSION and APPLICATION of concepts. The time allocated for the trainee to provide a response is very important. Each question or task must be properly tested and validated before it is used to ensure that the test will provide a fair and valid evaluation.
Reliability

To be reliable, an evaluation procedure should produce reasonably consistent results no matter which set of papers or version of the test involved is used.

Subjective testing

Traditional methods of evaluation require the trainee to demonstrate what has been learned by stating or writing formal answers to questions.

Such evaluation is subjective in that it invariably depends upon the judgement of the evaluator. Different evaluators can produce quite different scores when marking the same paper or evaluating oral answers.

Objective testing

A variety of objective tests have been developed over the years. Their common feature is that the evaluation does not require a judgement by the evaluator. The response is either right or wrong.

One type of objective test involves supplying an answer, generally a single word, to complete the missing portion of a sentence. Another involves supplying a short answer of two or three words to a question. Such tests are known as “completion tests” and “short answer tests”.

Another form of objective testing consists of “selective response tests” in which the correct, or best, response must be selected from given alternatives. Such tests may consist of “matching tests”, in which items contained in two separate lists must be matched or they may be of the true/false type or of the multiple-choice type.

The most flexible form of objective test is the multiple-choice test, which presents the trainee with a problem and a list of alternative solutions, from which he must select the most appropriate.

Distracters

The incorrect alternatives in multiple-choice questions are called “distracters”, because their purpose is to distract the uninformed trainee from the correct response. The distracter must be realistic and should be based on misconceptions commonly held, or on mistakes commonly made.

The options “none of the above” or “all of the above” are used in some tests. These can be helpful, but should be used sparingly.

Distracters should distract the uninformed, but they should not take the form of “trick” questions that could mislead the knowledgeable trainee (for example, do not insert “not” into a correct response to make it a distracter).
**Guess factor**

The “guess factor” with four alternative responses in a multiple-choice test would be 25%. The pass mark chosen for all selective-response questions should take this into account.

**Scoring**

In simple scoring of objective tests one mark may be allotted to each correct response and zero for a wrong or nil response.

A more sophisticated scoring technique entails awarding one mark for a correct response, zero for a nil response and minus one for an incorrect response. Where a multiple-choice test involves four alternatives, this means that a totally uninformed guess involves a 25% chance of gaining one mark and a 75% chance of losing one mark.

Scores can be weighted to reflect the relative importance of questions, or of sections of an evaluation.

**Further guidance**

Further information is provided in the Guidance on the implementation of model courses.
MODEL COURSE 3.05

SURVEY OF FIRE APPLIANCES AND PROVISIONS

ANNEX

IMO Assembly Resolutions A.565(14), A.602(15), A.123(V) and A.948(23)
MSC Circulars 677, 1009 and 731
MSC Circulars 451 and 1050
RESOLUTION A.565(14)

Adopted on 20 November 1985
Agenda item 10(b)

RECOMMENDED PROCEDURES TO PREVENT THE ILLEGAL OR ACCIDENTAL USE OF LOW FLASHPOINT CARGO OIL AS FUEL

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

NOTING that the Maritime Safety Committee adopted a recommendation on the danger of the use of low flashpoint cargo oil as fuel (MSC/Circ.347),

NOTING ALSO that this practice is contradictory to regulation II-2/15.1 of the International Convention for the Safety of Life at Sea, 1974, as amended,

NOTING FURTHER that in spite of the information provided in that circular the dangerous practice of the use of low flashpoint cargo oil as fuel is continuing,

RECOGNIZING the urgent need for such practice, whether illegal or accidental, to be discontinued,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its fifty-first session,

1. ADOPTS the Recommended Procedures to Prevent the Illegal or Accidental Use of Low Flashpoint Cargo Oil as Fuel, the text of which is set out in the Annex to the present resolution;

2. REQUESTS all Governments concerned to bring the Recommended Procedures to the notice of shipowners and seafarers, as well as to surveyors and control officers concerned.

ANNEX

RECOMMENDED PROCEDURES TO PREVENT THE ILLEGAL OR ACCIDENTAL USE OF LOW FLASHPOINT CARGO OIL AS FUEL

1. For some time an irregular and unsafe practice has existed whereby low flashpoint cargo oil has been transferred to bunker systems where it was used as fuel. This is a serious source of danger to ships and persons both at sea and in port and also to shore installations.

2. In some known cases, this transfer had been carried out by means of a cross connection made between the cargo and bunker piping systems.

3. In this connection it should be noted that a casualty occurred aboard a tanker where crude oil leaked from a cargo tank into an adjacent bunker tank. The crude oil was then
transferred together with the fuel oil into a heavy day tank and subsequently into a double bottom tank. As the tanker was under repair the flame of an oxyacetylene torch being used for repair work ignited the hydrocarbon vapours which had escaped into the machinery space.

4 Member Governments should take note of the possibility of either deliberate or accidental contamination of the bunkers by oil cargo with the consequential risk to persons, ships and shore installations.

5 The Guidelines on Surveys Required by the 1978 SOLAS Protocol, the International Bulk Chemical Code and the International Gas Carrier Code (resolution A.560(14)) require the examination of cargo and bunker piping systems (paragraph 3.3 4.1.4). Member Governments are urged to instruct their nominated surveyors or recognized organizations to give special attention during surveys to the possibility of cross connections being made between the cargo and bunker piping systems.

6 Member Governments are also urged to advise shipowners and crew members of the need to carry out routine checks on the flammability of bunker spaces and to further advise shipowners and ship repairers that such a check should always be carried out before any "hot-work" is started in the region of bunker spaces.

7 Random sampling of bunker tanks will act as a deterrent against the deliberate use of crude oil cargo to supplement the fuel oil. Member Governments are urged to incorporate this into their survey procedures under the 1978 SOLAS Protocol (resolution A.560(14)). Additionally, wherever there are clear grounds to believe (due to the odour or hydrocarbon vapours in the machinery space, irregularities in the cargo or bunker pipework or otherwise) that a ship may be using cargo oil as fuel, consignees, cargo officers, surveyors or inspectors should test the percentage of the lower flammable limit of the vapour in the bunker or bunker tanks by the use of an appropriate combustible gas indicator. If the percentage of the lower flammable limit is above 50, a sample should be taken of the liquid contents of the bunker tank and analysed by a laboratory recognized by the Administration of the flag State or port State concerned to ascertain the flashpoint using the closed cup method.

8 If the flashpoint is below 60°C, except when authorized under regulation II-2/15 of the 1974 SOLAS Convention as amended, the flag State Administration should be notified and cargo operations and/or bunkering stopped. In consultation with parties concerned (master, port services and ship inspectorate, consignee, shipowner, classification society as appropriate, etc.) a plan of measures to be taken is to be drawn up with the objective of removing the contaminated fuel, washing and gas-freeing the tanks and associated piping.
RESOLUTION A.602(15)

Adopted on 19 November 1987
Agenda item 12

REVISED GUIDELINES FOR MARINE PORTABLE FIRE EXTINGUISHERS

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING FURTHER that it adopted by resolution A.518(13) the Guidelines for Marine Portable Fire Extinguishers to supplement the requirements of chapter II-2 of the International Convention for the Safety of Life at Sea, 1974, as amended, as well as chapter V of the Torremolinos International Convention for the Safety of Fishing Vessels, 1977,

RECOGNIZING the need to improve these Guidelines in the light of experience gained,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its fifty-third session,

1. ADOPTS the Revised Guidelines for Marine Portable Fire Extinguishers, the text of which is annexed to the present resolution and which supersedes the Guidelines annexed to resolution A.518(13);

2. RECOMMENDS Governments concerned to apply the Revised Guidelines set out in the Annex, in conjunction with the appropriate requirements of the above instruments.

ANNEX

REVISED GUIDELINES FOR MARINE PORTABLE FIRE EXTINGUISHERS

1 SCOPE

These Guidelines have been developed to supplement the requirements for marine portable fire extinguishers* in the International Convention for the Safety of Life at Sea, 1974, and the Torremolinos International Convention for the Safety of Fishing Vessels, 1977. The Guidelines are offered to Administrations to assist them in determining appropriate design and construction parameters. The status of the Guidelines is advisory. Their content is based on current practices and does not exclude the use of designs and materials other than those indicated below.

* Wherever in the text of these Guidelines the word "extinguisher" appears it shall be taken as meaning "marine portable fire extinguisher".

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2 DEFINITIONS

2.1 An extinguisher is an appliance containing an extinguishing medium which can be expelled by the action of internal pressure and be directed into a fire. This pressure may be stored pressure, or be obtained by a chemical reaction, or be obtained by release of gas from a cartridge.

2.2 A portable extinguisher is one which is designed to be carried and operated by hand and which in working order has a total weight of not more that 23 kg.

2.3 Extinguishing medium is the substance contained in the extinguisher the action of which causes extinction of fire.

2.4 Charge of an extinguisher is the mass or volume of the extinguishing medium contained in the extinguisher. The quantity of the charge of water or foam extinguishers is normally expressed in volume (litres) and that of other types of extinguishers in mass (kilograms).

3 CLASSIFICATION

Extinguishers are classified according to the type of extinguishing medium they contain. At present the types of extinguishers and the uses for which they are recommended are as follows:

<table>
<thead>
<tr>
<th>Extinguishing medium</th>
<th>Recommended for use on fires involving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>wood, paper, textiles and similar materials</td>
</tr>
<tr>
<td>Foam</td>
<td>wood, paper, textiles and flammable liquids</td>
</tr>
<tr>
<td>Dry powder/dry chemical (standard)</td>
<td>flammable liquids, electrical equipment and flammable gases</td>
</tr>
<tr>
<td>Dry powder/dry chemical (multiple or general purpose)</td>
<td>wood, paper, textiles, flammable liquids, electrical equipment and flammable gases</td>
</tr>
<tr>
<td>Dry powder/dry chemical (metal)</td>
<td>combustible metals</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>flammable liquids, electrical equipment and flammable gases</td>
</tr>
<tr>
<td>Halogenated hydrocarbons (Halons)</td>
<td>flammable liquids, electrical equipment and flammable gases</td>
</tr>
</tbody>
</table>

A table is provided in the appendix which describes the general characteristics of each type of extinguisher.
4 CONSTRUCTION

4.1 The construction of an extinguisher should be designed and manufactured for simple and rapid operation, and ease of handling.

4.2 Extinguishers should be manufactured to a national or other recognized standard which includes a requirement that the body, and all other parts subject to internal pressure, be tested to a pressure above the maximum expected during the service life of the extinguisher. In the design of components, selection of materials, and determination of maximum filling ratios and densities, consideration should be given to the temperature extremes to which extinguishers may be exposed on board ships.

4.3 The materials of construction of exposed parts and adjoining dissimilar metals should be carefully selected to function properly in the marine environment.

5 FIRE CLASSIFICATIONS

Fire classifications are generally A, B, C and D. There are currently two standards, defining classes of fires according to the nature of the material undergoing combustion, as follows:

<table>
<thead>
<tr>
<th>International Organization for Standardization (ISO standard 3941)*</th>
<th>National Fire Protection Association (NFPA 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class A</strong>: Fires involving solid materials, usually of an organic nature, in which combustion normally takes place with the formation of glowing embers.</td>
<td><strong>Class A</strong>: Fires in ordinary combustible materials such as wood, cloth, paper, rubber and many plastics.</td>
</tr>
<tr>
<td><strong>Class B</strong>: Fires involving liquids or liquefiable solids.</td>
<td><strong>Class B</strong>: Fires in flammable liquids, oils, greases, tars, oil base paints, lacquers and flammable gases.</td>
</tr>
<tr>
<td><strong>Class C</strong>: Fires involving gases.</td>
<td><strong>Class C</strong>: Fires which involve energized electrical equipment where the electrical non-conductivity of the extinguishing medium is of importance. (When electrical equipment is de-energized, extinguishers for class A or B fires may be used safely.)</td>
</tr>
<tr>
<td><strong>Class D</strong>: Fires involving metals.</td>
<td><strong>Class D</strong>: Fires in combustible metals such as magnesium, titanium, zirconium, sodium, lithium, and potassium.</td>
</tr>
</tbody>
</table>

* Comité Européen de Normalisation (CEN standard-EN2) closely follows ISO standard 3941.
6 TEST SPECIFICATIONS

Construction, performance and fire-extinguishing test specifications should be to the satisfaction of the Administration.

7 CRITERIA FOR ASSESSING COMPLIANCE WITH REGULATION II-2/6.1.1 OF THE 1974 SOLAS CONVENTION AND REGULATION 81(1) OF THE 1977 TORREMOLINOS CONVENTION

7.1 Regulation II-2/6.1.1 requires that extinguishers have a fire extinguishing capability at least equivalent to that of a 9 litre fluid extinguisher which may be water or foam as required by the Administration. This equivalence may be demonstrated by fire test ratings determined according to an international, national or other recognized standard.

7.2 The size and type of extinguishers should be dependent upon the potential fire hazards in the protected spaces. Care should also be taken to ensure that the quantity of extinguishing medium released in small spaces does not endanger personnel.

8 MARKING OF EXTINGUISHERS

Each extinguisher should be clearly marked with the following minimum information:

.1 name of the manufacturer;
.2 types of fire for which the extinguisher is suitable;
.3 type and quantity of extinguishing medium;
.4 approval details;
.5 instructions for use and recharge (it is recommended that operating instructions be given in pictorial form);
.6 year of manufacture;
.7 temperature range over which the extinguisher will operate satisfactorily;
.8 test pressure;

9 PERIODICAL INSPECTIONS AND MAINTENANCE

9.1 Extinguishers should be subject to periodical inspections and maintenance in accordance with the manufacturer's instructions. The periods between such inspections and maintenance should not exceed the period between safety equipment surveys.

9.2 Records of inspections should be maintained. The records should show the date of inspection, the type of maintenance carried out, and whether or not a pressure test was performed.

9.3 Instructions for recharging extinguishers should be supplied by the manufacturer and be available for use on board.
<table>
<thead>
<tr>
<th>Extinguishing medium used:</th>
<th>Water, with possible salts in solution</th>
<th>Basic water solution</th>
<th>Basic water solution with foam generating substances</th>
<th>Water solution containing foam generating substances</th>
<th>Dry chemical powders</th>
<th>Pressurized carbon dioxide</th>
<th>Halogenated hydrocarbons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expellant charge of the extinguisher (stored pressure or cartridge as indicated):</td>
<td>Carbon dioxide or other pressurized inert gases or compressed air (storage pressure or separate cartridge)</td>
<td>Solution of sulphuric acid or hydrochloric acid or of aluminium sulphate</td>
<td>Water solution and acid reagent (e.g. solution of aluminium sulphate)</td>
<td>Carbon dioxide or other pressurized inert gases or compressed air (stored pressure or separate cartridge)</td>
<td>Carbon dioxide or other inert gases or dry air (stored pressure or separate cartridge)</td>
<td></td>
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</tr>
<tr>
<td>The discharge of the extinguisher is achieved by:</td>
<td>Opening of the valve. Generation of carbon dioxide (chemical reaction which develops inside the extinguisher)</td>
<td>Opening of the valve. Action of pressurized gas (opening of the cartridge)</td>
<td>Opening of the valve. Generation of carbon dioxide (chemical reaction between the acid in the cartridge and the basic solution of the charge)</td>
<td>Opening of the valve. Action of pressurized gas (opening of the cartridge)</td>
<td>Opening of the valve. Action of pressurized gas (opening of the cartridge)</td>
<td>Opening of the valve of the container constituting the extinguisher</td>
<td>Opening of the valve of the container constituting the extinguisher</td>
</tr>
<tr>
<td>Types of Extinguisher</td>
<td>Water</td>
<td>Chemical Foam</td>
<td>Mechanical Foam</td>
<td>Powder</td>
<td>Carbon Dioxide</td>
<td>Halogenated Hydrocarbons</td>
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<tr>
<td>The discharged</td>
<td>Water, with possible salts in solution</td>
<td>Water with salts in solution</td>
<td>Foam containing carbon dioxide</td>
<td>Foam containing the gas used</td>
<td>Dry chemical powders and carbon dioxide or other gas</td>
<td>Carbon dioxide</td>
<td>Halogenated hydrocarbons</td>
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<tr>
<td>extinguishing medium</td>
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<td>The discharged</td>
<td>Cooling of the burning materials. Water evaporation and consequent formation of a local atmosphere (water/steam) which isolates the burning products from the surrounding air</td>
<td>Formation of a foam layer which isolates the burning products from the surrounding air</td>
<td>Inhibition of the combustion process by interrupting the chemical reaction. Some separation of burning materials from the surrounding air</td>
<td>Inhibition of the combustion process by interrupting the chemical reaction</td>
<td>Formation of a local inert atmosphere (carbon dioxide) which isolates the burning materials from the surrounding air. Smothering and cooling action of carbon dioxide</td>
<td>Inhibition of the chemical reaction</td>
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<td>extinguishing medium</td>
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<td>The electrical</td>
<td>Very low</td>
<td>Very low</td>
<td>Very low</td>
<td>Low</td>
<td>Low</td>
<td>Very high. Under intense heat some powders may be electrically conductive</td>
<td>Very high</td>
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<td>resistance of the</td>
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<td>discharged extinguish</td>
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<td>ing medium is:</td>
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<tr>
<td>Types of Extinguisher</td>
<td>Water</td>
<td>Chemical foam</td>
<td>Mechanical foam</td>
<td>Powder</td>
<td>Carbon dioxide</td>
<td>Halogenated hydrocarbons</td>
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<tr>
<td>Operating peculiarities and limitations</td>
<td>The jet of the extinguisher is to be directed towards the base of the fire</td>
<td>The extinction of the fire is achieved only when all the burning surface is covered by foam</td>
<td>Powder mixture subject to windage; they may therefore have reduced effectiveness in the open or in ventilated spaces</td>
<td>Gas, subject to windage; they therefore have limited effectiveness in the open or in ventilated spaces</td>
<td>Halon 1211 and 2402 are normally discharged as a gas. When discharged as a gas, subject to windage, it has limited effectiveness in the open or in ventilated spaces. Caution should be exercised in selection of type of halogenated hydrocarbons and size of unit particularly if used in accommodation spaces. Avoid use in small enclosed spaces when persons are present inside the spaces.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disadvantages and dangers:</td>
<td>Water</td>
<td>Chemical foam</td>
<td>Mechanical foam</td>
<td>Powder</td>
<td>Carbon dioxide</td>
<td>Halogenated hydrocarbons</td>
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<tr>
<td>Not to be used where there are electrical hazards</td>
<td>Malfunctioning of the reducing arrangements may result in dangerous overpressures.</td>
<td>Generated powder mixtures may be suffocating. Powder can damage electrical contacts.</td>
<td>Carbon dioxide may be suffocating</td>
<td>Halogenated hydrocarbons may be toxic at concentration higher than limitation stated in regulation II-2/5 of the 1974 SOLAS Convention as amended or when decomposed by pyrolysis.</td>
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</tbody>
</table>

| Maintenance | Extinguishers with copper or copper alloy body should not be polished with products of corrosive nature which may cause wall thickness reduction. Such extinguishers should preferably be painted externally. | Some types of powder may be altered by humidity; therefore, avoid the refilling of the extinguisher in humid locations. | The charge can freeze at about 0°C (unless the charge is made non-freezable chemically). | The charge can freeze at about -5°C. The charge can be altered by elevated temperatures (about 40°C or more). Therefore, the extinguisher should not be installed in positions where it may be exposed to high or low temperatures. | When a carbon dioxide container is provided, avoid the installation of the extinguisher in excessively warm locations, where the internal pressure of the carbon dioxide in the container might rise to very high values. |
RESOLUTION A.123(V)

RECOMMENDATION ON FIXED FIRE EXTINGUISHING SYSTEMS FOR SPECIAL CATEGORY SPACES

The Assembly,

*Noting* Article 16(i) of the IMCO Convention concerning the functions of the Assembly,

*Noting also* that at this session it adopted a new Part H of Chapter II of the International Convention for the Safety of Life at Sea, 1960, in respect of fire protection, fire detection and fire extinction in passenger ships and, in particular, Regulation 108(c) which requires that each special

* For guidance purposes, it is assumed that each ship would be fitted with a vertically polarized unity gain antenna at a nominal height of 30 feet (9.15 metres) above water, a transmitter R.F. power output of 10 watts, and a receiver sensitivity of 2 microvolts across the input terminals for 20 db signal-to-noise ratio.
category space shall be fitted with an approved fixed fire extinguishing system which shall protect all parts of any deck and vehicle platform, if any, in such spaces,

Recognizing that the adoption of specific requirements in respect of fixed fire extinguishing systems for the vehicle spaces of passenger ships having drive-on/drive-off facilities might inhibit the development of new fire extinguishing systems for use in such spaces,

Having considered the Recommendation on the fixed fire extinguishing system for special category spaces adopted by the Maritime Safety Committee at its fifteenth session (Annex II, MSC XV/22),

Recommends that Contracting Governments, when approving the fixed fire extinguishing system for special category spaces, should satisfy themselves that any such system is at least as effective in controlling a flowing petrol fire as a fixed pressure water-spraying system, complying with the requirements set out in the Annex to this Resolution,

Invites governments concerned:

(1) to put the measures recommended into effect as soon as possible and

(2) to inform the Secretary-General of this accordingly.

ANNEX

RECOMMENDATION ON FIXED FIRE EXTINGUISHING SYSTEMS FOR SPECIAL CATEGORY SPACES*

A fixed fire extinguishing system for special category spaces should be at least as effective in controlling a flowing petrol fire as a fixed pressure water-spraying system complying with the following:

(a) The nozzles should be of an approved full bore type. They should be arranged so as to secure an effective distribution of water in the spaces which are to be protected. For this purpose, the system should be such as will provide water application at a rate of at least 3.5 litres per square metre per minute (0.07 gallons per square foot per minute) for spaces with a deck height not exceeding 2.5 metres (8.2 feet)

* "Special category spaces" are those enclosed spaces above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access.
and a capacity of at least 5 litres per square metre per minute (0.1 gallons per square foot per minute) for spaces with a deck height of 2.5 metres (8.2 feet) or more.

(b) The water pressure should be sufficient to secure an even distribution of water.

(c) The system should normally cover the full breadth of the vehicle deck and may be divided into sections provided they are of at least 20 metres (66 feet) in length, except that in ships where the vehicle deck space is subdivided with longitudinal "A" Class divisions forming boundaries of staircases, etc., the breadth of the sections may be reduced accordingly.

(d) The distribution valves for the system should be situated in an easily accessible position adjacent to but outside the space to be protected which will not readily be cut off by a fire within the space. Direct access to the distribution valves from the vehicle deck space and from outside that space should be provided. Adequate ventilation should be fitted in the space containing the distribution valves.

(e) The water supply to the system should be provided by a pump or pumps other than the ship's required fire pumps which should additionally be connected to the system by a lockable non-return valve which will prevent a back-flow from the system into the fire main.

(f) The principal pump or pumps should be capable of providing simultaneously at all times a sufficient supply of water at the required pressure to all nozzles in the vehicle deck or in at least two sections thereof.

(g) The principal pump or pumps should be capable of being brought into operation by remote control (which may be manually actuated) from the position at which the distribution valves are situated.

25 October 1987
Agenda item 10
Resolution A.948(23)

Adopted on 5 December 2003
(Agenda item 17)

REVISED SURVEY GUIDELINES UNDER THE HARMONIZED
SYSTEM OF SURVEY AND CERTIFICATION

THE ASSEMBLY,

RECALLING Article 15(f) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety and the prevention and control of marine pollution from ships,

RECALLING ALSO:


(b) the adoption by resolution MEPC.39(29) of amendments to introduce the harmonized system of survey and certification into the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the 1978 Protocol relating thereto (MARPOL 73/78), and

(c) the adoption, by the resolutions given below, of amendments to introduce the harmonized system of survey and certification into:

(i) the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code), (resolutions MEPC.40(29) and MSC.16(58)),

(ii) the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), (resolution MSC.17(58)).
(iii) the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code), (resolutions MEPC.41(29) and MSC.18(38)),

RECALLING FURTHER that, by resolution A.746(18), it adopted the Survey Guidelines under the Harmonized System of Survey and Certification, with a view to assisting Governments in the implementation of the requirements of the aforementioned instruments,

RECOGNIZING the need for the above Survey Guidelines to be revised to take account of the amendments to the IMO instruments referred to above, which have entered into force or become effective since the adoption of resolution A.746(18),

HAVING CONSIDERED the recommendations made by the Maritime Safety Committee at its seventy-seventh session and the Marine Environment Protection Committee at its forty-ninth session,

1. ADOPTS the Revised Survey Guidelines under the Harmonized System of Survey and Certification set out in the annex to the present resolution;

2. INVITES Governments carrying out surveys required by the relevant IMO instruments to follow the provisions of the annexed Revised Survey Guidelines, and

3. REQUESTS the Maritime Safety Committee and the Marine Environment Protection Committee to keep the Revised Survey Guidelines under review and amend them as necessary;

4. REVOKES resolution A.746(18).
ANNEX

REVISED SURVEY GUIDELINES UNDER THE HARMONIZED SYSTEM OF SURVEY AND CERTIFICATION

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GENERAL

1 INTRODUCTION

2 TYPES OF SURVEY

3 APPLICATION AND ARRANGEMENT OF THE GUIDELINES

4 DESCRIPTION OF THE VARIOUS TYPES OF SURVEY

(I) 4.1 Initial surveys
(A) 4.2 Annual surveys
(In) 4.3 Intermediate surveys
(P) 4.4 Periodical surveys
(R) 4.5 Renewal surveys
(B) 4.6 Inspections of the outside of the ship's bottom of cargo ships
(Ad) 4.7 Additional surveys
       4.8 Completion of surveys

5 AMPLIFICATION OF TERMS AND CONDITIONS

5.1 Definition of related items
5.2 Extending to five years a certificate issued for less than five years
5.3 Extending the period between inspections of the outside of the ship's bottom
5.4 Definition of short voyage
5.5 Application of "special circumstances"
5.6 Revalidation of certificates
5.7 Meaning of "any five-year period"
5.8 Surveys required after transfer of the ship to the flag of another State

ANNEX 1

SURVEY GUIDELINES UNDER THE 1974 SOLAS CONVENTION, AS MODIFIED BY THE 1988 PROTOCOL RELATING THERETO

(E) 1 GUIDELINES FOR SURVEYS FOR THE CARGO SHIP SAFETY EQUIPMENT CERTIFICATE

(EI) 1.1 Initial surveys
(EA) 1.2 Annual surveys
(EP) 1.3 Periodical surveys
SURVEY OF FIRE APPLIANCES AND PROVISIONS

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1.4 Renewal surveys

2 Guidelines for surveys for the Cargo Ship Safety Construction Certificate

2.1 Initial surveys
2.2 Annual surveys
2.3 Intermediate surveys
2.4 Renewal surveys

3 Guidelines for the inspection of the outside of the ship's bottom of cargo ships

4 Guidelines for surveys for the Cargo Ship Safety Radio Certificate

4.1 Initial surveys
4.2 Periodical surveys
4.3 Renewal surveys

5 Guidelines for surveys for the Passenger Ship Safety Certificate

5.1 Initial surveys
5.2 Renewal surveys

ANNEX 2

Survey Guidelines under the 1966 Load Line Convention, as modified by the 1988 Protocol relating thereto

1 Guidelines for surveys for the International Load Line Certificate or International Load Line Exemption Certificate

1.1 Initial surveys
1.2 Annual surveys
1.3 Renewal surveys

ANNEX 3

Survey Guidelines under the 1973/78 MARPOL Convention

1 Guidelines for surveys for the International Oil Pollution Prevention Certificate

1.1 Initial surveys
1.2 Annual surveys
1.3 Intermediate surveys
1.4 Renewal surveys

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(N)  2  GUIDELINES FOR SURVEYS FOR THE INTERNATIONAL POLLUTION PREVENTION CERTIFICATE FOR THE CARRIAGE OF NOXIOUS SUBSTANCES IN BULK

   (N1)  2.1  Initial surveys
   (NA)  2.2  Annual surveys
   (NIn)  2.3  Intermediate surveys
   (NR)  2.4  Renewal surveys

ANNEX 4

SURVEY GUIDELINES UNDER THE MANDATORY CODES

(D)  1  GUIDELINES FOR SURVEYS FOR THE INTERNATIONAL CERTIFICATE OF FITNESS FOR THE CARRIAGE OF DANGEROUS CHEMICALS IN BULK OR THE CERTIFICATE OF FITNESS FOR THE CARRIAGE OF DANGEROUS CHEMICALS IN BULK

   (DI)  1.1  Initial surveys
   (DA)  1.2  Annual surveys
   (DIn)  1.3  Intermediate surveys
   (DR)  1.4  Renewal surveys

(G)  2  GUIDELINES FOR SURVEYS FOR THE INTERNATIONAL CERTIFICATE OF FITNESS FOR THE CARRIAGE OF LIQUEFIED GAS IN BULK

   (GI)  2.1  Initial surveys
   (GA)  2.2  Annual surveys
   (GIn)  2.3  Intermediate surveys
   (GR)  2.4  Renewal surveys

Appendix

The Harmonized System of Survey and Certification - Diagrammatic arrangement
GENERAL

1 INTRODUCTION

1.1 These Guidelines supersede the guidelines adopted by resolution A. 746(18) and, take account of the Harmonized System of Survey and Certification in the following instruments:

1. International Convention for the Safety of Life at Sea, 1974 (SOLAS 1974), as modified by its 1988 Protocol and as amended by resolutions MSC.92(72) and MSC.100(73) (SOLAS 74/88/00);


3. International Convention for the Prevention of Pollution from Ships, 1973 and of the Protocol of 1978 relating thereto (MARPOL 73/78), as amended by resolution MEPC.39(29) (MARPOL 73/78/90);

4. International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code), as amended by resolutions MEPC.40(29), MSC.16(58), MSC.28(61), MSC 50(66), MSC.58(67) and MSC.102(73) (IBC Code 83/90/00);

5. International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), as amended by resolutions MSC.17(58), MSC.30(61), MSC.59(67) and MSC.103(73) (IGC Code 83/90/00); and

6. Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code), as amended by resolutions MEPC.41(29) and MSC.18(58) (BCH Code 85/90);

1.2 These Guidelines contain amendments to statutory instruments up to the year 2000:

1. Survey Guidelines under the 1974 SOLAS Convention, as modified by the 1988 Protocol relating thereto (annex 1);

2. Survey Guidelines under the 1966 Load Line Convention, as modified by the 1988 Protocol relating thereto (annex 2);

3. Survey Guidelines under the 1973/78 MARPOL Convention (annex 3); and

4. Survey Guidelines under the mandatory Codes (annex 4).

1.3 The harmonized system, a diagrammatic arrangement of which is given in the appendix, provides for:

1. a one-year standard interval between surveys, based on initial, annual, intermediate, periodical and renewal surveys, as appropriate;

2. a scheme for providing the necessary flexibility for the execution of each survey with the provision that:

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- the renewal survey may be completed within 3 months before the expiry date of the existing certificate with no loss of its period of validity;

- a "time window" of 6 months - from 3 months before to 3 months after the anniversary date of the certificate for annual, intermediate and periodical surveys;

.3 a maximum period of validity of five years for all certificates for cargo ships;

.4 a maximum period of validity of 12 months for the Passenger Ship Safety Certificate;

.5 a system for the extension of certificates limited to three months enables a ship to complete its voyage, or one month for ships engaged on short voyages;

.6 when an extension has been granted, the period of validity of the new certificate starts from the expiry date of the existing certificate before its extension;

.7 a flexible system for inspection of the outside of the ship's bottom on the following conditions:

- a minimum of two inspections during any five-year period of validity of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

- the interval between any two such inspections shall not exceed 36 months,

.8 a provision for a Cargo Ship Safety Certificate under SOLAS 74/88/00, as an alternative to separate Cargo Ship Safety Construction, Cargo Ship Safety Equipment and Cargo Ship Safety Radio Certificates;

.9 a flexible system concerning the frequency and the period of validity of certificates, provided that the minimum pattern of surveys is maintained.

1.4 In implementing the harmonized system, the following principal changes have been made to the survey and certification requirements of SOLAS 74/88/00:

.1 unscheduled inspections are no longer included and annual surveys are mandatory for cargo ships;

.2 intervals between the periodical surveys of equipment covered by the Cargo Ship Safety Equipment Certificate are alternatively at intervals of two and three years instead of two years;

.3 intermediate surveys are required for all ships under the Cargo Ship Safety Construction Certificate;

.4 inspection of the outside of the ship's bottom are required for all cargo ships;

.5 intermediate surveys for the Cargo Ship Safety Construction Certificate are held within three months of either the second or third anniversary date;
.6 all cargo ship certificates may be issued for any period of validity up to and including five years;

.7 there is provision for a Cargo Ship Safety Certificate;

.8 the extension provisions have been reduced from five months to three months to enable a ship to complete its voyage and the extension for one month for a period of grace is limited to ships engaged on short voyages.

1.5 With regard to LLC 66/88, the principal changes to the requirements for survey and certification are the introduction of similar extension provisions (see 1.4.8) and linking of the period of validity of the new certificate to the expiry date of the previous certificate (see 1.3.6).

1.6 With regard to MARPOL 73/78/90 and the IBC Code 83/90/00, the IGC Code 83/90/00 and the BCH Code 85/90, the main changes are the linking of the period of validity of the new certificate to the expiry date of the previous certificate (see 1.3.6), the holding of the intermediate survey within three months of the second or third anniversary date and the introduction of the same extension provisions (see 1.4.8).

2 TYPES OF SURVEY

The types of surveys used in the harmonized system are as follows:

(I) 2.1 _An initial survey_ is a complete inspection before a ship is put into service of all the items relating to a particular certificate to ensure that the relevant requirements are complied with and that these items are satisfactory for the service for which the ship is intended.

(P) 2.2 _A periodical survey_ is an inspection of the items relating to the particular certificate to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

(R) 2.3 _A renewal survey_ is the same as a periodical survey but also leads to the issue of a new certificate.

(In) 2.4 _An intermediate survey_ is an inspection of specified items relevant to the particular certificate to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

(A) 2.5 _An annual survey_ is a general inspection of the items relating to the particular certificate to ensure that they have been maintained and remain satisfactory for the service for which the ship is intended.

(B) 2.6 _An inspection of the outside of the ship's bottom_ is an inspection of the underwater part of the ship and related items to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

(Ad) 2.7 _An additional survey_ is an inspection, either general or partial according to the circumstances, to be made after a repair resulting from investigations or whenever any important repairs or renewals are made.
2.8 List of types of surveys in conventions and codes

(I) 2.8.1 Initial surveys

SOLAS 74/88, chapter I, regulation 7(a)(i)
  regulation 8(a)(i)
  regulation 9(a)(i)
  regulation 10(a)(i)
LLC 66/88, article 14(1)(a)
MARPOL 73/78/90, Annex I, regulation 4(l)(a)
MARPOL 73/78/90, Annex II, regulation 10(1)(a)
IBC Code 83/90, regulation 1.5.2.1.1
IGC Code 83/90, regulation 1.5.2.1.1
BCH Code 85/90, regulation 1.6.2.1.1

(P) 2.8.2 Periodical surveys

SOLAS 74/88, chapter I, regulation 8(a)(iii)
  regulation 9(a)(iii)

(R) 2.8.3 Renewal surveys

SOLAS 74/88, chapter I, regulation 7(a)(ii)
  regulation 8(a)(ii)
  regulation 9(a)(ii)
  regulation 10(a)(ii)
LLC 66/88 article 14(1)(b)
MARPOL 73/78/90, Annex I, regulation 4(l)(b)
MARPOL 73/78/90, Annex II, regulation 10(1)(b)
IBC Code 83/90, regulation 1.5.2.1.2
IGC Code 83/90, regulation 1.5.2.1.2
BCH Code 85/90, regulation 1.6.2.1.2

(In) 2.8.4 Intermediate surveys

SOLAS 74/88, chapter I, regulation 10(a)(iii)
MARPOL 73/78/90, Annex I, regulation 4(l)(c)
MARPOL 73/78/90, Annex II, regulation 10(1)(c)
IBC Code 83/90, regulation 1.5.2.1.3
IGC Code 83/90, regulation 1.5.2.1.3
BCH Code 85/90, regulation 1.6.2.1.3

(A) 2.8.5 Annual surveys

SOLAS 74/88, chapter I, regulation 8(a)(iv)
  regulation 10(a)(iv)
LLC 66/88, article 14(1)(c)
MARPOL 73/78/90, Annex I, regulation 4(l)(d)
MARPOL 73/78/90, Annex II, regulation 10(1)(d)
IBC Code 83/90, regulation 1.5.2.1.4
IGC Code 83/90, regulation 1.5.2.1.4
(B) 2.8.6 *Inspection of the outside of the ship's bottom*

SOLAS 74/88, chapter I, regulation 10(a)(v)

(Ad) 2.8.7 *Additional surveys*

SOLAS 74/88, chapter I, regulation 7(a)(iii)
regulation 8(a)(v)
regulation 9(a)(iv)
regulation 10(a)(vi)
MARPOL 73/78/90, Annex I, regulation 4(1)(e)
MARPOL 73/78/90, Annex II, regulation 10(1)(e)
IBC Code 83/90, regulation 1.5.2.1.5
IGC Code 83/90, regulation 1.5.2.1.5
BCH Code 85/90, regulation 1.6.2.1.5

3  **APPLICATION AND ARRANGEMENT OF THE GUIDELINES**

3.1 The Guidelines provide a general framework upon which Administrations will be able to base their arrangements for carrying out surveys. It is recognized that survey provisions contained in the Guidelines are not necessarily applicable to all types and sizes of ship.

3.2 Whilst the Guidelines are intended to cover instruments listed in 1.1, they should be applied, as appropriate, to drilling rigs and other platforms covered by MARPOL 73/78/90 Annex I regulation 21.

3.3 A description of the various types of survey is given in section 4 and, as shown on the contents page, this is followed by the detailed requirements for the various surveys for each of the certificates.

3.4 When appropriate, the detailed requirements for the various surveys contain a section that is applicable to all cargo ships followed by a section that only applies to oil tankers.

3.5 Whilst the Convention or Code references are included, when possible, it should be noted that, in general, it has not been possible to indicate where there are differing requirements dependent upon the ship's year of build. Consequently, care should be taken in applying specific requirements, particularly where there have been amendments that are only applicable to ships built after a certain date.

3.6 Although part of the requirements for the Cargo Ship Safety Construction Certificate, a separate section is provided for inspection of the outside of the ship's bottom.

3.7 SOLAS 74/88 regulation 1/12(v) provides for a Cargo Ship Safety Certificate to be issued as an alternative to the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Construction Certificate and the Cargo Ship Safety Radio Certificate. Consequently, the surveys for the issue and renewal of the Cargo Ship Safety Certificate should be in accordance with the certificates it replaces and, similarly, the surveys for the annual and intermediate should be the same as those required for the replaced certificates and the appropriate sections of the Cargo Ship Safety Certificate endorsed accordingly.

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3.8 On the left hand side of each item to be surveyed may be found two letters in brackets, the first indicating the certificate to which the survey relates, as follows:

(E) for the Cargo Ship Safety Equipment Certificate;
(C) for the Cargo Ship Safety Construction Certificate;
(R) for the Cargo Ship Safety Radio Certificate;
(L) for the International Load Line Certificate;
(O) for the International Oil Pollution Prevention Certificate;
(N) for the International Pollution Prevention Certificate for Carriage of Noxious Liquid Substances in Bulk;
(D) for the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;
(G) for the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk.
(P) for the Passenger Ship Safety Certificate,

and the second for the type of survey, as follows:

(I) for the initial survey;
(A) for the annual survey;
(In) for the intermediate survey;
(P) for the periodical survey;
(R) for the renewal survey;
(B) for inspection of the outside of the ship's bottom,
(Ad) for additional survey.

Consequently, for example, "(E)"", "(Oln)" and "(PR)" indicate the initial survey for the Cargo Ship Safety Equipment Certificate, the intermediate survey for the International Oil Pollution Prevention Certificate and the renewal survey for the Passenger Ship Safety Certificate respectively.

3.9 The amplification of various terms and conditions are given in section 5.
4 DESCRIPTION OF THE VARIOUS TYPES OF SURVEYS

(I) 4.1 Initial surveys

4.1.1 Frequency

4.1.1.1 The initial survey, as required by the relevant regulations (see 2.8.1), should be held before the ship is put in service and the appropriate certificate is issued for the first time.

4.1.2 General

4.1.2.1 The initial survey before the ship is put into service should include a complete inspection, with tests when necessary, of the structure, machinery and equipment to ensure that the requirements relevant to the particular certificate are complied with and that the structure, machinery and equipment are fit for the service for which the ship is intended.

4.1.2.2 The initial survey should consist of:

1. an examination of the plans, diagrams, specifications, calculations and other technical documentation to verify that the structure, machinery and equipment comply with the requirements relevant to the particular certificate;

2. an inspection of the structure, machinery and equipment to ensure that the materials, scantlings, construction and arrangements, as appropriate, are in accordance with the approved plans, diagrams, specifications, calculations and other technical documentation and that the workmanship and installation are in all respects satisfactory;

3. a check that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificate have been placed on board the ship.

4.1.3 Examination of plans and designs

4.1.3.1 An application for an initial survey should be accompanied by plans and designs referred to in sections 1, 2, 4 and 5 of Annex 1 and in Annexes 2, 3 and 4, as appropriate, together with:

1. the particulars of the ship;

2. any exemptions sought;

3. any special conditions.

(A) 4.2 Annual surveys

4.2.1 Frequency

4.2.1.1 The annual survey, as required by the relevant regulations (see 2.8.5) and as shown diagrammatically in the appendix, should be held within three months before or after each anniversary date of the certificate.
4.2.2 General

4.2.2.1 An annual survey should enable the Administration to verify that the condition of the ship, its machinery and equipment is being maintained in accordance with the relevant requirements.

4.2.2.2 In general, the scope of the annual survey should be as follows:

1. it should consist of certificate examination, of a visual examination of a sufficient extent of the ship and its equipment and of certain tests to confirm that their condition is being properly maintained;

2. it should also include a visual examination to confirm that no unapproved modifications have been made to the ship and its equipment;

3. the content of each annual survey is given in the respective guidelines. The thoroughness and stringency of the survey should depend upon the condition of the ship and its equipment;

4. should any doubt arise as to the maintenance of the condition of the ship or its equipment, further examination and testing should be conducted as considered necessary.

4.2.3 Where an annual survey has not been carried out within the due dates, reference should be made to 5.6.

(In) 4.3 Intermediate surveys

4.3.1 Frequency

4.3.1.1 The intermediate survey, as required by the relevant regulations (see 2.8.4) and as shown diagrammatically in the appendix, should be held within three months before or after the second anniversary date or within three months before or after the third anniversary date of the appropriate certificate and should take the place of one of the annual surveys.

4.3.2 General

4.3.2.1 The intermediate survey should be an inspection of items relevant to the particular certificate to ensure that they are in a satisfactory condition and are fit for the service for which the ship is intended.

4.3.2.2 When specifying items of hull and machinery for detailed examination, due account should be taken of any continuous survey schemes that may be applied by classification societies.

4.3.2.3 Where an intermediate survey has not been carried out within the due dates, reference should be made to 5.6.

(P) 4.4 Periodical surveys

4.4.1 Frequency

4.4.1.1 The periodical survey, as required by the relevant regulations (see 2.8.2) and as shown diagrammatically in the appendix, should be held within three months before or after the second
anniversary date or within three months before or after the third anniversary date in the case of the cargo ship safety equipment certificate and should take the place of one of the annual surveys and within three months before or after each anniversary date in the case of the cargo ship safety radio certificate.

4.4.2 General

4.4.2.1 The periodical survey should consist of an inspection, with tests when necessary, of the equipment to ensure that requirements relevant to the particular certificate are complied with and that they are in a satisfactory condition and are fit for the service for which the ship is intended.

4.4.2.2 The periodical survey should also consist of a check that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificate are on board the ship.

4.4.2.3 Where a periodical survey has not been carried out within the due dates, reference should be made to 5.6.

(R) 4.5 Renewal surveys

4.5.1 Frequency

4.5.1.1 The renewal survey, as required by the relevant regulations (see 2.8.3) and as shown diagrammatically in the appendix, should be held before the appropriate certificate is renewed.

4.5.2 General

4.5.2.1 The renewal survey should consist of an inspection, with tests when necessary, of the structure, machinery and equipment to ensure that the requirements relevant to the particular certificate are complied with and that they are in a satisfactory condition and are fit for the service for which the ship is intended.

4.5.2.2 The renewal survey should also consist of a check that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificate are on board the ship.

(B) 4.6 Inspections of the outside of the ship's bottom of cargo ships

4.6.1 Frequency

4.6.1.1 There should be a minimum of two inspections of the outside of the ship's bottom during any five year period (see 5.7), except where SOLAS 74/88 regulation I/14(e) or (f) is applicable. One such inspection should be carried out on or after the fourth annual survey in conjunction with the renewal of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate. Where the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate has been extended under SOLAS 74/88 regulation I/14(e) or (f), this five-year period may be extended to coincide with the validity of the certificate. In all cases the interval between any two such inspections should not exceed 36 months.
4.6.2 General

4.6.2.1 The inspection of the outside of the ship's bottom and the survey of related items (see 5.1) should include an inspection to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

4.6.2.2 Inspections of the outside of the ship's bottom should normally be carried out with the ship in a dry dock. However, consideration may be given to alternate inspections being carried out with the ship afloat. Special consideration should be given before ships of 15 years of age and over other than bulk carriers and oil tankers are permitted to have such surveys afloat. Inspection of the outside of the ship's bottom of bulk carriers and oil tankers of 15 years of age and over should be carried out with the ship in dry dock. Inspections with the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably trained staff are available. For ships subject to enhanced survey, the provisions of paragraphs 2.2.2* of Annexes A or B, as applicable, of resolution A.744(18), as amended, should apply.

4.6.3 Where an inspection of the ship's bottom has not been carried out before the due dates reference should be made to 5.6.

(Ad)4.7 Additional surveys

4.7.1 Whenever an accident occurs to a ship or a defect is discovered which affects the safety or integrity of the ship or the efficiency or completeness of its equipment, the master or owner should make a report at the earliest opportunity to the Administration, the nominated surveyor or recognized organization responsible for issuing the relevant certificate. The Administration, the nominated surveyor or recognized organization responsible for issuing the relevant certificate should then initiate an investigation to determine whether a survey, as required by the regulations applicable to the particular certificate, is necessary. This additional survey, which may be general or partial according to the circumstances, should be such to ensure that the repairs and any renewals have been effectively made and that the ship and its equipment continue to be fit for the service for which the ship is intended.

4.8 Completion of surveys

4.8.1 If a survey shows that the condition of the ship or its equipment is unsatisfactory, the officer of the Administration, nominated surveyor or recognized organization should be guided by the requirements of SOLAS 74/88 regulation 1/6(c), MARPOL 73/78/90 Annex I regulation 4(3)(d), MARPOL 73/78/90 Annex II regulation 10(2)(c), the IBC Code 83/90 regulation 1.5.1.3, the IGC Code 83/90 regulation 1.5.1.3 and the BCH Code 85/90 regulation 1.6.1.3. These instruments require that corrective action be taken immediately and the Administration notified in due course. In cases where the corrective action has not been undertaken the relevant certificate should be withdrawn and the Administration notified immediately. If the ship is in the port of another Party, the appropriate authorities of the port State also notified immediately.

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*2.2.2 For ships of 15 years of age and over, inspection of the outside of the ship's bottom should be carried out with the ship in dry dock. For ships of less than 15 years of age, alternate inspections of the ship's bottom not conducted in conjunction with the renewal survey may be carried out with the ship afloat. Inspections with the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably trained staff are available.

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4.8.2 Although LLC 66/88 does not contain specific requirements, if a load line survey shows the condition of the ship or its equipment is unsatisfactory, the officer of the Administration, nominated surveyor or recognized organization should, nevertheless, be guided by 4.8.1.

5 AMPLIFICATION OF TERMS AND CONDITIONS

5.1 Definition of related items

Reference: SOLAS 74/88 regulation 1/10(b)(v).

Related items mean those items which may only be inspected when the ship is in dry dock or undergoing an in-water examination of the outside of its bottom. For oil tankers, chemical tankers and gas carriers, this may mean that the ship has to be specially prepared by, for example, being cleaned and gas-free. Then the survey of items such as the internal examination of cargo tanks, as referred to in (CIn) 2.3.2 and (CIn) 2.3.3 in Annex I may be undertaken at the same time.

5.2 Extending to five years a certificate issued for less than five years

References: SOLAS regulation 1/14(c), LLC 66/88 A.19(3), MARPOL 73/78/90 Annex I regulation 8(3), MARPOL 73/78/90 Annex II regulation 12(3), the IBC Code 83/90 regulation 1.5.6.3, the IGC Code 83/90 regulation 1.5.6.3 and the BCH Code 85/90 regulation 1.6.6.3.

Where a certificate has been issued for a period of less than five years, it is permissible under these regulations or article to extend the certificate so that its maximum period of validity is five years provided that the pattern of surveys for a certificate with a five-year period of validity is maintained (see appendix). This means that, for example, if a request is made to extend a two-year Cargo Ship Safety Equipment Certificate to five years, then a periodical and two further annual surveys, as detailed in SOLAS 74/88 regulation 1/8, would be required. Also, for example, if it was intended to extend a four-year Cargo Ship Safety Construction Certificate to five years, then an additional annual survey would be required, as detailed in SOLAS 74/88 regulation 1/10. Where a certificate has been so extended, it is still permissible to also extend the certificate under SOLAS 74/88 regulations 1/14(e) and (f), LLC 66/88 articles 19(5) and (6), MARPOL 73/78/90 Annex I regulations 8(5) and (6), MARPOL 73/78/90 Annex II regulations 12(5) and (6), the IBC Code 83/90 regulations 1.5.6.5 and 1.5.6.6, the IGC Code 83/90 regulations 1.5.6.5 and 1.5.6.6 and the BCH Code 85/90 regulations 1.6.6.5 and 1.6.6.6, when no additional surveys would be required but, of course, the new certificate issued after the renewal survey would date from the five-year expiry of the existing certificate, in accordance with SOLAS 74/88 regulation 1/14(b)(ii), LLC 66/88 article 19(2)(b), MARPOL 73/78/90 Annex I regulation 8(2)(b), MARPOL 73/78/90 Annex II regulation 12(2)(b) of Annex II of MARPOL 73/78/90, the IBC Code 83/90 regulation 1.5.6.6.2, the IGC Code 83/90 regulation 1.5.6.2.2 and the BCH Code 85/90 regulation 1.6.6.2.2.

5.3 Extending the period between inspections of the outside of the ship's bottom

Reference: SOLAS 74/88 regulation 1/10(a)(v).

This permits the period of five years in which two inspections of the ship's bottom are to be carried out to be extended when the cargo ship safety construction Certificate is extended under regulation 1/14(e) and (f). However, no extension should be permitted on the period of 36 months between any two such inspections. If the first ship's bottom inspection is carried out between 24 and 27 months then the thirty-sixth-month limitation may prevent the certificate being extended by the periods permitted in regulation 1/14(e) and (f).
5.4 Definition of short voyage

References: SOLAS 74/88 regulation 1/14(f), LLC 66/88 article 19(6), MARPOL 73/78/90 Annex I regulation 8(6), MARPOL 73/78/90 Annex II regulation 12(6), the IBC Code 83/90 regulation 1.5.6.6, the IGC Code 83/90 regulation 1.5.6.6 and the BCH Code 85/90 regulation 1.6.6.6.

For the purpose of these regulations or article, a "short voyage" means a voyage where neither the distance from the port in which the voyage begins and the final port of destination nor the return voyage exceeds 1,000 miles.

5.5 Application of "special circumstances"

References: SOLAS 74/88 regulation 1/14(g), LLC 66/88 article 19(7), MARPOL 73/78/90 Annex I regulation 8(7), MARPOL 73/78/90 Annex II regulation 12(7), the IBC Code 83/90 regulation 1.5.6.7, the IGC Code 83/90 regulation 1.5.6.7 and the BCH Code 85/90 regulation 1.6.6.7.

The purpose of these regulations or article is to permit Administrations to waive the requirement that a certificate issued following a renewal survey that is completed after the expiry of the existing certificate should be dated from the expiry date of the existing certificate. The special circumstances when this could be permitted are where the ship has been laid-up or has been out of service for a considerable period because of a major repair or modification. Whilst the renewal survey would be as extensive as if the ship had continued in service, the Administration should consider whether additional surveys or examinations are required depending on how long the ship was out of service and the measures taken to protect the hull and machinery during this period. Where this regulation is invoked, it is reasonable to expect an examination of the outside of the ship's bottom to be held at the same time as the renewal survey when it would not be necessary to include any special requirements for cargo ships for the continued application of SOLAS 74/88 regulation 1/10(a)(v).

5.6 Revalidation of certificates

References: SOLAS 74/88 regulation 1/14(i)(i), LLC 66/88 article 19(9)(a), MARPOL 73/78/88 Annex I regulation 8(9)(a), MARPOL 73/78/90 Annex II regulation 12(9)(a), the IBC Code 83/90 regulation 1.5.6.9.1, the IGC Code 83/90 regulation 1.5.6.9.1 and the BCH Code 85/90 regulation 1.6.6.9.1.

A certificate ceases to be valid if the periodical, intermediate or annual survey, as appropriate, or the inspection of the outside of the ship's bottom is not completed within the periods specified in the relevant regulation or article. The validity of the certificate should be restored by carrying out the appropriate survey which, in such circumstances, should consist of the requirements of the survey that was not carried out, but its thoroughness and stringency should have regard to the time this survey was allowed to lapse. The Administration concerned should then ascertain why the survey was allowed to lapse and to consider further action.

5.7 Meaning of "any five-year period"

Reference: SOLAS 74/88 regulation 1/10(a)(v).

Any five-year period is the five-year period of validity of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate.
5.8 Surveys required after transfer of the ship to the flag of another State

The certificates cease to be valid when a ship transfers to the flag of another State and it is required that the Government of the State to which the ship transfers shall not issue new certificates until it is fully satisfied that the ship is being properly maintained and that there have been no unauthorized changes made to the structure, machinery and equipment. When so requested, the Government of the State whose flag the ship was formally entitled to fly is obliged to forward, as soon as possible, to the new Administration copies of certificates carried by the ship before the transfer and, if available, copies of the relevant survey reports and records, such as record of safety equipment and conditions of assignment for load line. When fully satisfied by an inspection that the ship is being properly maintained and that there have been no unauthorized changes, in order to maintain the harmonization of the surveys the new Administration may give due recognition to initial and subsequent surveys carried out by, or on behalf of, the former Administration and issue new certificates having the same expiry date as the certificates that ceased to be valid because of the change of flag.
ANNEX 1

SURVEY GUIDELINES UNDER THE 1974 SOLAS CONVENTION,
AS MODIFIED BY THE 1988 PROTOCOL RELATING THERETO

(E) 1 GUIDELINES FOR SURVEYS FOR THE CARGO SHIP SAFETY EQUIPMENT CERTIFICATE

(EI) 1.1 Initial surveys - see part "General" section 4.1.

(EI) 1.1.1 For the life-saving appliances and the other equipment of cargo ships the examination of plans and designs should consist of:

(EI) .1 examining the plans for the fire pumps, fire mains, hydrants, hoses and nozzles and the international shore connection (SOLAS 74/00 regs II-2/10.2 and 10.4.4 and FSSC chs.2 and 12);

(EI) .2 checking the provision, specification and arrangements of the fire extinguishers (SOLAS 74/00 reg.II-2/10.3) (SOLAS 74/88 reg.II-2/6);

(EI) .3 checking the provision, specification and arrangements of the fire fighters’ outfits and emergency escape breathing devices – EEBDs - (SOLAS 74/00 regs II-2/10.10, 13.3.4 and 13.4.3; FSSC ch.3) (SOLAS 74/88 reg.II-2/17);

(EI) .4 examining the plans for the fire-extinguishing arrangements in the machinery spaces (SOLAS 74/00 regs II-2/10.4 and 10.5 (except 10.5.5), FSSC chs.5, 6 and 7) (SOLAS 74/88 reg.II-2/7);

(EI) .5 examining the plans for the special arrangements in the machinery spaces (SOLAS 74/00 regs II-2/5.2, 8.3 and 9.5) (SOLAS 74/88 reg.II-2/11);

(EI) .6 checking the provision of a fixed fire detection and fire alarm system for machinery spaces including periodically unattended machinery spaces (SOLAS 74/00 regs II-2/7.2, 7.3 and 7.4) (SOLAS 74/88 reg.II-2/13 and 14);

(EI) .7 checking the provision of a fixed fire detection and fire alarm system and/or an automatic sprinkler, fire detection and fire alarm system in accommodation and service spaces and control stations (SOLAS 74/00 regs II-2/7.2, 7.3, 7.5.5, 7.7 and 10.6.2; FSSC chs.8 and 9) (SOLAS 74/88 reg.II-2/52);

(EI) .8 checking the provision of a fire-extinguishing system for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces (SOLAS 74/00 regs II-2/10.6.3 and 10.6.4; FSSC chs.5 and 7) (SOLAS 74/88 reg.II-2/18.7);

(EI) .9 examining the arrangements for remote closing of valves for oil fuel, lubricating oil and other flammable oils (SOLAS 74/00 reg.II-2/4.2.2.3.4) (SOLAS 74/88 reg.II-2/15.2.5);

(EI) .10 examining the plans for the fire protection arrangements in cargo spaces for general cargo and dangerous goods (SOLAS 74/00 regs II-2/10.7 and 19) (SOLAS 74/88 regs II-2/53 and 54);
examining the plans for the fire protection arrangements in vehicle, special
category and ro-ro spaces (SOLAS 74/00 reg.II-2/20(except 20.2.2 and 20.5),
FSSC chs.5, 6, 7, 9 and 10) (SOLAS 74/88 reg.II-2/37, 38 and 53);

examining the plans for the helicopter facilities (SOLAS 74/00 reg.II-2/18)
(SOLAS 74/88 reg.II-2/18.8);

examining the plans for the special arrangements for the carriage of dangerous
goods, when appropriate, including water supplies, electrical equipment and wiring,
fire detection, ventilation, bilge pumping, personnel protection and any water spray
system (SOLAS 74/00 reg.II-2/19 (except 19.3.8, 19.3.10 and 19.4), FSSC chs.9
and 10) (SOLAS 74/88 reg.II-2/54);

examining the provision and disposition of the survival craft and rescue boats and,
where applicable, marine evacuation systems (SOLAS 74/88 reg.III/11 to 16, 31
and 33);

examining the design of the survival craft, including their equipment, launching
and recovery appliances and embarkation and launching arrangements
(SOLAS 74/96 reg.III/16, 31, 32 to 33; LSAC sections 3.2, 4.1 to 4.9, 6.1 and
6.2);

examining the design of the rescue boats, including their equipment and launching
and recovery appliances and arrangements (SOLAS 74/00 reg.III/17 and 31;
LSAC sections 5.1 and 6.1);

examining the provision, specification and stowage of two-way
VHF radiotelephone apparatus and radio transponders. (SOLAS 74/88 reg.III/6);

examining the provision, specification and stowage of the distress flares and the
line-throwing appliance and the provision of on board communications equipment
and the general alarm system (SOLAS 74/00 reg.II-2/12.1 and 12.2, and reg.III/6
and 18; and LSAC sections 3.1, 7.1 and 7.2);

examining the provision, specification and stowage of the lifebuoys, including
those fitted with self-igniting lights, self-activating smoke signals and buoyant
lines, lifejackets, immersion suits, anti-exposure suits and thermal protective aids
(SOLAS 74/00 reg.III/7 and 32; LSAC sections 2.1 to 2.5 and 3.1 to 3.3);

examining the plans for the lighting of the muster and embarkation stations and the
alleyways, stairways and exits giving access to the muster and embarkation
stations, including the supply from the emergency source of power (SOLAS 74/88
reg.II-1/43 and III/11);

examining the plans for the positioning of, and the specification for, the navigation
lights, shapes and sound signalling equipment (International Regulations for
Preventing Collisions at Sea (COLREG) in force reg.s 20 to 24, 27 to 30 and 33);

examining the plans relating to the bridge design and arrangement of navigational
systems and equipment and bridge procedures (SOLAS 74/00 reg.V/15 and 12);
(EI) .23 checking the provision and specification of the following navigation equipment as appropriate: daylight signalling lamp, magnetic compass, transmitting heading device, gyro compass, gyro compass repeaters, radar installation(s), automatic identification system, electronic plotting aid, automatic tracking aid(s) or automatic radar plotting aid(s), echo-sounding device, speed and distance measuring device(s), rudder angle indicator, propeller rate of revolution indicator, variable-pitch propeller pitch and operational mode indicator, rate-of-turn indicator, heading or track control system, GNSS receiver, terrestrial radio navigation system and sound reception system, means of communication with emergency steering position, ECDIS including back-up arrangements, a pelorus or compass bearing device and means for correcting heading and bearings (SOLAS 74/00 reg.V/19);

(EI) .24 checking the provision and specification of voyage data recorder (SOLAS 74/00 reg.V/20);

(EI) .25 checking the provision and specification of the pilot ladders and hoists/pilot transfer arrangements (SOLAS 74/88 reg.V/23).

(EI) 1.1.2 For the examination of plans and designs of the life-saving appliances and the other equipment of cargo ships the additional requirements for oil tankers should consist of:

(EI) .1 examining the plans for the cargo tank protection (SOLAS 74/00 regs.II-2/4.5.3, 4.5.5, 4.5.6, 4.5.7 and 10.8; FSSC chs.14 and 15) (SOLAS 74/88 regs.II-2/60 and 62) and

(EI) .2 examining the plans for protection of the cargo pump rooms (SOLAS 78/00 regs.II-2/4.5.10 and 10.9) (SOLAS 74/88 reg.II-2/63).

(EI) 1.1.3 For the life-saving appliances and the other equipment of cargo ships the survey during construction and after installation should consist of:

(EI) .1 examining the fire pumps and fire main and the disposition of the hydrants, hoses and nozzle and the international shore connection and checking that each fire pump, including the emergency fire pump, can be operated separately so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required pressure is maintained in the fire main (SOLAS 74/00 reg.II-2/10.2; FSSC chs.2 and 12) (SOLAS 74/88 regs.II-2/4 and 19);

(EI) .2 examining the provision and disposition of the fire extinguishers (SOLAS 74/00 reg.II-2/10.3; FSSC ch.4) (SOLAS 74/88 reg.II-2/17);

(EI) .3 examining the fire fighters' outfits and emergency escape breathing devices - EEBDs - (SOLAS 74/00 regs.II-2/10.10, 13.3.4 and 13.4.3; FSSC ch.3) (SOLAS 74/88 reg.II-2/17);

(EI) .4 checking the operational readiness and maintenance of fire-fighting systems (SOLAS 74/00 reg.II-2/14 1) (SOLAS 74/88 reg.II-2/21);

(EI) .5 examining the fixed fire-fighting system for the machinery, cargo, vehicle, special category and ro-ro spaces, as appropriate, and confirming that the installation tests have been satisfactorily completed and that its means of operation are clearly
marked (SOLAS 74/00 regs.II-2/10.4, 10.5, 10.7 and 20.6.1; FSSC chs.5 to 7)
(SOLAS 74/88 regs.II-2/7 and 53);

(El) .6 examining the fire-extinguishing and special arrangements in the machinery spaces
and confirming, as far as practicable and as appropriate, the operation of the remote
means of control provided for the opening and closing of the skylights, the release
of smoke, the closure of the funnel and ventilation openings, the closure of power
operated and other doors, the stopping of ventilation and boiler forced and induced
draft fans and the stopping of oil fuel and other pumps that discharge flammable
liquids (SOLAS 74/00 regs.II-2/5.2, 8.3, 9.5 and 10.5) (SOLAS 74/88 regs.II-2/7
and 11);

(El) .7 examining any fire detection and alarm system and any automatic sprinkler, fire
detection and fire alarm system and confirming that installation tests have been
satisfactorily completed (SOLAS 74/00 regs.II-2/7.2, 7.3, 7.4, 7.5.1, 7.5.5, 19.3.3
and 20.4; FSSC ch.9) (SOLAS 74/88 regs.II-2/11, 13, 14, 53 and 54);

(El) .8 examining the fire-extinguishing system for spaces containing paint and/or
flammable liquids and deep-fat cooking equipment in accommodation and service
spaces and confirming that installation tests have been satisfactorily completed and
that its means of operation are clearly marked (SOLAS 74/00 regs.II-2/10.6.3 and
10.6.4; FSSC chs.4 to 7) (SOLAS 74/88 reg.II-2/18.7);

(El) .9 examining the arrangements for remote closing of valves for oil fuel, lubricating oil
and other flammable oils and confirming, as far as practicable and as appropriate,
the operation of the remote means of closing the valves on the tanks that contain oil
fuel, lubricating oil and other flammable oils (SOLAS 74/00 reg.II-2/4.2.2.3.4)
(SOLAS 74/88 reg.II-2/15.2.5);

(El) .10 examining the fire protection arrangements in cargo vehicle and ro-ro spaces and
confirming, as far as practicable and as appropriate, the operation of the means for
closing the various openings (SOLAS 74/00 regs.II-2/10.7, 20.2.1, 20.3 and 20.6.2)
(SOLAS 74/88 reg.II-2/53);

(El) .11 examining, when appropriate, the special arrangements for carrying dangerous
goods, including checking the electrical equipment and wiring, the ventilation, the
provision of protective clothing and portable appliances and the testing of the water
supply, bilge pumping and any water spray system (SOLAS 74/00 reg.II-2/19
(except 19.3.8, 19.3.10 and 19.4); FSSC chs.9 and 10) (SOLAS 74/88 reg.II-2/54);

(El) .12 checking the provision and disposition of the survival craft, where applicable,
marine evacuation systems and rescue boats (SOLAS 74/88 reg.III/11 to 16 and
31; LSAC section 6.2);

(El) .13 deployment of 50% of the MES after installation (LSAC paragraph 6.2.2.2);

(El) .14 examining each survival craft, including its equipment (SOLAS 74/88 reg.III/31;
LSAC sections 2.5, 3.1 to 3.3 and 4.1 to 4.9);

(El) .15 examining the embarkation arrangements for each survival craft and the testing of
each launching appliance, including overload tests, tests to establish the lowering
speed and the lowering of each survival craft to the water with the ship at its
lightest sea-going draught, and, where applicable, launching underway at 5 knots, checking the recovery of each lifeboat (SOLAS 74/00 regs.III/11, 12, 13, 16, 31 and 33; LSAC section 6.1);

(EI) .16 examining the embarkation arrangements for each marine evacuation device, where applicable, and the launching arrangements, including inspection for lack of side shell opening between the embarkation station and waterline, review of distance to the propeller and other life-saving appliances and ensuring that the stowed position is protected from heavy weather damage, as much as practicable (SOLAS 74/00 reg.III/15; LSAC section 6.2);

(EI) .17 examining each rescue boat, including its equipment (SOLAS 74/88 reg.III/31; LSAC sections 2.5, 5.1 and 6.1);

(EI) .18 examining the embarkation and recovery arrangements for each rescue boat and testing each launching and recovery appliance, including overload tests, tests to establish the lowering and recovery speeds and ensuring that each rescue boat can be lowered to the water and recovered with the ship at its lightest sea-going draught, launching underway at 5 knots (SOLAS 74/88 regs.III/14, 17 and 31; LSAC section 6.1);

(EI) .19 testing that the engine of the rescue boat(s) and of each lifeboat, when so fitted, start satisfactorily and operate both ahead and astern (SOLAS 74/00 reg.III/19);

(EI) .20 confirming that there are posters or signs in the vicinity of survival craft and their launching stations and containers, brackets, racks and other similar stowage locations for life-saving equipment (SOLAS 74/88 regs.III/9 and 20);

(EI) .21 examining the provision and stowage and checking the operation of portable on board communications equipment, if provided, and two-way VHF radiotelephone apparatus and radar transponders (SOLAS 74/88 regs.II-2/12.2 and III/6);

(EI) .22 examining the provision and stowage of the distress flares and the line-throwing appliance, checking the provision and operation of fixed on board communications equipment, if provided, and testing the means of operation of the general alarm system (SOLAS 74/00 regs.III/6 and 18; LSAC sections 3.1, 7.1 and 7.2);

(EI) .23 examining the provision, disposition and stowage of the lifebuoys, including those fitted with self-igniting lights, self-activating smoke signals and buoyant lines, lifejackets, immersion suits and thermal protective aids (SOLAS 74/00 regs.III/7 and 32 to 37; LSAC sections 2.1, 2.5 and 3.3);

(EI) .24 checking the lighting of the muster and embarkation stations and the alleyways, stairways and exits giving access to the muster and embarkation stations, including when supplied from the emergency source of power (SOLAS 74/88 regs.II-1/43 and III/11);

(EI) .25 examining the provision and positioning and checking the operation of, as appropriate, the navigation lights, shapes and sound signalling equipment (International Regulations for Preventing Collisions at Sea (COLREG) in force, regs.20 to 24, 27 to 30 and 33).
(EI) .26 checking that the minimum safe distances from the steering and standard magnetic compasses for all electrical equipment are complied with (SOLAS 74/00 regs V/17 and 19);

(EI) .27 checking the electromagnetic compatibility of electrical and electronic equipment on or in the vicinity of the bridge (SOLAS 74/00 reg. V/17);

(EI) .28 checking, as appropriate, the provision and operation of the following ship borne navigational systems equipment (SOLAS 74/00 reg. V/19):

(EI) .28.1 the magnetic compass, including examining the siting, movement, illumination and a pelorus or compass bearing device (SOLAS 74/00 reg. V/19);

(EI) .28.2 nautical charts and nautical publications necessary for the intended voyage are available and have been updated, and, where electronic systems are used, the electronic charts have been updated and the required back-up system is provided and updated (SOLAS 74/00 reg. V/19);

(EI) .28.3 global navigation satellite system receiver or terrestrial radionavigation system;

(EI) .28.4 sound reception satellite system receiver or terrestrial radionavigation system;

(EI) .28.5 means of communication to emergency steering position, where provided;

(EI) .28.6 spare magnetic compass;

(EI) .28.7 daylight signalling lamp;

(EI) .28.8 echo sounding device;

(EI) .28.9 spare magnetic compass;

(EI) .28.10 radar(s), including examining the waveguide and cable runs for routing and protection and the display unit confirming lighting, correct operation of all controls, and functions;

(EI) .28.11 electronic plotting aid, automatic tracking aid or automatic radar plotting aid as appropriate, using the appropriate test facilities;

(EI) .28.12 speed and distance measuring devices "through the water" and "over the ground";

(EI) .28.13 transmitting heading device providing heading information to radar, plotting aids and automatic identification system equipment and voyage data recorder;

(EI) .28.14 automatic identification system;

(EI) .28.15 gyrocompass, including examining the alignment of the master and all repeaters;

(EI) .28.16 rudder angle indicator;

(EI) .28.17 propeller rate of revolution indicator;
.28.18 propeller, operational mode, thrust, and pitch indicator;

.28.19 rate-of-turn indicator;

.28.20 heading or track control system;

.29 checking for the provision and operation of the voyage data recorder (SOLAS 74/00 reg.V/20);

.30 checking record of the voyage data recorder annual performance test (SOLAS 74/00 reg.V/18);

.31 checking navigation bridge visibility (SOLAS 74/00 reg.V/22);

.32 checking the provision and, as appropriate, the deployment or operation of the pilot ladders and hoists/pilot transfer arrangements (SOLAS 74/00 reg.V/23).

1.1.4 For the life-saving appliances and the other equipment of cargo ships for the additional requirements for oil tankers the survey during construction and after installation should consist of:

.1 checking the deck foam system, including the supplies of foam concentrate, and testing that the minimum number of jets of water at the required pressure in the fire main is obtained (see 1.1.3.1) when the system is in operation (SOLAS 74/00 reg.II-2/10.88; FSSC ch.15) (SOLAS 74/88 reg.II-2/61);

.2 examining the inert gas system (SOLAS 74/00 reg.II-2/4.5.5; FSSC ch.15) (SOLAS 74/88 reg.II-2/62) and in particular:

.2.1 examining externally for any sign of gas or effluent leakage;

.2.2 confirming the proper operation of both inert gas blowers;

.2.3 observing the operation of the scrubber-room ventilation system;

.2.4 checking the deck water seal for automatic filling and draining;

.2.5 examining the operation of all remotely operated or automatically controlled valves and, in particular, the flue gas isolating valves;

.2.6 observing a test of the interlocking feature of soot blowers;

.2.7 observing that the gas pressure-regulating valve automatically closes when the inert gas blowers are secured;

.2.8 checking, as far as practicable, the following alarms and safety devices of the inert gas system using simulated conditions where necessary:

.2.8.1 high oxygen content of gas in the inert gas main;

.2.8.2 low gas pressure in the inert gas main;

.2.8.3 low pressure in the supply to the deck water seal;
.2.8.4 high temperature of gas in the inert gas main;

.2.8.5 low water pressure or low water-flow rate;

.2.8.6 accuracy of portable and fixed oxygen-measuring equipment by means of calibration gas;

.2.8.7 high water level in the scrubber;

.2.8.8 failure of the inert gas blowers;

.2.8.9 failure of the power supply to the automatic control system for the gas regulating valve and to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main;

.2.8.10 high pressure of gas in the inert gas main;

checking the proper operation of the inert gas system on completion of the checks listed above;

.3 examining the fixed fire-fighting system for the cargo pump room, confirming that the installation tests have been satisfactorily completed and that its means of operation are clearly marked (SOLAS 74/00 reg.II-2/10.9; FSSC chs.5, 6, 7 and 8, as applicable) and, when appropriate, checking the operation of the remote means for closing the various openings;

.4 examining the protection of the cargo pump-rooms and confirming that the installation tests have been satisfactorily completed (SOLAS 74/00 reg.II-2/4.5.10) (SOLAS 74/88 regs.II-2/55 to 58).

1.1.5 For the life-saving appliances and the other equipment of cargo ships the check that the required documentation has been placed on board should consist of:

.1 confirming that the fire control plans are permanently exhibited or, alternatively, emergency booklets have been provided and that a duplicate of the plans or the emergency booklet are available in a prominently marked enclosure external to the ship's deckhouse (SOLAS 74/00 reg.II-2/15.2.4) (SOLAS 74/88 reg.II-2/20);

.2 confirming that maintenance plans have been provided (SOLAS 74/00 regs.II-2/14.2.2 and 14.4);

.3 confirming that the training manuals and the fire safety operational booklets have been provided (SOLAS 74/00 regs.II-2/15.2.3, 16.2 and 16.3);

.4 confirming, where appropriate, that the ship is provided with a document indicating compliance with the special requirement for carrying dangerous goods (SOLAS 74/00 reg.II-2/19.4) (SOLAS 74/88 reg.II-2/54(3));

.5 confirming that emergency instructions are available for each person on board, that the muster list is posted in conspicuous places and they are in a language understood by the persons on board (SOLAS 74/00 regs.III/8 and 37);
(EI) .6 confirming that the training manual and training aids for the life-saving appliances have been provided (SOLAS 74/00 reg. III/35);

(EI) .7 confirming that the instructions for on board maintenance of the life-saving appliances have been provided (SOLAS 74/88 reg. III/36);

(EI) .8 confirming that a table or curve of residual deviations for the magnetic compass has been provided, and that a diagram of the radar installations shadow sectors is displayed (SOLAS 74/00 reg. V/19);

(EI) .9 checking that operational and, where appropriate, maintenance manuals for all navigational equipment are provided (SOLAS 74/00 reg. V/16);

(EI) .10 checking that the charts and nautical publications necessary for the intended voyage are available and have been updated (SOLAS 74/88 reg. V/27);

(EI) .11 checking that the International Code of Signals is available (SOLAS 74/00 reg. V/21);

(EI) .12 checking that records of navigational activities have been maintained (SOLAS 74/00 reg. V/28);

(EI) .13 checking that the life-saving signals to be used by ships, aircraft or persons in distress are available (SOLAS 74/00 reg. V/29).

(EI) 1.1.6 For the life-saving appliances and the other equipment of cargo ships for the additional requirements for oil tankers the check that the required documentation has been placed on board should consist of:

(EI) .1 confirming, when appropriate, that the instruction manuals for the inert gas system have been provided (FSSC ch.15 paragraph 2.4.4) (SOLAS 74/88 reg. II-2/62.21).

(EI) 1.1.7 For the life-saving appliances and the other equipment of cargo ships the completion of the initial survey should consist of:

(EI) .1 after a satisfactory survey, the Cargo Ship Safety Equipment Certificate and its associated Record of Equipment (Form E) should be issued.

(EA) 1.2 Annual surveys - see part “General” section 4.2.

(EA) 1.2.1 For the life-saving appliances and the other equipment of cargo ships the examination of current certificates and other records should consist of:

(EA) .1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

(EA) .2 checking the validity of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board;
(EA) .3 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

(EA) .4 checking the validity of the International Oil Pollution Prevention Certificate;

(EA) .5 checking the certificates of class, if the ship is classed with a classification society;

(EA) .6 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;

(EA) .7 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk;

(EA) .8 checking, when appropriate, the validity of the International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk;

(EA) .9 checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/00 reg.V/14);

(EA) .10 checking that the master, officers and ratings are certificated as required by the STCW Convention;

(EA) .11 checking the manning and supervision of survival craft (SOLAS 74/00 reg.III/10);

(EA) .12 checking whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the appropriate certificate;

(EA) .13 confirming that the fire control plans are permanently exhibited or, alternatively, emergency booklets have been provided and that a duplicate of the plans or the emergency booklet are available in a prominently marked enclosure external to the ship's deckhouse (SOLAS 74/00 reg.II-2/15.2.4) (SOLAS 74/88 reg.II-2/20);

(EA) .14 confirming that the maintenance plans have been provided (SOLAS 74/00 regs.II-2/14.2.2 and 14.4);

(EA) .15 confirming that the training manuals and the fire safety operational booklets have been provided (SOLAS 74/00 regs.II-2/15.2.3, 16.2 and 16.3);

(EA) .16 checking whether any fire has occurred on board necessitating the operation of the fixed fire-extinguishing systems or the portable fire extinguishers since the last survey;

(EA) .17 checking, when appropriate, that the ship is provided with a document indicating compliance with the special requirements for carrying dangerous goods (SOLAS 74/00 reg.II-2/19.4) (SOLAS 74/88 reg.II-2/54(3));

(EA) .18 confirming, when appropriate, that there is a special list, manifest or stowage plan for the carriage of dangerous goods (SOLAS 74/88 reg.VII/5(3));
confirming, when appropriate, that the instruction manuals for the inert gas system have been provided and checking from the records of the pressure and oxygen content that the inert gas system is being operated correctly (FSSC ch.15) (SOLAS 74/88 reg. II-2/62);

checking that log-book entries are being made (SOLAS 74/00 regs. III/19 and 20) and in particular:

the date when the last full muster of the crew for boat and fire drill took place;

the records indicating that the lifeboat equipment was examined at that time and found to be complete;

the last occasion when the lifeboats were swung out and when each one was lowered into the water;

the records indicating that crew members have received the appropriate on board training;

confirming that the training manual and training aids for the life-saving appliances are on board (SOLAS 74/00 reg. III/35);

confirming that the checklist and instructions for on board maintenance of the life-saving appliances are on board (SOLAS 74/00 reg. III/36);

confirming that a table or curve of residual deviations for the magnetic compass has been provided, the compass deviation book has been properly maintained and a diagram of the radar installations shadow sectors is displayed (SOLAS 74/00 reg. V/19);

checking that operational and, where appropriate, maintenance manuals for all navigational equipment are provided (SOLAS 74/00 reg. V/16);

checking that nautical charts and nautical publications necessary for the intended voyage are available and have been updated, and, where electronic systems are used, the required back up system is provided (SOLAS 74/00 reg. V/19 and 27);

checking that the International Code of Signals is available;

checking that the life-saving signals to be used by ships, aircraft or persons in distress are available (SOLAS 74/00 reg. V/29).

1.2.2 For the life-saving appliances and the other equipment of cargo ships the annual survey should consist of:

examining the fire pumps, fire main, hydrants, hoses and nozzles and the international shore connection and checking that each fire pump, including the emergency fire pump, can be operated separately so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required pressure is maintained in the fire main (SOLAS 74/00 reg. II-2/10.2; FSSC chs.2 and 12) (SOLAS 74/88 regs. II-2/4 and 19);
(EA) .2 checking the provision and randomly examining the condition of the portable and non-portable fire extinguishers (SOLAS 74/00 reg.II-2/10.3; FSSC ch.4) (SOLAS 74/88 reg.II-2/6);

(EA) .3 confirming that the fire fighters’ outfits and emergency escape breathing devices – EEBDs - are complete and in good condition and that the cylinders, including the spare cylinders, of any required self-contained breathing apparatus are suitably charged (SOLAS 74/00 reg.II-2/10.10, 13.3.4 and 13.4.3; FSSC ch.3) (SOLAS 74/88 reg.II-2/17);

(EA) .4 checking the operational readiness and maintenance of fire-fighting systems (SOLAS 74/00 reg.II-2/14) (SOLAS 74/88/91 reg.II-2/21);

(EA) .5 examining the fixed fire-fighting system for the machinery, cargo, vehicle, special category and ro-ro spaces, as appropriate, and confirming that its means of operation is clearly marked (SOLAS 74/00 reg.II-2/10.4, 10.5, 10.7 and 20.6.1; FSSC chs.5 to 7) (SOLAS 74/88 reg.II-2/7 and 53);

(EA) .6 examining the fire-extinguishing and special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids (SOLAS 74/00 reg.II-2/5.2, 8.3, 9.5 and 10.5) (SOLAS 74/88 reg.II-2/7 and 11);

(EA) .7 examining, as far as possible, and testing, as feasible, any fire detection and alarm system (SOLAS 74/00 reg.II-2/7.2, 7.3, 7.4, 7.5.1, 7.5.5, 19.3.3 and 20.4; FSSC ch.9) (SOLAS 74/88 reg.II-2/11, 13, 14, 53 and 54);

(EA) .8 examining the fire-extinguishing systems for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces (SOLAS 74/00 reg.II-2/10.6.3 and 10.6.4; FSSC chs.5 to 7) (SOLAS 74/88 reg.II-2/18.7);

(EA) .9 examining the helicopter facilities (SOLAS 74/00 reg.II-2/18) (SOLAS 74/88 reg.II-2/18.8);

(EA) .10 examining the arrangements for remote closing of valves for oil fuel, lubricating oil and other flammable oils and confirming, as far as practicable and as appropriate, the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils (SOLAS 74/00 reg.II-2/4.2.2.3.4) (SOLAS 74/88 reg.II-2/15.2.5);

(EA) .11 examining and testing of the general emergency alarm system (SOLAS 74/88 reg.III/20);

(EA) .12 examining the fire protection arrangements in cargo, vehicle and ro-ro spaces and confirming, as far as practicable and as appropriate, the operation of the means of control provided for closing the various openings (SOLAS 74/00 reg.II-2/10.7, 20.2.1, 20.3 and 20.6.2) (SOLAS 74/88 reg.II-2/53);
examining, when appropriate, the special arrangements for carrying dangerous goods, including checking the electrical equipment and wiring, the ventilation, the provision of protective clothing and portable appliances and the testing of the water supply, bilge pumping and any water spray system (SOLAS 74/00 reg.II-2/19 (except 19.3.8, 19.3.10 and 19.4)) (SOLAS 74/88 reg.II-2/54);

checking that emergency instructions are available for each person on board and that copies of the suitably updated muster list are posted in conspicuous places and that they are in a language understood by all persons on board and confirming that there are posters or signs in the vicinity of survival craft and their launching stations (SOLAS 74/00 reg.III/8, 9 and 37);

examining each survival craft, including its equipment and, when fitted, the on-load release and hydrostatic lock and, for inflatable liferafts, the hydrostatic release unit and floath-free arrangements. Checking that the hand-held flares are not out of date (SOLAS 74/00 reg.III/20 and 31; LSAC sections 2.5, 3.1 to 3.3);

checking that the falls used in launching have been turned end for end in the previous 30 months and renewed in the past 5 years or have been subject to periodic inspection and been renewed within 4 years (SOLAS 74/00 reg.III/20);

examining the embarkation arrangements and launching appliances for each survival craft. Each lifeboat should be lowered to the embarkation position or, if the stowage position in the embarkation position, lowered a short distance and, if practicable, one of the survival craft should be lowered to the water. The operation of the launching appliances for davit-launched liferafts should be demonstrated. A check that the thorough examination of launching appliances, including the dynamic testing of the winch brake, and servicing of lifeboat on-load release gear have been carried out (SOLAS 74/00 reg.III/11, 12, 13, 16, 20 and 31; LSAC section 6.1);

examining each rescue boat, including its equipment (SOLAS 74/00 reg.III/31; LSAC sections 2.5 and 5.1);

confirming that there are posters or signs in the vicinity of the survival craft, their launching stations and containers, brackets, racks and other similar stowage locations for life-saving equipment (SOLAS 74/00 reg.III/9 and 20);

examining the embarkation and recovery arrangements for each rescue boat. If practicable, the rescue boat(s) should be lowered to the water and its recovery demonstrated (SOLAS 74/00 reg.III/14, 17 and 31; LSAC section 6.1);

testing that the engine of the rescue boat(s) and of each lifeboat, when so fitted, start satisfactorily and operate both ahead and astern;

examining and checking the operation of two-way VHF radiotelephone apparatus and radar transponders (SOLAS 74/88 reg.III/6);

examining the line-throwing appliance and checking that its rockets and the ship's distress signals are not out of date, and examining and checking the operation of on
board communications equipment and the general emergency alarm system (SOLAS 74/00 regs II-2/12.2 and III/6 and 18; LSAC sections 3.1, 7.1 and 7.2);

(EX) .24 examining the provision, disposition, stowage and the condition of the: lifebuoys, including those fitted with self-igniting lights, self-activating smoke signals and buoyant lines, liferafts and their whistles and lights, immersion suits, anti-exposure suits and thermal protective aids and that their associated batteries are not out of date (SOLAS 74/88 regs III/7 and 32, LSAC sections 2.2 and 2.5);

(EX) .25 checking the lighting of the muster and embarkation stations and the alleyways, stairways and exits giving access to the muster and embarkation stations, including when supplied from the emergency source of power (SOLAS 74/88 regs II-1/42 or 43 and III/11);

(EX) .26 checking that the required the navigation lights, shapes and sound signalling equipment are in order (International Regulations for Preventing Collisions at Sea (COLREG) in force, regs.20 to 24, 27 to 30 and 33);

(EX) .27 checking that the following items of navigation equipment are in working order, as appropriate: daylight signalling lamp, magnetic compass, transmitting heading device, gyro compass, gyro compass repeaters, radar installation(s), automatic identification system, electronic plotting aid, automatic tracking aid(s) or automatic radar plotting aid(s), echo-sounding device, speed and distance measuring device(s), rudder angle indicator, propeller rate of revolution indicator, variable-pitch propeller pitch and operational mode indicator, rate-of-turn indicator, heading or track control system, GNSS receiver, terrestrial radio navigation system and sound reception system, means of communication with emergency steering position, ECDIS including back-up arrangements, a pelorus or compass bearing device and means for correcting heading and bearings. Items that cannot be checked with the ship in port should be verified from records (SOLAS 74/00 reg.V/19);

(EX) .28 checking that the International Code of Signals is available (SOLAS 74/00 reg.V/21);

(EX) .29 rotational deployment of MES (SOLAS 74/88 reg.III/20.8.2; LSAC section 6.2.2.2);

(EX) .30 checking the provision and specification of the voyage data recorder, where fitted (SOLAS 74/00 reg.V/20);

(EX) .31 checking the provision and specification of the pilot ladders and hoists/pilot transfer arrangements (SOLAS 74/00 reg.V/23).

(EX) 1.2.3 For the life-saving appliances and the other equipment of cargo ships for the additional requirements for oil tankers the annual survey should consist of:

(EX) .1 checking the deck foam system, including the supplies of foam concentrate and testing that the minimum number of jets of water at the required pressure in the fire main is obtained (see (EX) 1.2.2.1) when the system is in operation (SOLAS 74/00 reg.II-2/10.8; FSSC ch.14) (SOLAS 74/88 reg.II-2/61);
(EA) .2 examining the inert gas system (SOLAS 74/00 reg.II-2/4.5.5; FSSC ch.15)
(SOLAS 74/88 reg.II-2/62), and in particular:

(EA) .2.1 examining externally for any sign of gas or effluent leakage;

(EA) .2.2 confirming the proper operation of both inert gas blowers;

(EA) .2.3 observing the operation of the scrubber-room ventilation system;

(EA) .2.4 checking the deck water seal for automatic filling and draining;

(EA) .2.5 examining the operation of all remotely operated or automatically controlled valves
and, in particular, the flue gas isolating valves;

(EA) .2.6 observing a test of the interlocking feature of soot blowers;

(EA) .2.7 observing that the gas pressure regulating valve automatically closes when the inert
gas blowers are secured;

(EA) .2.8 checking, as far as practicable, the following alarms and safety devices of the inert
gas system using simulated conditions where necessary:

(EA) .2.8.1 high oxygen content of gas in the inert gas main;

(EA) .2.8.2 low gas pressure in the inert gas main;

(EA) .2.8.3 low pressure in the supply to the deck water seal;

(EA) .2.8.4 high temperature of gas in the inert gas main;

(EA) .2.8.5 low water pressure or low water-flow rate;

(EA) .2.8.6 accuracy of portable and fixed oxygen-measuring equipment by means of
 calibration gas;

(EA) .2.8.7 high water level in the scrubber;

(EA) .2.8.8 failure of the inert gas blowers;

(EA) .2.8.9 failure of the power supply to the automatic control system for the gas regulating
valve and to the instrumentation for continuous indication and permanent recording
of pressure and oxygen content in the inert gas main;

(EA) .2.8.10 high pressure of gas in the inert gas main;

(EA) .3 checking, when practicable, the proper operation of the inert gas system on
completion of the checks listed above (FSSC ch.15) (SOLAS 74/88 reg.II-2/62);

(EA) .4 examining the fixed fire-fighting system for the cargo pump rooms, (SOLAS 74/00
reg.II-2/10.9) (SOLAS 74/88 reg.II-2/63) and confirming, as far as practicable and
when appropriate, the operation of the remote means for closing the various
openings.
checking condition and operation of water spray and air supply systems that are in
totally enclosed lifeboats and have self-contained air support systems
(LSAC sections 4.4 and 4.6 to 4.9);

checking protection of cargo pump room (SOLAS 74/00 reg.II-2/4.5.10), and in
particular:

checking temperature sensing devices for bulkheads glands and alarms;

checking interlock between lighting and ventilation;

checking gas detection system;

checking bilge level monitoring devices and alarms.

For the life-saving appliances and the other equipment of cargo ships the completion of the
annual survey should consist of:

after a satisfactory survey, the Cargo Ship Safety Equipment Certificate should be endorsed;

if a survey shows that the condition of a ship or its equipment is unsatisfactory, see
part “General” section 4.8.

Periodical surveys - see part “General” section 4.4.

For the life-saving appliances and the other equipment of cargo ships the examination of
current certificates and other records should consist of:

the provisions of (EA) 1.2.1.

For the life-saving appliances and the other equipment of cargo ships the periodical survey
should consist of:

the provisions of (EA) 1.2.2;

confirming during the examination of the fixed fire-fighting system for the
machinery, cargo, vehicle, special category and ro-ro spaces that, as appropriate,
any foam compounds and the CO₂ capacity have been checked and that the
distribution pipework has been proved clear (SOLAS 74/00 regs.II-2/10.4, 10.5,
10.7 and 20.6.1; FSSC chs.5 to 7) (SOLAS74/88 regs.II-2/7 and 53);

testing the operation of the remote means of control provided for the opening
and closing of the skylights, the release of smoke, the closure of the funnel and
ventilation openings, the closure of power operated and other doors, the stopping
of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and
other pumps that discharge flammable liquids (SOLAS 74/00 regs.II-2/5 2, 8.3, 9.5
and 10.5) (SOLAS 74/88 reg.II-2/11);

testing any fire detection and alarm system (SOLAS 74/00 regs.II-2/7.2, 7.3, 7.4,
7.5.5, 19.3.3 and 20.4; FSSC ch.9) (SOLAS 74/88 regs.II-2/11, 13 14, 53 and 54),
testing, as feasible, the fire-extinguishing system for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces (SOLAS 74/00 reg.II-2/10.6.3 and 10.6.4; FSSC chs.5 to 7) (SOLAS 74/88 reg.II-2/18.7);

(testing the remote closing of valves for oil fuel, lubricating oil and other flammable oils and the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils (SOLAS 74/00 reg.II-2/4.2.2.3.4) (SOLAS 74/88 reg.II-2/15.2.5);

(testing the operation of the means of control provided for closing the various openings for the cargo, vehicle, special category and ro-ro spaces (SOLAS 74/00 reg.II-2/5.2 and 20.3) (SOLAS 74/88 reg.II-2/53);

(testing, as feasible, the helicopter facilities (SOLAS 74/00 reg.II-2/18) (SOLAS 74/88 reg.II-2/18.8).

(EP) 1.3.3 For the life-saving appliances and the other equipment for the additional requirements for oil tankers the periodical survey should consist of:

(EP) .1 the provisions of (EA) 1.2.3;

(EP) .2 confirming during the examination of the fixed fire-fighting system for the cargo pump rooms that, as appropriate, any foam compounds have been checked and that the distribution pipework has been proved clear (SOLAS 74/00 reg.II-2/10.9; FSSC chs.5 to 7) (SOLAS 74/88 reg.II-2/63) and checking the operation of the remote means for closing the various openings.

(EP) 1.3.4 For the life-saving appliances and the other equipment of cargo ships the completion of the periodical survey should consist of:

(EP) .1 after a satisfactory survey, the cargo Ship Safety Equipment Certificate should be endorsed;

(EP) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part “General” section 4.8.

(RE) 1.4 Renewal surveys - see part “General” section 4.5

(RE) 1.4.1 For the life-saving appliances and the other equipment of cargo ships the examination of current certificates and other records should consist of:

(RE) .1 the provisions of (EA) 1.2.1, except for the validity of the Cargo Ship Safety Equipment Certificate.

(RE) 1.4.2 For the life-saving appliances and other equipment of cargo ships the renewal survey should consist of:

(RE) .1 the provisions of (EP) 1.3.2.
(ER) 1.4.3 For the life-saving appliances and the other equipment for the additional requirements for oil tankers the renewal survey should consist of:

(ER) .1 the provisions of (EP) 1.3.3;

(ER) .2 examining the deck water seal for the inert gas system internally and checking the condition of the non-return valve (FSSC ch.15 paragraphs 2.2.4 and 2.3.1.4) (SOLAS 74/88 reg.II-2/62).

(ER) 1.4.4 For the life-saving appliances and the other equipment of cargo ships the completion of the renewal survey should consist of:

(ER) .1 after a satisfactory survey, the cargo Ship Safety Equipment Certificate should be issued.

(C) 2 GUIDELINES FOR SURVEYS FOR THE CARGO SHIP SAFETY CONSTRUCTION CERTIFICATE

(CI) 2.1 Initial surveys - see part "General" section 4.1.

(CI) 2.1.1 For the hull, machinery and equipment of cargo ships the examination of plans and designs should consist of:

(CI) .1 examining the plans for the hull (SOLAS 74/88 regs.II-1/11, 12.1, 14, 18 and 19);

(CI) .2 examining the plans for the bilge pumping (SOLAS 74/88 reg.II-1/21);

(CI) .3 examining the stability information and the damage control plans (SOLAS 74/88/00 regs.II-1/22, 23-1 and 25);

(CI) .4 examining the plans for the machinery installation (SOLAS 74/88 regs.II-1/26 to 36);

(CI) .5 examining the plans for the electrical installation (SOLAS 74/88 regs.II-1/40, 41, 43, 44 and 45);

(CI) .6 examining the plans for the periodically unattended machinery spaces (SOLAS 74/00 reg.II-2/4.2.5) (SOLAS 74/88 regs.II-1/46 to 53);

(CI) .7 examining the plans for the structural fire protection, including ventilation systems, in accommodation and service spaces, control stations and machinery spaces and oil fuel and lubricating oil systems (SOLAS 74/00 regs.II-2/4.4, 4.2.2, 4.2.2.3, 4.2.2.4, 4.2.2.5, 5.2, 5.3.1, 5.3.2, 6.2, 6.3, 7.5.5, 7.7, 8.2, 8.4, 9.2.1, 9.2.2, 9.3, 9.5, 9.7.1, 9.7.2, 9.7.3, 9.7.5.2, 11.2, 11.3, 11.4, 11.5 and 17) (SOLAS 74/88 regs.II-2/42 to 52 (except 45 and 51)).

(CI) .8 examining the plans for the structural fire protection, including ventilation systems, in cargo spaces (SOLAS 74/00 reg.II-2/5.2, 8.2, 11.3, 11.5, 19.3.8, 19.3.10, 20.2.1 and 20.3) (SOLAS 74/88 reg.II-1/42 to 54);

(CI) .9 examining the plans for the means of escape (SOLAS 74/00 reg.II-2/13.2, 13.3.1, 13.3.3, 13.4.2 and 13.6; FSSC ch.13 paragraph 3) (SOLAS 74/88 reg.II-1/45);
exercising the plans for the arrangements for gaseous fuel for domestic purposes (SOLAS 74/00 reg.II-2/4.3) (SOLAS 74/88 reg.II-1/51);

exercising the plans for helicopter facilities for ships fitted with such facilities (SOLAS 74/00 reg.II-2/18) (SOLAS 74/88 reg.II-1/18.8);

exercising the Cargo Securing Manual for ships carrying cargo units including containers (SOLAS 74/98 reg.VI/5.6);

checking for the loading booklet for carriage of cargoes in bulk (SOLAS 74/00 reg.VI/7);

exercising the loading instrument for bulk carriers of 150 m in length and upwards (SOLAS 74/97 reg.XII/11);

confirming that bulk carriers constructed on or after 1 July 1999 of 150 m in length and upwards of single skin construction designed to carry solid bulk cargoes having a density of 1,000 kg/m³ and above have sufficient strength to withstand flooding of any cargo hold (SOLAS 74/97 reg.XII/5);

exercising the functionality of bilge well alarms to all cargo holds and conveyor tunnels (SOLAS 74/97 reg.XII/9);

confirming that the ship is constructed in accordance with the requirements of a recognized classification society of with equivalent national standards (SOLAS 74/00 reg.II-1/3-1);

confirming that a corrosion prevention system is fitted in dedicated ballast water tanks of oil tankers and bulk carriers (SOLAS 74/ reg.II-1/3-2).

2.1.2 For the hull, machinery and equipment of cargo ships the examination of plans and designs the additional requirements for oil tankers, chemical tankers and gas carriers should consist of:

exercising the plans for the steering gear (SOLAS 74/88 reg.II-1/29);

exercising the plans for the electrical installation (SOLAS 74/00 reg.II-1/43) (SOLAS 74/88 reg.II-1/45);

exercising the plans for the structural fire protection (SOLAS 74/00 reg.II-2/1.6, 4.5.1, 4.5.2, 4.5.9, 9.2.4, 9.3, 9.4, 9.5, 9.6.5 and 11.6) (SOLAS 74/88 regs.II-2/55 to 58);

exercising the plans for the cargo tank venting, cargo tank purging and gas-freeing and other ventilation arrangements and protection of the cargo tank structure against pressure or vacuum (SOLAS 74/00 reg.II-2/4.5.3, 4.5.4, 4.5.6, 4.5.8, 11.6 and 16.3) (SOLAS 74/88 reg.II-2/59);

exercising the plans of access to bow (SOLAS 74/00 reg.II-1/3-3);

exercising the plans for emergency towing, for tankers of not less than 20,000 tonnes deadweight (SOLAS 74/00 reg.II-1/3-4).
(CI) 0.7 checking the access to spaces in the cargo area of oil tankers (SOLAS 74/00 reg.II-1/12-2) (SOLAS 74/88/92 reg.II-1/12-2).

(CI) 2.1.3 For the hull, machinery and equipment of cargo ships the survey during construction and after installation should consist of:

(CI) 0.1 confirming that the collision bulkhead is watertight up to the freeboard deck, that the valves fitted on the pipes piercing the collision bulkhead are operable from above the freeboard deck and that there are no doors, manholes, ventilation ducts or any other openings (SOLAS 74/88 reg.II-1/11);

(CI) 0.2 confirming that the subdivision bulkheads are constructed and tested as watertight up to the freeboard deck or margin line, as applicable (SOLAS 74/88 reg.II-1/14);

(CI) 0.3 confirming that each watertight door has been tested (SOLAS 74/88 reg.II-1/18);

(CI) 0.4 confirming that the arrangements for operating any watertight doors are generally in accordance with the requirements for passenger ships and carrying out similar tests, (see (P) 5.1.2.5 to (P) 5.1.2.7) (SOLAS 74/88 reg.II-1/15);

(CI) 0.5 confirming by a hose or flooding test the watertightness of watertight decks and trunks, tunnels and ventilators (SOLAS 74/88 reg.II-1/19);

(CI) 0.6 confirming that each bilge pump and the bilge pumping system provided for each watertight compartment is working efficiently (SOLAS 74/88 reg.II-1/21);

(CI) 0.7 confirming that the drainage system of enclosed cargo spaces situated on the freeboard deck is working efficiently (SOLAS 74/88 reg.II-1/21);

(CI) 0.8 conducting an inclining test, when this is required (SOLAS 74/88 reg.II-1/22);

(CI) 0.9 confirming that the machinery, boilers and other pressure vessels, associated piping systems and fittings are installed and protected as to reduce to a minimum any danger to persons on board, due regard being given to moving parts, hot surfaces and other hazards (SOLAS 74/00 reg.II-2/4.2 (except 4.2.2.3.4 relating to remote closing of valves included in safety equipment)) (SOLAS 74/88 reg.II-1/26) (SOLAS 74/88 reg.II-2.15 (except 15.25));

(CI) 0.10 confirming that the normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative (SOLAS 74/88 reg.II-1/26);

(CI) 0.11 confirming that means are provided so that the machinery can be brought into operation from the dead ship condition without external aid (SOLAS 74/88 reg.II-1/26);

(CI) 0.12 confirming that the boilers, all parts of the machinery, all steam, hydraulic, pneumatic and other systems and their associated fittings which are under internal pressure have been subjected to the appropriate tests, including a pressure test as may be specified in the requirements of the Administration or the classification societies (SOLAS 74/88 reg.II-1/26);
(CI) .13 confirming that means is provided to ensure that the safe speed is not exceeded where there is the risk of machinery overspeeding (SOLAS 74/88 reg.II-1/27);

(CI) .14 confirming that, where practicable, means are provided to protect against overpressure in the parts of main, auxiliary and other machinery that are subject to internal pressure and may be subject to dangerous overpressure (SOLAS 74/88 reg.II-1/27);

(CI) .15 confirming that, when required, crankcase explosion relief devices are fitted to internal combustion engines and that they are arranged so as to minimize the possibility of injury to personnel (SOLAS 74/88 reg.II-1/27);

(CI) .16 confirming that main turbine propulsion machinery and, where applicable, main internal combustion propulsion machinery and auxiliary machinery are provided with automatic shut-off arrangements in the case of failures, such as lubricating oil supply failure, which could rapidly lead to a complete breakdown, serious damage or explosion (SOLAS 74/88 reg.II-1/27);

(CI) .17 confirming and recording the ability of the machinery to reverse the direction of the thrust of the propeller in sufficient time and to bring the ship to rest within a reasonable distance, including the effectiveness of any supplementary means of manoeuvring or stopping the ship (SOLAS 74/88 reg.II-1/28);

(CI) .18 confirming that the main and auxiliary steering gear are so arranged that the failure of one of them does not render the other inoperative (SOLAS 74/88 reg.II-1/29);

(CI) .19 confirming that, where appropriate, essential components of the steering gear are permanently lubricated or provided with lubrication fittings (SOLAS 74/88 reg.II-1/29);

(CI) .20 confirming that relief valves are fitted to any part of a steering gear hydraulic system which can be isolated and in which pressure can be generated from the power source or from external forces and that these relief valves are set to a pressure not exceeding the design pressure (SOLAS 74/88 reg.II-1/29);

(CI) .21 confirming that the main steering gear is capable of steering the ship at maximum ahead service speed and is capable of putting the rudder over from 35° on one side to 35° on the other side with the ship at its deepest seagoing draught and running ahead at maximum ahead service speed and, under the same conditions, from 35° on either side to 30° on the other side in not more than 28 s (SOLAS 74/88 reg.II-1/29);

(CI) .22 confirming that the auxiliary steering gear is capable of steering the ship at navigable speed and of being brought speedily into action in an emergency and that it is capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 s with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater (SOLAS 74/88 reg.II-1/29);
confirming that the main and auxiliary steering gear power units restart automatically when power is restored after a power failure, that they are capable of being brought into operation from a position on the navigating bridge and that, in the event of a power failure to any one of the steering gear power units, an audible and visual alarm is given on the navigating bridge (SOLAS 74/88 reg.II-1/29);

confirming that, where the main steering gear comprises two or more identical power units and an auxiliary steering gear is not fitted, a defect can be isolated so that steering capability can be maintained or speedily regained after a single failure in its piping system or in one of the power units (SOLAS 74/88 reg.II-1/29);

confirming that the control systems for the main steering gear from both the navigating bridge and the steering gear compartment are operating satisfactorily (SOLAS 74/88 reg.II-1/29);

confirming that, where the main steering gear comprises two or more identical power units and an auxiliary steering gear is not fitted, the two independent control systems from the navigating bridge are operating satisfactorily (SOLAS 74/88 reg.II-1/29);

confirming that the control system for the auxiliary steering gear in the steering gear compartment and, if this gear is power operated, from the navigating bridge are operating satisfactorily and that the latter is independent of the control system for the main steering gear (SOLAS 74/88 reg.II-1/29);

confirming that the control system for any main and auxiliary steering gear control system operable from the navigating bridge is capable of being brought into operation from a position on the navigating bridge, that means are provided in the steering gear compartment for disconnecting it from the steering gear that it serves and that an audible and visual alarm is given on the navigating bridge in the event of a failure of electrical power supply (SOLAS 74/88 reg.II-1/29);

confirming that the electric power circuits and steering gear control systems, together with their associated components, cables and pipes, are separated, as far as practicable, throughout their length (SOLAS 74/88 reg.II-1/29);

confirming that the means of communication between the bridge and the steering gear compartment is operating satisfactorily and that, with ships having emergency steering positions, a telephone or other means of communication for relaying heading information and supplying visual compass readings to the emergency steering position are provided (SOLAS 74/00 reg.V/19.2.1) (SOLAS 74/88 regs.II-1/29);

confirming that the angular position of the rudder is indicated independently of the steering control system on the navigating bridge if the main steering gear is power-operated and that this angular position is given in the steering gear compartment (SOLAS 74/88 reg.II-1/29);

confirming that with a hydraulic power-operated steering gear the audible and visual low-level alarms on the navigating bridge and in the machinery space for each hydraulic fluid reservoir are operating satisfactorily and that at least one
power actuating system including the reservoir can be recharged from a position
within the steering gear compartment by means of a fixed storage tank (to which a
contents gauge is fitted) with fixed piping (SOLAS 74/88 reg.II-1/29);

(CI) .33 confirming that the steering gear compartment is readily accessible, that it is
separated, as far as practicable, from machinery spaces and is provided with
suitable arrangements to ensure working access to steering gear machinery and
controls under safe conditions (SOLAS 74/88 reg.II-1/29);

(CI) .34 confirming that with electric and electro-hydraulic steering gear the means for
indicating on the navigating bridge and at a main machinery control position that
the motors are running and that the overload alarm and alarm for the loss of a phase
in a three phase supply located at the main machinery control position are operating
satisfactorily (SOLAS 74/88 reg.II-1/30);

(CI) .35 confirming that the main and auxiliary machinery essential for propulsion and the
safety of the ship are provided with the effective means for its operation and
control (SOLAS 74/88 reg.II-1/31);

(CI) .36 confirming that appropriate means are provided where it is intended that the
propulsion machinery should be remotely controlled from the navigating bridge
(SOLAS 74/88 reg.II-1/31);

(CI) .37 confirming that arrangements to operate main and other machinery from a
machinery control room are satisfactory (SOLAS 74/88 reg.II-1/31);

(CI) .38 confirming that, in general, means are provided for manually overriding automatic
controls and that a failure does not prevent the use of the manual override
(SOLAS 74/88 reg.II-1/31);

(CI) .39 confirming that oil-fired and exhaust gas boilers, unfired steam generators, steam
pipe systems and air pressure systems are fitted with the appropriate safety features
(SOLAS 74/88 regs II-1/32, 33 and 34);

(CI) .40 confirming the operation of the ventilation for the machinery spaces (SOLAS 74/88
reg.II-1/35);

(CI) .41 confirming that the measures to prevent noise in machinery spaces are effective
(SOLAS 74/88 reg.II-1/36);

(CI) .42 confirming that the engine room telegraph giving visual indication of the orders
and answers both in the machinery space and on the navigating bridge is operating
satisfactorily (SOLAS 74/88, reg.II-1/37);

(CI) .43 confirming that the second means of communication between the navigation bridge
and machinery space is also operating satisfactorily and that appropriate means are
provided to any other positions from which the engines are controlled
(SOLAS 74/88 reg.II-1/37);

(CI) .44 confirming that the engineer's alarm is clearly audible in the engineers'
accommodation (SOLAS 74/88 reg.II-1/38);
confirming that precautions, taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces, are efficient;

confirming that the means of ascertaining the amount of oil contained in any oil tank are in good working condition;

confirming that the devices provided to prevent overpressure in any oil tank or in any part of the oil system, including the filling pipes, are in good working condition (SOLAS 74/88 reg. II-2/4.2.2.4);

confirming that forepeak tanks are not intended for carriage of oil fuel, lubrication oil and other flammable oils;

confirming that the electrical installations, including the main source of power and lighting systems, are installed in accordance with the approved plans (SOLAS 74/88 regs. II-1/40 and 41);

confirming that a self-contained emergency source of electrical power has been provided and that the appropriate systems are satisfactorily supplied (SOLAS 74/88 reg. II-1/45);

confirming that starting arrangements of each emergency generating set are satisfactory (SOLAS 74/88 reg. II-1/44);

confirming that precautions have been provided against shock, fire and other hazards of electrical origin (SOLAS 74/88 reg. II-1/45);

confirming that the arrangements for periodically unattended machinery spaces are satisfactory (SOLAS 74/88 regs. II-1/46 to 53) and in particular:

checking the fire precautions and testing alarms, as appropriate;

checking the means for the protection against flooding;

checking the means to control the propulsion from the navigating bridge;

ensuring that a means of vocal communication between the main machinery control room or its control position, as appropriate, and the navigating bridge and engineer officer's accommodation is provided and is effective;

checking that an alarm system is provided with random testing of functions;

checking that means are provided to automatically shut down machinery or boiler operations in the event of serious malfunction and testing the alarms;

ensuring that special requirements for the machinery, boiler and electrical installations, as appropriate, are provided;

confirming that all aspects of the structural fire protection, including the ventilation systems, in accommodation and service spaces, control stations and machinery spaces are installed in accordance with the approved plans, testing the operation of...
the means of closing the main inlets and outlets of all ventilation systems and proving that the power ventilation is capable of being stopped from outside the space served (SOLAS 74/00 regs. II-2/4.4, 5.2, 5.3.1, 5.3.2, 6.2, 6.3, 7.5.5, 7.7, 8.2, 8.4, 9.2.1, 9.3, 9.4.2, 9.5, 9.7.1, 9.7.2, 9.7.3, 9.7.5.2, 11.2, 11.3, 11.4 and 11.5) (SOLAS 74/88 regs. II-2/42 to 44, 46 to 50 and 52);

(CI) .55 confirming that all aspects of the structural fire protection, including the ventilation systems, in cargo spaces are installed in accordance with the approved plans, testing the operation of the means of closing the main inlets and outlets of all ventilation systems and proving that the power ventilation is capable of being stopped from outside the space served (SOLAS 74/00 regs. II-2/5.2.1, 11.2, 11.3, 11.5, 19.3.8, 19.3.10, 20.2.1 and 20.3) (SOLAS 74/88 regs. II-2/42 to 44, 46 to 50 and 52 to 54);

(CI) .56 confirming that stairways and ladders are so arranged to provide a means of escape from all accommodation spaces and from spaces in which the crew is normally employed, other than machinery spaces, to the open deck and thence to the lifeboats and liferafts (SOLAS 74/00 regs. II-2/13.2, 13.3.1, 13.3.3 and 13.6; FSSC ch.13 paragraph 3) (SOLAS 74/88 reg. II-2/45) and in particular that:

(CI) .56.1 at all levels of accommodation there are provided at least two widely separated means of escape from each restricted space or group of spaces;

(CI) .56.2 below the lowest open deck the main means of escape is a stairway (the second being a trunk or a stairway);

(CI) .56.3 above the lowest open deck the means of escape are stairways or doors to an open deck or a combination of them;

(CI) .56.4 the radiotelegraph station has direct access to the open deck or is provided with two means of access or egress, one of which is a porthole or window of sufficient size;

(CI) .57 confirming that two widely separated means of escape and, when appropriate, a fire shelter from the lower part of the space, are provided from each machinery space of Category A and that suitable escape routes are provided from other machinery spaces (SOLAS 74/00 reg. II-2/13.4.2; FSSC ch.13 paragraph 3) (SOLAS 74/88 reg. II-2/45);

(CI) .58 examining the arrangements for gaseous fuel for domestic purposes (SOLAS 74/00 reg. II-2/4.3);

(CI) .59 confirming, when appropriate, that all aspects of the helicopter facilities are installed in accordance with the approved plans (SOLAS 74/00 reg. II-2/18) (SOLAS 74/88 reg. II-2/18.8);

(CD) .60 confirming that asbestos is not used on board unless for applications where its use is allowed (SOLAS 74/00 reg. II-1/3-5);

(CD) .61 confirming, for bulk carriers, that dedicated sea water ballast tanks have an efficient corrosion protection system such as hard coating (SOLAS 74/00 reg. II-1/3-2).
(CI) 2.1.4 For the hull, machinery and equipment of cargo ships for the additional requirements for oil tankers the survey during construction and after installation should consist of:

(CI) 1. confirming, when appropriate, that the main steering gear comprises the necessary two or more identical power units and the requisite arrangements to regain steering capability in the event of the prescribed single failure (SOLAS 74/88 reg.II-1/29);

(CI) 2. confirming that a hull return system of distribution and earthed distribution system are not used (SOLAS 74/88 reg.II-1/45);

(CI) 3. confirming that all aspects of the location of spaces and the structural fire protection, including the special arrangements when the ship is a combination carrier, are in accordance with the approved plans (SOLAS 74/00 regs.II-2/1.6, 4.5.1, 4.5.2, 4.5.9, 9.2.4, 9.3 and 9.6.5) (SOLAS 74/88 regs.II-2/55 to 58);

(CI) 4. confirming that permanent approved gastight lighting enclosures for illuminating cargo pump rooms, having adequate strength and not impairing the integrity and gas tightness of the bulkheads or decks, are fitted in bulkheads and decks separating cargo pump rooms and other spaces;

(CI) 5. confirming that all aspects of the cargo tank venting, cargo tank purging and gas-freeing and other ventilation arrangements and protection of the cargo tank structure against pressure or vacuum are in accordance with the approved plans (SOLAS 74/00 regs.II-2/4.5.3, 4.5.4, 4.5.6, 4.5.8 and 11.6) (SOLAS 74/88 regs.II-2/59 and 62.13.1 to 62.13.3);

(CI) 6. confirming that access to bow is arranged in accordance with approved plans (SOLAS 74/00 reg.II-1/3-3);

(CI) 7. confirming, for tankers of not less than 20,000 tonnes deadweight, that emergency towing is arranged in accordance with approved plans (SOLAS 74/00 reg.II-1/3-4);

(CI) 8. confirming that dedicated sea water ballast have an efficient corrosion protection system such as hard coating (SOLAS 74/00 reg.II-1/3-2).

(CI) 2.1.5 For the hull, machinery and equipment of cargo ships for the additional requirements for chemical tankers and gas carriers the survey during construction and after installation should consist of:

(CI) 1. the provisions of (CI) 2.1.4.

(CI) 2.1.6 For the hull, machinery and equipment of cargo ships the check that the required documentation has been placed on board should consist of:

(CI) 1. confirming that the stability information and the damage control plans have been provided (SOLAS 74/88 regs.II-1/22 and 23-1);

(CI) 2. confirming that the manoeuvring booklet has been provided and that the manoeuvring information has been displayed on the navigating bridge (SOLAS 74/88 reg.II-1/28);
(CI) .3 confirming that the approved Cargo Securing Manual for ships carrying cargo units including containers is provided on board (SOLAS 74/94 reg.VI/5.6);

(CI) .4 confirming that the approved loading instrument on bulk carriers of 150 m in length and upwards is provided on board (SOLAS 74/97 reg.XII/11).

(CI) 2.1.7 For the hull, machinery and equipment of cargo ships the completion of the initial survey should consist of:

(CI) .1 after a satisfactory survey, the Cargo Ship Safety Construction Certificate should be issued.

(CA) 2.2 Annual surveys - see part “General” section 4.2.

(CA) 2.2.1 For the hull, machinery and equipment of cargo ships the examination of current certificates and other records should consist of:

(CA) .1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

(CA) .2 checking the validity of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board;

(CA) .3 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

(CA) .4 checking the validity of the International Oil Pollution Prevention Certificate;

(CA) .5 checking the certificates of class, if the ship is classed with a classification society;

(CA) .6 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;

(CA) .7 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk;

(CA) .8 checking, when appropriate, the validity of the International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk;

(CA) .9 checking that the ship’s complement complies with the Minimum Safe Manning Document (SOLAS 74/00 reg.V/14) (SOLAS 74/88 reg.V/13(b));

(CA) .10 checking that the master, officers and ratings are certificated as required by the STCW Convention;

(CA) .11 checking whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the appropriate certificate,
(CA)  .12 confirming that the stability information, including damage stability, where applicable, and the damage control plans are on board (SOLAS 74/88 reg. II-1/22, 23 and 25);

(CA)  .13 confirming that the manoeuvring booklet is on board and that the manoeuvring information is displayed on the navigating bridge (SOLAS 74/88 reg. II-1/28);

(CA)  .14 checking by the log book entries that the testing and the emergency drills of the steering gear have been carried out (SOLAS 74/00 reg. V/26) (SOLAS 74/88 reg. V/19);

(CA)  .15 checking that the routine surveys of the boilers and other pressure vessels, as determined by the Administration, have been carried out as required and that safety devices, such as the boiler safety valves, have been tested;

(CA)  .16 checking that, as appropriate, the hull and machinery has been presented for survey in accordance with the continuous survey scheme approved by the Administration or a classification society;

(CA)  .17 confirming, when appropriate, that a complete file of the enhanced survey reports and the Condition Evaluation Report are on board;

(CA)  .18 confirming, for bulk carriers, that the loading/unloading booklet required in SOLAS regulation VI/7 is on board (SOLAS 74/97 reg. XII/8.1);

(CA)  .19 confirming, for bulk carriers with restrictions imposed with respect to the carriage of cargoes with a density of 1,780 kg/m³ above, that a triangle is permanently marked at midship (SOLAS 74/97 reg. XII/8.3);

(CA)  .20 confirming, for bulk carriers, that the loading instrument is on board and functioning (SOLAS 74/97 reg. XII/11);

(CA)  .21 confirming, for bulk carriers of 150 m in length and upwards of single skin construction designed to carry solid bulk cargoes having a density of 1,780 kg/m³ above constructed before 1 July 1999 have after the implementation date given in SOLAS 94/97 reg. XII/3 sufficient stability and strength to withstand flooding of the foremost cargo hold (SOLAS 74/97 reg. XII/3, 4, 5 and 6);

(CA)  .22 confirming approved Cargo Securing Manual for ships carrying cargo units including containers is on board (SOLAS 74/94 reg. VI/5.6);

(CA)  .23 confirming that the loading booklet for carriage of cargoes in bulk is on board (SOLAS 74/00 reg. VI/7);

(CA)  .24 confirming that asbestos was not used on board (SOLAS 74/00 reg. II-1/3-5);

(CA)  .25 examining the functionality of bilge well alarms to all cargo holds and conveyor tunnels (SOLAS 74/97 reg. XII/9).

* See the Guidelines on the Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers (resolution A.744(18)).

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For the hull**, machinery and equipment of cargo ships the annual survey should consist of:

1. examining, in general and as far as can be seen, the hull and its closing appliances;

2. examining the anchoring and mooring equipment as far as can be seen;

3. examining the collision and the other watertight bulkheads as far as can be seen (SOLAS 74/88 regs II-1/11 and 14);

4. examining and testing (locally and remotely) all the watertight doors in watertight bulkheads (SOLAS 74/88 reg. II-1/18);

5. examining each bilge pump and confirming that the bilge pumping system for each watertight compartment is satisfactory (SOLAS 74/88 reg. II-1/21);

6. confirming that the drainage from enclosed cargo spaces situated on the freeboard deck is satisfactory (SOLAS 74/88 reg. II-1/21);

7. confirming that the machinery, boilers and other pressure vessels, associated piping systems and fittings are installed and protected as to reduce to a minimum any danger to persons on board, due regard being given to moving parts, hot surfaces and other hazards (SOLAS 74/00 reg. II-2/4.2 (except 4.2.2.3.4 relating to remote closing of valves included in safety equipment)) (SOLAS 74/88 regs II-1/26, 32, 33 and 34) (SOLAS 74/88 reg. II-2/15 (except 15.2.5));

8. confirming that the normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative (SOLAS 74/88 reg. II-1/26);

9. confirming that means are provided so that the machinery can be brought into operation from the dead ship condition without external aid (SOLAS 74/88 reg. II-1/26);

10. carrying out a general examination of the machinery, the boilers, all steam, hydraulic, pneumatic and other systems and their associated fittings to see whether they are being properly maintained and with particular attention to the fire and explosion hazards (SOLAS 74/88 reg. II-1/26 and 27);

11. examining and testing the operation of main and auxiliary steering arrangements, including their associated equipment and control systems (SOLAS 74/88 reg. II-1/29);

12. confirming that the means of communication between the navigation bridge and steering gear compartment and the means of indicating the angular position of the rudder are operating satisfactorily (SOLAS 74/88 reg. II-1/29);

13. confirming that with ships having emergency steering positions there are means of relaying heading information and, when appropriate, supply visual compass

** See also the Guidelines on the Enhanced Programme of Inspections During Surveys of Bulk Carriers (resolution A.744(18), annex A).

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readings to the emergency steering position (SOLAS 74/88 regs.II-1/29 and SOLAS 74/00 reg.V/19 or the SOLAS 74/88 text in force prior to 1 July 2002 reg.V/12 as appropriate);

(CA) .14 confirming that the various alarms required for hydraulic power-operated, electric and electro-hydraulic steering gears are operating satisfactorily and that the re-charging arrangements for hydraulic power-operated steering gears are being maintained (SOLAS 74/88 regs.II-1/29 and 30);

(CA) .15 examining the means for the operation of the main and auxiliary machinery essential for propulsion and the safety of the ship, including, when applicable, the means of remotely controlling the propulsion machinery from the navigating bridge and the arrangements to operate the main and other machinery from a machinery control room (SOLAS 74/88 reg.II-1/31);

(CA) .16 confirming the operation of the ventilation for the machinery spaces (SOLAS 74/88 reg.II-1/35);

(CA) .17 confirming that the measures to prevent noise in machinery spaces are effective (SOLAS 74/88 reg.II-1/36);

(CA) .18 confirming that the engine room telegraph, the second means of communication between the navigation bridge and the machinery space and the means of communication with any other positions from which the engines are controlled are operating satisfactorily (SOLAS 74/88 reg.II-1/37);

(CA) .19 confirming that the engineer's alarm is clearly audible in the engineers' accommodation (SOLAS 74/88 reg.II-1/38);

(CA) .20 examining, as far as practicable, visually and in operation, the electrical installations, including the main source of power and the lighting systems (SOLAS 74/88 regs.II-1/40 and 41);

(CA) .21 confirming, as far as practicable, the operation of the emergency source(s) of electrical power including their starting arrangements, the systems supplied and, when appropriate, their automatic operation (SOLAS 74/88 regs.II-1/43 and 44);

(CA) .22 examining, in general, that the precautions provided against shock, fire and other hazards of electrical origin are being maintained (SOLAS 74/88 reg.II-1/45);

(CA) .23 examining the arrangements for periodically unattended machinery spaces (SOLAS 74/88 regs.II-1/46 to 53) and, in particular, the random testing of alarm, automatic and shutdown functions;

(CA) .24 confirming, as far as practicable, that no changes have been made in the structural fire protection, examining any manual and automatic fire doors and proving their operation, testing the means of closing the main inlets and outlets of all ventilation systems and testing the means of stopping power ventilation systems from outside the space served (SOLAS 74/00 regs.II-2/4.4, 5.2, 5.3.2, 5.3.2, 6.2, 6.3, 7.5.5, 7.7, 8.2, 8.3, 8.4, 9.2.1, 9.2.3, 9.3, 9.4.2, 9.5, 9.7.1, 9.7.2, 9.7.3, 9.7.5.2, 11.2, 11.3, 11.4, 11.5, 19.3.8, 19.3.10, 20.2.1 and 20.3) (SOLAS 74/88 regs.II-2/42 to 44, 46 to 50 and 52);
(CA) .25 confirming that the means of escape from accommodation, machinery and other spaces are satisfactory (SOLAS 74/60 regs. II-2/13.2, 13.3.1, 13.3.3, 13.4.2 and 13.6) (SOLAS 74/88 reg. II-2/45);

(CA) .26 examining the arrangements for gaseous fuel for domestic purposes (SOLAS 74/60 reg. II-2/4.3) (SOLAS 74/88 reg. II-2/51);

(CA) .27 examining visually the condition of any expansion joints in sea water systems.

(CA) 2.2.3 For the hull*, machinery and equipment of cargo ships for the additional requirements for oil tankers the annual survey should consist of:

(CA) .1 confirming, when appropriate, that the requisite arrangements to regain steering capability in the event of the prescribed single failure are being maintained (SOLAS 74/88 reg. II-1/29);

(CA) .2 examining the cargo tank openings, including gaskets, covers, coamings and screens;

(CA) .3 examining the cargo tank pressure/vacuum valves and devices to prevent the passage of flame (SOLAS 74/60 reg. II-2/11.6);

(CA) .4 examining the devices to prevent the passage of flame on vents to all bunker, oily-ballast and oily-slop tanks and void spaces, as far as practicable;

(CA) .5 examining the cargo tank venting, cargo tank purging and gas-freeing and other ventilation systems (SOLAS 74/60 reg. II-2/4.5.3, 4.5.4, 4.5.6 and 4.5.8) (SOLAS 74/88 reg. II-2/59);

(CA) .6 examining the cargo, crude oil washing, ballast and stripping systems both on deck and in the cargo pumping rooms and the bunker system on deck;

(CA) .7 confirming that all electrical equipment in dangerous zones is suitable for such locations, is in good condition and is being properly maintained;

(CA) .8 confirming that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in good condition;

(CA) .9 examining all pump room bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of cargo pump room bulkheads;

(CA) .10 examining, as far as practicable, the cargo, bilge, ballast and stripping pumps for undue gland seal leakage, verification of proper operation of electrical and mechanical remote operating and shutdown devices and operation of cargo pump room bilge system, and checking that pump foundations are intact;

* See also the Guidelines on the Enhanced Programme of Inspections During Surveys of Oil Tankers (resolution A.744(18), annex B).

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(CA) .11 confirming that the pump room ventilation system is operational, ducting intact, dampers are operational and screens clean;

(CA) .12 verifying that installed pressure gauges on cargo discharge lines and level indicator systems are operational;

(CA) .13 examining access to bow arrangement (SOLAS 74/00 reg.II-1/3-3);

(CA) .14 examining the towing arrangement for tankers of not less than 20,000 tonnes deadweight (SOLAS 74/00 reg.II-1/3-4);

(CA) .15 confirming that the corrosion prevention system fitted to dedicated ballast water tanks of oil tankers and bulk carriers is maintained (SOLAS 74/00 reg.II-1/3-2);

(CA) .16 examining the emergency lighting in all cargo pump rooms of tankers constructed after 1 July 2002 (SOLAS 74/00 reg.II-1/43).

(CA)2.2.4 For the hull, machinery and equipment of cargo ships for the additional requirements for chemical tankers and gas carriers the annual survey should consist of:

(CA) .1 the provisions of (CA) 2.2.3.1.

(CA)2.2.5 For the hull, machinery and equipment of cargo ships the completion of the annual survey should consist of:

(CA) .1 after a satisfactory survey, the Cargo Ship Safety Construction Certificate should be endorsed;

(CA) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part “General” section 4.8.

(CIn)2.3 Intermediate surveys - see part “General” section 4.3

(CIn)2.3.1 For the hull, machinery and equipment of cargo ships the examination of current certificates and other records should consist of:

(CIn) .1 the provisions of (CA) 2.2.1.

(CIn)2.3.2 For the hull, machinery and equipment of cargo ships the intermediate survey should consist of:

(CIn) .1 the provisions of (CA) 2.2.2;

(CIn) .2 for ships over 5 years of age, an internal examination of representative spaces used for water ballast;

(CIn) .3 for ships over 10 years of age, other than ships engaged in the carriage of dry cargoes only, an internal examination of selected cargo spaces;

(CIn) .4 for ships over 15 years of age, engaged in the carriage of dry cargoes only, an internal examination of selected cargo spaces.
(ClIn)2.3.3 For the hull, machinery and equipment of cargo ships for the additional requirements for oil tankers the intermediate survey should consist of:

(ClIn) .1 the provisions of (CA) 2.2.3;

(ClIn) .2 should there be any doubt as to its condition when examining the various piping systems, the piping may be required to be pressure tested, gauged or both. Particular attention is to be paid to repairs such as welded doublers;

(ClIn) .3 for ships over ten years of age an internal examination of selected cargo spaces;

(ClIn) .4 testing the insulation resistance of electrical circuits in dangerous zones such as cargo pump rooms and areas adjacent to cargo tanks but in cases where a proper record of testing is maintained consideration should be given to accepting recent readings.

(ClIn)2.3.4 For the hull, machinery and equipment of cargo ships for the additional requirements for chemical tankers and gas carriers the intermediate survey should consist of:

(ClIn) .1 the provisions of (CA) 2.2.3.1.

(ClIn)2.3.5 For the hull, machinery and equipment of cargo ships the completion of the intermediate survey should consist of:

(ClIn) .1 after a satisfactory survey, the Cargo Ship Safety Construction Certificate should be endorsed;

(ClIn) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part "General" section 4.8.

(CR)2.4 Renewal surveys - see part "General" section 4.5

(CR)2.4.1 For the hull, machinery and equipment of cargo ships the examination of current certificates and other records should consist of:

(CR) .1 the provisions of (CA) 2.2.1, except for the validity of the Cargo Ship Safety Construction Certificate.

(CR)2.4.2 For the hull, machinery and equipment of cargo ships the renewal survey should consist of:

(CR) .1 the provisions of (ClIn) 2.3.2;

(CR) .2 examination of sea valves and their connections to the hull;

(CR) .3 examination of anchoring and mooring equipment for which purpose the anchors should be lowered and raised using the windlass.

(CR)2.4.3 For the hull, machinery and equipment of cargo ships for the additional requirements for oil tankers the renewal survey should consist of:

(CR) .1 the provisions of (ClIn) 2.3.3.
(CR) 2.4.4 For the hull, machinery and equipment of cargo ships for the additional requirements for chemical tankers and gas carriers the renewal survey should consist of:

(CR) .1 the provisions of (CA) 2.2.3.1.

(CR) 2.4.5 For the hull, machinery and equipment of cargo ships the completion of the renewal survey should consist of:

(CR) .1 after a satisfactory survey, the Cargo Ship Safety Construction Certificate should be issued.

(B) 3 GUIDELINES FOR THE INSPECTION OF THE OUTSIDE OF THE SHIP'S BOTTOM OF CARGO SHIPS

(CB) 3.1 For the inspection of the outside of the ship's bottom of cargo ships the inspection should consist of:

(CB) .1 examination of the ship's shell including bottom and bow plating, keel, bilge keels, stem, stern frame and rudder;

(CB) .2 noting the clearances measured in the rudder bearings;

(CB) .3 examination of the propeller and shaft seals, as far as practicable;

(CB) .4 noting the clearance measured in the propeller shafts, as far as practicable;

(CB) .5 examination of sea chests and strainers;

(CB) .6 the survey of related items inspected at the same time (see part "General" section 5.1).

(CB) 3.2 For the inspection of the outside of the ship's bottom of cargo ships the completion of the inspection should consist of:

(CB) .1 after a satisfactory survey, the Cargo Ship Safety Construction Certificate should be endorsed;

(CB) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part "General" section 4.8.

(R) 4 GUIDELINES FOR SURVEYS FOR THE CARGO SHIP SAFETY RADIO CERTIFICATE

(RI) 4.1 Initial surveys - see part "General" section 4.1

(RI) 4.1.1 For the radio installations, including those used in life-saving appliances, of cargo ships the examination of plans and designs should consist of:

(RI) .1 establishing the sea areas declared for operation, the equipment installed to fulfil the functional requirements for the sea areas of operation, the methods adopted to ensure the availability of the functional requirements and the arrangements for supply of an emergency source of energy (if any) (SOLAS 74/88 regs. II-1/43 and IV/1 to 15).
establishing which radio equipment is to be surveyed and, if duplication of equipment is used as a means of ensuring the availability of the functional requirements, establishing which is the "basic equipment" and which the "duplicated equipment" (SOLAS 74/88 reg.IV/15) (Additional radiocommunications equipment provided other than for SOLAS compliance should be noted);

confirming all SOLAS equipment complies with appropriate performance standards not inferior to those adopted by IMO (SOLAS 74/88 reg.IV/14);

examining the plans for the provision and positioning of the radio installation including sources of energy and antennas (SOLAS 74/88 regs.II-1/43, IV/6 and 14);

examining the plans for the provision and positioning of the radio life-saving appliances (SOLAS 74/88 reg.III/6).

4.1.2 For the radio installations, including radio life-saving appliances, of cargo ships the survey during construction and after installation should consist of:

examining the position, physical and electromagnetic protection and illumination of each radio installation (SOLAS 74/88 reg.IV/6);

confirming the provision of equipment for the radio installation with due regard to the declared sea areas in which the ship will trade and the declared means of maintaining availability of functional requirements (SOLAS 74/88 regs.III/6, IV/7 to 11, 14 and 15);

confirming the ability to initiate the transmission of ship-to-shore distress alerts by at least two separate and independent means, each using a different radiocommunication service, from the position from which the ship is normally navigated (SOLAS 74/88 regs.IV/4, 7 to 11);

examining all antennas, including:

visually checking all antennas, including INMARSAT antennas, and feeders for satisfactory siting and absence of defects (SOLAS 74/88 reg.IV/14);

checking insulation and safety of all antennas;

examining the reserve source of energy, including:

checking there is sufficient capacity to operate the basic or duplicated equipment for 1 hour or 6 hours, as appropriate (SOLAS 74/88 reg.IV/13);

and if the reserve source of energy is a battery:

checking its siting and installation (SOLAS 74/88 reg.IV/13);

where appropriate, checking its condition by specific gravity measurement or voltage measurement;
5.2.3 with the battery off charge, and the maximum required radio installation load connected to the reserve source of energy, checking the battery voltage and discharge current;

5.2.4 checking that the charger(s) are capable of re-charging the reserve battery within 10 hours (SOLAS 74/88 reg.IV/13);

5.2.5 checking that information of ship’s position is provided continuously and automatically to all two-way communication equipment (SOLAS 74/88 reg.IV/18);

.6 examining the VHF transceiver(s), including:

.6.1 checking for operation on channels 6, 13 and 16 (SOLAS 74/88 regs.IV/7 and 14);

.6.2 checking frequency tolerance, transmission line quality and radio frequency power output (SOLAS 74/88 reg.IV/14);

.6.3 checking for correct operation of all controls including priority of control units (SOLAS 74/88 reg.IV/14);

.6.4 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

.6.5 checking the operation of the VHF control unit(s) or portable VHF equipment provided for navigational safety (SOLAS 74/88 reg.IV/6);

.6.6 checking for correct operation by on-air contact with a coast station or other ship;

.7 examining the VHF DSC controller and channel 70 DSC watch receiver, including:

.7.1 performing an off-air check confirming the correct Maritime Mobile Service Identity is programmed in the equipment (SOLAS 74/88 reg.IV/14);

.7.2 checking for correct transmission by means of a routine or test call to a coast station, other ship, on board duplicate equipment or special test equipment;

.7.3 checking for correct reception by means of a routine or test call from a coast station, other ship, on board duplicate equipment or special test equipment;

.7.4 checking the audibility of the VHF/DSC alarm;

.7.5 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

.8 examining the MF/HF radiotelephone equipment, including:

.8.1 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

.8.2 checking the antenna tuning in all appropriate bands;
(RI) .8.3 checking the equipment is within frequency tolerance on all appropriate bands (SOLAS 74/88 reg.IV/14);

(RI) .8.4 checking for correct operation by contact with a coast station and/or measuring transmission line quality and radio frequency output;

(RI) .8.5 checking receiver performance by monitoring known stations on all appropriate bands;

(RI) .8.6 if control units are provided outside the navigating bridge, checking the control unit on the bridge has first priority for the purpose of initiating distress alerts (SOLAS 74/88 regs.IV/9, 10, 11 and 14);

(RI) .9 examining the HF radiotelex equipment, including:

(RI) .9.1 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

(RI) .9.2 confirming that the correct selective calling number is programmed in the equipment;

(RI) .9.3 checking correct operation by inspection of recent hard copy or by a test with a coast radio station (SOLAS 74/88 regs.IV/10 and 11);

(RI) .10 examining the MF/HF DSC controller(s), including:

(RI) .10.1 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

(RI) .10.2 confirming that the correct Maritime Mobile Service Identity is programmed in the equipment;

(RI) .10.3 checking the off-air self-test programme;

(RI) .10.4 checking operation by means of a test call on MF and/or HF to a coast radio station if the rules of the berth permit the use of MF/HF transmissions (SOLAS 74/88 regs.IV/9, 10 and 11);

(RI) .10.5 checking the audibility of the MF/HF DSC alarm;

(RI) .11 examining the MF/HF DSC watch receiver(s), including:

(RI) .11.1 confirming that only distress and safety DSC frequencies are being monitored (SOLAS 74/88 regs.IV/9 to 12);

(RI) .11.2 checking that a continuous watch is being maintained whilst keying MF/HF radio transmitters (SOLAS 74/88 reg.IV/12);

(RI) .11.3 checking for correct operation by means of a test call from a coast station or other ship;
(RI) .12 examining the radiotelephone distress frequency watch receiver (SOLAS regs. IV/7 and 14), including:

(RI) .12.1 checking the mute/demute function;

(RI) .12.2 checking receiver sensitivity against known stations;

(RI) .12.3 checking the audibility of the loudspeaker;

(RI) .13 examining the INMARSAT Ship Earth Station(s), including:

(RI) .13.1 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy, and that where an uninterrupted supply of information from the ship's navigational or other equipment is required ensuring such information remains available in the event of failure of the ship's main or emergency source of electrical power. (SOLAS 74/88 regs. IV/13 and 14);

(RI) .13.2 checking the distress function by means of an approved test procedure where possible (SOLAS 74/88 regs. IV/10, 12 and 14);

(RI) .13.3 checking for correct operation by inspection of recent hard copy or by test call;

(RI) .14 if appropriate, examining the NAVTEX equipment (SOLAS 74/88 regs. IV/7, 12 and 14), including:

(RI) .14.1 checking for correct operation by monitoring incoming messages or inspecting recent hard copy;

(RI) .14.2 running the self-test programme if provided;

(RI) .15 examining the Enhanced Group Call equipment (SOLAS 74/88 regs. IV/7 and 14), including:

(RI) .15.1 checking for correct operation and area by monitoring incoming messages or by inspecting recent hard copy;

(RI) .15.2 running the self-test programme if provided;

(RI) .16 if appropriate, examining the radio equipment for receipt of maritime safety information by HF NBDP (SOLAS 74/88 regs. IV/7, 12 and 14) including:

(RI) .16.1 checking for correct operation by monitoring incoming messages or inspecting recent hard copy;

(RI) .16.2 running the self-test programme if provided;

(RI) .17 examining the 406 MHz satellite EPIRB (SOLAS 74/88 regs. IV/7 and 14), including:

(RI) .17.1 checking position and mounting for float free operation;

(RI) .17.2 carrying out visual inspection for defects;
(RI) .17.3 carrying out the self-test routine;
(RI) .17.4 checking that the EPIRB ID is clearly marked on the outside of the equipment and, where possible, decoding the EPIRB identity number confirming it is correct;
(RI) .17.5 checking the battery expiry date;
(RI) .17.6 if provided, checking the hydrostatic release and its expiry date;
(RI) .17.7 checking the emission on operational frequencies, coding and registration on the 406 MHz signal without transmission of a distress call to the satellite;
(RI) .17.8 checking that the EPIRB has been subject to maintenance at intervals not exceeding five years at an approved shore-based maintenance facility (SOLAS 74/00 reg.IV/15.9);
(RI) .17.9 if possible, checking the emission on operational frequencies, coding and registration on the 121.5 MHz homing signal without transmission of a distress call to the satellite;
(RI) .18 examining the INMARSAT 1.6 GHz satellite EPIRB (SOLAS 74/88 regs.IV/7 and 14);

(To be developed in due course when operational experience has been gained with this new equipment)

(RI) .19 examining the VHF DSC EPIRB (SOLAS 74/88 regs.IV/8 and 14);

(To be developed in due course when operational experience has been gained with this new equipment)

(RI) .20 examining the two-way VHF radiotelephone apparatus (SOLAS 74/88 reg.III/6), including:

(RI) .20.1 checking for correct operation on Channel 16 and one other by testing with another fixed or portable VHF installation;
(RI) .20.2 checking the battery charging arrangements where re-chargeable batteries are used;
(RI) .20.3 checking the expiry date of primary batteries where used;
(RI) .20.4 where appropriate, checking any fixed installation provided in a survival craft;

(RI) .21 examining the radar transponder(s) (SOLAS 74/88 regs.III/6, IV/7 and 14), including:

(RI) .21.1 checking the position and mounting;
(RI) .21.2 monitoring response on ship's 9 GHz radar;
(RI) .21.3 checking the battery expiry date;
(RI) .22 examining the test equipment and spares carried to ensure carriage is adequate in accordance with the sea areas in which the ship trades and the declared options for maintaining availability of the functional requirements (SOLAS 74/88 reg.IV/15).

(RI) 4.1.3 For the radio installations, including those used in life-saving appliances, the check that documentation, etc., has been placed on board should consist of:

(RI) .1 checking for a valid radio licence issued by the flag Administration (ITU RR Art.24);

(RI) .2 checking the radio operator's certificates of competence (SOLAS 74/88 reg.IV/16 and ITU RR Art.56);

(RI) .3 checking the radio record (log) (SOLAS 74/88 reg.IV/17 and ITU RR App.11);

(RI) .4 checking the carriage of up-to-date ITU publications (ITU RR App.11);

(RI) .5 checking the carriage of operating manuals for all equipment (SOLAS 74/88 reg.IV/15);

(RI) .6 checking the carriage of service manuals for all equipment when at-sea maintenance is the declared option (SOLAS 74/88 reg.IV/15).

(RI) 4.1.4 For the radio installations, including those used in life-saving appliances, of cargo ships the completion of the initial survey should consist of:

(RI) .1 the surveyor preparing and forwarding a report of survey, indicating clearly the organisation he represents, to the relevant authorities detailing results of the survey and recording omissions and deficiencies who, if satisfied, should issue a Cargo Ship Safety Radio Certificate and the associated Record of Equipment (form R).

(RP) 4.2 Periodical surveys - see part “General” section 4.4

(RP) 4.2.1 For radio installations, including radio life-saving appliances, on cargo ships the examination of current certificates and other records should consist of:

(RP) .1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

(RP) .2 checking the validity, where appropriate, of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board;

(RP) .3 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

(RP) .4 checking the validity of the International Oil Pollution Prevention Certificate;

(RP) .5 checking the certificates of class, if the ship is classed with a classification society;
(RP) .6 checking, where appropriate, the validity of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;

(RP) .7 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk;

(RP) .8 checking, when appropriate, the validity of the International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk;

(RP) .9 checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/88 reg.V/13(b));

(RP) .10 checking that adequate information is on board to enable the equipment to be properly operated and maintained;

(RP) .11 checking that the master, officers and ratings are certificated as required by the STCW Convention;

(RP) .12 confirming that any new equipment has been properly approved before installation and that no changes have been made such as would affect the validity of the certificate;

(RP) .13 confirming that a record has been kept in the period since the last survey to the satisfaction of the Administration and as required by the Radio Regulations (SOLAS 74/88 reg.IV/17);

(RP) .14 checking documentary evidence that the actual capacity of the battery has been proved in port within the last 12 months (SOLAS 74/88 reg.IV/13);

(RP) .15 confirming that the provisions of (RI) 4.1.3 have been met.

(RP) 4.2.2 For the radio installations, including those used in life-saving appliances, of cargo ships the periodical survey should consist of:

(RP) .1 the provisions of (RI) 4.1.2.

(RP) 4.2.3 For the radio installations, including those used in life-saving appliances, of cargo ships the completion of the periodical survey should consist of:

(RP) .1 after a satisfactory survey, the Cargo Ship Safety Radio Certificate should be endorsed;

(RP) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part “General” section 4.8.

(RR) 4.3 Renewal surveys - see part “General” section 4.5

(RR) 4.3.1 For the radio installations, including those used in life-saving appliances, of cargo ships the examination of current certificates and other records should consist of:
(RR) .1 the provisions of (RP) 4.2.1, except for the validity of the Cargo Ship Safety Radio Certificate.

(RR) 4.3.2 For the radio installations, including those used in life-saving appliances, of cargo ships the renewal survey should consist of:

(RR) .1 the provisions of (RI) 4.1.2.

(RR) 4.3.3 For the radio installations, including those used in life-saving appliances, of cargo ships the completion of the renewal survey should consist of:

(RR) .1 after a satisfactory survey, issuing the Cargo Ship Safety Radio Certificate as per the provisions of (RI) 4.1.4.

(P) 5 GUIDELINES FOR SURVEYS FOR THE PASSENGER SHIP CERTIFICATE

(P1) 5.1 Initial surveys - see part "General" section 4.1.

(P1) 5.1.1 For the hull, machinery and equipment of passenger ships the examination of plans and designs should consist of:

(P1) .1 examining the subdivision and stability (SOLAS 74/88 reg.s II-1/4 to 8, 8-1, 8-2, 8-3, 13 and 16);

(P1) .2 examining the ballasting arrangements (SOLAS 74/88 reg. II-1/9);

(P1) .3 examining the arrangement of the bulkheads, their construction and the openings therein, including the disposition and means of operation of the watertight doors (SOLAS 74/88 reg.s II-1/10, 14, and 15);

(P1) .4 examining the arrangement of the double bottoms (SOLAS 74/88 reg. II-1/12);

(P1) .5 examining the arrangements for the openings in the shell plating below the margin line, the construction of the watertight doors, sidecuttes, watertight decks, trunks, etc., and the watertight integrity above the margin line (SOLAS 74/88 reg.s II-1/17, 18, 19 and 20);

(P1) .6 examining the plans for the bilge pumping (SOLAS 74/88 reg.s II-1/21 and 39);

(P1) .7 examining, when appropriate, the means of indicating the status of any bow doors and the leakage there from (SOLAS 74/88 reg. II-1/23-2);

(P1) .8 examining the plans for the machinery installation (SOLAS 74/88 reg.s II-1/26 to 36 and 54);

(P1) .9 examining the plans for the electrical installation (SOLAS 74/88 reg.s II-1/39, 40, 41, 42, 44 and 45);

(P1) .10 checking, when appropriate, the provision of supplementary emergency lighting (SOLAS 74/88 reg. II-1/42-1).
examining the plans for the fire pumps, fire mains, hydrants, hoses and nozzles and the international shore connection (SOLAS 74/88 reg.II-1/39 and SOLAS 74/00 reg.II-2/10.2; FSSC chs.2 and 12) (SOLAS 74/88 reg.II-1/39 and regs.II-2/4 and 19);

checking the provision and specification of the fire extinguishers and the fireman's outfits (SOLAS 74/88 regs.II-2/6 and 17);

examining the plans for the fire extinguishing and special arrangements in the machinery spaces (SOLAS 74/88 reg.II-1/39 and regs.II-2/7 and 11);

examining the arrangements for oil fuel, lubricating oil and other flammable oils (SOLAS 74/00 reg.II-2/4.2.3) (SOLAS 74/88 reg.II-2/15);

examining the plans for the structural fire protection, including the means of escape (SOLAS 74/00 regs.II-2/4.4.4, 5.2, 5.3, 7.5, 7.8.2, 8.4, 8.5, 9, 10.6, 11, 13, 17, 20; FSSC ch.13 sect.5663 1 and 2) (SOLAS 74/88 regs.II-2/23 to 36);

examining the plans for the protection of special category spaces and other cargo spaces (SOLAS 74/88 regs.II-2/37, 38 and 39);

examining the plans for the fixed fire detection and alarm system, the crew alarm and the public address system or other effective means of communication (SOLAS 74/00 reg.II-2/12) (SOLAS 74/88 reg.II-2/40);

examining the plans for the special arrangements for the carriage of dangerous goods, when appropriate, including water supplies, electrical equipment and wiring, fire detection, bilge pumping and personnel protection (SOLAS 74/88 regs.II-2/41 and 54);

examining the provision and disposition of the survival craft and rescue boats and the arrangements for mustering passengers (SOLAS 74/00 regs.III/11 to 17, 21 and 24);

examining the design of the survival craft, including their equipment, launching and recovery appliances and embarkation and launching arrangements (SOLAS 74/88 regs.III/20 to 24, 36, 38 to 44 and 48);

examining the design of the rescue boats, including their equipment and launching and recovery appliances and arrangements (SOLAS 74/88 regs.III/16, 20, 47 and 48);

examining the provision, specification and stowage of two-way VHF radiotelephone apparatus and radar transponders (SOLAS 74/88 reg.III/6);

examining the provision, specification and stowage of the distress flares and the line-throwing appliance and the provision of on board communications equipment and the general alarm system (SOLAS 74/88 regs.III/6, 17, 35, 49 and 50);

examining the provision, specification and stowage of the lifebuoys, including those fitted with self-igniting lights, self-activating smoke signals and buoyant
lines, lifejackets, immersion suits and thermal protective aids (SOLAS 74/88 reg.

examine the plans for the lighting of the muster and embarkation stations and the
alleyways, stairways and exits giving access to the muster and embarkation
stations, including the supply from the emergency source of power (SOLAS 74/88 reg.

examine the plans for the positioning of, and the specification for, the navigation
lights, shapes and sound signalling equipment (International Regulations for
Preventing Collisions at Sea (COLREG) in force reg. 20 to 24, 27 to 30 and 33);

examine the plans relating to the bridge design and arrangement of navigational
systems and equipment and bridge procedures (SOLAS 74/00 reg. V/15);

check the provision and specification of the following navigation equipment as
appropriate: daylight signalling lamp, magnetic compass, transmitting heading
device, gyro compass, gyro compass repeaters, radar installation(s), automatic
identification system, electronic plotting aid, automatic tracking aid(s) or automatic
radar plotting aid(s), echo-sounding device, speed and distance indicator, rudder
gle indicator, propeller rate of revolution indicator, variable pitch propeller pitch
and operational mode indicator, rate-of-turn indicator, heading or track control
system, GNSS receiver, terrestrial radio navigation system and sound reception
system, ECDIS including back-up arrangements, a pelorus or compass bearing
device and means for correcting heading and bearings (SOLAS 74/00 reg. V/19);

check the provision and specification of the voyage data recorder
(SOLAS 74/00 reg. V/20);

check navigation bridge visibility (SOLAS 74/00 reg. V/22);

check the provision and specification of the pilot ladders and hoists/pilot
transfer arrangements (SOLAS 74/00 reg. V/23);

establish the sea areas declared for operation, the equipment installed to fulfil
the functional requirements for the sea areas of operation, the methods adopted to
ensure the availability of the functional requirements and the arrangements for
supply of an emergency source of energy (if any) (SOLAS 74/88 reg. II-1/42 and
IV/1 to 15);

establishing which radio equipment is to be surveyed and, if duplication of
equipment is used as a means of ensuring the availability of the functional
requirements, establishing which is the "basic equipment" and which the
"duplicated equipment" (SOLAS 74/88 reg. IV/15) (Additional radiocommunication
equipment provided other than for SOLAS compliance should be noted);

confirming all SOLAS equipment complies with appropriate performance
standards not inferior to those adopted by IMO (SOLAS 74/88 reg. IV/14);

examine the plans for the provision and positioning of the radio installation
including sources of energy and antennas. (SOLAS 74/88 reg. II-1/42, IV/6 and
14);
(PI) .36 examining the plans for the provision and positioning of the radio life-saving appliances (SOLAS 74/88 reg. III/6);

(PI) .37 if applicable, checking that a list of all limitations on the operation of a passenger ship is kept on board and kept updated.

(PI) 5.1.2 For the hull, machinery and equipment of passenger ships the survey during construction and after installation should consist of:

(PI) .1 examining the outside of the ship's bottom, including the bottom and bow plating, keel, bilge keels, stem, stern frame, the rudder, sea chests and strainers (SOLAS 74/88 reg. II/7(b)(i));

(PI) .2 confirming the arrangements for the subdivision, including the ship's stability in the damaged condition, and checking the subdivision load lines (SOLAS 74/88 reg. II-1/4 to 8, 13 and 16);

(PI) .3 checking the ballasting arrangements (SOLAS 74/88 reg. II-1/9);

(PI) .4 confirming the arrangement of the bulkheads, their construction and the openings therein, confirming that the collision bulkhead is watertight up to the freeboard deck, that the valves fitted on the pipes piercing the collision bulkhead are operable from above the freeboard deck and that there are no doors, manholes, ventilation ducts or any other openings, confirming that the other bulkheads, as required for the ship's subdivision, are watertight up to the bulkhead deck and confirming the construction of the watertight doors and that they have been tested (SOLAS 74/88 reg. II-1/10, 14, 15 and 18);

(PI) .5 confirming that the watertight integrity has been maintained where pipes, scuppers, etc., pass through sub-division watertight bulkheads (SOLAS 74/88 reg. II-1/15);

(PI) .6 confirming that a diagram is provided on the navigating bridge showing the location of the watertight doors together with indicators showing whether the doors are open or closed and confirming that the watertight doors and their means of operation have been installed in accordance with the approved plans (SOLAS 74/88 reg. II-1/15);

(PI) .7 testing the operation of the watertight doors both from the navigating bridge in the event of an emergency and locally at the door itself (SOLAS 74/88 reg. II-1/15) and, in particular, that:

.7.1 they are operable locally from each side of the bulkhead;

.7.2 provided with devices giving an indication of whether the door is open or closed at all remote operating positions;

.7.3 provided with an audible alarm that is distinct from any other alarm in the area and, when appropriate, an intermittent visual signal;
control handles are provided on each side of the bulkhead so that a person may hold both handles in the open position and pass safely through the watertight door without accidentally setting the power closing mechanism into operation;

confirming that the watertight doors and their indicating devices are operable in the event of a failure of the main and emergency sources of power (SOLAS 74/88 reg.II-1/15);

checking, when appropriate, any watertight doors, that are not required to be closed remotely, fitted in watertight bulkheads dividing 'tween deck spaces and confirming that a notice is affixed concerning their closure (SOLAS 74/88 reg.II-1/15);

confirming that a notice is affixed to any portable plates on bulkheads in machinery spaces concerning their closure and, if appropriate, testing any power operated watertight door fitted in lieu (SOLAS 74/88 reg.II-1/15);

confirming the arrangements for closing sidescuttles and their deadlights, also scuppers, sanitary discharges and similar openings and other inlets and discharges in the shell plating below the margin line (SOLAS 74/88 reg.II-1/17);

confirming that valves for closing the main and auxiliary sea inlets and discharges in the machinery spaces are readily accessible and indicators showing the status of the valves are provided (SOLAS 74/88 reg.II-1/17);

confirming that gangway, cargo and coaling ports fitted below the margin line may be effectively closed and that the inboard end of any ash or rubbish chutes are fitted with an effective cover (SOLAS 74/88 reg.II-1/17);

confirming by a hose or flooding test the watertightness of watertight decks and trunks, tunnels and ventilators (SOLAS 74/88 reg.II-1/19);

confirming the arrangements to maintain the watertight integrity above the margin line (SOLAS 74/88 reg.II-1/20);

confirming the arrangements for the bilge pumping and that each bilge pump and the bilge pumping system provided for each watertight compartment is working efficiently (SOLAS 74/88 reg.II-1/21);

confirming that the drainage system of enclosed cargo spaces situated on the freeboard deck is working efficiently (SOLAS 74/88 reg.II-1/21);

conducting an inclining test (SOLAS 74/88 reg.II-1/22);

checking, when appropriate, the means of indicating the status of any bow doors and any leakage therefrom (SOLAS 74/88 reg.II-1/23-2);

confirming that the machinery, boilers and other pressure vessels, associated piping systems and fittings are installed and protected as to reduce to a minimum any danger to persons on board, due regard being given to moving parts, hot surfaces and other hazards (SOLAS 74/88 reg.II-1/26),
confirming that the normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative (SOLAS 74/88 reg.II-1/26);

confirming that means are provided so that the machinery can be brought into operation from the dead ship condition without external aid (SOLAS 74/88 reg.II-1/26);

confirming that the boilers, all parts of the machinery, all steam, hydraulic, pneumatic and other systems and their associated fittings which are under internal pressure have been subjected to the appropriate tests, including a pressure test (SOLAS 74/88 reg.II-1/26);

confirming that means is provided to ensure that the safe speed is not exceeded where there is the risk of machinery overspeeding (SOLAS 74/88 reg.II-1/27);

confirming that, where practicable, means are provided to protect against overpressure in the parts of main, auxiliary and other machinery that are subject to internal pressure and may be subject to dangerous overpressure (SOLAS 74/88 reg.II-1/27);

confirming that, when required, crankcase explosion relief devices are fitted to internal combustion engines and that they are arranged so as to minimise the possibility of injury to personnel (SOLAS 74/88 reg.II-1/27);

confirming that main turbine propulsion machinery and, where applicable, main internal combustion propulsion machinery and auxiliary machinery are provided with automatic shut-off arrangements in the case of failures, such as lubricating oil supply failure, which could rapidly lead to a complete breakdown, serious damage or explosion (SOLAS 74/88 reg.II-1/27);

confirming and recording the ability of the machinery to reverse the direction of the thrust of the propeller in sufficient time and to bring the ship to rest within a reasonable distance, including the effectiveness of any supplementary means of manoeuvring or stopping the ship (SOLAS 74/88 reg.II-1/28);

confirming that the main and auxiliary steering gear are so arranged that the failure of one of them does not render the other inoperative (SOLAS 74/88 reg.II-1/29);

confirming that, where appropriate, essential components of the steering gear are permanently lubricated or provided with lubrication fittings (SOLAS 74/88 reg.II-1/29);

confirming that relief valves are fitted to any part of a steering gear hydraulic system which can be isolated and in which pressure can be generated from the power source or from external forces and that these relief valves are set to a pressure not exceeding the design pressure (SOLAS 74/88 reg.II-1/29);

confirming that the main steering gear is capable of steering the ship at maximum ahead service speed and is capable of putting the rudder over from 35 degrees on one side to 35 degrees on the other side with the ship at its deepest seagoing draught and running ahead at maximum ahead service speed and, under the same
conditions, from 35 degrees on either side to 30 degrees on the other side in not more than 28 seconds (SOLAS 74/88 reg.II-1/29);

(PI) .33 confirming that the auxiliary steering gear is capable of steering the ship at navigable speed and of being brought speedily into action in an emergency and that it is capable of putting the rudder over from 15 degrees on one side to 15 degrees on the other side in not more than 60 seconds with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater (SOLAS 74/88 reg.II-1/29);

(PI) .34 confirming that the main or auxiliary steering gear power units restart automatically when power is restored after a power failure, that they are capable of being brought into operation from a position on the navigating bridge and that, in the event of a power failure to any one of the steering gear power units, an audible and visual alarm is given on the navigating bridge (SOLAS 74/88 reg.II-1/29);

(PI) .35 confirming that, where the main steering gear comprises two or more identical power units and an auxiliary steering gear is not fitted, a defect can be isolated so that steering capability can be maintained or speedily regained after a single failure in its piping system or in one of the power units (SOLAS 74/88 reg.II-1/29);

(PI) .36 confirming that the control systems for the main steering gear from both the navigating bridge and the steering gear compartment are operating satisfactorily (SOLAS 74/88 reg.II-1/29);

(PI) .37 confirming that, where the main steering gear comprises two or more identical power units and an auxiliary steering gear is not fitted, the two independent control systems from the navigating bridge are operating satisfactorily (SOLAS 74/88 reg.II-1/29);

(PI) .38 confirming that the control system for the auxiliary steering gear in the steering gear compartment and, if this gear is power operated, from the navigating bridge are operating satisfactorily and that the latter is independent of the control system for the main steering gear (SOLAS 74/88 reg.II-1/29);

(PI) .39 confirming that the control system for any main and auxiliary steering gear control system operable from the navigating bridge is capable of being brought into operation from a position on the navigating bridge, that means are provided in the steering gear compartment for disconnecting it from the steering gear that it serves and that an audible and visual alarm is given on the navigating bridge in the event of a failure of electrical power supply (SOLAS 74/88 reg.II-1/29);

(PI) .40 confirming that the electric power circuits and steering gear control system, together with their associated components, cables and pipes, are separated, as far as practicable, throughout their length (SOLAS 74/88 reg.II-1/29);

(PI) .41 confirming that the means of communication between the bridge and the steering gear is operating satisfactorily and that, with ships having emergency steering positions, a telephone or other means of communication for relaying heading information and supplying visual compass readings to the emergency steering position are provided (SOLAS 74/88 regs.II-1/29 and V/12);
confirming that the angular position of the rudder is indicated independently of the steering control system on the navigating bridge if the main steering gear is power-operated and that this angular position is given in the steering gear compartment (SOLAS 74/88 reg.II-1/29, ch.V, reg.5/12);

confirming that with a hydraulic power-operated steering gear the audible and visual low-level alarms on the navigating bridge and in the machinery space for each hydraulic fluid reservoir are operating satisfactorily and that at least one power actuating system including the reservoir can be recharged from a position within the steering gear compartment by means of a fixed storage tank to which a contents gauge is fitted with fixed piping (SOLAS 74/88 reg.II-1/29);

confirming that the steering gear compartment is readily accessible, that it is separated, as far as practicable, from machinery spaces and is provided with suitable arrangements to ensure working access to steering gear machinery and controls under safe conditions (SOLAS 74/88 reg.II-1/29);

confirming that with electric and electro-hydraulic steering gear the means for indicating on the navigating bridge and at a main machinery control position that the motors are running and that the overload alarm and alarm for the loss of a phase in a three phase supply located at the main machinery control position are operating satisfactorily (SOLAS 74/88 reg.II-1/30);

confirming that the main and auxiliary machinery essential for propulsion and the safety of the ship are provided with the effective means for its operation and control (SOLAS 74/88 reg.II-1/31);

confirming that appropriate means are provided where it is intended that the propulsion machinery should be remotely controlled from the navigating bridge (SOLAS 74/88 reg.II-1/31);

confirming that arrangements to operate main and other machinery from a machinery control room are satisfactory (SOLAS 74/88 reg.II-1/31);

confirming that, in general, means are provided for manually overriding automatic controls and that a failure does not prevent the use of the manual override (SOLAS 74/88 reg.II-1/31);

confirming that oil-fired and exhaust gas boilers, unfired steam generators, steam pipe systems and air pressure systems are fitted with the appropriate safety features (SOLAS 74/88 regs.II-1/32, 33 and 34);

confirming the operation of the ventilation for the machinery spaces (SOLAS 74/88 reg.II-1/35);

confirming that the measures to prevent noise in machinery spaces are effective (SOLAS 74/88 reg.II-1/36);

confirming that the engine room telegraph giving visual indication of the orders and answers both in the machinery space and on the navigating bridge is operating satisfactorily (SOLAS 74/88, regulation II-1/37);
confirming that the second means of communication between the navigation bridge and machinery space is also operating satisfactorily and that appropriate means are provided to any other positions from which the engines are controlled (SOLAS 74/88 regulation II-1/37);

confirming that the engineer's alarm is clearly audible in the engineers' accommodation (SOLAS 74/88, regulation II-1/38);

confirming that precautions, taken to prevent any oil than may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces, are efficient;

confirming that the means of ascertaining the amount of oil contained in any oil tank are in good working condition;

confirming that the devices provided to prevent overpressure in any oil tank or in any part of the oil system, including the filling pipes, are in good working condition;

confirming that forepeak tanks are not intended for carriage of oil fuel, lubrication oil and other flammable oils;

confirming that the electrical installations, including the main source of power and lighting systems, are installed in accordance with the approved plans (SOLAS 74/88 regs.II-1/40 and 41);

confirming that a self-contained emergency source of electrical power has been provided and that the appropriate systems are satisfactorily supplied (SOLAS 74/88 reg.II-1/42);

confirming that starting arrangements of each emergency generating set is satisfactory (SOLAS 74/88 reg.II-1/44);

checking, when appropriate, the disposition of and testing the supplementary emergency lighting (SOLAS 74/88 reg.II-1/42-1);

confirming that precautions have been provided against shock, fire and other hazards of electrical origin (SOLAS 74/88 reg.II-1/45);

confirming, when appropriate, that the arrangements for the machinery spaces being periodically unattended are satisfactory (SOLAS 74/88 reg.II-1/54);

examining the fire pumps and fire main and the disposition of the hydrants, hoses and nozzles and the international shore connection and checking that each fire pump, including the emergency fire pump, can be operated separately so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required pressure is maintained in the fire main (SOLAS 74/88 regs.II-2/4 and 19);

examining the provision and disposition of the fire extinguishers and the fireman's outfit (SOLAS 74/88 regs.II-2/6 and 17);
(PI) .68 checking the operational readiness and maintenance of fire-fighting systems (SOLAS 74/00 reg.II-2/14) (SOLAS 74/88 regs.II-2/6 and 17);

(PI) .69 examining the fixed fire fighting system for the machinery and cargo spaces, as appropriate, and confirming that the installation tests have been satisfactorily completed and that its means of operation are clearly marked (SOLAS 74/88 regs.II-2/7 and 53);

(PI) .70 examining the fire extinguishing and special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids (SOLAS 74/88 regs.II-2/7 and 11);

(PI) .71 examining the arrangements for oil fuel, lubricating oil and other flammable oils and confirming, as far as practicable and as appropriate, the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils (SOLAS 74/88 reg.II-2/15);

(PI) .72 examining any fire detection and alarm system and confirming that installation tests have been satisfactorily completed; (SOLAS 74/88 regs.II-2/11, 12, 13, 14, 36 and 41);

(PI) .73 confirming that all aspects of the installation of the structural fire protection, including the structure, fire integrity, protection of stairways and lifts, openings in 'A' and 'B' Class divisions, ventilation systems and windows and sideshoots, and the use of combustible material are in accordance with the approved plans (SOLAS 74/00 regs.II-2/4.4.4, 5.2, 5.3, 7.5, 7.8.2, 8.4, 8.5, 9, 10.6, 11, 13, 17, 20 and FSCC ch.13 sections 1 and 2) (SOLAS 74/88 regs.II-2/23 to 35);

(PI) .74 testing any manual and automatic fire doors, including the means of closing the openings in 'A' and 'B' Class divisions (SOLAS 74/88 regs.II-2/30 and 31);

(PI) .75 testing the means of closing the main inlets and outlets of all ventilation smoke extraction systems and proving that the power ventilation is capable of being stopped from outside the space served (SOLAS 74/88 reg.II-2/32);

(PI) .76 confirming that stairways and ladders are so arranged to provide a means of escape to the lifeboat and liferaft and liferaft embarkation deck from all passenger and crew spaces and from those spaces in which the crew is normally employed (SOLAS 74/00 reg.II-2/13.7) and in particular that:

(PI) .76.1 below the bulkhead deck there are two means of escape from each watertight compartment, one being independent of watertight doors;

(PI) .76.2 above the bulkhead deck two means of escape from each vertical zone or similar such area, one leading directly to a stairway forming a vertical escape;
.76.3 the radiotelegraph station, if provided, has direct access to the open deck or is provided with two means of access or egress, one of which is a porthole or window of sufficient size;

.77 confirming that the means of escape from any special category spaces are generally in accordance with (PI) 5.1.2.76 (SOLAS 74/88 reg.II-2/28);

.78 confirming that in the machinery spaces there are two widely separated means of escape leading to the lifeboat and life raft embarkation decks, including, when from a space below the bulkhead deck, a continuous fire shelter (SOLAS 74/88 reg.II-2/28);

.79 confirming the fire protection arrangements for special category spaces and other cargo spaces and testing, as appropriate, the operation of the means for closing the various openings (SOLAS 74/88 regs.II-2/37, 38 and 39);

.80 confirming and testing, as appropriate, the fixed fire detection and alarm system, the special alarm and the public address system or other effective means of communication (SOLAS 74/88 reg.II-2/40);

.81 examining, when appropriate, the special arrangements for carrying dangerous goods, including checking the electrical equipment and wiring and boundary insulation, the provision of protective clothing and portable appliances and the testing of the water supply, bilge pumping and any water spray system (SOLAS 74/88 regs.II-2/41 and 54);

.82 checking the provision and disposition of the survival craft and rescue boats and the arrangements for mustering passengers (SOLAS 74/88 regs.III/11 to 16, 20 and 24);

.83 examining each survival craft, including its equipment (SOLAS 74/88 regs.III/20, 21, 33, 34, 36 and 38 to 44);

.84 examining the embarkation arrangements for each survival craft and the testing of each launching appliance, including overload tests, tests to establish the lowering speed and the lowering of each survival craft to the water with the ship at its lightest sea-going draught, checking the recovery of each lifeboat (SOLAS 74/88 regs.III/11, 12, 13, 15, 20 and 48);

.85 deployment of 50% of the MES after installation (LSAC section 5.1 and MSC/Circ.809);

.86 examining each rescue boat, including its equipment (SOLAS 74/00 regs.III/21 and 26.3; LSAC section 5.1 and MSC/Circ.809);

.87 examining the embarkation and recovery arrangements for each rescue boat and testing each launching and recovery appliances, including overload tests, tests to establish the lowering and recovery speeds and ensuring that each rescue boat can be lowered to the water and recovered with the ship at its lightest sea-going draught (SOLAS 74/88 regs.III/14, 16, 20 and 48);

.88 examining the arrangements for mustering passengers (SOLAS 74/88 reg.III/24);
testing that the engine of the rescue boat(s) and of each lifeboat, when so fitted, start satisfactorily and operate both ahead and astern;

confirming that there are posters or signs in the vicinity of survival craft and their launching stations (SOLAS 74/88 reg. III/9);

examining the provision and stowage and checking the operation of two-way VHF radiotelephone apparatus and radar transponders, (SOLAS 74/88 reg. III/6);

examining the provision and stowage of the distress flares and the line-throwing appliance, checking the provision and operation of on board communications equipment and testing the means of operation of the general alarm system (SOLAS 74/88 reg. III/6);

examining the provision, disposition and stowage of the lifebuoys, including those fitted with self-igniting lights, self-activating smoke signals and buoyant lines, lifejackets, immersion suits and thermal protective aids (SOLAS 74/88 regs. III/7, 21 and 31 to 37);

checking the lighting of the muster and embarkation stations and the alleyways, stairways and exits giving access to the muster and embarkation stations, including when supplied from the emergency source of power (SOLAS 74/88 regs. II-1/42 and III/11);

checking that means of rescue is provided on ro-ro passenger ships (SOLAS 74/00 reg. III/26.4);

checking that a helicopter pick-up area is provided on ro-ro passenger ships (SOLAS 74/00 reg. III/28);

checking that a decision support system is provided for the Master (SOLAS 74/00 reg. III/29);

checking the electromagnetic compatibility of electrical and electronic equipment on or in the vicinity of the bridge (SOLAS 74/00 reg. V/17);

examining the provision and positioning and checking the operation of, as appropriate, the navigation lights, shapes and sound signalling equipment (International Regulations for Preventing Collisions at Sea in force, regs.20 to 24, 27 to 30 and 33);

checking the provision and specification of a daylight signalling lamp (SOLAS 74/88 reg. V/11);

checking, as appropriate, the provision and operation of the following equipment (SOLAS 74/00 reg. V/19):

the magnetic compass, including examining the siting, movement, illumination and a pelorus or compass bearing device (SOLAS 74/00 reg. V/19);
(PI) .101.2 nautical charts and nautical publications necessary for the intended voyage are available and have been updated and where electronic systems are used (ECDIS), the electronic charts have been updated and the required back-up system is provided and updated (SOLAS 74/00 reg.V/19);

(PI) .101.3 global navigation satellite receiver or terrestrial radionavigation system;

(PI) .101.4 sound reception system, when bridge is totally enclosed;

(PI) .101.5 means of communication to emergent steering position, where provided;

(PI) .101.6 spare magnetic compass;

(PI) .101.7 daylight signalling lamp;

(PI) .101.8 echo sounding device, including examining the display for good access, viewing and lighting;

(PI) .101.9 radar(s), including examining the waveguide and cable runs for routing and protection and the display unit confirming lighting, plotting facilities, correct operation of all controls, functions and the true-motion facility if provided;

(PI) .101.10 electronic plotting aid, automatic tracking aid or automatic radar plotting aid as appropriate, using the appropriate test facilities;

(PI) .101.11 speed and distance measuring device;

(PI) .101.12 transmitting heading device providing heading information to radar, plotting aids and automatic identification system equipment and distance devices;

(PI) .101.13 automatic identification system (to be developed when experience with equipment has been obtained);

(PI) .101.14 heading or track control system;

(PI) .102 checking for the provision and operation of the voyage data recorder (SOLAS 74/00 reg.V/20);

(PI) .103 checking that the International Code of Signals is available (SOLAS 74/00 reg.V/21);

(PI) .104 checking the provision and, as appropriate, the deployment or operation of the pilot ladders and hoists/pilot transfer arrangements (SOLAS 74/00 reg.V/23);

Note: The survey of the radio installation, including those used in life-saving appliances, should always be carried out by a qualified radio surveyor who has necessary knowledge of the requirements the 1974 SOLAS Convention, the International Telecommunication Union's Radio Regulations and the associated performance standards for radio equipment. The radio survey should be carried out using suitable test equipment capable of performing all the relevant measurements required by these guidelines. On the satisfactory completion of the survey, the
radio surveyor should forward a report of the survey, which should also state the organisation he represents, to the authorities responsible for the issue of the ship's Passenger Ship Safety Certificate.

(PI) .105 examining the position, physical and electromagnetic protection and illumination of each radio installation (SOLAS 74/88 reg.IV/6);

(PI) .106 confirming the provision of equipment for the radio installation with due regard to the declared sea areas in which the ship will trade and the declared means of maintaining availability of functional requirements (SOLAS 74/88 regs.II/6, IV/7 to 11,14 and 15);

(PI) .107 confirming the ability to initiate the transmission of ship-to-shore distress alerts by at least two separate and independent means, each using a different radiocommunication service, from the position from which the ship is normally navigated (SOLAS 74/88 regs.IV/4,7 to 11);

(PI) .108 examining all antennas, including:

(PI) .108.1 visually checking all antennas, including INMARSAT antennas, and feeders for satisfactory siting and absence of defects (SOLAS 74/88 reg.IV/14);

(PI) .108.2 checking insulation and safety of all antennas;

(PI) .109 examining the reserve source of energy, including:

(PI) .109.1 checking there is sufficient capacity to operate the basic or duplicated equipment for 1 hour or 6 hours, as appropriate (SOLAS 74/88 reg.IV/13);

(PI) .109.2 and, if the reserve source of energy is a battery:

(PI) .109.2.1 checking its siting and installation (SOLAS 74/88 reg.IV/13);

(PI) .109.2.2 where appropriate, checking its condition by specific gravity measurement or voltage measurement;

(PI) .109.2.3 with the battery off charge, and the maximum required radio installation load connected to the reserve source of energy, checking the battery voltage and discharge current;

(PI) .109.2.4 checking that the charger(s) are capable of re-charging the reserve battery within 10 hours (SOLAS 74/88 reg.IV/13);

(PI) .110 examining the VHF transceiver(s), including:

(PI) .110.1 checking for operation on channels 6, 13 and 16 (SOLAS 74/88 regs.IV/7 and 14);

(PI) .110.2 checking frequency tolerance, transmission line quality and radio frequency power output (SOLAS 74/88 reg.IV/14);

(PI) .110.3 checking for correct operation of all controls including priority of control units (SOLAS 74/88 reg.IV/14);
(PI) .110.4 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

(PI) .110.5 checking the operation of the VHF control unit(s) or portable VHF equipment provided for navigational safety (SOLAS 74/88 reg.IV/6);

(PI) .110.6 checking for correct operation by on-air contact with a coast station or other ship;

(PI) .111 examining the VHF DSC controller and channel 70 DSC watch receiver, including:

(PI) .111.1 performing an off-air check confirming the correct Maritime Mobile Service Identity is programmed in the equipment (SOLAS 74/88 reg.IV/14);

(PI) .111.2 checking for correct transmission by means of a routine or test call to a coast station, other ship, on board duplicate equipment or special test equipment;

(PI) .111.3 checking for correct reception by means of a routine or test call from a coast station, other ship, on board duplicate equipment or special test equipment,

(PI) .111.4 checking the audibility of the VHF/DSC alarm;

(PI) .111.5 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

(PI) .112 examining the MF/HF radiotelephone equipment, including:

(PI) .112.1 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

(PI) .112.2 checking the antenna tuning in all appropriate bands;

(PI) .112.3 checking the equipment is within frequency tolerance on all appropriate bands (SOLAS 74/88 reg.IV/14);

(PI) .112.4 checking for correct operation by contact with a coast station and/or measuring transmission line quality and radio frequency output;

(PI) .112.5 checking receiver performance by monitoring known stations on all appropriate bands;

(PI) .112.6 if control units are provided outside the navigating bridge, checking the control unit on the bridge has first priority for the purpose of initiating distress alerts (SOLAS 74/88 regs IV/9, 10, 11 and 14);

(PI) .112.7 checking the correct operation of the radiotelephone alarm signal generating device on a frequency other than 2182 kHz;

(PI) .113 examining the HF radiotelex equipment, including:

(PI) .113.1 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);
113.2 confirming that the correct selective calling number is programmed in the equipment;

113.3 checking correct operation by inspection of recent hard copy or by a test with a coast radio station (SOLAS 74/88 regs.IV/10 and 11);

114 examining the MF/HF DSC controller(s), including:

114.1 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy (SOLAS 74/88 reg.IV/13);

114.2 confirming that the correct Maritime Mobile Service Identity is programmed in the equipment;

114.3 checking the off-air self test programme;

114.4 checking operation by means of a test call on MF and/or HF to a coast radio station if the rules of the berth permit the use of MF/HF transmissions (SOLAS 74/88 regs.IV/9 to 11);

114.5 checking the audibility of the MF/HF DSC alarm;

115 examining the MF/HF DSC watch receiver(s), including:

115.1 confirming that only distress and safety DSC frequencies are being monitored (SOLAS 74/88 regs.IV/9 to 12);

115.2 checking that a continuous watch is being maintained whilst keying MF/HF radio transmitters (SOLAS 74/88 reg.IV/12);

115.3 checking for correct operation by means of a test call from a coast station or other ship;

116 examining the radiotelephone distress frequency watch receiver (SOLAS regs.IV/7 and 14), including:

116.1 checking the mute/demute function;

116.2 checking receiver sensitivity against known stations;

116.3 checking the audibility of the loudspeaker;

117 examining the INMARSAT ship earth station(s), including:

117.1 checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy, and that where an uninterrupted supply of information from the ship's navigational or other equipment is required ensuring such information remains available in the event of failure of the ship's main or emergency source of electrical power. (SOLAS 74/88 regs.IV/13 and 14);
(PI) .117.2 checking the distress function by means of an approved test procedure where possible (SOLAS 74/88 regs. IV/10, 12 and 14);

(PI) .117.3 checking for correct operation by inspection of recent hard copy or by test call;

(PI) .118 if appropriate, examining the NAVTEX equipment (SOLAS 74/88 regs. IV/7, 12 and 14), including:

(PI) .118.1 checking for correct operation by monitoring incoming messages or inspecting recent hard copy;

(PI) .118.2 running the self-test programme if provided;

(PI) .119 examining the enhanced group call equipment (SOLAS 74/88 regs. IV/7 and 14), including:

(PI) .119.1 checking for correct operation and area by monitoring incoming messages or by inspecting recent hard copy;

(PI) .119.2 running the self-test programme if provided;

(PI) .120 if appropriate, examining the radio equipment for receipt of maritime safety information by HF NBDP (SOLAS 74/88 regs. IV/7, 12 and 14) including:

(PI) .120.1 checking for correct operation by monitoring incoming messages or inspecting recent hard copy;

(PI) .120.2 running the self-test programme if provided;

(PI) .121 examining the 406 MHz EPIRB (SOLAS 74/88 regs. IV/7 and 14), including:

(PI) .121.1 checking position and mounting for float free operation;

(PI) .121.2 carrying out visual inspection for defects;

(PI) .121.3 carrying out the self-test routine;

(PI) .121.4 checking that the EPIRB ID is clearly marked on the outside of the equipment and, where possible, decoding the EPIRB identity number confirming it is correct;

(PI) .121.5 checking the battery expiry date;

(PI) .121.6 if provided, checking the hydrostatic release and its expiry date;

(PI) .122 examining the INMARSAT 1.6 GHz satellite EPIRB (SOLAS 74/88 regs IV/7 and 14);

(to be developed in due course when operational experience has been gained with this new equipment)

(PI) .123 examining the VHF DSC EPIRB (SOLAS 74/88 regs. IV/8 and 14);
(to be developed in due course when operational experience has been gained with this new equipment)

(Pl) .124 examining the two-way VHF radiotelephone apparatus (SOLAS 74/88 reg.III/6), including:

(Pl) .124.1 checking for correct operation on channel 16 and one other by testing with another fixed or portable VHF installation (SOLAS 74/88 reg.IV/14);

(Pl) .124.2 checking the battery charging arrangements where re-chargeable batteries are used (SOLAS 74/88 reg.IV/14);

(Pl) .124.3 checking the expiry date of primary batteries where used (SOLAS 74/88 reg.IV/14);

(Pl) .124.4 where appropriate, checking any fixed installation provided in a survival craft (SOLAS 74/88 reg.IV/14);

(Pl) .125 examining the radar transponder(s) (SOLAS 74/88 reg.III/6 and regs.IV/7 and 14), including:

(Pl) .125.1 checking the position and mounting;

(Pl) .125.2 monitoring response on ship's 9 GHz radar;

(Pl) .125.3 checking the battery expiry date;

(Pl) .126 examining the test equipment and spares carried to ensure carriage is adequate in accordance with the sea areas in which the ship trades and the declared options for maintaining availability of the functional requirements (SOLAS 74/88 reg.IV/15);

(Pl) .127 checking the distress panel installed at the conning position, or, where applicable, an additional EPIRB is placed near the conning position (SOLAS 74/88 reg.IV/6);

(Pl) .128 checking that positional information is provided continuously and automatically to all communications equipment included in the initial distress alert (SOLAS 74/88 reg.IV/6);

(Pl) .129 checking the distress alarm panel installed at the conning position and its visual and aural indications of received distress alerts (SOLAS 74/88 reg.IV/6);

(Pl) .130 checking the provision and operation of the means for two-way on-scene communication for search and rescue purposes and its operation on 121.5 MHz and 123.1 MHz from the position from which the ship is normally navigated (SOLAS 74/88 reg.IV/7).

(Pl) 5.1.3 For the hull, machinery and equipment of passenger ships the check that the required documentation has been placed on board should consist of:

(Pl) .1 confirming that the stability information and damage control plans have been provided (SOLAS 74/88 regs.II- 1/22 and 23);
confirming that the manoeuvring booklet has been provided and that the manoeuvring information has been displayed on the navigating bridge (SOLAS 74/88 reg.II-1/28);

confirming that the fire control plans are permanently exhibited or, alternatively, emergency booklets have been provided to each officer and that a duplicate of the plans or the emergency booklet are available in a prominently marked enclosure external to the ship's deckhouse (SOLAS 74/00 regs.II-2/15.2.4 and 15.3.2) (SOLAS 74/88 reg.II-2/20). The fire control plan is in the language required by the Administration;

confirming that the maintenance plans have been provided (SOLAS 74/88 regs.II-1/14.2.2 and 14.3);

confirming that the training manuals and the fire safety operational booklets have been provided (SOLAS 74/88 regs.II-1/15.2.3 and 16.2);

confirming, when appropriate, that the ship is provided with a document indicating compliance with the special requirements for carrying dangerous goods (SOLAS 74/00 reg.II-2/19.4) (SOLAS 74/88 regs.II-2/41 and 54(3));

confirming that emergency instructions are available for each person on board, that the muster list is posted in conspicuous places and they are in a language understood by the persons on board (SOLAS 74/00 regs.III/8 and 53);

confirming that the training manual for the life-saving appliances has been provided (SOLAS 74/00 reg.III/35);

confirming that the checklist and instructions for MES, if provided, and on board maintenance of the life-saving appliances have been provided (SOLAS 74/00 reg.III/36);

confirming that a table or curve of residual deviations for the magnetic compass have been provided, and that a diagram of the radar installations shadow sectors is displayed (SOLAS 74/00 reg.V/19);

checking that operational and, where appropriate, maintenance manuals for all navigational equipment are provided (SOLAS 74/00 regs.V/16 and 19);

checking that the charts and nautical publications necessary for the intended voyage are available and have been up-dated (SOLAS 74/00 regs.V/19 and 27);

checking that the International Code of Signals is available where the ship is required to carry a radio installation (SOLAS 74/88 reg.V/21);

confirming that a list showing the operational limitations imposed to the ship is kept on board (SOLAS 74/00 reg.V/30);

checking that the life-saving signals to be used by ships, aircraft or persons in distress (SOLAS 74/00 reg.V/29);
(PI)  .16 checking the carriage of operating manuals for all equipment (SOLAS 74/88 reg.IV/15);
(PI)  .17 checking the carriage of service manuals for all equipment when at-sea maintenance is the declared option (SOLAS 74/88 reg.IV/15);
(PI)  .18 checking for a valid radio licence issued by the flag Administration (ITU RR Art.24);
(PI)  .19 checking the radio operators’ certificates of competence (ITU RR Art.55);
(PI)  .20 checking the emission on operational frequencies, coding and registration on the 406 MHz signal without transmission of a distress call to the satellite;
(PI)  .21 checking the radio log (SOLAS 74/88 text in force prior to 1 February 1992 reg.IV/19 and ITU RR App.11);
(PI)  .22 checking the carriage of up-to-date ITU publications (ITU RR App.11);
(PI)  .23 checking that the EPIRB has been subject to maintenance at intervals not exceeding five years at an approved shore-based maintenance facility;
(PI)  .24 if possible, checking the emission on operational frequencies, coding and registration on the 121.5 MHz homing signal without transmission of the satellite system.

(PI) 5.1.4 For the hull, machinery and equipment of passenger ships the completion of the initial survey should consist of:

(PI)  .1 after a satisfactory survey, the Passenger Ship Safety Certificate and its associated Record of Equipment (Form P) should be issued.

(PR)5.2 Renewal surveys - see part “General” section 4.5

(PR)5.2.1 For the hull, machinery and equipment of passenger ships the examination of current certificates and other records should consist of:

(PR)  .1 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;
(PR)  .2 checking the validity of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board;
(PR)  .3 checking the validity of the International Oil Pollution Prevention Certificate;
(PR)  .4 checking the certificates of class, if the ship is classed with a classification society;
(PR)  .5 checking, when appropriate, the validity of the International Pollution Prevention Certificate for the carriage of Noxious Liquid Substances in Bulk;
(PR)  .6 checking that the ship’s complement complies with the Minimum Safe Manning Document (SOLAS 74/88 reg.V/13(b));
checking that the master, officers and ratings are certificated as required by the STCW Convention;

checking whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the appropriate certificate;

checking that the routine surveys of the boilers and other pressure vessels, as determined by the Administration, have been carried out as required and that safety devices, such as the boiler safety valves, have been tested;

checking that, as appropriate, the hull and machinery has been presented for survey in accordance with the continuous survey scheme approved by the Administration or a classification society;

confirming that the opening and the closing and locking of sidescuteses positioned below the margin line are being recorded in the log book (SOLAS 74/88 reg.II-1/17);

confirming that the closure of the cargo loading doors and the opening and closing of any doors at sea required for the operation of the ship or the embarking and disembarking of passengers are being recorded in the log book (SOLAS 74/88 reg.II-1/20-1);

confirming that the stability information and damage control plans are readily available (SOLAS 74/88 regs.II-1/22 and 23);

confirming from the log book entries that the openings required to be closed at sea are being kept closed and that the required drills and inspections of watertight doors, etc., are being carried out (SOLAS 74/88 regs.II-1/24 and 25);

confirming that the manoeuvring booklet is readily available and that the manoeuvring information is displayed on the navigating bridge (SOLAS 74/88 reg.II-1/28);

confirming that the fire control plans are permanently exhibited or, alternatively, emergency booklets have been provided and that a duplicate of the plans or the emergency booklet are available in a prominently marked enclosure external to the ship's deckhouse (SOLAS 74/88 reg.II-2/20);

confirming that the maintenance plans have been provided (SOLAS 74/00 regs. II-2/14.2.2 and 14.3);

confirming that the training manuals and the fire safety operational booklets have been provided (SOLAS 74/00 regs. II-2/15.2.3 and 16.2);

checking whether any fire has occurred on board necessitating the operation of the fixed fire-extinguishing systems or the portable fire extinguishers since the last survey and the entries into the ship's log book;
(PR) .20 checking, when appropriate, that the ship is provided with a document indicating compliance with the special requirements for carrying dangerous goods (SOLAS 74/00 reg.II-2/19.4) (SOLAS 74/88 reg.II-2/54(3));

(PR) .21 confirming, when appropriate, that there is a special list, manifest or stowage plan for the carriage of dangerous goods (SOLAS 74/88 reg.VII/5);

(PR) .22 confirming that emergency instructions are available for each person on board, that the muster list is posted in conspicuous places and they are in a language understood by the persons on board (SOLAS 74/00 regs.III/8 and 37);

(PR) .23 checking that log-book entries are being made (SOLAS 74/00 regs.III/19 and 20) and in particular:

(PR) .23.1 the date when the last full muster of the passengers and crew for boat and fire drill took place;

(PR) .23.2 the records indicating that the lifeboat equipment was examined at that time and found to be complete;

(PR) .23.3 the last occasion when the lifeboats were swung out and when each one was lowered into the water;

(PR) .23.4 the records indicating that crew members have received the appropriate on board training;

(PR) .24 confirming that the training manual and training aids for the life-saving appliances is on board (SOLAS 74/00 reg.III/35);

(PR) .25 confirming that the instructions for on board maintenance of the life-saving appliances is on board (SOLAS 74/00 reg.III/36);

(PR) .26 checking by the log book entries that the testing and the emergency drills of the steering gear have been carried out (SOLAS 74/00 reg.V/26);

(PR) .27 confirming that a table or curve of residual deviations for the magnetic compass and that a diagram of the radar installations shadow sectors is displayed (SOLAS 74/00 reg.V/19);

(PR) .28 checking that operational and, where appropriate, maintenance manuals for all navigational equipment are provided (SOLAS 74/00 reg.V/16);

(PR) .29 checking that the charts and nautical publications necessary for the intended voyage are available and have been up-dated (SOLAS 74/00 reg.V/27);

(PR) .30 checking that the compass deviation book is properly maintained (SOLAS 74/00 reg.V/19);

(R) .31 confirming that a list showing the operational limitations imposed to the ship is kept on board (SOLAS 74/00 reg.V/30);
(R)  .32 checking that the life-saving signals to be used by ships, aircraft or persons in distress (SOLAS 74/00 reg.V/29).

(PR)  .33 the provisions of (PI) 5.1.3.11 to (PI) 5.1.3.16;

(PR)  .34 confirming that a record has been kept in the period since the last survey to the satisfaction of the Administration and as required by the Radio Regulations (SOLAS 74/88 reg.IV/17);

(PR)  .35 checking documentary evidence that the actual capacity of the battery has been proved in port within the last 12 months (SOLAS 74/88 reg.IV/13);

(PR)  .36 if applicable, checking that a list of all limitations on the operation of a passenger ship is kept on board and updated.

(PR) 5.2.2 For the hull, machinery and equipment of passenger ships the renewal survey should consist of:

(PR)  .1 examining the outside of the ship's bottom, including the bottom and bow plating, keel, bilge keels, stem, stem frame, the rudder, sea chests and strainers, noting the clearance measured in the rudder bearings, examining the propeller and shaft seals, as far as practicable, and noting the clearance measured in the propeller shafts (SOLAS 74/88 reg.I/7)(b)(iii)),

(PR)  .2 examining the arrangements for the subdivision, including the ship's stability in the damaged condition, and checking the subdivision load lines (SOLAS 74/88 regs.II-1/4 to 8, 13 and 16);

(PR)  .3 checking the ballasting arrangements (SOLAS 74/88 reg.II-1/9);

(PR)  .4 examining the collision and other watertight bulkheads required for the ship's subdivision (SOLAS 74/88 regs.II-1/10, 14, 15 and 18);

(PR)  .5 confirming that the watertight integrity has been maintained where pipes, scuppers, etc., pass through sub-division watertight bulkheads (SOLAS 74/88 reg.II-1/15);

(PR)  .6 confirming that a diagram is provided on the navigating bridge showing the location of the watertight doors together with indicators showing whether the doors are open or closed (SOLAS 74/88 reg.II-1/15);

(PR)  .7 testing the operation of the watertight doors both from the navigating bridge in the event of an emergency and locally at the door itself (SOLAS 74/88 reg.II-1/15) and, in particular, that:

(PR)  .7.1 they are operable locally from each side of the bulkhead;

(PR)  .7.2 provided with devices giving an indication of whether the door is open or closed at all remote operating positions;

(PR)  .7.3 provided with an audible alarm that is distinct from any other alarm in the area and, when appropriate, an intermittent visual signal;

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control handles are provided on each side of the bulkhead so that a person may hold both handles in the open position and pass safely through the watertight door without accidentally setting the power closing mechanism into operation;

confirming that the watertight doors and their indicating devices are operable in the event of a failure of the main and emergency sources of power (SOLAS 74/88 reg.II-1/15);

checking, when appropriate, any watertight doors, that are not required to be closed remotely, fitted in watertight bulkheads dividing tween deck spaces and confirming that a notice is affixed concerning their closure (SOLAS 74/88 reg.II-1/15);

confirming that a notice is affixed to any portable plates on bulkheads in machinery spaces concerning their closure and, if appropriate, testing any power operated watertight door fitted in lieu (SOLAS 74/88 reg.II-1/15);

examining the arrangements for closing scuttles and their deadlights, also scuppers, sanitary discharges and similar openings and other inlets and discharges in the shell plating below the margin line (SOLAS 74/88 reg.II-1/17);

confirming that valves for closing the main and auxiliary sea inlets and discharges in the machinery spaces are readily accessible and indicators showing the status of the valves are provided (SOLAS 74/88 reg.II-1/17);

confirming that gangway, cargo and coaling ports fitted below the margin line may be effectively closed and that the inboard end of any ash or rubbish chutes are fitted with an effective cover (SOLAS 74/88 reg.II-1/17);

examining the arrangements to maintain the watertight integrity above the margin line (SOLAS 74/88 reg.II-1/20);

examining the arrangements for the bilge pumping and confirming that each bilge pump and the bilge pumping system provided for each watertight compartment is working efficiently (SOLAS 74/88 reg.II-1/21);

confirming that the drainage system of enclosed cargo spaces situated on the freeboard deck is working efficiently (SOLAS 74/88 reg.II-1/21);

examining, when appropriate, the means of indicating the status of any bow doors and any leakage therefrom (SOLAS 74/88 reg.II-1/23-2);

confirming that the machinery, boilers and other pressure vessels, associated piping systems and fittings are being maintained so as to reduce to a minimum any danger to persons on board, due regard being given to moving parts, hot surfaces and other hazards (SOLAS 74/88 reg.II-1/26);

confirming that the normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative (SOLAS 74/88 reg.II-1/26);
confirming that means are provided so that the machinery can be brought into operation from the dead ship condition without external aid (SOLAS 74/88 reg.II-1/26);

examining, where practicable, the means provided to protect against overpressure in the parts of main, auxiliary and other machinery that are subject to internal pressure and may be subject to dangerous overpressure (SOLAS 74/88 reg.II-1/27);

examining, when appropriate, the crankcase explosion relief devices fitted to internal combustion engines and confirming that they are arranged so as to minimise the possibility of injury to personnel (SOLAS 74/88 reg.II-1/27);

confirming that the automatic shut-off arrangements fitted to the main turbine propulsion machinery and, where applicable, main internal combustion propulsion machinery and auxiliary machinery are being properly maintained (SOLAS 74/88 reg.II-1/27);

confirming, as far as practicable, the ability of the machinery to reverse the direction of the thrust of the propeller in sufficient time, including the effectiveness of any supplementary means of manoeuvring or stopping the ship (SOLAS 74/88 reg.II-1/28);

confirming that the main and auxiliary steering gear are being properly maintained, are arranged so that the failure of one does not render the other inoperative and that the auxiliary steering gear is capable of being brought speedily into action in an emergency (SOLAS 74/88 reg.II-1/29);

confirming that, where appropriate, essential components of the steering gear are permanently lubricated or provided with lubrication fittings (SOLAS 74/88 reg.II-1/29);

confirming that relief valves fitted to the steering gear hydraulic system which can be isolated and in which pressure can be generated from the power source or from external forces are being maintained and are set to a pressure not exceeding the design pressure (SOLAS 74/88 reg.II-1/29);

confirming that the main or auxiliary steering gear power units restart automatically when power is restored after a power failure, that they are capable of being brought into operation from a position on the navigating bridge and that, in the event of a power failure to any one of the steering gear power units, an audible and visual alarm is given on the navigating bridge (SOLAS 74/88 reg.II-1/29);

confirming that the control systems for the main steering gear from both the navigating bridge and the steering gear compartment are operating satisfactorily (SOLAS 74/88 reg.II-1/29);

confirming that, where the main steering gear comprises two or more identical power units and an auxiliary steering gear is not fitted, the two independent control systems from the navigating bridge are operating satisfactorily (SOLAS 74/88 reg.II-1/29);
confirming that the control system for the auxiliary steering gear in the steering
gear compartment and, if this gear is power operated, from the navigating bridge
are operating satisfactorily and that the latter is independent of the control system
for the main steering gear (SOLAS 74/88 reg.II-1/29);

confirming that an audible and visual alarm is given on the navigating bridge in the
event of a failure of electrical power supply (SOLAS 74/88 reg.II-1/29);

confirming that the means of communication between the bridge and the steering
gear is operating satisfactorily and that, with ships having emergency steering
positions, a telephone or other means of communication for relaying heading
information and supplying visual compass readings to the emergency steering
position are provided (SOLAS 74/00 regs.II-1/29 and V/19);

confirming that the angular position of the rudder is indicated independently of the
steering control system on the navigating bridge if the main steering gear is
power-operated and that this angular position is given in the steering gear
compartment (SOLAS 74/00 reg.II-1/29, reg.V/19);

confirming that with a hydraulic power-operated steering gear the audible and
visual low-level alarms on the navigating bridge and in the machinery space for
each hydraulic fluid reservoir are operating satisfactorily and that at least one
power actuating system including the reservoir can be recharged from a position
within the steering gear compartment by means of a fixed storage tank to which a
contents gauge is fitted with fixed piping (SOLAS 74/88 reg.II-1/29);

confirming that the steering gear compartment is readily accessible and is provided
with suitable arrangements to ensure working access to steering gear machinery
and controls under safe conditions (SOLAS 74/88 reg.II-1/29);

confirming that with electric and electro-hydraulic steering gear the means for
indicating on the navigating bridge and at a main machinery control position that
the motors are running and, as far as practicable, that the overload alarm and alarm
for the loss of a phase in a three phase supply located at the main machinery control
position are operating satisfactorily (SOLAS 74/88 reg.II-1/30);

confirming that the effective means of operation and control of the main and
auxiliary machinery essential for propulsion and the safety of the ship are being
maintained including, when appropriate, any means for remotely controlling the
propulsion machinery from the navigating bridge (SOLAS 74/88 reg.II-1/31);

confirming that arrangements to operate main and other machinery from a
machinery control room are satisfactory (SOLAS 74/88 reg.II-1/31);

confirming that the means provided for manually overriding automatic controls are
being maintained and that a failure does not prevent the use of the manual override
(SOLAS 74/88 reg.II-1/31);

confirming that the appropriate safety features fitted to the oil-fired and exhaust gas
boilers, unfired steam generators, steam pipe systems and air pressure systems are
being maintained (SOLAS 74/88 reg.II-1/32, 33 and 34);
confirming the operation of the ventilation for the machinery spaces (SOLAS 74/78 reg.II-1/35);

confirming that the measures to prevent noise in machinery spaces are effective (SOLAS 74/78 reg.II-1/36);

confirming that the engine room telegraph giving visual indication of the orders and answers both in the machinery space and on the navigating bridge is operating satisfactorily (SOLAS 74/88, reg.II-1/37);

confirming that the second means of communication between the navigation bridge and machinery space is also operating satisfactorily, including any appropriate means provided to any other positions from which the engines are controlled (SOLAS 74/88, reg.II-1/37);

confirming that the engineer's alarm is clearly audible in the engineers' accommodation (SOLAS 74/88, reg.II-1/38);

confirming that precautions, taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces, are efficient;

confirming that the means of ascertaining the amount of oil contained in any oil tank are in good working condition;

confirming that the devices provided to prevent overpressure in any oil tank or in any part of the oil system, including the filling pipes, are in good working condition;

confirming that the electrical installations, including the main source of power and lighting systems, are being maintained (SOLAS 74/88 regs.II-1/40 and 41);

confirming that the self-contained emergency source of electrical power and its associated systems are operating satisfactorily (SOLAS 74/88 reg.II-1/42);

confirming that starting arrangements of each emergency generating set is satisfactory (SOLAS 74/88 reg.II-1/44);

checking, when appropriate, the disposition of and testing the supplementary emergency lighting (SOLAS 74/88 reg.II-1/42-1);

confirming that precautions provided against shock, fire and other hazards of electrical origin are being maintained (SOLAS 74/88 reg.II-1/45);

confirming, when appropriate, that the arrangements for the machinery spaces being periodically unattended are satisfactory (SOLAS 74/88 reg.II-1/54);

examining the fire pumps and fire main and the disposition of the hydrants, hoses and nozzles and the international shore connection and checking that each fire pump can be operated separately so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required
pressure is maintained in the fire main (SOLAS 74/00 reg.II-2/10.2; FSSC chs.2 and 12) (SOLAS 74/88 reg.II-2/4 and 19);

(PR) .57 examining the provision and randomly examining the condition of the portable and non-portable fire extinguishers (SOLAS 74/00 reg.II-2/10.3; FSSC ch.4) (SOLAS 74/88 reg.II-2/6);

(PR) .58 examining the fixed fire extinguishing system for the machinery spaces and confirming that its means of operation are clearly marked (SOLAS 74/00 reg.II-2/10.4 and 10.5; FSSC chs.2 and 12) (SOLAS 74/88 reg.II-2/5, 7, 9, 10 and 53);

(PR) .59 examining the special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids (SOLAS 74/00 reg.II-2/5.2, 8.3 and 9.5) (SOLAS 74/88 reg.II-2/11);

(PR) .60 examining the fire extinguishing arrangements in control stations, accommodation and service spaces (SOLAS 74/00 reg.II-2/10.6.1; FSSC ch.8) (SOLAS 74/88 reg.II-2/36);

(PR) .61 examining the provision of fire extinguishing systems for the spaces containing flammable liquids and deep-fat cooking equipment in accommodation and service spaces (SOLAS 74/00 reg.II-2/10.6.3 and 10.6.4; FSSC chs.5, 6 and 7) (SOLAS 74/88 ch.II-2);

(PR) .62 examining the arrangements for oil fuel, lubricating oil and other flammable oils and confirming, as far as practicable and as appropriate, the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils (SOLAS 74/00 reg.II-2/4.2) (SOLAS 74/88 reg.II-2/15);

(PR) .63 examining and testing, as far as practicable, any fire detection and fire alarm arrangements in machinery spaces, if applicable, accommodation and service spaces and control spaces (SOLAS 74/00 reg.II-2/27 (except 7.5.5, 7.6 and 7.9); FSSC ch.9) (SOLAS 74/88 reg.II-2/11, 12, 13, 13-1, 14, 36 and 41);

(PR) .64 confirming that the fire fighter's outfits and the emergency escape breathing devices - EEBD- are complete and in good condition and that the cylinders, including the spare cylinders, of the self-contained breathing apparatus, are suitably charged (SOLAS 74/00 reg.II-2/10.10, 13.3.4 and 13.4.3; FSSC ch.3) (SOLAS 74/88 reg.II-2/17);

(PR) .65 checking the operational readiness and maintenance of fire-fighting systems (SOLAS 74/00 reg.II-2/14) (SOLAS 74/88/91 reg.II-2/21);

(PR) .66 confirming, as far as practicable, that no changes have been made in the structural fire protection, including the structure, fire integrity, protection of stairways and lifts, openings in 'A' and 'B' Class divisions, ventilation systems and windows and sidescuttes, and the use of combustible material (SOLAS 74/00 reg.II-2/5.2, 5.3,
confirming, as far as practicable, that no changes have been made in the structural fire protection in cargo spaces intended for the carriage of dangerous goods (SOLAS 74/00 reg.II-2/19,3.8 and 19.3.10) (SOLAS 74/88 reg.II-2/4, 54.2.8, 54.2.10 and 54.2.11);

examining and testing any manual and automatic fire doors including the means of closing the openings in 'A' and 'B' Class divisions (SOLAS 74/00 reg.II-2/9.4.1) (SOLAS 74/88 reg.II-2/30 and 31);

examining and testing the main inlets and outlets of all ventilation systems and proving that the power ventilation is capable of being stopped from outside the space served (SOLAS 74/00 reg.II-2/5.2.1) (SOLAS 74/88 reg.II-2/16 and 32);

confirming that the stairways and ladders, including the low-location lighting system, arranged to provide a means of escape to the lifeboat and liferaft and liferaft embarkation deck from all passenger and crew spaces and from those spaces in which the crew is normally employed are being maintained (SOLAS 74/00 reg.II-2/13.2, 13.3.1, 13.3.2 and 13.7; FSSC chs.11 and 13 (except paragraph 3)) (SOLAS 74/88 reg.II-2/28);

confirming that the means of escape from any special category spaces and ro-ro spaces are satisfactory (SOLAS 74/00 reg.II-2/13.5 and 13.6) (SOLAS 74/88 reg.II-2/28);

confirming that means of escape from the machinery spaces are satisfactory (SOLAS 74/00 reg.II-2/13.4.1) (SOLAS 74/88 reg.II-2/28);

examining the fire extinguishing arrangements including fire detection in cargo spaces for general cargo and dangerous goods and testing, as far as practicable and as appropriate, the operation of the means for closing the various openings (SOLAS 74/00 reg.II-2/7.6 and 10.7; FSSC chs.5) (SOLAS 74/88 reg.II-2/39);

examining the fire extinguishing arrangements including fire detection in vehicle, special category and ro-ro spaces and testing, as far as practicable and as appropriate, the operation of the means for closing the various openings (SOLAS 74/00 reg.II-2/20 (except 20.5); FSSC chs.5, 6, 7, 9 and 10) (SOLAS 74/88 reg.II-2/37, 38 and 38-1);

examining and testing, as appropriate and as far as practicable, the crew alarm and the public address system or other effective means of communication (SOLAS 74/00 regs. II-2/7.9 and 12; LSAC ch.7) (SOLAS 74/88 reg.II-2/40);

examining, when appropriate, the special arrangements for carrying dangerous goods, including checking the electrical equipment and wiring, fire detection, ventilation, the provision of personnel protection clothing and portable appliances and testing, as far as practicable, the water supply, bilge pumping and any water spray system (SOLAS 74/00 reg.II-2/19 (except 19.3.8, 19.3.10 and 19.4); FSSC chs.3, 4, 7, 9 and 10) (SOLAS 74/88 regs.II-2/41 and 54);
(PR) .77 examining, when appropriate, the helicopter facilities (SOLAS 74/00 regs. II-2/18, III/28) (SOLAS 74/88 reg.II-2/18.8);

(PR) .78 checking the requirement for passenger ships carrying more than 36 passengers constructed before 1 October 1994 (SOLAS 74/88/91 regs. II-2/41-1 and 41-2);

(PR) .79 checking that emergency instructions are available for each person on board, the muster list is posted in conspicuous places and there are signs or posters in the vicinity of survival craft and their launching stations (SOLAS 74/96 regs. III/8, 9 and 37);

(PR) .80 checking that the falls used in launching have been turned end for end in the previous 30 months and renewed in the past 5 years or have been subject to periodic inspection and been renewed within 4 years (SOLAS 74/96 reg. III/20);

(PR) .81 examining each survival craft, including its equipment and, when fitted, the on-load release and hydrostatic lock, and for inflatable life rafts the hydrostatic release unit and float-free arrangements, including the date of servicing or replacement. Checking that the hand held flares are not out of date (SOLAS 74/96 regs. III/20, 21, 23, 24, 26, 34, 36 and 44; LSAC sections 2.3 to 2.5, 3.2 and 4.1 to 4.6);

(PR) .82 examining the embarkation arrangements and launching appliances for each survival craft. Each lifeboat should be lowered to the embarkation position or, if the stowage position is the embarkation position, lowered a short distance and, if practicable, one of the survival craft should be lowered to the water. The operation of the launching appliances for davit launched life rafts should be demonstrated. A check that the thorough examination of launching appliances, including the dynamic testing of the winch brake, and servicing of lifeboat on-load release gear have been carried out (SOLAS 74/96 regs. III/11, 12, 13, 15, 16, 20, 21 and 23; LSAC sections 6.1 and 6.2);

(PR) .83 rotational deployment of MES (SOLAS 74/88 reg. III/20.8.2; LSAC section 6.2.2.2);

(PR) .84 examining each rescue boat, including its equipment (SOLAS 74/88 regs. III/17, 21, 26.3 and 34);

(PR) .85 examining the embarkation and recovery arrangements for each rescue boat. If practicable, the rescue boat(s) should be lowered to the water and its recovery demonstrated while underway at 5 knots (SOLAS 74/88 regs. III/14, 16, 17, 20 and 21; LSAC section 6.1);

(PR) .86 checking the arrangements for mustering passengers (SOLAS 74/96 regs. III/11, 24 and 25);

(PR) .87 confirming that a means of rescue is provided on ro-ro passenger ships (SOLAS 74/00 regs. III/11, 26.4);

(PR) .88 confirming that a helicopter pick-up area is provided on ro-ro passenger ships (SOLAS 74/00 reg. III/28);
(PR) confirming that a decision support system is provided for the Master (SOLAS 74/88 reg. III/29);

(PR) testing that the engine of the rescue boat(s) and of each lifeboat, when so fitted, start satisfactorily and operate both ahead and astern;

(PR) examining and checking the operation of two-way VHF radiotelephone apparatus and radar transponders (SOLAS 74/88 regs III/6, IV/7 and 14);

(PR) examining the line-throwing appliance and checking that its rockets and the ship's distress signals are not out of date, and examining and checking the operation of on board communications equipment and the general alarm system (SOLAS 74/96 regs III/6, 18 and 35; LSAC sections 3.1 and 7.1);

(PR) examining the provision, disposition, stowage and condition of the lifebuoys, including those fitted with self-igniting lights, self-activating smoke signals and buoyant lines, lifejackets, immersion suits, anti-exposure suits and thermal protective aids and that their associated batteries are not out of date (SOLAS 74/88 regs III/7, 21, 22 and 31; LSAC sections 2.1 to 2.5 and 3.1 to 3.3);

(PR) checking the lighting of the muster and embarkation stations and the alleyways, stairways and exits giving access to the muster and embarkation stations, including when supplied from the emergency source of power (SOLAS 74/88 regs II-1/42 and II/11);

(PR) checking that the required navigation lights, shapes and sound signalling equipment are in order (International Regulations for Preventing Collisions at Sea in Force (COLREG), regs.20 to 24, 27 to 30 and 33);

(PR) checking that the following items of navigation equipment are in working order, as appropriate: daylight signalling lamp, magnetic compass, transmitting heading device, gyro-compass, gyro-compass repeaters, radar installation(s), automatic identification system, electronic plotting aid, automatic tracking aid(s) or automatic radar plotting aid(s), echo sounding device, speed and distance measuring device(s), rudder angle indicator, propeller rate of revolution indicator, variable pitch propeller pitch and operational mode indicator, rate-of-turn indicator, heading or track control system, GNSS receiver, terrestrial radionavigation system and sound reception system, means of communication with emergency steering position, ECDIS including back-up arrangements, a pelorus or compass bearing device and means of correcting heading and bearings. Items that cannot be checked with the ship in port should be verified from (SOLAS 74/00 reg. V/19);

(PR) checking the provision and specification of the voyage data recorder, where fitted (SOLAS 74/00 reg. V/20);

(PR) checking that the International Code of Signals is available (SOLAS 74/00 reg. V/21);

(PR) checking the provision and specification of the pilot ladders and hoists/pilot transfer arrangements (SOLAS 74/00 reg. V/17);
The survey of the radio installation, including those used in life-saving appliances, should always be carried out by a qualified radio surveyor who has necessary knowledge of the requirements the 1974 SOLAS Convention, the International Telecommunication Union's Radio Regulations and the associated performance standards for radio equipment. The radio survey should be carried out using suitable test equipment capable of performing all the relevant measurements required by these guidelines. On the satisfactory completion of the survey, the radio surveyor should forward a report of the survey, which should also state the organisation he represents, to the authorities responsible for the issue of the ship's Passenger Ship Safety Certificate.

the provisions of (PI) 5.1.2.105 to (PI) 5.1.2.126;

the provisions of (PI) 5.1.2.127 to (PI) 5.1.2.130.

For the hull, machinery and equipment of passenger ships the completion of the renewal survey should consist of:

after a satisfactory survey, the Passenger Ship Safety Certificate and its associated Record of Equipment (Form P) should be issued.
ANNEX 2

SURVEY GUIDELINES UNDER THE 1966 LOAD LINE CONVENTION, AS MODIFIED BY THE 1988 PROTOCOL RELATING THERETO

(LI) 1 GUIDELINES FOR SURVEYS FOR THE INTERNATIONAL LOAD LINE CERTIFICATE OR INTERNATIONAL LOAD LINE EXEMPTION CERTIFICATE

(LI) 1.1 Initial surveys - see part “General” section 4.1

(LI) 1.1.1 For the load line the examination of plans and designs should consist of:

(LI) .1 examining the structural strength at the draft corresponding to the assigned freeboard (LLC 66/88 reg.1);

(LI) .2 examining the intact stability, and, where applicable, the damaged stability information and the loading and ballasting information that is to be supplied to the master, and, where not dispensed by the Administration, inclining experimental data (LLC 66/88 reg.10);

(LI) .3 determining the freeboard, including specifying and the consideration of the conditions of assignment for the freeboard (LLC 66/88 regs.11 to 45).

(LI) 1.1.2 For the load line the survey during construction and after installation should consist of:

(LI) .1 checking that, as far as its strength, the ship has been constructed in accordance with the approved plans (LLC 66/88 reg.1);

(LI) .2 confirming that the deck line and load line mark are properly positioned (LLC 66/88 regs.4 to 9);

(LI) .3 where not dispensed by the Administration, witnessing the inclining experiment (LLC 66/88 reg.10);

(LI) .4 examining the superstructure and bulkheads and the openings therein (LLC 66/88 regs.11 and 12);

(LI) .5 examining the means of securing the watertightness of cargo hatchways, other hatchways and other openings on the freeboard and superstructure decks (LLC 66/88 regs.13 to 18);

(LI) .6 examining the ventilators and air pipes, including their coamings and closing appliances (LLC 66/88 regs.19 and 20);

(LI) .7 examining the watertight integrity of the closures to any openings in the ship's side below the freeboard deck (LLC 66/88 reg.21);

(LI) .8 examining the scuppers, inlets and discharges (LLC 66/88 reg.22);

(LI) .9 examining the side scuttles and deadlights (LLC 66/88 reg.23);
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(LI) .10 examining the bulwarks including the provision of freeing ports, special attention being given to any freeing ports fitted with shutters (LLC 66/88 reg.24);

(LI) .10.1 examining the guardrails, gangways, walkways and other means provided for the protection of the crew and for gaining access to and from crew's quarters and working spaces (LLC 66/88 reg.25);

(LI) .10.2 examining, when applicable, the special requirements for ships permitted to sail with reduced freeboards (LLC 66/88 reg.26);

(LI) .10.3 checking, when applicable, of the fittings and appliances for timber deck cargoes (LLC 66/88 reg.42 to 45).

(LI) 1.1.3 For the load line the check that certificates, etc., have been placed on board should consist of:

(LI) .1 checking that the loading and ballasting information has been supplied to the master (LLC 66/88 reg.10).

(LI) 1.1.4 For the load line the completion of the initial survey should consist of:

(LA) 1.2 Annual surveys - see part "General" section 4.2

(LA) 1.2.1 For the load line the examination of current certificates and other records should consist of:

(LA) .1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

(LA) .2 checking the validity of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board;

(LA) .3 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

(LA) .4 checking the validity of the International Oil Pollution Prevention Certificate;

(LA) .5 checking the certificate of class, if the ship is classed with a classification society;

(LA) .6 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;

(LA) .7 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk;

(LA) .8 checking, when appropriate, the validity of the International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk;

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(LA) .9  checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/88 reg.V/14;  

(LA) .10 checking that the master, officers and ratings are certificated as required by the STCW Convention;  

(LA) .11 checking whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the appropriate certificate;  

(LA) .12 checking that the stability and, where applicable, the loading and ballasting information is available (LLC 66/88 reg.10).  

(LA) 1.2.2 For the load line the annual survey should consist of:  

(LA) .1 checking, in general, that there has been no deterioration in the strength of the hull (LLC 66/88 reg.1);  

(LA) .2 checking of the positions of the deck line and load line which, if necessary, are to be re-marked and re-painted (LLC 66/88 regs.4 to 9);  

(LA) .3 checking that no alterations have been made to the hull or superstructures that would affect the calculations determining the position of the load lines (LLC 66/88 regs.11 to 45);  

(LA) .4 examining the superstructure end bulkheads and the openings therein (LLC 66/88 regs.11 and 12);  

(LA) .5 examining the means of securing the weathertightness of cargo hatchways, other hatchways and other openings on the freeboard and superstructure decks (LLC 66/88 regs.13 to 18);  

(LA) .6 examining the ventilators and air pipes, including their coamings and closing appliances (LLC 66/88 regs.19 and 20);  

(LA) .7 examining the watertight integrity of the closures to any openings in the ship's side below the freeboard deck (LLC 66/88 reg.21);  

(LA) .8 examining the scuppers, inlets and discharges (LLC 66/88 reg.22);  

(LA) .9 examining the side scuttles and deadlights (LLC 66/88 reg.23);  

(LA) .10 examining the bulwarks including the provision of freeing ports, special attention being given to any freeing ports fitted with shutters (LLC 66/88 reg.24);  

(LA) .11 examining the guardrails, gangways, walkways and other means provided for the protection of the crew and for gaining access to and from crew's quarters and working spaces (LLC 66/88 reg.25);  

(LA) .12 examining, when applicable, the special requirements for ships permitted to sail with reduced freeboards (LLC 66/88 reg.26);
(LA) 1.2.3 For the load line the completion of the annual survey should consist of:

(LA) 1 after a satisfactory survey, the International Load Line Certificate or International Load Line Exemption Certificate should be endorsed;

(LA) 2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part “General” section 4.8.

(LR) 1.3 Renewal surveys - see part “General” section 4.5

(LR) 1.3.1 For the load line the examination of current certificates and other records should consist of:

(LR) 1 the provisions of (LA) 1.2.1, except for the validity of the International Load Line Certificate or International Load Line Exemption Certificate.

(LR) 1.3.2 For the load line the renewal survey should consist of:

(LR) 1 the provisions of (LA) 1.2.2;

(LR) 2 examining the hull to ensure that its strength is sufficient for the draft corresponding to the freeboard assigned (LLC 66/88 reg.1).

(LR) 1.3.3 For the load line the completion of the renewal survey should consist of:

(LR) 1 after a satisfactory survey, the International Load Line Certificate or International Load Line Exemption Certificate should be issued.
ANNEX 3

SURVEY GUIDELINES UNDER THE 1973/78 MARPOL CONVENTION

(OI) 1 Guidelines for surveys for the International Oil Pollution Prevention Certificate

(OI) 1.1 Initial surveys - see part “General” section 4.1

(OI) 1.1.1 For oil pollution prevention the examination of plans and designs should consist of:

(OI) .1 examining the arrangements for the control of the discharge of oil and examining the plans and designs of the oil discharge monitoring and control system and oily-water separating and oil filtering equipment (MARPOL 73/78/90 Annex I regs.9 and 16);

(OI) .2 examining the arrangements for operation in special areas (MARPOL 73/78/90 Annex I reg.10);

(OI) .3 examining the arrangements for the segregation of oil and water ballast and the carriage of oil in the forepeak tanks (MARPOL 73/78/90 Annex I reg.14);

(OI) .4 examining the sludge tank and standard discharge arrangements (MARPOL 73/78/90 Annex I regs.17 and 19).

(OI) 1.1.2 For the oil pollution prevention for the additional requirements for oil tankers the examination of plans and designs should consist of:

(OI) .1 examining the arrangements for the control of the discharge of oil and for the retention of oil on board (MARPOL 73/78/90 Annex I regs.9 and 15);

(OI) .2 examining the arrangements for operation in special areas (MARPOL 73/78/90 Annex I reg.10);

(OI) .3 examining the arrangements for the segregated ballast tanks, checking their capacity and ascertaining whether the draft and trim conditions will be met (MARPOL 73/78/90 Annex I reg.13);

(OI) .4 examining for the arrangements for crude oil washing, including shadow diagrams and the Operations and Equipment Manual, checking that an inert gas system is to be fitted (MARPOL 73/78/90 Annex I regs.13 and 13B);

(OI) .5 examining, as appropriate, the arrangements for the prevention of oil pollution in the event of collision or stranding (MARPOL 73/78/90 Annex I reg.13F);

(OI) .6 examining the protective location of the segregated ballast spaces and the arrangements for minimising pollution due to side and bottom damages (MARPOL 73/78/90 Annex I regs.13E and 22 to 25);

(OI) .7 examining the pumping, piping and discharge arrangements (MARPOL 73/78/90 Annex I reg.18);
(OI) .8 examining the shipboard oil pollution emergency plan (MARPOL 73/78/90 Annex I reg.26).

(OI) 1.1.3 For the oil pollution prevention the survey during construction and after installation should consist of:

(OI) .1 confirming the satisfactory installation and operation of, as appropriate, the oily-water separating equipment or the oily-water separating equipment fitted with either an oil discharge monitoring and control system (including the operation of the automatic and manual operation of the means provided to stop the discharge of effluent) or oil filtering equipment (including the satisfactory operation of the alarm) or other installation (MARPOL 73/78/90 Annex I regs.9 and 16);

(OI) .2 confirming, when applicable, that the oil content meter and its recording device are operable and that there is a sufficient supply of consumables for the recording device on board (MARPOL 73/78/90 Annex I regs.9 and 16);

(OI) .3 testing, where fitted, the automatic stopping device required for discharges in Special Areas (MARPOL 73/78/90 Annex I reg.10);

(OI) .4 confirming the segregation of the oil fuel and water ballast system (MARPOL 73/78/90 Annex I reg.14);

(OI) .5 confirming that the oily residue (sludge) tank and its discharge arrangements are satisfactory and, when the size of the sludge tank is approved on the basis of such installations, confirming the satisfactory operation of homogenizers, sludge incinerators or other recognised means for the control of sludge (MARPOL 73/78/90 Annex I reg.17);

(OI) .6 confirming the provision of the standard discharge connection (MARPOL 73/78/90 Annex I reg.19).

(OI) 1.1.4 For the oil pollution prevention for the additional requirements for oil tankers the survey during construction and after installation should consist of:

(OI) .1 confirming that the arrangements of slop tanks or cargo tanks designated as slop tanks and associated piping systems are satisfactory (MARPOL 73/78/90 Annex I regs.9 and 15);

(OI) .2 confirming the satisfactory installation and operation of the oil discharge monitoring and control system, including any audible or visual alarms, the automatic and manual means to stop the discharge of effluent, the starting interlock and the accuracy of the flow meter (MARPOL 73/78/90 Annex I regs.9 and 15);

(OI) .3 confirming that the oil content meter and its recording device are operable and that there is a sufficient supply of consumables for the recording device on board (MARPOL 73/78/90 Annex I regs.9 and 15);

(OI) .4 confirming that the approved oil/water interface detectors are on board and are operational (MARPOL 73/78/90 Annex I regs.9 and 15);
 confirming that the arrangements of pumps, pipes and valves are in accordance with the requirements for segregated ballast systems and that there are no cross-connections between the cargo and segregated ballast systems (MARPOL 73/78/90 Annex I reg.13);

where a portable spool piece is provided for the emergency discharge of segregated ballast by connecting the segregated ballast system to a cargo pump, confirming that non-return valves are fitted on the segregated ballast connections and that the spool piece is mounted in a conspicuous position in the pump room with a permanent notice restricting its use (MARPOL 73/78/90 Annex I reg.13);

testing ballast pipelines that pass through cargo tanks and those cargo pipelines that pass through ballast tanks to ensure there is no cross contamination (MARPOL 73/78/90 Annex I reg.13);

confirming that the crude oil washing system is installed in accordance with the approved plans (MARPOL 73/78/90 Annex I reg.13B) and, in particular:

examining crude oil washing piping, pumps, valves and deck mounted washing machines for signs of leakage and to check that all anchoring devices for crude oil washing piping are intact and secure;

carrying out pressure testing of the crude oil washing system to 1.5 times the working pressure;

confirming in those cases where drive units are not integral with the tank washing machines, that the number of operational drive units specified in the Manual are on board;

checking that, when fitted, steam heaters for water washing can be properly isolated during crude oil washing operations, either by double shut-off valves or by clearly identifiable blanks;

checking that the prescribed means of communications between the deck watchkeeper and the cargo control position is operational;

confirming that an overpressure relief device (or other approved arrangement) is fitted to the pumps supplying the crude oil washing system;

verifying that flexible hoses for supply of oil to the washing machines on combination carriers are of an approved type, are properly stored and are in good condition;

verifying the effectiveness of the crude oil washing system (MARPOL 73/78/90 Annex I reg.13B) and, in particular:

checking tanks containing departure and/or arrival ballast water, as applicable, to confirm the effectiveness of the cleaning and stripping;

checking that the crude oil washing machines are operable and to observe the proper operation of the washing machines by means of the movement indicators and/or sound patterns or other approved methods;
(OI) 9.3 checking the effectiveness of the stripping system in appropriate cargo tanks by observing the monitoring equipment and by hand-dipping or other approved means;

(OI) 9.4 verifying by internal tank inspection after crude oil washing that the installation and operational procedures laid down in the Operations and Equipment Manual are satisfactory;

(OI) 10 confirming that, where there is a crude oil washing system, an inert gas system has been installed and tested in accordance with the requirements of SOLAS 74/88 (see (EI) 1.1.4.2 in Annex I);

(OI) 11 confirming, as appropriate, that the arrangements for the prevention of oil pollution in the event of collision or stranding are in accordance with the approved plans (MARPOL 73/78/90 Annex I reg.13F);

(OI) 12 confirming that the piping systems associated with the discharge of dirty ballast water or oil-contaminated water are satisfactory (MARPOL 73/78/90 Annex I reg.18);

(OI) 13 confirming that the observation and discharge control positions for visually observing the discharge of oil-contaminated water, including the testing of the communication system between the two positions are satisfactory (MARPOL 73/78/90 Annex I reg.18);

(OI) 14 confirming that the means of draining cargo pumps and cargo lines, including the provision of a stripping device and the connections for pumping to the slop or cargo tanks or ashore are satisfactory (MARPOL 73/78/90 Annex I reg.18);

(OI) 15 confirming that the arrangements for the part flow system, where fitted, are satisfactory (MARPOL 73/78/90 Annex I reg.18);

(OI) 16 confirming that closing devices installed in the cargo transfer system and cargo piping as appropriate are satisfactory (MARPOL 73/78/90 Annex I reg.24);

(OI) 17 confirming that the subdivision and stability arrangements, in addition to the provision of (OI) 1.1.4.16, to prevent progressive flooding are satisfactory (MARPOL 73/78/90 Annex I reg.24).

(OI) 1.1.5 For the oil pollution prevention the check that the documentation has been placed on board cargo ships should consist of:

(OI) 1 confirming that certificates for type approval of oil pollution prevention equipment, such as oily-water separating equipment, oil filtering equipment, process units, oil content meters are available (MARPOL 73/78/90 Annex I reg.16);

(OI) 2 confirming that the Oil Record Book (Part I) has been provided (MARPOL 73/78/90 Annex I reg.20).

(OI) 1.1.6 For the oil pollution prevention the check that the documentation has been placed on board oil tankers should additionally consist of:
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1. confirming that, if applicable, a Dedicated Ballast Tank Operation Manual has been provided (MARPOL 73/78/90 Annex I reg.13A);

2. confirming that, if applicable, a Crude Oil Washing Operations and Equipment Manual has been provided (MARPOL 73/78/90 Annex I reg.13B);

3. confirming that an operations manual for the oil discharge monitoring and control system has been provided (MARPOL 73/78/90 Annex I reg.15);

4. confirming that the certificates for the type approval of oil pollution prevention equipment, such as oily-water separating equipment, oil filtering equipment, process units, oil content meters, oil/water interface detectors have been provided (MARPOL 73/78/90 Annex I regs.15 and 16);

5. confirming that an Oil Record Book (Part II) has been provided (MARPOL 73/78/90 Annex I reg.20);

6. confirming that the instructions for the operation of the part flow system have been provided or included in the ship’s cargo and ballast handling manuals (MARPOL 73/78/90 Annex I reg.18(6)(e));

7. confirming that the information and data concerning the loading and damage stability has been provided (MARPOL 73/78/90 Annex I reg.25);

8. confirming that the shipboard oil pollution emergency plan has been provided (MARPOL Annex I reg.26).

1.1.7 For the oil pollution prevention the completion of initial survey should consist of:

1. after satisfactory survey, the International Oil Pollution Prevention Certificate should be issued.

1.2 **Annual surveys** - see part “General” section 4.2

1.2.1 For the oil pollution prevention the examination of current certificates and other records should consist of:

1. checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

2. checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

3. checking the validity of the International Oil Pollution Prevention Certificate;

4. checking the certificates of class, if the ship is classed with a classification society;

5. checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;
(OA) .6 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk;

(OA) .7 checking, when appropriate, the validity of the International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk;

(OA) .8 checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/88 reg.V/13(b));

(OA) .9 checking that the master, officers and ratings are certificated as required by the STCW Convention;

(OA) .10 checking whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the appropriate certificate;

(OA) .11 checking from the certificates for the type approval of the oil pollution prevention equipment, such as the oily-water separating equipment, oil filtering equipment, process units, oil content meters and oil/water interface detectors and sighting the records of the various oil discharge monitoring equipment, as applicable (MARPOL 73/78/90 Annex I reg.16);

(OA) .12 checking whether the appropriate entries have been made in Part I of the Oil Record Book (MARPOL 73/78/90 Annex I reg.20).

(OA) 1.2.2 For the oil pollution prevention the examination of current certificates and other records for oil tankers should additionally consist of:

(OA) .1 confirming that the approved Dedicated Clean Ballast Tank Operation Manual, and/or the approved Operations and Equipment Manual for the Crude Oil Washing Systems, as appropriate, is/are on board (MARPOL 73/78/90 Annex I regs.13A and 13B);

(OA) .2 confirming that, when appropriate, the approved operational procedures for existing oil tankers having special ballast arrangements are on board (MARPOL 73/78/90 Annex I reg.13D);

(OA) .3 confirming, when appropriate, that a complete file of the enhanced survey reports and Condition Evaluation Report are on board (MARPOL 73/78, Annex I, regulation 13G);

(OA) .4 confirming that the operations manual for the oil discharge monitoring and control system, is on board (MARPOL 73/78/90 Annex I reg.15);

(OA) .5 checking whether the appropriate entries have been made in Part II of the Oil Record Book (MARPOL 73/78/90 Annex I reg.20);

(OA) .6 confirming that the loading and stability information in an approved form, where applicable, is on board (MARPOL 73/78/90 Annex I reg.25);

(OA) .7 confirming that the oil pollution emergency plan is on board (MARPOL 73/78/90 Annex I reg.26).
(OA)1.2.3 For the oil pollution prevention the annual survey should consist of:

(OA) .1 examining externally the oily-water separating equipment or oil filtering equipment or process unit, where fitted, and confirming, as far as practicable, their satisfactory operation including, when appropriate, testing the alarm for the oil filtering equipment (MARPOL 73/78/90 Annex I regs.9 and 16);

(OA) .2 examining externally the oil discharge monitoring and control system and confirming, as far as practicable, its satisfactory operation, including, where possible, the automatic and manual operation of the means provided to stop the discharge of effluent, observing that indicators and recording devices in the monitor are operable and verifying that a sufficient supply of consumables for the recorders are on board (MARPOL 73/78/90 Annex I regs.9 and 16);

(OA) .3 testing, where fitted, the automatic stopping device required for discharge in special areas (MARPOL 73/78/90 Annex I reg.10);

(OA) .4 confirming the segregation of oil fuel and water ballast systems (MARPOL 73/78/90 Annex I reg.14);

(OA) .5 checking that the arrangement of oily residue (sludge) tank and its discharge arrangements are satisfactory and confirming that, where applicable, homogenizers, sludge incinerators or other recognised means for the control of sludge are satisfactory (MARPOL 73/78/90 Annex I reg.17);

(OA) .6 confirming that a standard discharge connection is provided (MARPOL 73/78/90 Annex I reg.19).

(OA)1.2.4 For oil pollution prevention the annual survey of the additional requirements for oil tankers should consist of:

(OA) .1 examining the oil discharge monitoring and control system and its associated equipment (MARPOL 73/78/90 Annex I regs.9 and 15) and, in particular:

(OA) .1.1 examining externally the system and equipment;

(OA) .1.2 confirming, as far as practicable, the satisfactory operation of the oil discharge monitoring and control system including the oil content meter and, where applicable, the automatic and manual means provided to stop the discharge of effluent and the starting interlock;

(OA) .1.3 observing that indicators and recording devices are operable and verifying that sufficient supply of consumables for the recorders are on board;

(OA) .1.4 testing, as far as practicable, any audible or visual alarms fitted to the oil discharge monitoring and control system;

(OA) .2 examining, as far as practicable, the oil/water interface detectors (MARPOL 73/78/90 Annex I regs.9 and 15);
confirming that no cross connections have been fitted between the cargo and segregated ballast systems (MARPOL 73/78/90 Annex I reg.13);

where a portable spool piece is provided for the emergency discharge of segregated ballast by connecting the segregated ballast system to a cargo pump, confirming that non-return valves are fitted on the segregated ballast connections and that the spool piece is mounted in a conspicuous position in the pump room with a permanent notice restricting its use (MARPOL 73/78/90 Annex I reg.13);

confirming by sighting that there has been no contamination with oil in the segregated ballast tanks (MARPOL 73/78/90 Annex I reg.13);

confirming, as far as practicable, that the dedicated clean ballast tank arrangement remains satisfactory (MARPOL 73/78/90 Annex I reg.13A);

confirming by sighting that there has been no contamination with oil in the dedicated clean ballast tanks (MARPOL 73/78/90 Annex I reg.13A);

confirming, as far as practicable, that the crude oil washing system remains satisfactory (MARPOL 3/78/90 Annex I reg.13B) and in particular:

examining externally the crude oil washing piping, pumps, valves and deck mounted washing machines for signs of leakage and checking that all anchoring devices for crude oil washing piping are intact and secure;

confirming, in those cases where drive units are not integral with the tank cleaning machines, that the number of operational drive units as specified in the Manual are on board;

checking that, when fitted, steam heaters for water washing can be properly isolated during crude oil washing operations, either by double shut-off valves or clearly identifiable blanks;

checking that the prescribed means of communications between the deck watchkeeper and the cargo control position is operational;

confirming that an overpressure relief device (or other approved arrangement) is fitted to the pumps supplying the crude oil washing systems;

confirming that flexible hoses for supply of oil to the washing machines on combination carriers, are of an approved type, are properly stored and are in good condition;

verifying, as far as practicable, the effectiveness of the crude oil washing system (MARPOL 73/78/90 Annex I reg.13B) and, in particular:

checking tanks containing departure and/or arrival ballast water, as applicable, to confirm the effectiveness of the cleaning and stripping;
(OA) .9.2 checking, as far as practicable, that the crude oil washing machines are operable and, when the survey is carried out during crude oil washing operations, observing the proper operation of the washing machines by means of the movement indicators and/or sound patterns or other approved methods;

(OA) .9.3 checking, as far as practicable, the effectiveness of the stripping system in appropriate cargo tanks by observing the monitoring equipment and by hand-dipping or other approved means;

(OA) .10 confirming that on those existing tankers operating with special ballast arrangements, the arrangements are as approved and are satisfactory (MARPOL 73/78/90 Annex I reg.13D);

(OA) .11 confirming, as appropriate and as practicable, that the arrangements for the prevention of oil pollution in the event of collision or stranding are approved and are satisfactory (MARPOL 73/78/90 Annex I reg.13F and 13G);

(OA) .12 examining the piping systems associated with the discharge of dirty or oil-contaminated water including the part flow system, if fitted (MARPOL 73/78/90 Annex I reg.18);

(OA) .13 testing the communication system between the observation and discharge control positions (MARPOL 73/78/90 Annex I reg.18);

(OA) .14 examining the means of draining cargo pumps and cargo lines, including the stripping device and the connections for pumping to the slop or cargo tanks or ashore (MARPOL 73/78/90 Annex I reg.18).

(OA)1.2.5 For the oil pollution prevention the completion of the annual survey should consist of:

(OA) .1 after a satisfactory survey, the International Oil Pollution Prevention Certificate should be endorsed;

(OA) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part “General” section 4.8.

(OL)n)1.3 Intermediate surveys - see part “General” section 4.3

(OL)n)1.3.1 For the oil pollution prevention the examination of current certificates and other records should consist of:

(OL)n) .1 the provisions of (OA) 1.2.1.

(OL)n)1.3.2 For the oil pollution prevention the examination of current certificates and other records for oil tankers should additionally consist of:

(OL)n) .1 the provisions of (OA) 1.2.2.

* See also the Guidelines on the Enhanced Programme of Inspections During Surveys of Oil Tankers (resolution A.744(18), annex B).
(OIn) 1.3.3 For oil pollution prevention the intermediate survey should consist of:

(OIn) .1 the provisions of (OA) 1.2.3;

(OIn) .2 examining the oily-water separating equipment or oil filtering equipment or process unit, where fitted, including associated pumps, piping and fittings for wear and corrosion (MARPOL 73/78/90 Annex I reg.9 and 16);

(OIn) .3 examining the oil content meter (15 ppm alarm and bilge monitor) for obvious defects, deterioration or damage and checking the record of calibration of the meter when done in accordance with the manufacturer's operation and instruction manual (MARPOL 73/78/90 Annex I reg.9 and 16).

(OIn) 1.3.4 For oil pollution prevention the intermediate survey of the additional requirements for oil tankers should consist of:

(OIn) .1 the provisions of (OA) 1.2.4;

(OIn) .2 examining the oil discharge monitoring and control system and the oil content meter for obvious defects, deterioration or damage, and to check the record or calibration of the meter when done in accordance with the manufacturer's operation and instruction manual (MARPOL 73/78/90 Annex I reg.9 and 15);

(OIn) .3 confirming the satisfactory operation of the oil/water interface detectors (MARPOL 73/78/90 Annex I reg.9 and 15);

(OIn) .4 for the crude oil washing system (MARPOL 73/78/90 Annex I reg.13B):

(OIn) .4.1 examining the crude oil washing piping outside the cargo tanks. If upon examination there is any doubt as to its condition, the piping may be required to be pressure tested, gauged or both. Particular attention should be paid to any repairs such as welded doublers;

(OIn) .4.2 confirming the satisfactory operation of the isolation valves to steam heaters for washing water, when fitted;

(OIn) .4.3 examining at least two selected cargo tanks for the express purpose of verifying the continued effectiveness of the installed crude oil washing and stripping systems. If the tank cannot be gas-free for the safe entry of the surveyor, an internal examination should not be conducted. In this case this examination may be conducted in conjunction with the internal examination of cargo tanks required in (CIn) 2.3.3.3 in Annex I;

(OIn) .5 examining the manual and/or remote operation of the individual tank valves (or other similar closing devices) to be kept closed at sea (MARPOL 73/78/90 Annex I reg.24).

(OIn) 1.3.5 For the oil pollution prevention the completion of the intermediate survey should consist of:
(OIn) .1 after a satisfactory survey, the International Oil Pollution Prevention Certificate should be endorsed;

(OIn) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part “General” section 4.8.

(OR)1.4 Renewal surveys - see part “General” section 4.5

(OR)1.4.1 For the oil pollution prevention the examination of current certificates and other records should consist of:

(OR) .1 the provisions of (OA) 1.2.1, except for the validity of the International Oil Pollution Prevention Certificate.

(OR)1.4.2 For the oil pollution prevention the examination of current certificates and other records for tankers should additionally consist of:

(OR) .1 the provisions of (OA) 1.2.2.

(OR)1.4.3 For oil pollution prevention the renewal survey should consist of:

(OR) .1 the provisions of (OIn) 1.3.3;

(OR) .2 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the oily-water separating equipment or oil filtering equipment (MARPOL 73/78/90 Annex I reg.s 9 and 16);

(OR) .3 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the oil discharge monitoring and control system including where practicable the automatic and manual operation of the means provided to stop the discharge of effluent (MARPOL 73/78/90 Annex I reg.s 9 and 16);

(OR) .4 confirming the satisfactory operation of the alarm for the oil filtering system (MARPOL 73/78/90 Annex I reg.s 9 and 16);

(OR) .5 confirming the satisfactory operation of homogenizers, sludge incinerators or other recognized means for the control of sludge when the size of oily residue (sludge) tank is approved on the basis of such installations (MARPOL 73/78/90 Annex I reg.17).

(OR)1.4.4 For oil pollution prevention the renewal survey of the additional requirements for oil tankers should consist of:

(OR) .1 the provisions of (OIn) 1.3.4;

(OR) .2 confirming that the arrangements of slop tanks or cargo tanks designated as slop tanks and associated piping systems are satisfactory (MARPOL 73/78/90 Annex I reg.s 9 and 15);
confirming, if necessary by simulated test or equivalent, the satisfactory operation of the oil discharge monitoring and control system and its associated equipment, including the oil/water interface detectors (MARPOL 73/78/90 Annex I reg.s 9 and 15);

confirming that the arrangements of pumps, pipes and valves are in accordance with the requirements for SBT systems (MARPOL 73/78/90 Annex I reg.13);

confirming that the arrangements of pumps, pipes and valves are in accordance with the Revised Specifications for Oil Tankers with Dedicated Clean Ballast Tanks (MARPOL 73/78/90 Annex I reg.13A);

confirming that the crude oil washing system is in accordance with the requirements for such systems (MARPOL 73/78/90 Annex I reg.13A) and, in particular:

- carrying out pressure testing of the crude oil washing system to at least the working pressure;
- examining the cargo tanks for the express purpose of verifying the continued effectiveness of the installed crude oil washing and stripping systems;
- examining internally, when fitted, the isolation valves for any steam heaters;
- verifying, by internal tank inspection or by another alternative method acceptable to the Administration, the effectiveness of the crude oil washing system. If the tank cannot be gas-freed for the safe entry of the surveyor, an internal inspection should not be conducted. An acceptable alternative would be satisfactory results during the surveys required by (OA) 1.2.4.9 (MARPOL 73/78/90 Annex I reg.13B);

confirming that there is no leakage from those ballast pipelines passing through cargo tanks and those cargo pipelines passing through ballast tanks (MARPOL 73/78/90 Annex I reg.s 13, 13A and 13B);

confirming that the pumping, piping and discharge arrangements are satisfactory (MARPOL 73/78/90 Annex I reg.18) and, in particular:

- confirming that the piping systems associated with the discharge of dirty ballast water or oil contaminated water are satisfactory;
- confirming that the means of draining cargo pumps and cargo lines, including the stripping device and the connections for pumping to the slop or cargo tanks or ashore are satisfactory;
- confirming that the arrangements for the part flow system, where fitted, are satisfactory;
- confirming that closing devices installed in the cargo transfer system and cargo piping as appropriate are satisfactory (MARPOL 73/78/90 Annex I reg.24);
(OR) .11 confirming, as appropriate and as practicable, that the arrangements for the prevention of oil pollution in the event of collision or stranding are satisfactory (MARPOL 73/78/90 Annex I reg. 13F and 13G).

(OR) 1.4.5 For the oil pollution prevention the completion of the renewal survey should consist of:

(OR) .1 after a satisfactory survey, the International Oil Pollution Prevention Certificate should be issued.

(N) 2 GUIDELINES FOR SURVEYS FOR THE INTERNATIONAL POLLUTION PREVENTION CERTIFICATE FOR THE CARRIAGE OF NOXIOUS SUBSTANCES IN BULK

(N) 2.1 Initial surveys - see part "General" section 4.1

(N) 2.1.1 For the carriage of noxious liquid substances in bulk the examination of plans and designs (as applicable to the cargoes the ship is to be certified to carry) should consist of:

(N) .1 drawing up the list of Annex II (appendix II) substances it is proposed the ship will be certified to carry (MARPOL 73/78/90 Annex II reg. 11 or reg. 12A);

(N) .2 examining the pumping system (MARPOL 73/78/90 Annex II reg. 5A);

(N) .3 examining the stripping system (MARPOL 73/78/90 Annex II reg. 5A);

(N) .4 examining the tank washing system and equipment (MARPOL 73/78/90 Annex II P & A Standards);

(N) .5 examining the underwater discharge arrangements (MARPOL 73/78/90 Annex II P & A Standards);

(N) .6 examining the ventilation equipment for residue removal (MARPOL 73/78/90 Annex II P & A Standards);

(N) .7 examining the heating system for solidifying and high viscosity substances (MARPOL 73/78/90 Annex II P & A Standards);

(N) .8 examining the Procedures and Arrangements Manual (including cargo carriage requirements to meet Annex II regulations) (MARPOL 73/78/90 Annex II P & A Standards).

(N) 2.1.2 For the carriage of noxious liquid substances in bulk the survey during construction and after installation (as applicable to the cargoes the ship is to be certified to carry) should consist of:

(N) .1 confirming that the pumping and stripping systems are satisfactory and that portable pipes or bends in sufficient number, if required, are on board (MARPOL 73/78/90 Annex II reg. 5A);

(N) .2 conducting the water test for assessing the stripping quantity (MARPOL 73/78/90 Annex II reg. 5A and P & A Standards App. A);
confirming that the tank washing machines provided on board are in working order, are those described in the Procedures and Arrangements Manual and are installed in accordance with the approved plans (MARPOL 73/78/90 Annex II P & A Standards),

confirming that the wash water heating system, if required, is installed in accordance with the approved plans (MARPOL 73/78/90 Annex II P & A Standards),

confirming that the number and position of tank cleaning openings for portable machines are in accordance with the approved plans (MARPOL 73/78/90 Annex II P & A Standards),

confirming that the underwater discharge outlet(s) are in accordance with the approved plans (MARPOL 73/78/90 Annex II P & A Standards),

confirming that means are provided in the common discharge piping to isolate openings provided above the waterline (MARPOL 73/78/90 Annex II P & A Standards),

verifying by actual test that the discharge rate of the pumps, where a variable rate type is used, can be controlled as specified in the Procedures and Arrangements Manual (MARPOL 73/78/90 Annex II P & A Standards),

verifying that means for restricting the discharge flow of fixed rate pumps to the specified rates have been fitted (MARPOL 73/78/90 Annex II P & A Standards),

confirming the satisfactory operation of the recording device, as fitted, and verifying by an actual flow test that it has an accuracy of +/- 15% or better (MARPOL 73/78/90 Annex II P & A Standards),

confirming that the ventilation equipment for residue removal is installed in accordance with the approved plan and is in working order and that the pressure in the driving medium for portable fans for ventilation equipment for residue removal can be achieved to give the required fan capacity (MARPOL 73/78/90 Annex II P & A Standards),

confirming that the heating system for solidifying and high viscosity substances is installed in accordance with the approved plan (MARPOL 73/78/90 Annex II P & A Standards).

2.1.3 For the carriage of noxious liquid substances in bulk, the check that the required documentation has been placed on board cargo ships (as applicable to the cargoes the ship is to be certified to carry) should consist of:

confirming that the Procedures and Arrangements Manual has been provided (MARPOL 73/78/90 Annex II regs.5, 5A and 8);

confirming that the Cargo Record Book has been provided (MARPOL 73/78/90 Annex II reg.9).
(NI) .3 confirming that the oil discharge monitor is certified for oil-like substances as may be listed on the Oil Pollution Prevention Certificate (MARPOL 73/78/90 Annex II reg.14).

(NI) 2.1.4 For the carriage of noxious liquid substances in bulk the completion of initial survey should consist of:

(NI) .1 after satisfactory survey, the International Certificate for the Carriage of Noxious Liquid Substances in Bulk should be issued.

(NA) 2.2 Annual surveys - see part “General” section 4.2

(NA) 2.2.1 For the carriage of noxious liquid substances in bulk the examination of current certificates and other records should consist of:

(NA) .1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

(NA) .2 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

(NA) .3 checking the validity of the International Oil Pollution Prevention Certificate;

(NA) .4 checking the certificates of class, if the ship is classed with a classification society;

(NA) .5 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk;

(NA) .6 checking the validity of the International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk;

(NA) .7 checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/88 reg.V/13(b));

(NA) .8 checking that the master, officers and ratings are certificated as required by the STCW Convention;

(NA) .9 checking whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the appropriate certificate;

(NA) .10 confirming that the Procedures and Arrangements Manual is on board (MARPOL 73/78/90 Annex II regs.5, 5A and 8);

(NA) .11 confirming that the Cargo Record Book is being correctly used (MARPOL 73/78/90 Annex II reg.9);

(NA) .12 confirming that the oil discharge monitor is certified for oil-like substances as may be listed on the Oil Pollution Prevention Certificate (MARPOL 73/78/90 Annex II reg.14);
(NA) .13 sighting the records of the recording device, as fitted, when category B cargoes are carried (MARPOL 73/78/90 Annex II P & A Standards).

(NA) .2.2.2 For the carriage of noxious liquid substances in bulk the annual survey should consist of:

(NA) .1 examining externally and confirming that the pumping and piping systems, including a stripping system if fitted, and associated equipment remain as approved (MARPOL 73/78/90 Annex II P & A Standards);

(NA) .2 examining externally the tank washing piping and confirming that the type, capacity, number, and arrangement of the tank washing machines are as approved (MARPOL 73/78/90 Annex II P & A Standards);

(NA) .3 examining externally the wash water heating system (MARPOL 73/78/90 Annex II P & A Standards);

(NA) .4 examining externally, as far as practicable, the underwater discharge arrangements (MARPOL 73/78/90 Annex II P & A Standards);

(NA) .5 confirming that the means of controlling the rate of discharge of the residue is as approved (MARPOL 73/78/90 Annex II P & A Standards);

(NA) .6 confirming that the flow rate indicating device is operable (MARPOL 73/78/90 Annex II P & A Standards);

(NA) .7 confirming that the ventilation equipment for residue removal is as approved (MARPOL 73/78/90 Annex II P & A Standards);

(NA) .8 examining externally, as far as is accessible, the heating system required for solidifying and high viscosity substances (MARPOL 73/78/90 Annex II P & A Standards);

(NA) .9 confirming that any cargo tank high-level alarms are operable;

(NA) .10 examining any additional requirements listed on the International Certificate for the Carriage of Noxious Liquids in Bulk.

(NA) .2.2.3 For the carriage of noxious liquid substances in bulk the completion of annual survey should consist of:

(NA) .1 after satisfactory survey, the International Certificate for the Carriage of Noxious Liquid Substances in Bulk should be endorsed;

(NA) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part "General" section 4.8.

(IN) .2.3 Intermediate surveys - see part "General" section 4.3

(IN) .2.3.1 For the carriage of noxious liquid substances in bulk the examination of current certificates and other records should consist of:

(IN) .1 the provisions of (NA) 2.2.1.
(NIn) 2.3.2 For the carriage of noxious liquid substances in bulk the intermediate survey should consist of:

(NIn) .1 the provisions of (NA) 2.2.2;

(NIn) .2 verifying from the cargo record book that the pumping and stripping arrangements have been emptying the tanks efficiently and are all in working order (MARPOL 73/78/90 Annex II reg.5A and 9);

(NIn) .3 confirming, if possible, that the discharge outlet(s) are in good condition (MARPOL 73/78/90 Annex II P & A Standards);

(NIn) .4 confirming the satisfactory operation of the recording device, as fitted, and verifying by an actual flow test that it has an accuracy of +/- 15% or better (MARPOL 73/78/90 Annex II P & A Standards);

(NIn) .5 confirming that the ventilation equipment for residue removal is satisfactory and that the pressure in the driving medium for portable fans for ventilation equipment for residue removal can be achieved to give the required fan capacity (MARPOL 73/78/90 Annex II P & A Standards).

(NIn) 2.3.3 For the carriage of noxious liquid substances in bulk the completion of intermediate survey should consist of:

(NIn) .1 after satisfactory survey, the International Certificate for the Carriage of Noxious Liquid Substances in Bulk should be endorsed;

(NIn) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory, see part "General" section 4.8.

(NR) 2.4 Renewal surveys - see part "General" section 4.4

(NR) 2.4.1 For the carriage of noxious liquid substances in bulk the examination of current certificates and other records should consist of:

(NR) .1 the provisions of (NA) 2.2.1, except for the validity of the International Certificate for the Carriage of Noxious Liquid Substances in Bulk.

(NR) 2.4.2 For the carriage of noxious liquid substances in bulk the renewal survey should consist of:

(NR) .1 the provisions of (NIn) 2.3.2;

(NR) .2 confirming that the pumping and stripping systems are satisfactory and that portable pipes or bends in sufficient number, if required, are on board (MARPOL 73/78/90 Annex II reg.5A);

(NR) .3 conducting the water test for assessing the stripping quantity (MARPOL 73/78/90 Annex II reg.5A and P & A Standards App.A);

(NR) .4 confirming that the tank washing machines provided on board are in working order, are those described in the Procedures and Arrangements Manual and are installed
in accordance with the approved plans (MARPOL 73/78/90 Annex II P & A Standards).

(NR) .5 confirming that the wash water heating system, if required, is installed in accordance with the approved plans (MARPOL 73/78/90 Annex II P & A Standards);

(NR) .6 confirming that the number and position of tank cleaning openings for portable machines are in accordance with the approved plans (MARPOL 73/78/90 Annex II P & A Standards);

(NR) .7 confirming that the underwater discharge outlet(s) are in good condition and are accordance with the approved plans (MARPOL 73/78/90 Annex II P & A Standards);

(NR) .8 confirming that means are provided in the common discharge piping to isolate openings provided above the waterline (MARPOL 73/78/90 Annex II P & A Standards);

(NR) .9 verifying by actual test that the discharge rate of the pumps, where a variable rate type is used, can be controlled as specified in the Procedures and Arrangements Manual (MARPOL 73/78/90 Annex II P & A Standards);

(NR) .10 verifying that means for restricting the discharge flow of fixed rate pumps to the specified rates are still fitted (MARPOL 73/78/90 Annex II P & A Standards);

(NR) .11 confirming that the ventilation equipment for residue removal is installed in accordance with the approved plan and is in working order (MARPOL 73/78/90 Annex II P & A Standards);

(NR) .12 confirming that the heating system for solidifying and high viscosity substances is installed in accordance with the approved plan (MARPOL 73/78/90 Annex II P & A Standards).

(NR) .2.4.3 For the carriage of noxious liquid substances in bulk the completion of renewal survey should consist of:

(NR) .1 after satisfactory survey, the International Certificate for the Carriage of Noxious Liquid Substances in Bulk should be issued.
ANNEX 4

SURVEY GUIDELINES UNDER THE MANDATORY CODES

(D) 1 GUIDELINES FOR THE SURVEYS FOR THE INTERNATIONAL CERTIFICATE OF FITNESS FOR THE CARRIAGE OF DANGEROUS CHEMICALS IN BULK AND THE CERTIFICATE OF FITNESS FOR THE CARRIAGE OF DANGEROUS CHEMICALS IN BULK

(DI) 1.1 Initial surveys – see part “General” section 4.1

(DI) 1.1.1 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the examination of plans and designs of the structure, equipment, fittings, arrangements and materials should consist of:

(DI) .1 determining the products that it is intended that the ship will be permitted to carry and noting the corresponding minimum special requirements (IBC Code 83/90/00, ch.17) and any other special requirements (IBC Code 83/90/00, ch.15);

(DI) .2 examining the plans for the ship type, location of the cargo tanks, cargo containment, materials of construction, cargo temperature control, cargo tank vent systems, environmental control, electrical installations, fire protection and fire extinction, instrumentation and the provision, specification and stowage of the equipment for personnel protection (IBC Code 83/90/00, chs.2, 4, 6, 7, 8, 9, 10, 11, 13 and 14);

(DI) .3 examining the plans for the freeboard and intact stability, discharges below the bulkhead deck and survival capability (IBC Code 83/90/00, ch.2);

(DI) .4 examining the plans for the ship arrangements IBC Code 83/90/00, ch.3);

(DI) .5 examining the plans for the cargo transfer IBC Code 83/90/00, ch.5);

(DI) .6 examining the plans for the mechanical ventilation in the cargo area (IBC Code 83/90/00, ch.12);

(DI) .7 the provisions of (NI) 2.1.1 in Annex 3.

(DI) 1.1.2 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the survey during construction and after installation of the structure, equipment, fittings, arrangements and materials should consist of:

(DI) .1 confirming that tanks containing cargo or residues of cargo are suitably segregated from accommodation, service and machinery spaces and from drinking water and stores for human consumption, that cargo piping does not pass through any accommodation, service or machinery space other than cargo pump rooms or pump rooms and that cargoes are not to be carried in either the fore or the aft peak tank (IBC Code 83/90/00, ch.3);
examining the air intakes and openings into the accommodation, service and machinery spaces in relation to the cargo piping and vent systems and their entrances, air inlets and openings in relation to the cargo area (IBC Code 83/90/00, ch.3);

examining the arrangements of the cargo pump rooms (IBC Code 83/90/00, ch.3);

examining the accesses to spaces in the cargo area (IBC Code 83/90/00, ch.3);

examining the bilge and ballast arrangements and confirming that pumps and pipelines are identified (IBC Code 83/90/00, ch.3);

examining, when applicable, the bow or stern loading and unloading arrangements with particular reference to the air inlets and entrances to the accommodation, machinery and service spaces, the electrical equipment, fire-fighting arrangements and means of communication and testing the remote shut down for the cargo pumps (IBC Code 83/90/00, ch.3);

confirming that the cargo tank types are arranged and installed in accordance with the approved plans, internally examining the cargo tanks, water ballast tanks and other spaces in the cargo area and pressure testing the boundaries (IBC Code 83/90/00, ch.4);

examining the cargo transfer arrangements and confirming that any hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing (IBC Code 83/90/00, ch.5);

examining and testing any cargo heating and cooling systems (IBC Code 83/90/00, ch.7);

confirming that the cargo tank vent systems have been installed in accordance with the approved plans (IBC Code 83/90/00, ch.8);

confirming that high-level alarms, or overflow control systems or spill valves or other equivalent means provided to control possible liquid rising in the venting system, are operating satisfactorily (IBC Code 83/90/00, ch.8);

confirming that suitable provision is made for drainage of vent lines and that no shut-off valves or other means of stoppage, including spectacle or blank flanges, are fitted either to the individual vents or to the header, if the vents are combined or either above or below pressure/vacuum relief valves with closed vent systems (IBC Code 83/90/00, ch.8);

confirming that suitable provisions are made for primary and secondary means (or alternative measures) for controlled tank venting (MSC.102(73), MEPC.79(43), chapter 8)
(DI) .14 examining the location of the vent outlets in respect of the height above the weather deck or the fore and aft gangway, from the nearest air intakes or openings to accommodation, service and machinery spaces and ignition sources and confirming that any high velocity vents are of the approved type (IBC Code 83/90/00, ch.8);

(DI) .15 examining the arrangements for the environmental control, including the means of storing or generating and drying an inert gas (IBC Code 83/90/00, ch.9);

(DI) .16 examining the electrical installations and confirming that, when appropriate, special materials have been used and that the electrical equipment installed in hazardous locations, as permitted, is certified by a recognised authority for the cargoes to be carried (IBC Code 83/90/00, ch.10);

(DI) .17 confirming that independent cargo tanks are electrically bonded to the hull and that all gasketed cargo pipe joints and hose connections are electrically bonded (IBC Code 83/90/00, ch.10);

(DI) .18 examining the arrangements for the fire protection and fire extinction (IBC Code 83/90/00, ch.11);

(DI) .19 examining the fixed fire fighting system for the cargo pump room and confirming that the installation tests have been satisfactorily completed and that its means of operation are clearly marked (IBC Code 83/90/00, ch.11);

(DI) .20 checking the deck foam system for the cargo area, including the supplies of foam concentrate, and testing that the minimum number of jets of water at the required pressure in the fire main is obtained, see (EI) 1.1.3.1 in Annex 1, when the system is in operation (IBC Code 83/90/00, ch.11);

(DI) .21 confirming that suitable portable fire extinguishing equipment for the cargoes to be carried is provided in the cargo area (IBC Code 83/90/00, ch.11);

(DI) .22 examining, and confirming the satisfactory operation of, the arrangements for the mechanical ventilation of spaces in the cargo area normally entered during cargo handling operations (IBC Code 83/90/00, ch.12) and checking in particular that:

(DI) .22.1 it may be controlled from outside the space;

(DI) .22.2 warning notices concerning its use have been posted;

(DI) .22.3 it is of the extraction type, with extraction from below the floor plates, unless the space houses electrical motors driving cargo pumps when it should be of the positive pressure type;

(DI) .22.4 the ducting does not pass through accommodation, machinery and service spaces and that the exhaust ducts are clear of the ventilation inlets and openings to such spaces,
.22.5 the electric motors driving ventilation fans are positioned outside the ventilation ducts and the ventilation fans and the ducts, in way of the fans only, are of non-sparking construction in hazardous locations;

.23 examining, and confirming the satisfactory operation of, the arrangements for the mechanical ventilation of spaces normally entered other than those covered by (DI) 1.1.2.21 (IBC Code 83/90/00, ch.12);

.24 confirming that double bottoms, cofferdams, duct keels, pipe tunnels, hold spaces and other spaces where cargo may accumulate are capable of being efficiently ventilated to ensure a safe environment when entry into the space is necessary and that, when appropriate, permanent ducting is provided and any ventilation fans comply with (DI) 1.1.2.22.5 (IBC Code 83/90/00, ch.12);

.25 examining the intrinsically safe systems and circuits used for measurement, monitoring, control and communication purposes in all hazardous locations (IBC Code 83/90/00, ch.13);

.26 checking the provision of equipment for personnel protection (IBC Code 83/90/00, ch.14) and in particular that:

.26.1 suitable protective clothing is available for the crew engaged in loading and discharging operations and that suitable storage is provided;

.26.2 the required safety equipment and associated breathing apparatus and air supplies and, when appropriate, emergency-escape respiratory and eye protection are provided and are properly stowed;

.26.3 medical first-aid equipment, including stretchers and oxygen resuscitation equipment are provided;

.26.4 arrangements have been made for the antidotes for the cargoes actually carried to be on board;

.26.5 decontamination arrangements and eyewashes are operational;

.26.6 the required gas detection instruments are on board and that arrangements have been made for the supply of the appropriate vapour detection tubes;

.26.7 the stowage for cargo samples is satisfactory;

.27 the provisions of (NI) 2.1.2 in Annex 3.

(DI) 1.1.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the check that all the required documentation has been placed on board the ship should consist of:

.1 confirming that a loading and stability information booklet, containing details of typical service and ballast conditions, provisions for evaluating other conditions of loading, a summary of the ship's survival capabilities and sufficient information to ensure that the ship is loaded and operated in a safe and seaworthy manner is available on board (IBC Code 83/90/00, ch.2);
(DI) .2 confirming that damage survival capability information is supplied on the basis of
loading information for all anticipated conditions of loading and variations in
draught and trim (IBC Code 83/90/00, ch.2);

(DI) .3 confirming that a table giving the filling ratios for the cargo tanks at various
densities has been provided (IBC Code 83/90/00, ch.16);

(DI) .4 confirming that a copy of the International Code for the Construction and
Equipment of Ships Carrying Dangerous Chemicals in Bulk, or the equivalent
national regulations, has been provided (IBC Code 83/90/00, ch.16);

(DI) .5 confirming that information relating to the chemical and physical properties of the
products to be carried has been provided together with the measures to be taken in
an accident have been provided (IBC Code 83/90/00, ch.16);

(DI) .6 confirming that a manual covering procedures for cargo transfer, tank cleaning,
gas freeing, ballasting, etc., has been provided (IBC Code 83/90/00, ch.16);

(DI) .7 the provisions of (NI) 2.1.3 in Annex 3.

(DI) 1.1.4 For compliance with the International Code for the Construction and Equipment of
Ships Carrying Dangerous Chemicals in Bulk the completion of the initial survey should consist of:

(DI) .1 after a satisfactory survey the International Certificate of Fitness for the Carriage
of Dangerous Chemicals in Bulk should be issued.

(DA)1.2 Annual surveys - see part “General” section 4.2

(DA)1.2.1 For compliance with the International Code for the Construction and Equipment of Ships
Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the examination of current certificates and other
records should consist of:

(DA) .1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment
Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety
Construction Certificate or the Cargo Ship Safety Certificate;

(DA) .2 checking the validity of the Safety Management Certificate (SMC) and that a
copy of the Document of Compliance (DOC) is on board;

(DA) .3 checking the validity of the International Load Line Certificate or International
Load Line Exemption Certificate;

(DA) .4 checking the validity of the International Oil Pollution Prevention Certificate;

(DA) .5 checking the certificates of class, if the ship is classed with a classification
society,
(DA) .6 checking, when appropriate, the validity of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk;

(DA) .7 checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/88, reg.V/15(b));

(DA) .8 checking that the master, officers and ratings are certificated as required by the STCW Convention;

(DA) .9 checking whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the appropriate certificate;

(DA) .10 confirming that the loading and stability information booklet, containing details of typical service and ballast conditions, provisions for evaluating other conditions of loading, a summary of the ship's survival capabilities and sufficient information to ensure that the ship is loaded and operated in a safe and seaworthy manner is available on board (IBC Code 83/90/00, ch.2) (No BCH Code 85/90/00 reference);

(DA) .11 confirming that damage survival capability information is supplied on the basis of loading information for all anticipated conditions of loading and variations in draught and trim (IBC Code 83/90/00, ch.2) (No BCH Code 85/90/00 reference);

(DA) .12 confirming that a table giving the filling ratios for the cargo tanks at various densities has been provided (IBC Code 83/90/00, ch.16) (BCH Code 85/90/00, ch.IIIIG);

(DA) .13 confirming that a copy of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk or the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, or the equivalent national regulations, has been provided (IBC Code 83/90/00, ch.16) (BCH Code 85/90/00, ch.V);

(DA) .14 confirming that information relating to the chemical and physical properties of the products to be carried has been provided together with the measures to be taken in an accident have been provided (IBC Code 83/90/00, ch.16) (BCH Code 85/90/00, ch.V);

(DA) .15 confirming that a manual covering procedures for cargo transfer, tank cleaning, gas freeing, ballasting, etc., has been provided (IBC Code 83/90/00, ch.16) (BCH Code 85/90/00, ch.V);

(DA) .16 confirming that the Procedures and Arrangements Manual is on board (IBC Code 83/90/00, ch.16A) (BCH Code 85/90/00, ch.VA);

(DA) .17 confirming that the Shipboard marine pollution emergency plan is on board (MARPOL 73/78 – 02, Annex II reg.16);

(DA) .18 confirming that the Cargo Record Book is on board and being correctly used (MARPOL 73/78 – 91/97/02, Annex II reg.9);
(DA) 1.2.2 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the annual survey of the structure, equipment, fittings, arrangements and materials should consist of:

(DA) .1 confirming that wheelhouse doors and windows, sidescuttles and windows in superstructure and deckhouse ends facing the cargo area are in a satisfactory condition (IBC Code 83/90/00, ch.3) (BCH Code 85/90/00, ch.IIC);

(DA) .2 confirming that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in a satisfactory condition (IBC Code 83/90/00, ch.3) (BCH Code 85/90/00, ch.IIC);

(DA) .3 confirming that removable pipe lengths or other approved equipment necessary for cargo separation are available in the pump room and are in a satisfactory condition (IBC Code 83/90/00, ch.3) (BCH Code 85/90/00, ch.IIC);

(DA) .4 examining all pump room bulkheads for signs of cargo leakage or fractures and, in particular, the sealing arrangements of all penetrations of pump room bulkheads (IBC Code 83/90/00, ch.3) (BCH Code 85/90/00, ch.IIC);

(DA) .5 confirming that the remote operation of the cargo pump bilge system is satisfactory (IBC Code 83/90/00, ch.3) (BCH Code 85/90, ch.IIC);

(DA) .6 examining the bilge and ballast arrangements and confirming that pumps and pipelines are identified (IBC Code 83/90/00, ch.3) (No BCH Code 85/90/00 reference);

(DA) .7 confirming, when applicable, that the bow or stern loading and unloading arrangements are in order and testing the means of communication and the remote shut down for the cargo pumps (IBC Code 83/90/00, ch.3) (No BCH Code 85/90/00 reference);

(DA) .8 examining the cargo transfer arrangements and confirming that any hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing (IBC Code 83/90/00, ch.5) (BCH Code 85/90/00, ch.IID);

(DA) .9 examining, when applicable, the cargo heating or cooling systems, including any sampling arrangements, and confirming that the means for measuring the temperature and associated alarms are operating satisfactorily (IBC Code 83/90/00, ch.7) (BCH Code 85/90/00, ch.IIF);

(DA) .10 examining, as far as practicable, the cargo tank vent system, including the pressure/vacuum valves and secondary means to prevent over- or under pressure and devices to prevent the passage of flame (IBC Code 83/90/00 MSC 102(73), MEPC.79(43), ch.8) (BCH Code 85/90/00 and MEPC 80(43), ch.IIE);

(DA) .11 examining the gauging devices, high-level alarms and valves associated with overflow control (IBC Code 83/90/00, ch.8) (BCH Code 85/90/00, ch.IIE);
confirming that arrangements for sufficient gas to be carried or generated to compensate for normal losses and that the means provided for monitoring ullage spaces are satisfactory (IBC Code 83/90/00, ch.9) (BCH Code 85/90/00, ch.IIIH);

confirming that arrangements are made for sufficient medium to be carried where drying agents are used on air inlets to cargo tanks (IBC Code 83/90/00, ch.9) (BCH Code 85/90/00, ch.IIIH);

confirming that all electrical equipment in dangerous zones is suitable for such locations, is in satisfactory condition and has been properly maintained (IBC Code 83/90/00, ch.10) (BCH Code 85/90/00, ch.IIIB);

examining the fixed fire-fighting system for the cargo pump room and the deck foam system for the cargo area and confirming that their means of operation are clearly marked (IBC Code 83/90/00, ch.11) (BCH Code 85/90/00, ch.IIIE);

confirming that the condition of the portable fire extinguishing equipment for the cargoes to be carried in the cargo area is satisfactory (IBC Code 83/90/00, ch.11) (BCH Code 85/90/00, ch.IIIE);

examining, as far as practicable, and confirming the satisfactory operation of, the arrangements for the ventilation of spaces normally entered during cargo handling operations and other spaces in the cargo area (IBC Code 83/90/00, ch.12) (BCH Code 85/90/00, ch.IIIA);

confirming, as far as practicable, that the intrinsically safe systems and circuits used for measurement, monitoring, control and communication purposes in all hazardous locations are being properly maintained (IBC Code 83/90/00, ch.13) (BCH Code 85/90/00, ch.IIIC);

examining the equipment for personnel protection (IBC Code 83/90/00, ch.14) (BCH Code 85/90/00, ch.IIIF) and in particular that:

the protective clothing for crew engaged in loading and discharging operations and its stowage is in a satisfactory condition;

the required safety equipment and associated breathing apparatus and associated air supplies and, when appropriate, emergency-escape respiratory and eye protection are in a satisfactory condition and are properly stowed;

medical first-aid equipment, including stretchers and oxygen resuscitation equipment are in a satisfactory condition;

arrangements have been made for the antidotes for the cargoes actually carried to be on board;

decontamination arrangements and eyewashes are operational;

the required gas detection instruments are on board and that arrangements have been made for the supply of the appropriate vapour detection tubes;
(DA) .19.7 the arrangements for the stowage of cargo samples are satisfactory;

(DA) .20 the provisions of (NA) 2.2.2 in Annex 3.

(DA) 1.2.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the completion of the annual survey should consist of:

(DA) .1 after a satisfactory survey the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk should be endorsed;

(DA) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory - see part “General” section 4.8.

(Dln) 1.3 Intermediate surveys - see part “General” section 4.3

(Dln) 1.3.1 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the examination of current certificates and other records should consist of:

(Dln) .1 the provisions of (DA) 1.2.1.

(Dln) 1.3.2 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the intermediate survey of the structure, equipment, fittings, arrangements and materials should consist of:

(Dln) .1 the provisions of (DA) 1.2.2;

(Dln) .2 examination of vent line drainage arrangements (IBC Code 83/90/00, ch.8) (BCH Code 85/90/00, ch.IIE);

(Dln) .3 confirmation, where applicable, that pipelines and independent cargo tanks are electrically bonded to the hull (IBC Code 83/90/00, ch.10) (BCH Code 85/90/00, ch.IIIB);

(Dln) .4 generally examining the electrical equipment and cables in dangerous zones such as cargo pump rooms and areas adjacent to cargo tanks to check for defective equipment, fixtures and wiring. The insulation resistance of the circuits should be tested and in cases where a proper record of testing is maintained, consideration should be given to accepting recent readings (IBC Code 83/90/00, ch.10) (BCH Code 85/90/00, ch.IIIB);

(Dln) .5 confirmation that spares are provided for cargo area mechanical ventilation fans (IBC Code 83/90/00, ch.12) (BCH Code 85/90/00, ch.IIIA);

(Dln) .6 the provisions of (Nln) 2.3.2 in Annex 3.
1.3.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the completion of the intermediate survey should consist of:

1. after a satisfactory survey the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk should be endorsed;

2. if a survey shows that the condition of a ship or its equipment is unsatisfactory - see part “General” section 4.8.

1.4 Renewal surveys - see part “General” section 4.4

1.4.1 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the examination of current certificates and other records should consist of:

1. the provisions of (DA) 1.2.1, except the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk.

1.4.2 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the renewal survey of the structure, equipment, fittings, arrangements and materials should consist of:

1. the provisions of (DIn) 1.3.3.

2. the provisions of (NR) 2.4.2 in Annex 3.

1.4.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the completion of the renewal survey should consist of:

1. after a satisfactory survey the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk should be issued.

2 Guidelines for Surveys for the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk

2.1 Initial surveys - see part “General” section 4.1.

2.1.1 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the examination of plans and designs of the structure, equipment, fittings, arrangements and materials should consist of:
determining the products that it is intended that the ship will be permitted to carry and noting the corresponding minimum special requirements (IGC Code 83/90/00, ch.19);

examining the plans for the ship type, cargo containment, control of vapour space within the cargo tanks, vapour detection, gauging, personnel protection, filling limits for cargo tanks and other special requirements (IGC Code 83/90/00, chs.2, 4, 6, 13, 14, 15, and 17);

examining the plans for the freeboard and intact stability, discharges below the bulkhead deck and survival capability (IGC Code 83/90/00, ch.2);

examining the plans for the ship arrangements (IGC Code 83/90/00, ch.3);

examining the plans for the process pressure vessels and liquid, vapour and pressure piping systems (IGC Code 83/90/00, chs.5 and 6);

examining the plans for the cargo pressure/temperature control (IGC Code 83/90/00, ch.7);

examining the plans for the cargo tank ventilation systems (IGC Code 83/90/00, ch.8);

examining the plans for the environmental control (IGC Code 83/90/00, ch.9);

examining the plans for the electrical installations (IGC Code 83/90/00, ch.10);

examining the plans for the fire protection and fire extinction (IGC Code 83/90/00, ch.11);

examining the plans for the mechanical ventilation in the cargo area (IGC Code 83/90/00, ch.12);

examining the plans for the instrumentation (gauging, gas detection) (IGC Code 83/90/00, ch.13);

examining, when applicable, the plans for the use of cargo as fuel (IGC Code 83/90/00, ch.16);

For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the survey during construction and after installation of the structure, equipment, fittings, arrangements and materials should consist of:

examining that the segregation in the cargo area and the arrangement of the accommodation, service and machinery spaces are in accordance with the approved plans (IGC Code 83/90/00, ch.3);

examining the arrangements of the cargo pump rooms and cargo compressor rooms (IGC Code 83/90/00, ch.3);
confirming that the manually operated emergency shutdown system together with the automatic shutdown of the cargo pumps and compressors are satisfactory (IGC Code 83/90/00, ch.3);

examining the arrangement of the cargo control room (IGC Code 83/90/00, ch.3);

examining the accesses to spaces in the cargo area (IGC Code 83/90/00, ch.3);

confirming the arrangements for the air locks (IGC Code 83/90/00, ch.3);

examining the bilge, ballast and oil fuel arrangements (IGC Code 83/90/00, ch.3);

examining, when applicable, the bow or stern loading and unloading arrangements with particular reference to the air inlets and entrances to the accommodation, machinery and service spaces, the electrical equipment, fire-fighting arrangements and means of communication between the cargo control room and the shore location (IGC Code 83/90/00, ch.3);

confirming that the cargo tanks are arranged and installed in accordance with the approved plans, internally examining the cargo tanks, water ballast tanks and other spaces in the cargo area, ensuring that the appropriate non-destructive and pressure testing are carried out (IGC Code 83/90/00, ch.4);

examining the cargo and process piping, including the expansion arrangements, insulation from the hull structure, pressure relief and drainage arrangements and carrying out a leak detection test (IGC Code 83/90/00, ch.5);

confirming that the cargo system valving arrangements are in accordance with the approved plans (IGC Code 83/90/00, ch.5);

confirming that any liquid and vapour hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing (IGC Code 83/90/00, ch.5);

examining the arrangements for the cargo pressure/temperature control including, when fitted, any refrigeration system and confirming that any associated alarms are satisfactory (IGC Code 83/90/00, ch.7);

confirming that the cargo tank vent systems, including, when appropriate, any additional pressure relieving system for liquid level control and vacuum pressure systems, have been installed in accordance with the approved plans (IGC Code 83/90/00, ch.8);

examining the arrangements for the environmental control, including the means of storing or generating and drying an inert gas (IGC Code 83/90/00, ch.9);

examining the electrical installations with particular reference to the certified safe type equipment fitted in gas-dangerous spaces and zones (IGC Code 83/90/00, ch.10);
examining the arrangements for the fire protection and fire extinction (IGC Code 83/90/00, ch.11);

examining the fixed fire-fighting system for the cargo pump room and confirming that the installation tests have been satisfactorily completed and that its means of operation is clearly marked (IGC Code 83/90/00, ch.11);

examining the fire water main with particular reference to the provision of hydrants and isolation arrangements, checking that the two jets of water reach all areas of the cargo and containment area at the required pressure and testing the remote means of starting one main fire pump (IGC Code 83/90/00, ch.11);

examining and testing the water spray system for cooling, fire protection and crew protection and confirming that its means of operation is clearly marked (IGC Code 83/90/00, ch.11);

examining the dry chemical powder fire-extinguishing system for the cargo area, seeing that the fixed piping has been properly installed and has been proved clear and confirming that its means of operation is clearly marked (IGC Code 83/90/00, ch.11);

examining the carbon dioxide system for the cargo compressor and pump rooms and confirming that the installation tests have been satisfactorily completed and that its means of operation is clearly marked (IGC Code 83/90/00, ch.11);

confirming the provision and examining the disposition of the fire fighter's outfits (IGC Code 83/90/00, ch.11);

examining, and confirming the satisfactory operation of, the arrangements for the mechanical ventilation of spaces in the cargo area normally entered during cargo handling operations (IGC Code 83/90/00, ch.12) and checking in particular that:

- it may be controlled from outside the space;
- warning notices concerning its use have been posted;
- is fixed and is of the negative pressure type, permitting extraction from either the upper or lower parts of the space or from both the upper and lower parts when appropriate, for cargo compressor and pump rooms and for cargo control rooms when considered to be gas-dangerous spaces;
- is of the positive pressure type for spaces containing electric motors driving cargo compressors or pumps and other gas-safe spaces within the cargo area, except those containing inert gas generators;
- exhaust ducts are clear of the ventilation inlets and openings to accommodation spaces, service spaces, control stations and other gas-safe spaces;
- intakes are arranged to minimize the recycling or hazardous vapours;
- ducts from gas-dangerous spaces are not led through accommodation, service and machinery spaces and control stations, except when (GI) 2.1.2.30 applies;
the electric motors driving ventilation fans are positioned outside the ventilation ducts when the carriage of flammable products is intended and the ventilation fans and the ducts, in way of the fans only, are of non-sparking construction in gas-dangerous spaces;

examine, and confirming the satisfactory operation of, the arrangements for the mechanical ventilation of spaces normally entered other than those covered by (GI) 2.1.2.24 (IGC Code 83/90/00, ch.12);

examine, and testing as appropriate, the liquid level indicators, overflow control, pressure gauges, high pressure and, when applicable, low pressure alarms, and temperature indicating devices for the cargo tanks (IGC Code 83/90/00, ch.13);

examine, and testing as appropriate, the gas detection equipment (IGC Code 83/90/00, ch.13);

confirming that two sets of portable gas detection equipment suitable for the cargoes to be carried and a suitable instrument for measuring oxygen levels have been provided (IGC Code 83/90/00, ch.13);

checking the provision of equipment for personnel protection (IGC Code 83/90/00, ch.14) and in particular that:

two complete sets of safety equipment each permitting personnel to enter and work in a gas-filled space are provided and are properly stowed;

the requisite supply of compressed air is provided and examining, when applicable, the arrangements for any special air compressor and low-pressure air line system;

medical first-aid equipment, including stretchers and oxygen resuscitation equipment and antidotes, when available, for the products to be carried are provided;

respiratory and eye protection suitable for emergency escape purposes are provided;

decontamination arrangements and eyewashes are operational;

when applicable, personnel are protected against the effects of a major cargo release by a special suitably designed and equipped space within the accommodation area;

when applicable, the cargo control room is of the gas-safe type;

examining, when applicable, the arrangements for the use of cargo as fuel and testing that the gas supply to the machinery space is cut off should the exhaust ventilation not be functioning correctly and that the master gas fuel valve may be remotely closed from within the machinery space (IGC Code 83/90/00, ch.16).
(GI) 2.1.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the check that all the required documentation has been placed on board the ship should consist of:

(GI) 1 confirming that a loading and stability information booklet, containing details of typical service and ballast conditions, provisions for evaluating other conditions of loading, a summary of the ship's survival capabilities and sufficient information to ensure that the ship is loaded and operated in a safe and seaworthy manner is available on board (IGC Code 83/90/00, ch.2);

(GI) 2 confirming that damage survival capability information is supplied on the basis of loading information for all anticipated conditions of loading and variations in draught and trim (IGC Code 83/90/00, ch.2);

(GI) 3 confirming that necessary information for the safe carriage of the products to be carried has been provided (IGC Code 83/90/00, ch.18);

(GI) 4 confirming that a copy of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, or the equivalent national regulations, has been provided (IGC Code 83/90/00, ch.18).

(GI) 2.1.4 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the completion of the initial survey should consist of:

(GI) 1 after a satisfactory survey the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk should be issued.

(GA) 2.2 Annual surveys - see part “General” section 4.2.

(GA) 2.2.1 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the examination of current certificates and other records should consist of:

(GA) 1 checking the validity, as appropriate, of the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Radio Certificate and the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;

(GA) 2 checking the validity of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board;

(GA) 3 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

(GA) 4 checking the validity of the International Oil Pollution Prevention Certificate;

(GA) 5 checking the certificates of class, if the ship is classed with a classification society;

(GA) 6 checking the validity of the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk;
checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/88 reg.V/13(b));

checking that the master, officers and ratings are certificated as required by the STCW Convention;

checking whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the appropriate certificate;

confirming that the loading and stability information booklet, containing details of typical service and ballast conditions, provisions for evaluating other conditions of loading, a summary of the ship's survival capabilities and sufficient information to ensure that the ship is loaded and operated in a safe and seaworthy manner is available on board (IGC Code 83/90/00, ch.2);

confirming that damage survival capability information is supplied on the basis of loading information for all anticipated conditions of loading and variations in draught and trim (IGC Code 83/90/00, ch.2);

confirming that necessary information for the safe carriage of the products to be carried has been provided (IGC Code 83/90/00, ch.18);

confirming that a copy of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, or the equivalent national regulations, has been provided (IGC Code 83/90/00, ch.18).

For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the annual survey of the structure, equipment, fittings, arrangements and materials should consist of:

confirming that any special arrangements to survive conditions of damage are in order (IGC Code 83/90/00, ch.2);

confirming that the wheelhouse doors and windows, sidescutles and windows in superstructure and deckhouse ends in the cargo area are in a satisfactory condition (IGC Code 83/90/00, ch.3);

examining the cargo pump rooms and cargo compessor rooms (IGC Code 83/90/00, ch.3);

confirming that the manually operated emergency shutdown system together with the automatic shutdown of the cargo pumps and compressors are satisfactory (IGC Code 83/90/00, ch.3);

examining the cargo control room (IGC Code 83/90/00, ch.3);

examining the gas detection arrangements for cargo control rooms and the measures taken to exclude ignition sources where such spaces are not gas-safe (IGC Code 83/90/00, ch.3);
confirming the arrangements for the air locks are being properly maintained (IGC Code 83/90/00, ch.3);

exercising, as far as practicable, the bilge, ballast and oil fuel arrangements (IGC Code 83/90/00, ch.3);

examining, when applicable, the bow or stern loading and unloading arrangements with particular reference to the electrical equipment, fire-fighting arrangements and means of communication between the cargo control room and the shore location (IGC Code 83/90/00, ch.3);

confirming that the sealing arrangements at the gas domes are satisfactory (IGC Code 83/90/00, ch.4);

confirming that portable or fixed drip trays or deck insulation for cargo leakage is in order (IGC Code 83/90/00, ch.4);

examining the cargo and process piping, including the expansion arrangements, insulation from the hull structure, pressure relief and drainage arrangements (IGC Code 83/90/00, ch.5);

confirming that the cargo tank and interbarrier space pressure and relief valves, including safety systems and alarms, are satisfactory (IGC Code 83/90/00, ch.5);

confirming that any liquid and vapour hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing (IGC Code 83/90/00, ch.5);

examining the arrangements for the cargo pressure/temperature control including, when fitted, any refrigeration system and confirming that any associated alarms are satisfactory (IGC Code 83/90/00, ch.7);

examining the cargo, bunker, ballast and vent piping systems, including vent masts and protective screens, as far as practicable (IGC Code 83/90/00, ch.8);

confirming that arrangements are made for sufficient inert gas to be carried to compensate for normal losses and that means are provided for monitoring the spaces (IGC Code 83/90/00, ch.9);

confirming that any air-drying system and any interbarrier and hold space purging inert gas system are satisfactory (IGC Code 83/90/00, ch.9);

confirming that electrical equipment in gas-dangerous spaces and zones is in a satisfactory condition and is being properly maintained (IGC Code 83/90/00, ch.10);

examining the arrangements for the fire protection and fire extinction and testing the remote means of starting one main fire pump (IGC Code 83/90/00, ch.11);

examining the fixed fire-fighting system for the cargo pump room and confirming that its means of operation is clearly marked (IGC Code 83/90/00, ch.11);
(GA) .22 examining the water spray system for cooling, fire protection and crew protection and confirming that its means of operation is clearly marked (IGC Code 83/90/00, ch.11);

(GA) .23 examining the dry chemical powder fire-extinguishing system for the cargo area and confirming that its means of operation is clearly marked (IGC Code 83/90/00, ch.11);

(GA) .24 examining the fixed installation for the gas-dangerous spaces and confirming its means of operation is clearly marked (IGC Code 83/90/00, ch.11);

(GA) .25 confirming the provision and examining the condition of the fire fighter's outfits (IGC Code 83/90/00, ch.11);

(GA) .26 examining, as far as practicable, and confirming the satisfactory operation of, the arrangements for the mechanical ventilation of spaces in the cargo area normally entered during cargo handling operations (IGC Code 83/90/00, ch.12);

(GA) .27 examining, and confirming the satisfactory operation of, the arrangements for the mechanical ventilation of spaces normally entered other than those covered by (GI) 2.1.2.24 (IGC Code 83/90/00, ch.12);

(GA) .28 examining, and testing as appropriate and as far as practicable, the liquid level indicators, overflow control, pressure gauges, high pressure and, when applicable, low pressure alarms, and temperature indicating devices for the cargo tanks (IGC Code 83/90/00, ch.13);

(GA) .29 examining, and testing as appropriate, the gas detection equipment (IGC Code 83/90/00, ch.13);

(GA) .30 confirming that two sets of portable gas detection equipment suitable for the cargoes to be carried and a suitable instrument for measuring oxygen levels have been provided (IGC Code 83/90/00, ch.13);

(GA) .31 checking the provision of equipment for personnel protection (IGC Code 83/90/00, ch.14) and in particular that:

(GA) .31.1 two complete sets of safety equipment each permitting personnel to enter and work in a gas-filled space are provided and are properly stowed;

(GA) .31.2 the requisite supply of compressed air is provided and examining, when applicable, the arrangements for any special air compressor and low-pressure air line system;

(GA) .31.3 medical first-aid equipment, including stretchers and oxygen resuscitation equipment and antidotes, when available, for the products to be carried are provided;

(GA) .31.4 respiratory and eye protection suitable for emergency escape purposes are provided;

(GA) .31.5 decontamination arrangements and eyewashes are operational;
(GA) 31.6 examining, when applicable, the arrangements to protect personnel against the effects of a major cargo release by a special suitably designed and equipped space within the accommodation area;

(GA) 32 examining, when applicable, the arrangements for the use of cargo as fuel and testing, as far as practicable, that the gas supply to the machinery space is cut off should the exhaust ventilation not be functioning correctly and that master gas fuel valve may be remotely closed from within the machinery space (IGC Code 83/90/00, ch.16).

(GA) 2.2.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the completion of the annual survey should consist of:

(GA) 1 after a satisfactory survey the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk should be endorsed;

(GA) 2 if a survey shows that the condition of a ship or its equipment is unsatisfactory - see part "General" section 4.8.

(GIn) 2.3 Intermediate surveys - see part "General" section 4.3.

(GIn) 2.3.1 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the examination of current certificates and other records should consist of:

(GIn) 1 the provisions of (GA) 2.2.1.

(GIn) 2.3.2 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the intermediate survey of the structure, equipment, fittings, arrangements and materials should consist of:

(GIn) 1 the provisions of (GA) 2.2.2;

(GIn) 2 confirming, where applicable, that pipelines and independent cargo tanks are electrically bonded to the hull (IGC Code 83/90/00, ch.10);

(GIn) 3 generally examining the electrical equipment and cables in dangerous zones such as cargo pump rooms and areas adjacent to cargo tanks to check for defective equipment, fixtures and wiring. The insulation resistance of the circuits should be tested and in cases where a proper record of testing is maintained consideration should be given to accepting recent readings (IGC Code 83/90/00, ch.10);

(GIn) 4 confirming that spares are provided for cargo area mechanical ventilation fans (IGC Code 83/90/00, ch.12);

(GIn) 5 confirming that the heating arrangements, if any, for steel structures are satisfactory.

(GIn) 2.3.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the completion of the intermediate survey should consist of:
(GIn) .1 after a satisfactory survey the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk should be endorsed;

(GIn) .2 if a survey shows that the condition of a ship or its equipment is unsatisfactory - see part “General” section 4.8.

(GR) 2.4 **Renewal surveys** - see part “General” section 4.4.

(GR) 2.4.1 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the examination of current certificates and other records should consist of:

(GR) .1 the provisions of (GA) 2.2.1, except the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk.

(GR) 2.4.2 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the renewal survey of the structure, equipment, fittings, arrangements and materials should consist of:

(GR) .1 the provisions of (GIn) 2.3.3;

(GR) .2 examining the insulation and means of support of the cargo tanks and confirming that the secondary barrier remains effective (IGC Code 83/90/00, ch.4).

(GR) 2.4.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the completion of the renewal survey should consist of:

(GR) .1 after a satisfactory survey the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk should be issued.
APPENDIX

THE HARMONIZED SYSTEM OF SURVEY AND CERTIFICATION

DIAGRAMMATIC ARRANGEMENT

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PASSENGER

SEC

RADIO

SAFCON

IGC/GC

IBC/BCH

LOAD LINE

MARPOL Annex I

MARPOL Annex II

Code of types of survey:

R - Renewal

P - Periodical

I - Intermediate

A - Annual
REVISED STANDARDS FOR THE DESIGN, TESTING AND LOCATING OF DEVICES TO PREVENT THE PASSAGE OF FLAME INTO CARGO TANKS IN TANKERS

1. By resolution A 519(13) the Maritime Safety Committee was requested by the 1983 Assembly to finalize the Standards for devices to prevent the passage of flame into cargo tanks, the Committee was developing at the time, prior to the coming into force of the 1981 SOLAS amendments.

2. The Committee, at its forty-ninth session, (2 to 6 April 1984), adopted the standards so developed, which were attached to MSC/Circ 373.

3. The Committee agreed that the inert gas system was to be considered as equivalent to devices to prevent the passage of flame into cargo tanks only if vent outlets on ships fitted with inert gas systems were at least fitted with devices to prevent the passage of flame into cargo tanks, but that these devices need not comply with the test requirement for endurance burning. The Committee noted that, in the standards, emphasis was laid on compliance with test specifications rather than on construction. It was then understood that, in the case of a tanker fitted with an inert gas system, the provision of flashback would suffice and a well-designed and fitted flame screen could meet this criterion. In summary, if a flame screen met the standards, it would be accepted.

4. The Committee, at its fifty-fifth session, (11 to 22 April 1988), adopted amendments to the standards contained in MSC/Circ 373 and disseminated them as MSC/Circ 373/Rev 1.

5. The Committee, at its sixty-fourth session, (5 to 9 December 1994), recognizing the necessity to clarify some provisions in the revised standards, adopted further amendments thereto, which are incorporated in the test set out in the annex.

6. Member Governments are invited to give effect to the revised standards in conjunction with the application of regulation II-2/59 of the 1974 SOLAS Convention, as amended.

***
ANNEX

REVISED STANDARDS FOR THE DESIGN, TESTING AND LOCATING OF DEVICES TO PREVENT THE PASSAGE OF FLAME INTO CARGO TANKS IN TANKERS

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3.2 Test procedures for flame arresters located at openings to the atmosphere
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3.4 Test rig and test procedures for detonation flame arresters located in-line
3.5 Operational test procedures
4 MISCELLANEOUS
4.1 Marking of device
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4.3 Manufacturers' instruction manual
1 INTRODUCTION

1.1 Purpose

The 1981 and the 1983 amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS) include revised requirements for fire safety measures for tankers. Regulation II-2/59 of these amendments contains provisions concerning venting, purging, gas-freeing and ventilation. Regulation II-2/59.1.5 states:

"The venting system shall be provided with devices to prevent the passage of flame into the cargo tanks. The design, testing and locating of these devices shall comply with the requirements established by the Administration which shall contain at least the Standards adopted by the Organization."

1.2 Application

1.2.1 These Standards are intended to cover the design, testing, locating and maintenance of "devices to prevent the passage of flame into cargo tanks" (hereafter called "devices") of tankers and combination carriers carrying crude oil and petroleum products having a flashpoint of 60°C (closed cup) or less, and a Reid vapour pressure below atmospheric pressure and other products having a similar fire hazard.

1.2.2 Oil tankers and combination carriers fitted with an inert gas system in accordance with regulation 62 should be fitted with devices which comply with these Standards, except that the tests specified in 3.2.3 and 3.3.3.2 are not required. Such devices are only to be fitted at openings unless they are tested in accordance with 3.4.

1.2.3 These Standards are intended for devices protecting cargo tanks containing crude oil, petroleum products and flammable chemicals. In the case of the carriage of chemicals, the test media referred to in section 3 can be used. However, devices for chemical tankers dedicated to the carriage of products with MESC less than 0.9 mm should be tested with appropriate media.

1.2.4 Devices should be tested and located in accordance with these Standards.

1.2.5 Devices are installed to protect:

.1 openings designed to relieve pressure or vacuum caused by thermal variations (regulation II-2/59.1.2.1);

.2 openings designed to relieve pressure or vacuum during cargo loading, ballasting or during discharging (regulation II-2/59.1.2.2);

.3 outlets designed for gas-freeing (regulation II-2/59.2.2.3).

1.2.6 Devices should not be capable of being bypassed or blocked open unless they are tested in the bypassed or blocked open position in accordance with section 3.

*Reference is made to IEC - Publication 79-1.
1.2.7 These Standards do not include consideration of sources of ignition such as lightning discharges since insufficient information is available to formulate equipment recommendations. All cargo handling, tank cleaning and ballasting operations should be suspended on the approach of an electrical storm.

1.2.8 These Standards are not intended to deal with the possibility of the passage of flame from one cargo tank to another on tankers with common venting systems.

1.2.9 When outlet openings of gas-freeing systems on tankers not fitted with inert gas systems are required to be protected with devices, they should comply with these Standards except that the tests specified in 3.2.3 and 3.3.3.2 are not required.

1.2.10 Certain of the tests prescribed in section 3 of these Standards are potentially hazardous, but no attempt is made in this circular to specify safety requirements for these tests.

1.3 Definitions

For the purpose of these Standards, the following definitions are applicable.

1.3.1 "Flame arrester" is a device to prevent the passage of flame in accordance with a specified performance standard. Its flame-arresting element is based on the principle of quenching.

1.3.2 "Flame screen" is a device utilizing wire mesh to prevent the passage of unconfined flames, in accordance with a specified performance standard.

1.3.3 "Flame speed" is the speed at which a flame propagates along a pipe or other system.

1.3.4 "Flashback" is the transmission of a flame through a device.

1.3.5 "High velocity vent" is a device to prevent the passage of flame, consisting of a mechanical valve which adjusts the opening available for flow in accordance with the pressure at the inlet of the valve in such a way that the efflux velocity cannot be less than 30 m/s.

1.3.6 "Pressure/vacuum valve" is a device designed to maintain pressure and vacuum in a closed container within preset limits.

2 STANDARDS

2.1 Principles

2.1.1 Depending on their service and location, devices are required to protect against the propagation of:

1. moving flames; and/or

2. stationary flames from pre-mixed gases;

after ignition of gases resulting from any cause.

Pressure/vacuum valves are devices to prevent the passage of flame when designed and tested in accordance with these Standards.
2.1.2 When flammable gases from outlets ignite, the following four situations may occur:

1. At low gas velocities, the flame may:
   1. flashback, or
   2. stabilize itself as if the outlet were a burner.

2. At high velocities, the flame may:
   1. burn at a distance above the outlet; or
   2. be blown out.

2.1.3 In order to prevent the passage of flame into a cargo tank, devices must be capable of performing one or more of the following functions:

1. permitting the gas to pass through passages without flashback and without ignition of the gases on the protected side when the device is subjected to heating for a specified period;

2. maintaining an efflux velocity in excess of the flame speed for the gas, irrespective of the geometric configuration of the device and without the ignition of gases on the protected side when the device is subjected to heating for a specified period; and

3. preventing an influx of flame when conditions of vacuum occur within the cargo tanks.

2.2 Mechanical design standards

2.2.1 The casing or housing of devices should meet similar standards of strength, heat resistance and corrosion resistance as the pipe to which they are attached.

2.2.2 The design of devices should allow for ease of inspection and removal of internal elements for replacement, cleaning or repair.

2.2.3 All flat joints of the housing should be machined true and should provide for a joint having an adequate metal-to-metal contact.

2.2.4 Flame arrester elements should fit in the housing in such a way that flame cannot pass between the element and the housing.

2.2.5 Resilient seals may be installed only if their design is such that if the seals are partially or completely damaged or burned, the device is still capable of effectively preventing the passage of flame.

2.2.6 Devices should allow for efficient drainage of moisture without impairing their efficiency to prevent the passage of flame.
2.2.7 The casing and element and gasket materials should be capable of withstanding the highest pressure and temperature to which the device may be exposed under both normal and specified fire test conditions.

2.2.8 End-of-line devices should be so constructed as to direct the efflux vertically upwards.

2.2.9 Fastenings essential to the operation of the device, i.e. screws, etc., should be protected against loosening.

2.2.10 Means should be provided to check that any valve lifts easily without remaining in the open position.

2.2.11 Devices in which the flame arresting effect is achieved by the valve function and which are not equipped with the flame arrester elements (e.g. high velocity valves) must have a width of the contact area of the valve seat of at least 5 mm.

2.2.12 Devices should be resistant to corrosion in accordance with 3.5.1.

2.2.13 Elements, gaskets and seals should be of material resistant to both seawater and the cargoes carried.

2.2.14 The casing or housing should be capable of passing a hydrostatic pressure test, as required in 3.5.2.

2.2.15 In-line devices should be able to withstand, without damage or permanent deformation, the internal pressure resulting from detonation when tested in accordance with section 3.4.

2.2.16 A flame arrester element should be designed to ensure quality control of manufacture to meet the characteristics of the prototype tested, in accordance with these Standards.

2.3 Performance Standards

2.3.1 Devices should be tested in accordance with 3.5 and thereafter shown to meet the test requirements of 3.2 to 3.4, as appropriate.

2.3.2 Performance characteristics, such as the flow rates under both positive and negative pressure, operating sensitivity, flow resistance and velocity should be demonstrated by appropriate tests.

2.3.3 Devices should be designed and constructed to minimize the effect of fouling under normal operating conditions. Instructions on how to determine when cleaning is required and the method of cleaning should be provided for each device in the manufacturers' instruction manual.

2.3.4 Devices should be capable of operating in freezing conditions (such as may cause blockage by freezing cargo vapours or by icing in bad weather) and if any device is provided with heating arrangements so that its surface temperature exceeds 85°C, then it should be tested at the highest operating temperature.

2.3.5 Devices based upon maintaining a minimum velocity should be capable of opening in such a way that a velocity of 30 m/s is immediately initiated, maintaining an efflux velocity of at least 30 m/s at all
flow rates and, when the gas flow is interrupted, be capable of closing in such a way that this minimum velocity is maintained until the valve is fully closed.

2.3.6 In the case of high velocity vents, the possibility of inadvertent detrimental hammering leading to damage and/or failure should be considered with a view to eliminating it.

2.4 Flame screens

2.4.1 Flame screens should be:

1. designed in such a manner that they cannot be inserted improperly in the opening;
2. securely fitted in openings so that flames cannot circumvent the screen;
3. able to meet the requirements of these standards. For flame screens fitted at vacuum inlets through which vapours cannot be vented the test specified in 3.2.3 need not be complied with; and
4. be protected against mechanical damage.

2.5 Sizing, location and installation of devices

2.5.1 For determining the size of devices to avoid inadmissible pressure or vacuum in cargo tanks during loading or discharging, calculations of pressure losses should be carried out. The following parameters should be taken into account:

1. loading/discharge rates;
2. gas evolution;
3. pressure loss across devices, taking into account the resistance coefficient;
4. pressure loss in the vent piping system;
5. pressure at which the vent opens if a high velocity valve is used;
6. density of the saturated vapour/air mixture, and
7. to compensate for possible fouling of a flame arrester, 70% of its rated performance is to be used in the pressure drop calculation of the installation.

2.5.2 Devices should be located at the outlets to atmosphere unless tested and approved for in-line installation. Devices for in-line installation may not be fitted at the outlets to atmosphere unless they have also been tested and approved for that position.

Hammering is rapid full stroke opening/closing, not intended by the manufacturer during normal operations.
2.5.3 End of line devices which are intended for exclusive use at openings of inerted cargo tanks need not be tested against endurance burning as specified in 3.2.3.

2.5.4 Where end-of-line devices are fitted with cowl, weather hoods and deflectors, etc., these attachments should be fitted for the tests described in 3.2.

2.5.5 Where detonation flame arresters are installed, as in-line devices venting to atmosphere, they should be located at a sufficient distance from the open end of the pipeline so as to preclude the possibility of a stationary flame resting on the arrester.

2.5.6 When venting to atmosphere is not performed through an end-of-line device according to 2.5.4, or a detonation flame arrester according to 2.5.5, the in-line device has to be specifically tested with the inclusion of all pipes, tees, bends, cowl, weather hood, etc., which may be fitted between the device and atmosphere. The testing should consist of the flashback test of 3.2.2 and, if for the given installation it is possible for a stationary flame to rest on the device, the testing should also include the endurance burning test of 3.2.3.

2.5.7 Means should be provided to enable personnel to reach devices situated more than 2 m above deck to facilitate maintenance, repair and inspection.

3 TYPE TEST PROCEDURES

3.1 Principles

3.1.1 Tests should be conducted by a laboratory acceptable to the Administration.

3.1.2 Each size of each model should be submitted for type testing. However, for flame arresters testing may be limited to the smallest and the largest sizes and one additional size in between to be chosen by the Administration. Devices should have the same dimensions and most unfavourable clearances expected in the production model. If a test device is modified during the test programme, the testing should be started over again.

3.1.3 Tests described in this section using gasoline vapours (a non-lead petroleum distillate consisting essentially of aliphatic hydrocarbon compounds with a boiling range approximating 65°C/75°C), technical hexane vapours, or technical propane, as appropriate, and referred to in this section, are suitable for all devices protecting tanks containing a flammable atmosphere of the cargoes referred to in 1.2.1. This does not preclude the use of gasoline vapours or technical hexane vapours for all tests referred to in this section.

3.1.4 After the relevant tests, the device should not show mechanical damage that affects its original performance.

3.1.5 Before the tests the following equipment as appropriate should be properly calibrated:

1. gas concentration meters,
2. thermometers,
3. flow meters.
3.1.6 The following characteristics should be recorded, as appropriate, throughout the tests:

1. concentration of fuel in the gas mixture,
2. temperature of the test gas mixture at inflow of the device, and
3. flow rates of the test gas mixtures when applicable

3.1.7 Flame passage should be observed by recording, e.g., temperature, pressure, or light emission by suitable sensors on the protected side of the device, alternatively, flame passage may be recorded on video tape.

3.2 Test procedures for flame arresters located at openings to the atmosphere

3.2.1 The test rig should consist of an apparatus producing an explosive mixture, a small tank with a diaphragm, a flanged prototype of the flame arrester, a plastic bag*, and a firing source in three positions (see appendix 1)**. Other test rigs may be used, provided the tests referred to in this section are achieved to the satisfaction of the Administration.

3.2.2 A flashback test should be carried out as follows

1. The tank, flame arrester assembly and the plastic bag* enveloping the prototype flame arrester should be filled so that this volume contains the most easily ignitable propane/air mixture***. The concentration of the mixture should be verified by appropriate testing of the gas composition in the plastic bag. Where devices referred to in 2.5.6 are tested, the plastic bag should be fitted at the outlet to atmosphere. Three ignition sources should be installed along the axis of the bag, one close to the flame arrester, another as far away as possible therefrom, and the third at the midpoint between these two. These three sources should be fired in succession, twice in each of the three positions. The temperature of the test gas should be within the range of 15°C to 40°C.

2. If a flashback occurs, the tank diaphragm will burst and this will be audible and visible to the operator by the emission of a flame. Flame, heat and pressure sensors may be used as an alternative to a bursting diaphragm.

*The dimensions of the plastic bag are dependent on those of the flame arrester, but for the flame arresters normally used on tankers, the plastic bag may have a circumference of 2 m, a length of 2.5 m and a wall thickness of 0.05 m.

**In order to avoid remnants of the plastic bag from falling back on to the device being tested after ignition of the fuel/air mixture, it may be useful to mount a coarse wire frame across the device within the plastic bag. The frame should be so constructed as not to interfere with the test result.

***Reference is made to IEC Publication 79-1.
3.2.3 An endurance burning test should be carried out, in addition to the flashback test, for flame arresters at outlets where flows of explosive vapour are foreseeable:

1. The test rig as referred to in 3.2.1 may be used, without the plastic bag. The flame arrester should be so installed that the mixture emission is vertical. In this position the mixture should be ignited. Where devices referred to in 2.5.6 are tested, the flame arrester should be so installed as to reflect its final orientation.

2. Endurance burning should be achieved by using the most easily ignitable gasoline vapour/air mixture or the most easily ignitable technical hexane vapour/air mixture with the aid of a continuously operated pilot flame or a continuously operated spark igniter at the outlet. The test gas should be introduced upstream of the tank shown in appendix 2. Maintaining the concentration of the mixture as specified above, by varying the flow rate, the flame arrester should be heated until the highest obtainable temperature on the cargo tank side of the arrester is reached. Temperatures should be measured, for example, at the protected side of the flame quenching matrix of the arrester (or at the seat of the valve in case of testing high velocity vents according to 3.3). The highest obtainable temperature may be considered to have been reached when the rate of rise of temperature does not exceed 0.5°C per minute over a ten-minute period. This temperature should be maintained for a period of ten minutes, after which the flow should be stopped and the conditions observed. The temperature of the test gas should be within the range of 15°C to 40°C.

If no temperature rise occurs at all: inspect the arrester for a more adequate position of the temperature sensor, taking account of the visually registered position of the stabilized flame during the first test sequence. Positions which require the drilling of small holes into fixed parts of the arrester have to be taken into account. If all this is not successful, affix the temperature sensor at the unprotected side of the arrester in a position near to the stabilized flame.

If difficulties arise in establishing stationary temperature conditions (at elevated temperatures), the following criteria should apply: using the flow rate which produced the maximum temperature during the foregoing test sequence, endurance burning should be continued for a period of two hours from the time the above-mentioned flow rate has been established. After that period the flow should be stopped and the conditions observed. Flashback should not occur during this test.

3.2.4 When a pressure or/and vacuum valve is integrated to a flame arresting device, the flashback test has to be performed with the pressure or/and vacuum valve blocked open. If there are no additional flame quenching elements integrated in a pressure valve, this valve has to be considered and tested as a high velocity vent valve according to paragraph 3.3.

3.3 Test procedures for high velocity vents

3.3.1 The test rig should be capable of producing the required volume flow rate. In appendices 2 and 3, drawings of suitable test rigs are shown. Other test rigs may be used, provided the tests are achieved to the satisfaction of the Administration.

3.3.2 A flow condition test should be carried out with high velocity vents using compressed air or gas at agreed flow rates. The following should be recorded.
1. The flow rate. Where air or a gas other than vapours of cargoes with which the vent is to be used is employed in the test, the flow rates achieved should be corrected to reflect the vapour density of such cargoes.

2. The pressure before the vent opens. The pressure in the test tank on which the device is located should not rise at a rate greater than 0.01 N/mm²/min.

3. The pressure at which the vent opens.

4. The pressure at which the vent closes.

5. The efflux velocity at the outlet which should not be less than 30 m/s at any time when the valve is open.

3.3.3 The following fire safety tests should be conducted while adhering to 2.3.6 using a mixture of gasoline vapour and air or technical hexane vapour and air, which produces the most easily ignitable mixture at the point of ignition. This mixture should be ignited with the aid of a permanent pilot flame or a spark igniter at the outlet:

1. Flashback tests in which propane may be used instead of gasoline or hexane should be carried out with the vent in the upright position and then inclined at 10° from the vertical. For some vent designs further tests with the vent inclined in more than one direction may be necessary. In each of these tests the flow should be reduced until the vent closes and the flame is extinguished, and each should be carried out at least 50 times. The vacuum side of combined valves should be tested in accordance with 3.2.2 with the vacuum valve maintained in the open position for the duration of this test, in order to test the efficiency of the device which must be fitted.

2. An endurance burning test, as described in 3.2.3, should be carried out. Following this test, the main flame should be extinguished and then, with the pilot flame burning or the spark igniter discharging, small quantities of the most easily ignitable mixture should be allowed to escape for a period of ten minutes maintaining a pressure below the valve of 90% of the valves opening setting, during which time flashback should not occur. For the purposes of this test the soft seals or seats should be removed.

3.4 Test rig and test procedures for detonation flame arresters located in-line

3.4.1 A flame arrester should be installed at one end of a pipe of suitable length and of the same diameter as the flange of the flame arrester. On the opposed flange a pipe of a length corresponding to 10 pipe diameters should be affixed and be closed by a plastic bag or diaphragm. The pipe should be filled with the most easily ignitable mixture of propane and air, which should then be ignited. The velocity of the flame near the flame arrester should be measured and should have a value of that for stable detonations.

3.4.2 Three detonation tests should be conducted and no flashback should occur through the device and no part of the flame arrester should be damaged or show permanent deformation.

*The dimensions should be at least 4 m circumference, 4 m length and a material wall thickness of 0.05 mm.
3.4.3 A drawing of the test rig is shown in appendix A. Other test rigs may be used provided the tests are achieved to the satisfaction of the Administration.

3.5 Operational test procedures

3.5.1 A corrosion test should be carried out. In this test a complete device, including a section of the pipe to which it is fitted, should be exposed to a 5% sodium chloride solution spray at a temperature of 25°C for a period of 240 hours, and allowed to dry for 48 hours. An equivalent test may be used to the satisfaction of the Administration. Following this test, all movable parts should operate properly and there should be no corrosion deposits which cannot be washed off.

3.5.2 A hydraulic pressure test should be carried out in the casing or housing of a sample device, in accordance with 2.2.1.

4 MISCELLANEOUS

4.1 Marking of device

Each device should be permanently marked, or have a permanently fixed tag made of stainless steel or other corrosion-resistant material, to indicate:

1. manufacturer's name or trade mark;
2. style, type, model or other manufacturer's designation for the device;
3. size of the outlet for which the device is approved;
4. approved location for installation, including maximum or minimum length of pipe, if any, between the device and the atmosphere;
5. direction of flow through the device;
6. indication of the test laboratory and report number, and
7. compliance with the requirements of MSC/Circ.373/Rev.2.

4.2 Laboratory report

4.2.1 The laboratory report should include

1. detailed drawings of the device,
2. types of tests conducted. Where in-line devices are tested, this information should include the maximum pressures and velocities observed in the test;
3. specific advice on approved attachments,
4. types of cargo for which the device is approved.
drawings of the test rig,

in the case of high velocity vent, the pressures at which the device opens and closes in the efflux velocity; and

all the information marked on the device in 4.1.

4.3 Manufacturer's instruction manual

4.3.1 The manufacturer should supply a copy of the instruction manual, which should be kept on board the tanker and which should include:

1. installation instructions;

2. operating instructions;

3. maintenance requirements, including cleaning (see 2.3.3);

4. copy of the laboratory report referred to in 4.2; and

5. flow test data, including flow rates under both positive and negative pressures, operating sensitivity, flow resistance and velocity, should be provided.
Appendix 1

1 - bursting diaphragm (plastic)
2 - explosive mixture inlet
3 - tank
4 - flame arresting device
5 - plastic bag
6 - ignition source

TEST RIG FOR FLASH BACK TEST
Schematic Plan of the Test Plant for High Velocity Valves
(endurance burning test only)

1 fan with variable speed
2 volume rate indicator
3 pipe (500 mm diameter), length ~ 30 m
4 heated vapour pipe
5 air bypass
6 evaporator and liquid storage tank
7 vapour/air-mixture bypass
8 extinguishing agents
9 control and quick action stop valve
10 explosion arresting crimped ribbon with temperature control for the safety of the test plant
11 high velocity valve to be tested
12 flame detector
13 bursting diaphragm
14 concentration indicator
15 tank
TEST RIG FOR HIGH VELOCITY VENTS

Primary Igniter

Secondary Igniter

Explosion Door

Cock

Manometer Gauge

Gas Analyser

Spade Blank and Bypass Line for Low Rates

Flow Meter

Flash Back Detector

Chart Recorder

Prox Gas Supply
REVISION OF MSC/CIRC.677

New ISO standard on pressure-vacuum valves for cargo tanks

Submitted by the International Organization for Standardization

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1 The International Organization for Standardization (ISO) is aware that the BLG Sub-Committee is considering revisions to the Maritime Safety Committee (MSC) Circular No.677 (MSC/Circ.677) on Revised Standards for the design, testing and locating of devices to prevent the passage of flame into cargo tanks in tankers. In light of these, ISO would like to inform the BLG Sub-Committee of the publishing of a new standard, ISO 15364:2000 entitled Pressure-vacuum valves for cargo tanks.

2 This new standard applies to pressure-vacuum relief valves protecting marine vessel systems, including cargo tanks, that may be subject to gas/vapour pressure or vacuum outside the design parameters of the system/tank. The new standard specifies the minimum requirements for performance and testing of pressure-vacuum relief valves, with emphasis on selection of materials, internal finish and surface requirements for pressure-vacuum valves installed on cargo tanks in tankers. The new standard also specifies design and in-service performance criteria and operational testing and maintenance requirements. This standard was specifically developed so as not to overlap onto issues addressing devices to prevent the passage of flame. For advice on this issue, the standard specifically refers to regulation II-2/59 of the 1974 International Convention on the Safety of Life at Sea and MSC/Circ.677.

3 ISO will provide copies of ISO 15364 to the IMO Secretariat for use by the Sub-Committee.

Action requested of the Sub-Committee

4 The Sub-Committee is invited to note the above information in its consideration of the revisions to MSC/Circ.677.
AMENDMENTS TO THE REVISED STANDARDS FOR THE DESIGN, TESTING AND LOCATING OF DEVICES TO PREVENT THE PASSAGE OF FLAME INTO CARGO TANKS IN TANKERS (MSC/CIRC.677)

1 The Maritime Safety Committee, at its seventy-fourth session (28 May to 8 June 2001), noting that ISO standard 15364 “Ships and marine technology - Pressure/vacuum valves for cargo tanks” was completed, approved amendments to paragraph 1.2.4 of the Revised standards for design, testing and locating of devices to prevent the passage of flame into cargo tanks in tankers (MSC/Circ.677), as follows:

“1.2.4 Devices should be tested and located in accordance with these standards. In addition to these standards, pressure/vacuum valves should comply with ISO standard 15364:2000 “Ships and marine technology - Pressure/vacuum valves for cargo tanks”.”

2 Member Governments are invited to apply the amendments to the Revised standards, in conjunction with regulation II-2/4* of the 1974 SOLAS Convention, as amended, for devices installed on or after 1 July 2002.

3 Member Governments are also invited to bring the annexed amendments to the Revised Standards to the attention of ship designers, ship owners and other parties involved in the design, construction and operation of tankers.

*Refers to the revised SOLAS chapter II-2 adopted by resolution MSC.99(73).
REVISED FACTORS TO BE TAKEN INTO CONSIDERATION WHEN DESIGNING CARGO TANK VENTING AND GAS-FREEING ARRANGEMENTS

1  The International Convention for the Safety of Life at Sea, 1974, as amended, includes requirements for fire safety measures for tankers in regulations II-2/59 and 62. These regulations contain arrangements for venting, inerting, purging, gas-freeing and ventilation.

2  The Sub-Committee on Fire Protection has considered problems associated with the design of cargo tank venting and gas-freeing arrangements and the Maritime Safety Committee, at its fifty-third session (8 to 17 September 1986), approved MSC/Circ.450 on main factors that should be considered in the design of the arrangements referred to in paragraph 1 above. That circular was revised by the Committee, at its fifty-fifth session (11 to 20 April 1988), and issued as MSC/Circ.450/Rev.1.

3  The Committee, at its sixty-sixth session (28 May to 6 June 1996), taking into account the development of MSC/Circ.677 (Revised standards for the design, testing and locating of devices to prevent the passage of flame into cargo tanks in tankers), revised the aforementioned main factors as contained in the annex.
ANNEX

REVISED FACTORS TO BE TAKEN INTO CONSIDERATION WHEN DESIGNING CARGO TANK VENTING AND GAS-FREEING ARRANGEMENTS

Maximum loading/discharge rate

The venting system should be designed to take into consideration the maximum permissible loading/discharge rate for each cargo tank and in the case of a combined venting system, for each group of tanks. These loading and discharge rates should also be used for the design of the inert gas system, regulation II-2/6.2.3.1

Gas evolution

Regulation II-2/59.1 9.5 require at least 25% to be added to the maximum loading rate to account for the increased volume due to gas evolution from the cargo. A higher gas evolution factor may be considered for highly volatile cargoes.

Pressure loss across devices

Data relating to pressure loss across devices to prevent the passage of flame, approved in accordance with MSC/Circ.677 and referred to in regulation II-2/59 15, is to be considered in the design of the venting system. Fouling of devices should be taken into account.

Pressure loss in the venting system

Pressure loss calculations of systems including pipes, valves, bends, fittings, etc., should be made to ensure that the pressure inside the cargo tanks does not exceed the pressure these tanks are designed to withstand taking into consideration 2 and 3 above. In the case where a combined venting system is used in association with loading of cargo tanks simultaneously, the combined effect of vapour pressure generated in the tanks and venting system should be considered.

Pressure at which the vents open

The initial opening pressure of the vent valves should be considered in selecting the appropriate valves for the venting system.

Prevention of hammering

In the case of high velocity vents, the possibility of inadvertent detrimental hammering leading to damage and/or failure should be considered, with a view to eliminating it.

Density of the gaseous mixture

The maximum density of the gaseous mixtures likely to be encountered in the cargo tanks having regard to the types of cargo intended to be carried and their temperature is to be considered.

Design to prevent liquid overfill
Where overflow control systems are fitted, consideration is to be given to the dynamic conditions during loading.

**Location of vent outlets**

Horizontal and vertical distances of the vent outlets are to be in accordance with regulation II-2/59.

**Types of venting systems**

Due regard is to be given to cargo segregation when considering a venting system or inert gas system common to more than one tank. Where the inert gas main is designed for venting of cargo tanks, additional means for venting of these tanks are to be in accordance with regulation II-2/62.11.3.

**Vent draining arrangements**

The draining arrangements for venting systems are to be designed in accordance with regulation II-2/59.1.4.

**Gas-freeing**

In designing a gas-freeing system in conformity with paragraphs 2.2.2 and 2.2.3 of regulation II-2/59 in order to achieve the required exit velocities, the following should be considered:

1. the flow characteristics of the fans to be used;
2. the pressure losses created by the design of a particular tank's inlets and outlets;
3. the pressure achievable in the fan driving medium (e.g., water or compressed air); and
4. the densities of the cargo vapour air mixtures for the range of cargoes to be carried.

**Others**

Repairs and renewal of the venting system should conform to the original design parameters. Factors in the above paragraphs are to be taken into consideration when modifications are carried out to the venting system.

The master is to be provided with a manual containing information relating to the maximum loading and unloading rates for each tank or group of tanks established during the design of the venting system, as per paragraph 1 of this circular.

Data referred to in paragraph 4.3 of MSC/Circ.677 should be taken into consideration when renewing devices referred to in the above circular.
Ref. T4/4.03

GUIDANCE CONCERNING THE LOCATION OF FIRE CONTROL PLANS FOR THE ASSISTANCE OF SHORESIDE FIRE-FIGHTING PERSONNEL

1 The Maritime Safety Committee at its fiftieth session noted that regulation II-2/20.2 of the 1974 SOLAS Convention as amended requires a duplicate set of fire control plans or a booklet containing such plans to be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shoreside fire brigades.

2 The Committee has confirmed the importance of providing such information on fire control plans to be readily available on board for the guidance in an emergency of shoreside fire-fighting personnel, and also to co-ordinate the action to be taken in co-operation with the ships crew who will have a more intimate knowledge and experience of facilities for fire fighting available on board.

3 The Maritime Safety Committee at its fifty-third session approved the guidance concerning the location of fire control plans for the assistance of shoreside fire-fighting personnel (attached in the annex), and Member Governments are invited to use this guidance in the location of fire control plans on their ships, as early as possible.
ANNEX

GUIDANCE CONCERNING THE LOCATION OF FIRE CONTROL PLANS FOR THE ASSISTANCE OF SHORESIDE FIRE-FIGHTING PERSONNEL

1 General

Regulation II-2/20.2 of the 1974 SOLAS Convention as amended requires all new and existing ships to be provided with fire control plans (or a booklet) for the assistance of shoreside fire-fighting personnel (e.g. port fire brigade) and the plans shall be permanently stowed in a prominently marked weathertight enclosure outside the deckhouse.

2 Location

2.1 The enclosure should be readily available to the shoreside fire-fighting personnel so that any expected fire on board will not readily cut off access to it. In oil tankers, chemical tankers and gas carriers the fire control plans should not be located on exterior boundaries of superstructures which face cargo tanks and on the surfaces within 3 m from them along the side.

2.2 The enclosure should be red and the contents of the enclosure should be indicated by a red ship silhouette on white background. Dimensions of the location sign should not be less than 297 x 400 mm (see figure 1).

Figure 1 - Location sign
2.3 If the enclosure is not adjacent to the gangway, there should be guide signs to help the shoreside fire-fighting personnel to find the enclosure containing the fire control plans. The guide sign should be the location sign defined in paragraph 2.2 with the addition of a red arrow (figures 2.1 or 2.2, at the discretion of the Administration) showing the direction where the fire control plan enclosure can be found.

Figure 2.1

FIRE PLANS

Figure 2.2

FIRE PLANS

Figure 2 - Guide sign

The arrows show the direction where the fire control plan enclosure can be found.
2.4 The enclosure should be capable of being easily opened.

2.5 The enclosure with the fire control plan should be located in a well-illuminated position, if possible including illumination from an emergency source.

2.6 The fire control plan should be protected against marine environment.

3 Information

Shoreside fire brigades and other rescue organizations should be informed of the contents of the fire control plans and the signs indicating the location of the fire control plan enclosure.
SHIPBOARD PLANS FOR FIRE PROTECTION APPLIANCES,
LIFE-SAVING APPLIANCES AND MEANS OF ESCAPE

1 The Maritime Safety Committee at its seventy-fifth session (15 to 24 May 2002) noted that SOLAS regulation II-2/15 (which will enter into force on 1 July 2002) requires that fire control plans be permanently exhibited for the guidance of the ship’s officers and that a duplicate set of fire control plans or a booklet containing such plans be permanently stored in an enclosure outside the deckhouse for the assistance of shoreside fire-fighting personnel.

2 The Committee further noted that resolution A.654(16) on Graphical symbols for fire control plans, recognizing that the use of universally understood symbols should greatly increase the usefulness of fire control plans, both for the crew of the ship and for shorebased fire brigades, urged Member Governments to bring the symbols annexed to that resolution to the attention of ships’ personnel and shorebased fire-fighting personnel with a view to encouraging their adoption for use on board all ships.

3 The Committee, having noted that ISO, in close co-operation with IMO, had developed its standard ISO 17631:2002 – Ships and marine technology – Shipboard plans for fire protection, life-saving appliances and means of escape, providing fire protection symbols which generally conform to the corresponding symbols set out in the Annex to resolution A.654(16), decided that the ISO standard 17631 should be brought to the attention of Member Governments.

4 It is the intention of the Committee to prepare a revision of resolution A.654(16), which either will make reference to, or incorporate the graphical symbols contained therein, the abovementioned ISO standard, without any changes, for adoption by the Assembly at its twenty-third session in 2003.

5 Member Governments are invited to bring standard ISO 17631:2002 to the attention of shipbuilders, ship owners, ship operators, ship masters, shorebased fire-fighting personnel and other parties concerned with the preparation or use of shipboard fire control plans, so that they may use it, on a voluntary basis, for the preparation or use of shipboard fire control plans in compliance with SOLAS regulation II-2/15, pending the adoption of the revised Assembly resolution.

6 Member Governments are also invited to note that existing ships may still use resolution A.654(16) in the fire control plan on board.

7 Member Governments are further invited to note that ISO is currently developing an ISO standard* for shipboard signage for fire protection appliances and arrangements and means of escape. Once the standard is published, it may be taken into consideration in the context of resolution A.760(18) on Symbols related to life-saving appliances and arrangements, as amended by resolution MSC.82(70), for possible revision thereof.

* Ships and marine technology – Shipboard signage for fire protection appliances, life-saving appliances and means of escape.
GUIDANCE ON THE IMPLEMENTATION OF MODEL COURSES
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Part 1 – Preparation

1 Introduction
1.1 The success of any enterprise depends heavily on sound and effective preparations.

1.2 Although the IMO model course “package” has been made as comprehensive as possible, it is nonetheless vital that sufficient time and resources are devoted to preparation. Preparation not only involves matters concerning administration or organization, but also includes the preparation of any course notes, drawings, sketches, overhead transparencies, etc., which may be necessary.

2 General considerations
2.1 The course “package” should be studied carefully; in particular, the course syllabus and associated material must be attentively and thoroughly studied. This is vital if a clear understanding is to be obtained of what is required, in terms of resources necessary to successfully implement the course.

2.2 A “checklist”, such as that set out in annex A1, should be used throughout all stages of preparation to ensure that all necessary actions and activities are being carried out in good time and in an effective manner. The checklist allows the status of the preparation procedures to be monitored, and helps in identifying the remedial actions necessary to meet deadlines. It will be necessary to hold meetings of all those concerned in presenting the course from time to time in order to assess the status of the preparation and “trouble-shoot” any difficulties.

2.3 The course syllabus should be discussed with the teaching staff who are to present the course, and their views received on the particular parts they are to present. A study of the syllabus will determine whether the incoming trainees need preparatory work to meet the entry standard. The detailed teaching syllabus is constructed in “training outcome” format. Each specific outcome states precisely what the trainee must do to show that the outcome has been achieved. An example of a model course syllabus is given in annex A2. Part 3 deals with curriculum development and explains how a syllabus is constructed and used.

2.4 The teaching staff who are to present the course should construct notes or lesson plans to achieve these outcomes. A sample lesson plan for one of the areas of the sample syllabus is provided in annex A3.

2.5 It is important that the staff who present the course convey, to the person in charge of the course, their assessment of the course as it progresses.

3 Specific considerations
3.1 Scope of course
In reviewing the scope of the course, the instructor should determine whether it needs any adjustment in order to meet additional local or national requirements (see Part 3).

3.2 Course objective
3.2.1 The course objective, as stated in the course material, should be very carefully considered so that its meaning is fully understood. Does the course objective require expansion to encompass any additional task that national or local requirements will impose upon those who successfully complete the course? Conversely, are there elements included which are not validated by national industry requirements?

3.2.2 It is important that any subsequent assessment made of the course should include a review of the course objectives.
3.3 Entry standards
3.3.1 If the entry standard will not be met by your intended trainee intake, those entering the course should first be required to complete an upgrading course to raise them to the stated entry level. Alternatively, those parts of the course affected could be augmented by inserting course material which will cover the knowledge required.

3.3.2 If the entry standard will be exceeded by your planned trainee intake, you may wish to abridge or omit those parts of the course the teaching of which would be unnecessary, or which could be dealt with as revision.

3.3.3 Study the course material with the above questions in mind and with a view to assessing whether or not it will be necessary for the trainees to carry out preparatory work prior to joining the course. Preparatory material for the trainees can range from refresher notes, selected topics from textbooks and reading of selected technical papers, through to formal courses of instruction. It may be necessary to use a combination of preparatory work and the model course material in modified form. It must be emphasized that where the model course material involves an international requirement, such as a regulation of the International Convention on Standards of Training, Certification and Watchkeeping (STCW) 1978, as amended, the standard must not be relaxed; in many instances, the intention of the Convention is to require review, revision or increased depth of knowledge by candidates undergoing training for higher certificates.

3.4 Course certificate, diploma or document
Where a certificate, diploma or document is to be issued to trainees who successfully complete the course, ensure that this is available and properly worded and that the industry and all authorities concerned are fully aware of its purpose and intent.

3.5 Course intake limitations
3.5.1 The course designers have recommended limitations regarding the numbers of trainees who may participate in the course. As far as possible, these limitations should not be exceeded; otherwise, the quality of the course will be diluted.

3.5.2 It may be necessary to make arrangements for accommodating the trainees and providing facilities for food and transportation. These aspects must be considered at an early stage of the preparations.

3.6 Staff requirements
3.6.1 It is important that an experienced person, preferably someone with experience in course and curriculum development, is given the responsibility of implementing the course.

3.6.2 Such a person is often termed a “course co-ordinator” or “course director”. Other staff, such as lecturers, instructors, laboratory technicians, workshop instructors, etc., will be needed to implement the course effectively. Staff involved in presenting the course will need to be properly briefed about the course work they will be dealing with, and a system must be set up for checking the material they may be required to prepare. To do this, it will be essential to make a thorough study of the syllabus and apportion the parts of the course work according to the abilities of the staff called upon to present the work.

3.6.3 The person responsible for implementing the course should consider monitoring the quality of teaching in such areas as variety and form of approach, relationship with trainees, and communicative and interactive skills; where necessary, this person should also provide appropriate counselling and support.

3.7 Teaching facilities and equipment
*Rooms and other services*
3.7.1 It is important to make reservations as soon as is practicable for the use of lecture rooms, laboratories, workshops and other spaces.
Equipment
3.7.2 Arrangements must be made at an early stage for the use of equipment needed in the spaces mentioned in 3.7.1 to support and carry through the work of the course. For example:

1. blackboards and writing materials
2. apparatus in laboratories for any associated demonstrations and experiments
3. machinery and related equipment in workshops
4. equipment and materials in other spaces (e.g. for demonstrating fire fighting, personal survival, etc.).

3.8 Teaching aids
Any training aids specified as being essential to the course should be constructed, or checked for availability and working order.

3.9 Audio-visual aids
Audio-visual aids (AVA) may be recommended in order to reinforce the learning process in some parts of the course. Such recommendations will be identified in Part A of the model course. The following points should be borne in mind:

1. Overhead projectors
Check through any illustrations provided in the course for producing overhead projector (OHP) transparencies, and arrange them in order of presentation. To produce transparencies, a supply of transparency sheets is required; the illustrations can be transferred to these via photocopying. Alternatively, transparencies can be produced by writing or drawing on the sheet. Coloured pens are useful for emphasizing salient points. Ensure that spare projector lamps (bulbs) are available.

2. Slide projectors
If you order slides indicated in the course framework, check through them and arrange them in order of presentation. Slides are usually produced from photographic negatives. If further slides are considered necessary and cannot be produced locally, OHP transparencies should be resorted to.

3. Cine projector
If films are to be used, check their compatibility with the projector (i.e. 16 mm, 35 mm, sound, etc.). The films must be test-run to ensure there are no breakages.

4. Video equipment
It is essential to check the type of video tape to be used. The two types commonly used are VHS and Betamax. Although special machines exist which can play either format, the majority of machines play only one or the other type. Note that VHS and Betamax are not compatible; the correct machine type is required to match the tape. Check also that the TV raster format used in the tapes (i.e. number of lines, frames/second, scanning order, etc.) is appropriate to the TV equipment available. (Specialist advice may have to be sought on this aspect.) All video tapes should be test-run prior to their use on the course.

5. Computer equipment
If computer-based aids are used, check their compatibility with the projector and the available software.

6. General note
The electricity supply must be checked for voltage and whether it is AC or DC, and every precaution must be taken to ensure that the equipment operates properly and safely. It is important to use a proper screen which is correctly positioned; it may be necessary to exclude daylight in some cases. A check must be made to ensure that appropriate screens or blinds are available. All material to be presented should be test-run to eliminate any possible troubles, arranged in the correct sequence in which it is to be shown, and properly identified and cross-referenced in the course timetable and lesson plans.
3.10 **IMO references**
The content of the course, and therefore its standard, reflects the requirements of all the relevant IMO international conventions and the provisions of other instruments as indicated in the model course. The relevant publications can be obtained from the Publication Service of IMO, and should be available, at least to those involved in presenting the course, if the indicated extracts are not included in a compendium supplied with the course.

3.11 **Textbooks**
The detailed syllabus may refer to a particular textbook or textbooks. It is essential that these books are available to each student taking the course. If supplies of textbooks are limited, a copy should be loaned to each student, who will return it at the end of the course. Again, some courses are provided with a compendium which includes all or part of the training material required to support the course.

3.12 **Bibliography**
Any useful supplementary source material is identified by the course designers and listed in the model course. This list should be supplied to the participants so that they are aware where additional information can be obtained, and at least two copies of each book or publication should be available for reference in the training institute library.

3.13 **Timetable**
If a timetable is provided in a model course, it is for guidance only. It may only take one or two presentations of the course to achieve an optimal timetable. However, even then it must be borne in mind that any timetable is subject to variation, depending on the general needs of the trainees in any one class and the availability of instructors and equipment.
Part 2 – Notes on Teaching Technique

1 Preparation
1.1 Identify the section of the syllabus which is to be dealt with.
1.2 Read and study thoroughly all the syllabus elements.
1.3 Obtain the necessary textbooks or reference papers which cover the training area to be presented.
1.4 Identify the equipment which will be needed, together with support staff necessary for its operation.
1.5 It is essential to use a “lesson plan”, which can provide a simplified format for co-ordinating lecture notes and supporting activities. The lesson plan breaks the material down into identifiable steps, making use of brief statements, possibly with keywords added, and indicating suitable allocations of time for each step. The use of audio-visual material should be indexed at the correct point in the lecture with an appropriate allowance of time. The audio-visual material should be test-run prior to its being used in the lecture. An example of a lesson plan is shown in annex A3.
1.6 The syllabus is structured in training outcome format and it is thereby relatively straightforward to assess each trainee’s grasp of the subject matter presented during the lecture. Such assessment may take the form of further discussion, oral questions, written tests or selection-type tests, such as multiple-choice questions, based on the objectives used in the syllabus. Selection-type tests and short-answer tests can provide an objective assessment independent of any bias on the part of the assessor. For certification purposes, assessors should be appropriately qualified for the particular type of training or assessment.

REMEMBER – POOR PREPARATION IS A SURE WAY TO LOSE THE INTEREST OF A GROUP

1.7 Check the rooms to be used before the lecture is delivered. Make sure that all the equipment and apparatus are ready for use and that any support staff are also prepared and ready. In particular, check that all blackboards are clean and that a supply of writing and cleaning materials is readily available.

2 Delivery
2.1 Always face the people you are talking to; never talk with your back to the group.
2.2 Talk clearly and sufficiently loudly to reach everyone.
2.3 Maintain eye contact with the whole group as a way of securing their interest and maintaining it (i.e. do not look continuously at one particular person, nor at a point in space).
2.4 People are all different, and they behave and react in different ways. An important function of a lecturer is to maintain interest and interaction between members of a group.
2.5 Some points or statements are more important than others and should therefore be emphasized. To ensure that such points or statements are remembered, they must be restated a number of times, preferably in different words.
2.6 If a blackboard is to be used, any writing on it must be clear and large enough for everyone to see. Use colour to emphasize important points, particularly in sketches.
2.7 It is only possible to maintain a high level of interest for a relatively short period of time; therefore, break the lecture up into different periods of activity to keep interest at its highest level. Speaking, writing, sketching, use of audio-visual material, questions, and discussions can all be used to accomplish this. When a group is writing or sketching, walk amongst the group, looking at their work, and provide comment or advice to individual members of the group when necessary.

2.8 When holding a discussion, do not allow individual members of the group to monopolize the activity, but ensure that all members have a chance to express opinions or ideas.

2.9 If addressing questions to a group, do not ask them collectively; otherwise, the same person may reply each time. Instead, address the questions to individuals in turn, so that everyone is invited to participate.

2.10 It is important to be guided by the syllabus content and not to be tempted to introduce material which may be too advanced, or may contribute little to the course objective. There is often competition between instructors to achieve a level which is too advanced. Also, instructors often strongly resist attempts to reduce the level to that required by a syllabus.

2.11 Finally, effective preparation makes a major contribution to the success of a lecture. Things often go wrong; preparedness and good planning will contribute to putting things right. Poor teaching cannot be improved by good accommodation or advanced equipment, but good teaching can overcome any disadvantages that poor accommodation and lack of equipment can present.
Part 3 – Curriculum Development

1 Curriculum
The dictionary defines *curriculum* as a “regular course of study”, while *syllabus* is defined as “a concise statement of the subjects forming a course of study”. Thus, in general terms, a curriculum is simply a course, while a syllabus can be thought of as a list (traditionally, a “list of things to be taught”).

2 Course content
The subjects which are needed to form a training course, and the precise skills and depth of knowledge required in the various subjects, can only be determined through an in-depth assessment of the job functions which the course participants are to be trained to perform (job analysis). This analysis determines the training needs, hence the purpose of the course (course objective). After ascertaining this, it is possible to define the scope of the course.

(NOTE: Determination of whether or not the course objective has been achieved may quite possibly entail assessment, over a period of time, of the “on-the-job performance” of those completing the course. However, the detailed learning objectives are quite specific and immediately assessable.)

3 Job analysis
A job analysis can only be properly carried out by a group whose members are representative of the organizations and bodies involved in the area of work to be covered by the course. The validation of results, via review with persons currently employed in the job concerned, is essential if undertraining and overtraining are to be avoided.

4 Course plan
Following definition of the course objective and scope, a course plan or outline can be drawn up. The potential students for the course (the trainee target group) must then be identified, the entry standard to the course decided and the prerequisites defined.

5 Syllabus
The final step in the process is the preparation of the detailed syllabus with associated time scales; the identification of those parts of textbooks and technical papers which cover the training areas to a sufficient degree to meet, but not exceed, each learning objective; and the drawing up of a bibliography of additional material for supplementary reading.

6 Syllabus content
The material contained in a syllabus is not static; technology is continuously undergoing change and there must therefore be a means for reviewing course material in order to eliminate what is redundant and introduce new material reflecting current practice. As defined above, a syllabus can be thought of as a list and, traditionally, there have always been an “examination syllabus” and a “teaching syllabus”; these indicate, respectively, the subject matter contained in an examination paper, and the subject matter a teacher is to use in preparing lessons or lectures.
7 Training outcomes

7.1 The prime communication difficulty presented by any syllabus is how to convey the "depth" of knowledge required. A syllabus is usually constructed as a series of "training outcomes" to help resolve this difficulty.

7.2 Thus, curriculum development makes use of training outcomes to ensure that a common minimum level and breadth of attainment is achieved by all the trainees following the same course, irrespective of the training institution (i.e. teaching/lecturing staff).

7.3 Training outcomes are trainee-oriented, in that they describe an end result which is to be achieved by the trainee as a result of a learning process.

7.4 In many cases, the learning process is linked to a skill or work activity and, to demonstrate properly the attainment of the objective, the trainee response may have to be based on practical application or use, or on work experience.

7.5 The training outcome, although aimed principally at the trainee to ensure achievement of a specific learning step, also provides a framework for the teacher or lecturer upon which lessons or lectures can be constructed.

7.6 A training outcome is specific and describes precisely what a trainee must do to demonstrate his knowledge, understanding or skill as an end product of a learning process.

7.7 The learning process is the "knowledge acquisition" or "skill development" that takes place during a course. The outcome of the process is an acquired "knowledge", "understanding", "skill"; but these terms alone are not sufficiently precise for describing a training outcome.

7.8 Verbs, such as "calculates", "defines", "explains", "lists", "solves" and "states", must be used when constructing a specific training outcome, so as to define precisely what the trainee will be enabled to do.

7.9 In the IMO model course project, the aim is to provide a series of model courses to assist instructors in developing countries to enhance or update the maritime training they provide, and to allow a common minimum standard to be achieved throughout the world. The use of training outcomes is a tangible way of achieving this desired aim.

7.10 As an example, a syllabus in training-outcome format for the subject of ship construction appears in annex A2. This is a standard way of structuring this kind of syllabus. Although, in this case, an outcome for each area has been identified – and could be used in an assessment procedure – this stage is often dropped to obtain a more compact syllabus structure.

8 Assessment

Training outcomes describe an outcome which is to be achieved by the trainee. Of equal importance is the fact that such an achievement can be measured OBJECTIVELY through an evaluation which will not be influenced by the personal opinions and judgements of the examiner. Objective testing or evaluation provides a sound base on which to make reliable judgements concerning the levels of understanding and knowledge achieved, thus allowing an effective evaluation to be made of the progress of trainees in a course.
## Annex A1 – Preparation checklist

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### Annex A1 – Preparation checklist (continued)

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Annex A2 – Example of a Model Course syllabus in a subject area

Subject area: Ship construction

Prerequisite: Have a broad understanding of shipyard practice

General aims: Have knowledge of materials used in shipbuilding, specification of shipbuilding steel and process of approval

Textbooks: No specific textbook has been used to construct the syllabus, but the instructor would be assisted in preparation of lecture notes by referring to suitable books on ship construction, such as *Ship Construction* by Eyres (T12) and *Merchant Ship Construction* by Taylor (T58)
### COURSE OUTLINE

<table>
<thead>
<tr>
<th>Knowledge, understanding and proficiency</th>
<th>Total hours for each topic</th>
<th>Total hours for each subject area of Required performance</th>
</tr>
</thead>
</table>

**Competence:**

**3.1 CONTROL TRIM, STABILITY and STRESS**

**3.1.1 FUNDAMENTAL PRINCIPLES OF SHIP CONSTRUCTION, TRIM AND STABILITY**

- .1 Shipbuilding materials 3
- .2 Welding 3
- .3 Bulkheads 4
- .4 Watertight and weathertight doors 3
- .5 Corrosion and its prevention 4
- .6 Surveys and dry-docking 2
- .7 Stability 83 102
Part C3: Detailed Teaching Syllabus

Introduction
The detailed teaching syllabus is presented as a series of learning objectives. The objective, therefore, describes what the trainee must do to demonstrate that the specified knowledge or skill has been transferred.

Thus each training outcome is supported by a number of related performance elements in which the trainee is required to be proficient. The teaching syllabus shows the Required performance expected of the trainee in the tables that follow.

In order to assist the instructor, references are shown to indicate IMO references and publications, textbooks and teaching aids that instructors may wish to use in preparing and presenting their lessons.

The material listed in the course framework has been used to structure the detailed teaching syllabus; in particular,

- Teaching aids (indicated by A)
- IMO references (indicated by R) and
- Textbooks (indicated by T)

will provide valuable information to instructors.

Explanation of information contained in the syllabus tables
The information on each table is systematically organized in the following way. The line at the head of the table describes the FUNCTION with which the training is concerned. A function means a group of tasks, duties and responsibilities as specified in the STCW Code. It describes related activities which make up a professional discipline or traditional departmental responsibility on board.

The header of the first column denotes the COMPETENCE concerned. Each function comprises a number of competences. For example, the Function 3, Controlling the Operation of the Ship and Care for Persons on board at the Management Level, comprises a number of COMPETENCES. Each competence is uniquely and consistently numbered in this model course.

In this function the competence is Control trim, stability and stress. It is numbered 3.1; that is, the first competence in Function 3. The term "competence" should be understood as the application of knowledge, understanding, proficiency, skills, experience for an individual to perform a task, duty or responsibility on board in a safe, efficient and timely manner.

Shown next is the required TRAINING OUTCOME. The training outcomes are the areas of knowledge, understanding and proficiency in which the trainee must be able to demonstrate knowledge and understanding. Each COMPETENCE comprises a number of training outcomes. For example, the above competence comprises three training outcomes. The first is concerned with FUNDAMENTAL PRINCIPLES OF SHIP CONSTRUCTION, TRIM AND STABILITY. Each training outcome is uniquely and consistently numbered in this model course. That
concerned with fundamental principles of ship construction, trim and stability is uniquely numbered 3.1.1. For clarity, training outcomes are printed in black type on grey, for example TRAINING OUTCOME.

Finally, each training outcome embodies a variable number of Required performances – as evidence of competence. The instruction, training and learning should lead to the trainee meeting the specified Required performance. For the training outcome concerned with fundamental principles of ship construction, trim and stability there are three areas of performance. These are:

3.1.1.1 Shipbuilding materials
3.1.1.2 Welding
3.1.1.3 Bulkheads

Following each numbered area of Required performance there is a list of activities that the trainee should complete and which collectively specify the standard of competence that the trainee must meet. These are for the guidance of teachers and instructors in designing lessons, lectures, tests and exercises for use in the teaching process. For example, under the topic 3.1.1.1, to meet the Required performance, the trainee should be able to:

- state that steels are alloys of iron, with properties dependent upon the type and amounts of alloying materials used
- state that the specifications of shipbuilding steels are laid down by classification societies
- state that shipbuilding steel is tested and graded by classification society surveyors who stamp it with approval marks

and so on.

IMO references (Rx) are listed in the column to the right-hand side. Teaching aids (Ax), videos (Vx) and textbooks (Tx) relevant to the training outcome and required performances are placed immediately following the TRAINING OUTCOME title.

It is not intended that lessons are organized to follow the sequence of Required performances listed in the Tables. The Syllabus Tables are organized to match with the competence in the STCW Code Table A-II/2. Lessons and teaching should follow college practices. It is not necessary, for example, for ship building materials to be studied before stability. What is necessary is that all of the material is covered and that teaching is effective to allow trainees to meet the standard of the Required performance.
FUNCTION 3: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR
PERSONS ON BOARD AT THE MANAGEMENT LEVEL

COMPETENCE 3.1 Control trim, stability and stress

IMO reference

3.1.1 FUNDAMENTAL PRINCIPLES OF SHIP
CONSTRUCTION, TRIM AND STABILITY

Textbooks: T11, T12, T35, T58, T69
Teaching aids: A1, A4, V5, V6, V7

Required performance:

1.1 Shipbuilding materials (3 hours)

- states that steels are alloys of iron, with properties dependent upon
  the type and amounts of alloying materials used
- states that the specifications of shipbuilding steels are laid down by
  classification societies
- states that shipbuilding steel is tested and graded by classification
  society surveyors, who stamp it with approval marks
- explains that mild steel, graded A to E, is used for most parts of the
  ship
- states why higher tensile steel may be used in areas of high stress,
  such as the sheer strake
- explains that the use of higher tensile steel in place of mild steel
  results in a saving of weight for the same strength
- explains what is meant by:
  • tensile strength
  • ductility
  • hardness
  • toughness
- defines strain as extension divided by original length
- sketches a stress–strain curve for mild steel
- explains:
  • yield point
  • ultimate tensile stress
  • modulus of elasticity
- explains that toughness is related to the tendency to brittle fracture
- explains that stress fracture may be initiated by a small crack or notch
  in a plate
- states that cold conditions increase the chances of brittle fracture
- states why mild steel is unsuitable for the very low temperatures
  involved in the containment of liquefied gases
- lists examples where castings or forgings are used in ship
  construction
- explains the advantages of the use of aluminium alloys in the
  construction of superstructures
- states that aluminium alloys are tested and graded by classification
  society surveyors
- explains how strength is preserved in aluminium superstructures in the
  event of fire
- describes the special precautions against corrosion that are needed
  where aluminium alloy is connected to steelwork
Annex A3 – Example of a lesson plan for annex A2

Subject area: 3.1 Control trim, stability and stress  Lesson number: 1  Duration: 3 hours

Training Area: 3.1.1 Fundamental principles of ship construction, trim and stability

<table>
<thead>
<tr>
<th>Main element</th>
<th>Teaching method</th>
<th>Textbook</th>
<th>IMO reference</th>
<th>A/V aid</th>
<th>Instructor guidelines</th>
<th>Lecture notes</th>
<th>Time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific training outcome in teaching sequence, with memory keys</td>
<td>Lecture</td>
<td>T12, T58</td>
<td>STCW II/2, A-II/2</td>
<td>V5 to V7</td>
<td>A1</td>
<td>Compiled by the lecturer</td>
<td>10</td>
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<tr>
<td>1.1 Shipbuilding materials (3 hours)</td>
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<tr>
<td>States that steels are alloys of iron, with properties dependent upon the type and amounts of alloying materials used</td>
<td>Lecture</td>
<td>T12, T58</td>
<td>STCW II/2, A-II/2</td>
<td>V5 to V7</td>
<td>A1</td>
<td>Compiled by the lecturer</td>
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<tr>
<td>States that the specifications of shipbuilding steels are laid down by classification societies</td>
<td>Lecture</td>
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<td>STCW II/2, A-II/2</td>
<td>V5 to V7</td>
<td>A1</td>
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<tr>
<td>Explains that mild steel, graded A to E, is used for most parts of the ship</td>
<td>Lecture</td>
<td>T12, T58</td>
<td>STCW II/2, A-II/2</td>
<td>V5 to V7</td>
<td>A1</td>
<td>Compiled by the lecturer</td>
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</tr>
<tr>
<td>States why higher tensile steel may be used in areas of high stress, such as the sheer strake</td>
<td>Lecture</td>
<td>T12, T58</td>
<td>STCW II/2, A-II/2</td>
<td>V5 to V7</td>
<td>A1</td>
<td>Compiled by the lecturer</td>
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<tr>
<td>Explains that use of higher tensile steel in place of mild steel results in a saving of weight for the same strength</td>
<td>Lecture</td>
<td>T12, T58</td>
<td>STCW II/2, A-II/2</td>
<td>V5 to V7</td>
<td>A1</td>
<td>Compiled by the lecturer</td>
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</tr>
</tbody>
</table>
This Compendium has been prepared for use by instructors and trainees during the presentation of IMO Model Course 3.06, Survey of Life-Saving Appliances and Arrangements, in which specific references to the appropriate sections are made. It supplements the information contained in publications listed in the course framework.
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CHAPTER 1  SURVEY AND CERTIFICATION GENERALLY

1.1 The Role of the International Maritime Organization

When the establishment of a specialized agency of the United Nations concerned solely with maritime affairs was first proposed, the main concern was to improve safety at sea.

This was understandable for two main reasons. In the first place, seafaring has always been one of the most dangerous of occupations. In the second place, because of the international nature of the shipping industry, it had long been recognized that action to improve safety in shipping operations would be more effective if carried out at an international level rather than by individual countries acting unilaterally and without co-ordination with others. Although a number of important international agreements had already been adopted, many States agreed that there was the need for a permanent body, which would be able to co-ordinate and promote further measures on a more continuing basis.

It was against this background that the United Nations Maritime Conference of 1948 adopted the Convention establishing the International Maritime Organization (IMO)\(^1\) as the first ever international body devoted exclusively to maritime matters.

In the ten-year period between the adoption of the Convention and its entry into force in 1958, other problems related to safety, but requiring slightly different emphasis, had attracted international attention. One of the most important of these was the threat of marine pollution from ships, particularly pollution by oil carried in tankers. An international convention on this subject was actually adopted in 1954, four years before IMO came into existence; and responsibility for administering and promoting this Convention was assumed by IMO at the inception of its work in January 1959. Thus, from the very beginning, the improvement of maritime safety and the prevention of marine pollution have been IMO's most important objectives.

The governing body of IMO is the Assembly, which meets once every two years and consists of all of the Member States. In the period between the sessions of the Assembly, a Council exercises the functions of the Assembly in running the affairs of the Organization. For the time being, the Council consists of 40 Member Governments elected for two-year terms by the Assembly.

The Organization's technical work is carried out by a number of committees, the most senior of which is the Maritime Safety Committee (MSC). The functions of the MSC are to "consider any matter within the scope of the Organization concerned with aids to navigation, construction and equipment of vessels, manning from a safety standpoint, rules for the prevention of collisions, handling of dangerous cargoes, maritime safety procedures and requirements, hydrographic information, log-books and navigation records, marine casualty investigation, salvage and

\(^1\) Until 22 May 1982 the Organization was called the Inter-Governmental Maritime Consultative Organization (IMCO).
rescue, and any other matters directly affecting maritime safety”. The MSC operates with the assistance of nine Sub-Committees. These are:

- Bulk Liquids and Gases (BLG)
- Carriage of Dangerous Goods, Solid Cargoes and Containers (DSC)
- Fire protection (FP)
- Radio communications and Search and Rescue (COMSAR)
- Safety of Navigation (NAV)
- Ship Design and Equipment (DE)
- Stability and Load Lines and Fishing Vessels Safety (SLF)
- Standards of Training and Watching-keeping (STW)
- Flag State Implementation (FSI)

The Sub-Committees on Bulk Liquid and Gases and Flag State Implementation are also sub-committees of another technical committee, the Marine Environment Protection Committee (MEPC), which deals with the Organization’s activities for the prevention and control of marine pollution. Because of the legal issues involved in much of its work, the Organization also has a Legal Committee, while the Committee on Technical Co-operation co-ordinates and directs IMO’s activities in this area. The IMO Convention recognizes all these committees. Finally, there is the Facilitation Committee, which deals with measures to simplify and minimize documentation in international maritime traffic. This is a subsidiary body of the Council.

In order to achieve its objectives, IMO has promoted the adoption of more than 40 conventions and protocols and adopted a large number of codes and recommendations on various matters relating to maritime safety and the prevention of pollution. A committee or sub-committee normally does the initial work on a convention; a draft instrument is then produced, which is submitted to a conference to which delegations from all States within the United Nations system - including States, which may not be IMO Members - are invited. The conference adopts a final text, which is submitted to Governments for ratification.

Most of these conventions and codes, guidelines and recommendations have been amended on several occasions to ensure that they are kept up to date with changes taking place in world shipping. Often, a maritime accident or a series of incidents provides the spark for a new piece of work at IMO; or it may be triggered by a new technical development, a response to changing circumstances within the industry or the anticipation of a potential problem in the future. A proposal, typically to amend or revise part of the existing regulatory framework, may be processed through the appropriate committee structure for detailed consideration to find a balanced measure, ready for adoption and implementation throughout the industry as a whole.
1.2 The role of Governments

With the successful adoption of the convention, the onus for action moves to Governments. The speed with which the convention enters into force (that is, becomes binding on States which have agreed to be bound by it) depends upon the time taken by Governments to ratify or accept it. The consent to be bound may be expressed by signature, ratification, acceptance, approval or accession, depending on the wish of the State concerned. This procedure is generally referred to as "ratification". IMO treaties enter into force after a specific number of States have ratified them. Most IMO conventions require that a certain proportion of the world's total tonnage is recovered before they enter into force.

A Government ratifying a convention has to ensure that its own national law conforms to its provisions. This usually involves some form of domestic legislative action.

After the requirements for entry into force of a convention have been achieved, there is a "period of grace" before it actually comes into force. This period varies from a few months to a year or even two years, and is designed to enable the Governments concerned to take the necessary legislative or administrative measures for implementing the provisions of the convention.

The third stage is implementation – in many ways the most important stage. Generally speaking, the main responsibility for the enforcement of an international convention lies with the State under whose flag the ships concerned operate. Basically, each Government is responsible for ensuring that ships which fly its flag conform to the requirements of the conventions which it has ratified. However, many IMO conventions also contain provisions permitting or requiring other states, particularly port States, to enforce the requirements of the conventions concerned.

The effectiveness of a convention, therefore, depends to a considerable extent on the way in which it is enforced by the States entrusted with its implementation. IMO as an organization has no authority – or means – to enforce or implement conventions against individual ships or States. The Organization's role is to encourage the Governments concerned to take the required measures. Where necessary, the Organization provides technical advice and assistance to Governments which may need such advice and assistance in taking the requisite action.

1.3 SOLAS and MARPOL

As indicated above, IMO has, over the years, adopted a considerable number of conventions but, for the survey courses, two are of particular importance:

- The International Convention for the Safety of Life at Sea (SOLAS) and
- The International Convention for the Prevention of Pollution from Ships (MARPOL)
The history of SOLAS goes back a long time. The first maritime safety conference was convened in 1914, but the First World War intervened and the convention it adopted never entered into force. In the following decades, a number of maritime safety conventions were adopted, the last one in 1974. This Convention, known as SOLAS 74, has been modified by a protocol in 1988, and continues to be updated by IMO resolutions, articles and annexes.

MARPOL does not have such a long history. A first conference, held in 1929, did not lead to a convention. The first convention dealing with oil pollution from ships was adopted in 1954, but it only addressed persistent oils. MARPOL, which deals with various types of pollution, was adopted in 1973 and, even before its entry into force, was modified by a Protocol in 1978. It is now known as MARPOL 73/78 and it has also been amended since its entry into force.

1.4 Surveys and certification

The above Conventions have in common that they require ships to comply with the provisions covering design, construction, equipment and, to some extent, operational procedures and each flag State which is party to the Conventions is obliged to assume responsibility for meeting these requirements, not only by incorporating the Conventions' provisions into its national legislation, but also by instituting effective control and corrective action.

An important element of control is the carrying out of surveys, for which detailed provisions are included in the text of the Conventions. If the surveys show that a ship complies with the relevant provisions, certificates are issued by means of which a flag State declares that the ship named on the certificate has been examined and found to comply with the provisions indicated on the certificate. Flag states may delegate the work associated with surveys and the issue of certificates to surveyors nominated for the purpose or to classification societies recognized by them, but remain responsible for the facts stated on the certificate (See appendix 1.2, page 12).

The Conventions provide the basis for issuing the certificates, but their provisions are not as a rule detailed enough for carrying out surveys and additional guidance is necessary for surveyors. This usually takes the form of guidelines, recommendations and specifications which may be adopted either by the IMO Assembly or by its technical committees, MSC or MEPC. Whatever the procedure, the guidelines, recommendations and specifications are eventually promulgated as resolutions and distributed by means of circulars. Assembly resolutions are published in book form after each biennial session. Other resolutions may also be published as booklets.

Even so, the information may not in all cases be sufficiently detailed and the maritime administration of a flag state must be prepared to elaborate on national rules and instructions. To illustrate the above, one could look at the International Code for Fire Safety Systems (FSS Code) Ch.15.2.3.1.3, which concerns non-return devices in the inert gas system of an oil tanker. Paragraph 2.3.1.4.3 requires
a non-return valve or equivalent to be fitted forward of the deck water seal. The guidelines for inert gas systems, adopted by the MSC, require the materials used in the construction of the non-return devices to be resistant to fire and corrosive attack and specify these materials as low carbon steel, protected by rubber lining or coated with glass fibre epoxy resin or an equivalent material. Actual dimensions, thickness, or accept deterioration are not further spelled out but are, of course, of importance to a surveyor.

In this context, mention should be made of type-tested equipment. SOLAS 74 and MARPOL 73/78 refer to equipment approved by an administration which, in its approval procedures, must take into account specifications contained in certain resolutions. Administrations, after approving equipment in accordance with these resolutions, inform IMO which, in turn, circulates the information to other governments. Other administrations have the choice of going through the approval procedures themselves or, as frequently happens, of accepting approvals by other administrations. It is important that those involved in purchasing, fitting or inspecting equipment should know whether it is accepted by the flag state.

Apart from type-testing, a considerable amount of preparatory survey work is done by means of the approval of plans and drawings. It is at this stage that compliance with many provisions is verified. It is also at this stage that corrections can be made without too great a difficulty. Administrations, when carrying out plan and drawings approval will, at this stage, check on:

- Applicability of the provisions
- Compatibility with other provisions
- Calculations regarding strength, capacity, draught, trim, freeboard, subdivision, stability, etc.
- Possibilities for equivalences or exemptions

They will also indicate points of particular interest to be looked at during the survey. Surveyors will then verify that a ship has been built and equipped in accordance with the approved drawings. They will also satisfy themselves that approved equipment has been used, that it works satisfactorily and that the standard of workmanship is acceptable.

For the extent of surveys, reference is made to IMO resolution A 560(14) as amended by MSC.84(70).

On successful completion of the initial survey and the periodical surveys, the certificates described below can be issued.

**1.4.1 SOLAS 74**

Passenger ships require a Passenger Ship Safety Certificate, which is issued for a period not exceeding 12 months in accordance with the provisions of chapters II-1, II-2, III, IV and V of SOLAS 74 and any other relevant regulations applicable to passenger ships.
Cargo ships at present require four certificates which together generally cover the items of the Passenger Ship Safety Certificate as applicable to cargo ships. These are:

.1 Cargo Ship Safety Construction Certificate (issued for a period not exceeding five years)
.2 Cargo Ship Safety Equipment Certificate (issued for a period not exceeding five years)
.3 Cargo Ship Safety Radio Certificate (issued for a period not exceeding five years)
.4 As an alternative, a Cargo Ship Safety Certificate may be issued, which combines the certificates listed in .1, .2, and .3.

All the above certificates are required for cargo ships of 500 gross tonnage and above. The certificates state their duration and validity which, in the case of the cargo ship certificates, is subject to regular endorsements.

An Exemption Certificate may be issued in addition to the certificates listed above when an exemption is granted to a ship under and in accordance with the provisions of the present regulations. Exemption certificates shall not be valid for longer than the period of the certificates to which they refer.

1.4.2 MARPOL 73/78

The International Oil Pollution Prevention (IOPP) Certificate is required for oil tankers of 150 gross tonnage and above and ships other than oil tankers of 400 gross tonnage and above. The Certificate is issued in accordance with the requirements of Annex I of MARPOL 73/78, which concerns oil pollution. The Certificate is supplemented by a record of construction and equipment. Again, a distinction is made between oil tankers and ships other than oil tankers and the supplements for the two categories of ships differ. The Certificate shows its duration and validity and is subject to regular endorsements.

The International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk (NLS Certificate) is required for ships, other than chemical tankers which have been issued with a Certificate of Fitness, carrying noxious liquid substances in bulk. The Certificate is issued in accordance with the relevant regulations of Annex II of MARPOL 73/78, which concerns pollution by noxious liquid substances.

The Certificates of Fitness for chemical tankers and liquefied gas tankers fall outside the scope of the survey courses, as do the certificates required under the International Convention on Load Lines, 1966 and the International Convention on Tonnage Measurement of Ships, 1969.

Fire-fighting appliances and installations of passenger ships are subject to surveys annually and are certified by the Passenger Ship Safety Certificate which covers not only fire appliances but also other structural and equipment surveys. The certificate is issued for a period not exceeding twelve months.
CHAPTER 1: SURVEY & CERTIFICATION GENERALLY

Fire-fighting appliances of cargo ships and installations come under two different survey regimes i.e. the surveys of fire appliances and other equipment of cargo ships (Safety Equipment) and surveys of hull, machinery and equipment of cargo ships (Safety Construction).

The first, which covers the fire-extinguishing appliances and the inert gas system of cargo ships, consists of an initial survey before the ship is put into service and periodical surveys every five years thereafter. In addition either unscheduled inspections or annual surveys must be carried out within that period. In practice administrations opt for mandatory annual surveys which must be carried out within three months before or after the anniversary date of the certificate.

The certificate issued subsequent to initial and periodical surveys is the Cargo Ship Safety Equipment Certificate which in addition to fire-fighting appliances covers other equipment of cargo ships. The certificate is valid for a period not exceeding five years, which must be endorsed on completion of the mandatory annual surveys, or unscheduled inspection.

The second survey covers the applicable requirements of Chapter II-2 of SOLAS 74, other than equipment covered by the Cargo Ship Safety Equipment Certificate. The survey consists of an initial survey before the ship is put into service and periodical surveys every five years thereafter. In addition, similar to the previous survey, there are either unscheduled inspections or mandatory annual surveys.

The certificate issued is the Cargo Ship Safety Construction Certificate which in addition to chapter II-2 of SOLAS 74 covers other hull, machinery and equipment items of cargo ships. The Certificate is valid for a period not exceeding five years and must be endorsed on completion of the mandatory annual surveys or unscheduled inspections.

For tankers of ten years of age and over, an intermediate survey must be carried out on or near the halfway point of the validity period of the certificates. For either Certificate, the intermediate survey may take the place of either the 2nd or 3rd mandatory annual survey. In this case the intermediate survey is of greater depth than the mandatory annual surveys.

There are situations when the issue of a certificate for a full (i.e. five, two or one year) period is not possible. At the same time, a ship requires its certificates to be able to keep on trading and it is customary to issue a certificate of limited validity until such time as a full period certificate can be issued. Such situations arise when:

- A ship has been built at a foreign shipyard where flag State surveyors may not be in a position to carry out the necessary surveys; a similar situation arises when a ship has been purchased abroad and needs a short-term certificate to proceed to a home port,
- A ship does not yet fully comply with the applicable provisions of a convention but is in the process of modification,
- The certificate expires when a ship is in a foreign port but will return to a home port shortly for survey,
• A ship has sustained damage and has effected temporary repairs.

All limited validity certificates may not be issued for a period exceeding three months and must state the reason for the limitation.

1.5 Classification societies

Many maritime administrations delegate the work associated with survey and certification to classification societies and it is therefore of interest to explain the work of these societies.

Classification societies are independent, normally non-commercial organizations, originally concerned solely with the standards of construction and maintenance of ships. As such, they contributed greatly to the advancement of ship safety and are a potential source of a vast amount of technical experience gained worldwide. Through their rules for construction and a regime of periodical surveys, they are in a position to enhance ship construction and operations.

They were originally established to designate minimum standards on which underwriters could rely before insuring a vessel, but they have, over the years of their existence, developed into standard setting institutions for every section of the shipping community. Their principle of work is to supervise all stages of the construction or major repairs of a ship even to the extent of ensuring that the right materials are used. A ship, so constructed, is assigned a class in accordance with a code, such assignment usually being a condition for insurance.

Through their work and available facilities, the classification societies are well placed to carry out survey work in all major ports of the world and it was only natural that they should undertake statutory surveys delegated to them by governments.

Surveys for class assignment differ somewhat from statutory surveys. Class rules cover areas not touched by conventions and are primarily concerned with equipment and structural issues versus operational issues. The opposite also holds true for statutory surveys and for that reason classification societies may not have detailed guidelines for some convention provisions. Since classification work is basically related to safety of ship structures, this particularly holds true for marine pollution provisions, an area not previously touched upon by classification societies.

Through carrying out statutory surveys, the societies will also come into a different relationship with the ship-owners. Traditionally, the owner could be regarded as the employer. Now, with the enforcement of statutory requirements, the societies assume part of the task of the government.

1.6 International Association of Classification Societies (IACS)

The major classification societies* have been meeting informally for over sixty years but it was not until 1968 that, by adopting a charter, they formalized their association and established the International Association of Classification Societies
(IACS). The purpose of the Association is to promote co-operation and consultation among its members and with other national and international organizations. In 1970, IACS was granted consultative status with IMO, thus enabling the Association to play a useful role in IMO's technical work.

1.7 Harmonizing surveys and certification

IMO has finished work on harmonizing the periods between surveys and this means that the periods of validity of the different certificates are, as of 1988, all the same. The diagram in appendix 1.1, page 12, is a bar diagram of the harmonized system of surveys.

The diagram shows that passenger ships will require a new certificate every year, as is the case at present. The necessary surveys may take place from three months before the expiry date up to the expiry date of the certificate, but not later. Cargo ships require new certificates every five years, but are also subject to annual surveys.

The first survey by the flag state administration which a cargo ship undergoes is the initial survey. When the period of validity of a certificate expires, a renewal survey is required for the new certificate. The annual surveys have different names depending on the certificate involved.

In the case of the Cargo Ship Safety Radio Certificate, they are called periodical surveys. In the case of the International Load Line Certificate, MARPOL related and the other SOLAS certificates they are called annual surveys. A more extensive survey takes the place of the second or third annual survey; the choice is up to the ship-owner. This survey, which is carried out near the halfway point of the five-year validity period of the certificates, is called the intermediate survey and must be carried out within three months of the due date for the second or third annual survey. The diagram, appendix 1.1, page 12, shows the time period before or after the anniversary date in which surveys can take place.

* Members
  American Bureau of Shipping
  Bureau Veritas
  China Classification Society
  Det Norske Veritas
  Germanischer Lloyd
  Korean Register of Shipping
  Lloyds Register
  Nippon Kaiji Kyokai
  Registro Italiano Navale
  Russian Maritime Register of Shipping

Associate Members
  Indian Register of Shipping
  Croatian Register of Shipping
1.8 Documents of compliance

A document of compliance, which may be called a certificate, statement, or declaration, may be issued at the request of an owner whose ship operates under the flag of a State which is not party to a convention. The administration of such a state cannot issue an international certificate, but it may be of advantage to the owner to be able to prove that the ship complies with the relevant provisions of the convention. In such cases, in fact, a document of compliance issued by such an administration or by an internationally recognized classification society is a virtual necessity. Authorities of States parties to the convention concerned are not obliged to accept the document at its face value but will in practice frequently do so, thus preventing problems during port State control inspections. No standard format is prescribed for the document, but it is of advantage to have it contain the same information as the international certificates.

1.9 Reports and records

Reporting and keeping records of the particulars of a ship's survey are essential elements of a survey procedure. Because of the varying procedures used by different administrations, it is not possible to give more than general guidance.

In general, the surveyor who boards the ship will, when everything has been found satisfactory, hand over the certificates to the ship's owner or to the owner's representative. He will also make the necessary arrangements for minor outstanding items to be rectified and inspected or reported to him. He must also keep the office which is responsible for issuing the certificates informed, usually by forwarding a copy of the certificate, together with comments on matters raised by that office.

The latter may be the head office or a regional office of the maritime administration and usually deals with plan approval, and the partial or complete delegation of the survey work to recognized bodies. Keeping this office informed is important since an administration is responsible for the facts stated on the certificate and must be prepared to deal with queries which may arise from the:

- Detention or other action against a ship in a foreign port, or
- Investigation into incidents involving a ship.

1.10 Substandard ships

A surveyor in carrying out his work may conclude that a ship is either unfit to proceed to sea or only fit to proceed to the nearest port where the necessary repairs can be carried out. When acting on behalf of an administration, surveyors should be aware of:

- Regulation I/6 of SOLAS 74;
- Regulation 4, Annex I, of MARPOL 73/78, and
- Regulation 10, Annex II, of MARPOL 73/78

which cover these contingencies.
Appendix 1.1
Bar diagram showing the harmonized system of surveys

<table>
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<th>Years</th>
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<td>12</td>
<td>15</td>
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<td>24</td>
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</table>

\[\begin{align*}
\text{SOLAS} & \{ \\
\text{PASSENGER} & \text{R} \quad \text{R} \quad \text{R} \quad \text{R} \quad \text{R} \\
\text{RADIO} & \text{P} \quad \text{P} \quad \text{P} \quad \text{P} \quad \text{R} \\
\text{SAFCON} & \text{A} \quad \text{A or I} \quad \text{I or A} \quad \text{A} \quad \text{R} \\
\text{SEC} & \text{A} \quad \text{A or P} \quad \text{P or A} \quad \text{A} \quad \text{R} \\
\text{LOAD LINE} & \text{A} \quad \text{A} \quad \text{A} \quad \text{A} \quad \text{R} \\
\text{IOPP} & \text{A} \quad \text{A or I} \quad \text{I or A} \quad \text{A} \quad \text{R} \\
\text{NLS} & \text{A} \quad \text{A or I} \quad \text{I or A} \quad \text{A} \quad \text{R} \\
\end{align*}\]

**Glossary:**

- **PASSENGER**: Passenger Ship Safety Certificate
- **RADIO**: Cargo Ship Safety Radio Certificate
- **SAFCON**: Cargo Ship Safety Construction Certificate
- **SEC**: Cargo Ship Safety Equipment Certificate
- **LOAD LINE**: International Load Line Certificate
- **IOPP**: International Oil Pollution Prevention Certificate
- **NLS**: International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk
- **P**: Periodical survey
- **R**: Renewal survey
- **A**: Annual survey
- **I**: Intermediate survey
Appendix 1.2

List of Governments for which Det Norske Veritas is acting on NV-classed ships, or has been appointed in each separate case by the respective authorities or consultants, or through head office and also issuance of class declarations on IMO requirements.

**SYMBOL DESIGNATION**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>LLC</td>
<td>Load Line Certificate</td>
</tr>
<tr>
<td>STAB</td>
<td>Approval of information on intact stability</td>
</tr>
<tr>
<td>CCCS</td>
<td>Cargo Ship Safety Construction Certificate survey including acceptance of approval of NV-classed ships</td>
</tr>
<tr>
<td>CECS</td>
<td>Cargo Ship Safety Equipment Certificate Survey</td>
</tr>
<tr>
<td>CRCS</td>
<td>Cargo Ship Safety Radiotelegraphy/Telephony Certificate Survey</td>
</tr>
<tr>
<td>GRD</td>
<td>Grain Loading Arrangement Declaration (To be issued by head office only)</td>
</tr>
<tr>
<td>PSCS</td>
<td>Passenger Ship Safety Certificate Survey</td>
</tr>
<tr>
<td>TM</td>
<td>Tonnage Measurement</td>
</tr>
<tr>
<td>ACCS</td>
<td>Accommodation Survey, etc. (e.g. for ILO-Declarations or Trading Certificates)</td>
</tr>
<tr>
<td>ICC</td>
<td>IMO Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IMO resolution A.212(VII) of 12 October 1971) (and/or any relevant national regulations)</td>
</tr>
<tr>
<td>IGC</td>
<td>IMO Code (and/or any relevant national regulations) for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IMO resolution A.328 (IX) of 12 November 1975) (and/or any relevant national regulations)</td>
</tr>
<tr>
<td>IGCX</td>
<td>IMO Code for existing Ships Carrying Liquefied Gases in Bulk (IMO resolution A 329(IX) of 12 November 1975) (and/or any relevant national regulations)</td>
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<td>IOPP</td>
<td>MARPOL 73/78, Annex I International Oil Pollution Prevention Certificate</td>
</tr>
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<td>ANNEX II</td>
<td>MARPOL 73/78, Annex II International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk or Chemical Carrier Code Certificate of Fitness</td>
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<td>NCG</td>
<td>Non-Contracting Government of S - SOLAS IV</td>
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<td>L - LL 66</td>
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<td></td>
<td>P - 1978 SOLAS PROTOCOL</td>
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<td></td>
<td>M - MARPOL 73/78</td>
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<tr>
<td></td>
<td>T - Tonnage 69</td>
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<tr>
<td>A</td>
<td>General authorization for survey and certificate issuance</td>
</tr>
<tr>
<td>B</td>
<td>General authorization for survey or calculation only, without any certificate of issuance</td>
</tr>
<tr>
<td>C</td>
<td>Survey only upon necessary authorization in each separate case</td>
</tr>
</tbody>
</table>
CHAPTER 1: SURVEY & CERTIFICATION GENERALLY

D  Survey and certificate issuance and necessary authorization in each separate case. The D also indicates that we have been authorized at least once or that the authorities have confirmed that they may authorize us on a case-by-case basis.

E  General authorization for survey. Short-term certificate to be issued by the surveyor after survey with copy to head office for special procedure.

F  Special instructions by authorities or head office in each separate case, if request received for such survey.

G  Special instructions by head office in each separate case, if request received for survey.

H  Limited authorization to assign loadline.

H  General authorization to carry out the statutory part of the cargo ship mandatory annual survey and the statutory part of the intermediate survey of tankers. The authorization includes endorsement on the Attachment and Supplement to the Cargo Ship Safety Equipment Certificate.

J  General authorization to endorse the Attachment and Supplement to the Cargo Ship Safety Construction Certificate.

The endorsement shall be made upon completion of the class part of the mandatory annual survey and the class part of the intermediate survey of tankers.

K  Authorization to carry out the statutory part of the cargo ship mandatory annual survey and the statutory part of the intermediate survey of tankers in foreign ports, including endorsement on the Supplement and Attachment to the ship's Safety Equipment Certificate, Det Norske Veritas's own form to be used.

L  Necessary authorization in each separate case to carry out mandatory annual survey and intermediate survey of tankers and endorse the Attachment and Supplement to the Cargo Ship Safety Equipment Certificate. Completion of survey to be reported directly to Department of Trade and Hong Kong Marine department, as applicable.

M  General authorization for survey and certificate issuance, except initial survey.

N  General authorization to carry out the class part of the mandatory annual survey and the class part of the intermediate survey of tankers. The Cargo Ship Safety Construction Certificate to be endorsed accordingly. Compliance with the 1978 SOLAS Protocol requirements to existing ships regarding steering gear and inert gas to be checked simultaneously. Refer also to section 10 Appendix regarding national procedures and requirements.

O  Necessary authorization in each separate case to carry out the statutory part of the mandatory annual survey outside Sweden and Rotterdam Office (Hamburg to Le Havre and Immingham to Southampton). Within said district, the Authorities carry out the surveys themselves. The Cargo Ship Safety Equipment Certificate to be endorsed upon completion of the survey.

P  Annex I to MARPOL 73/78 will enter into force for all (MARPOL) Contracting Parties on 6Apr11 1987. All affected vessels must by that date be fully converted, surveyed and certificated except that installation of underwater discharge outlet may be postponed until 1 January 1988 on existing vessels.
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CHAPTER 2  PREPARATION FOR SURVEYS

2.1 Requests for surveys

It is important that the procedures listed below are observed when a survey request is received and that they are carried out before the ship is visited for the survey.

.1 Check who requests the survey and ensure that they are authorized to do so. For example, a survey request may be made by:

- The owner or master of the ship (or his agent), for a periodical survey, including a mandatory annual survey and an intermediate survey, or occasional survey in the case of damage to the ship's structure or equipment,
- The port state, for clarification of possible non-compliance of the ship's structure or its equipment,
- The Administration of a state whose flag the ship is entitled to fly, for verification of the ship's condition, including an unscheduled inspection as required by SOLAS regulation I/6.

.2 If the surveyor is a nominated surveyor or belongs to an organization recognized by the administration, check whether he is authorized to carry out the requested survey and what is the extent of his responsibility and obligation to the administration. See in this connection appendix 1.2, page 15, which shows the different degrees of authorization given by various administrations to a classification society.

.3 Ensure that it is known which regulations of SOLAS, which national regulations and which other orders and decrees are applicable to the requested survey.

.4 If necessary, contact the administration or organization responsible for issuing SOLAS-related certificates to which special requirements and/or instructions apply, such as:

- National requirements laid down by the administration which are additional to the international convention, e.g. a dead-man alarm on Norwegian ships, the use of asbestos, which is banned by many authorities although there may be varying interpretations of this ban, and remote starting of fire pumps on Liberian ships having unattended machinery space, etc.,
- Exemptions from the international convention's requirements, e.g. fixed fire extinguishing system of cargo holds.
- Different survey methods and procedures accepted by the national authority, e.g. in-water survey (diving survey) instead of the dry-docking of
a ship, and non-traditional methods of surveying machinery such as surveys based on condition monitoring,

- Different procedures for reporting to the administration, to be followed by the surveyor.

If the request for a survey is made by the port state authority, the surveyor should obtain the full background to this request, including the authority's point of view, before visiting the ship.

- Check and study the drawings, data, past survey records and report, if necessary.

### 2.2 Tools and equipment

#### .1 Personal equipment

- Suitable working clothes
- Safety shoes
- Safety helmet
- Ear protectors
- Gloves
- Notebook for recording or small dictaphone
- Reference Documentation: Rules, Resolutions, Vessel status, etc.

#### .2 Other tools and equipment used in surveys

Surveyors must be familiar with the following equipment and tools often used in a machinery survey. Some of them are provided by the surveyor himself, as indicated. However, the ship's equipment can also be used.

- Portable flash light (electric torch), usually carried by the surveyor. If the light is used in gas-dangerous zones of tankers, gas carriers and chemical carriers or in a suspected area of explosive or flammable gas/liquid, it should be of an explosion-proof type.

The fact that a flash light is explosion-proof can be verified from the certificate issued by a testing authority. Such testing authorities are, for example:

- BASEEFA in the United Kingdom
- PTB and BVS in the Federal Republic of Germany
- CERCHAR and LCIE in France
- INIEX in Belgium
- DEMCO in Denmark
- Underwriter Laboratory and Factory Mutual in the United States
- CSA in Canada
• Testing hammer, usually carried by the surveyor. Note that hammers made of steel must not be used in gas-dangerous or gas-suspected areas.

• Measurement tools:
  Calliper, ruler, depth/height gauge, dial gauge and welding gauge, etc. Calibration equipment for pressure gauge and thermometer.

• Portable oxygen and explosive gas (hydrocarbon gas) content meter. The surveyor’s instrument should be calibrated regularly by a recognized organization or by approved methods. If a ship’s instrument is used, proper calibration of the instrument must be confirmed by using propane gas, or by the latest calibration record issued by a recognized testing firm.

• Magnifying glass.
  Useful in detecting cracks and in welding inspection, for example.

• Thickness measurement instrument.
  Calibration of the instrument and accuracy of measured value to be confirmed. Attention to be paid also to the surface condition of the steel which is gauged.

• Hand tachometer.
  For checking the revolutions of rotating machines, useful in the performance test of a pump.

• Electric tester and Insulation Resistance Tester (Megger).
  Note that Megger-testing of the electrical system in a gas-dangerous area or on electronic circuits is not permitted.

• Vibration measurement equipment.
  For checking rotating machinery such as electric motor/pump and steam turbine, etc. It may also be used for the survey of some components without overhauling.

• Water contamination test kit for lubrication oil. Effective in assessing the condition of the lubrication oil if it is within a specification for further use laid down by the oil manufacturer.

• Camera.
  Photographs can greatly aid proper reporting, if a camera is available.

2.3 Safety precautions

A surveyor must pay due attention to his personal safety as well as to that of other persons on board. The following general precautions should always be taken in connection with surveys:
.1 General precautions

- Ensure that a responsible supervising officer or engineer officer from the ship's staff always accompanies the surveyor during the survey for necessary communication and assistance. Such staff are also responsible for the overall safety of the intended survey.
- Be aware of moving parts of components in operation, hot surfaces and electric current, such as:
  - Running motor
  - Generator in service with driving engine/turbine
  - Shafting system
  - Exhaust pipes
  - Live parts of switchboard
- If necessary, protective measures should be taken to avoid the accidental touching of potentially dangerous parts.
- Ensure proper access and staging if necessary is arranged and secured for the intended survey.

.2 Ensure that the following safety precautions have been taken before the survey with regard to any machinery and electrical systems such as the electrical supply to the machinery, which may accidentally endanger the person involved in the survey.

- Electric systems should be disconnected during the survey by means of a breaker (disconnecting) switch in the distributing and starter panel.
- Fuses in the starter panel should be taken out.
- A notice (signboard) should be placed on the starter panel.

.3 Testing of alarms

Make sure that the persons on board are warned that the alarm/safety system is to be tested to avoid unnecessary confusion and misunderstanding.

Such testing could involve:
- General alarm
- Fire alarm
- Alarm of CO₂ fixed fire-extinguishing gas discharge
- Black-out testing of electrical system

.4 Atmosphere

Check the atmosphere before entering an enclosed space.
• Oxygen: the oxygen content should be 21% by volume. Possible hazardous areas are:
  – Cargo holds or tanks for crude oil, grain, ore, coal and chemicals
  – Inerted cargo tanks
  – Ballast tanks
  – Enclosed dry spaces, such as void spaces and cofferdams, especially if the surrounding steel is heavily rested or where those spaces are located next to a gas-dangerous or hazardous space
  – Boiler drum, especially after chemical cleaning

• Hydrocarbon: The presence of hydrocarbon gas, apart from displacing oxygen, is dangerous because of its flammable and toxic properties. Spaces are generally safe for entry when hydrocarbon concentrations have been reduced to a maximum of 1% Lower Flammable Limit (LFL).

• Toxic gases: Maximum concentration of hydrocarbon: no more than the Threshold Limit value-Time Weighted Average (TLV-TWA) for the actual mixture encountered. The TLV-TWA for hydrocarbon varies, depending on the cargo carried. For gasoline, if the TLV-TWA is unknown, a value of about 150 ppm should be assumed.

  – Maximum concentration of benzene: 10 ppm
  – Maximum hydrogen sulphide: 10 ppm
  – Maximum nitrogen dioxide: 3 ppm
  – Maximum nitrogen oxide: 25 ppm
  – Maximum sulphur dioxide: 2 ppm

Toxic gases are likely to be found in petroleum cargoes, i.e. in the cargo tank and spaces adjacent to the cargo tank, e.g. cofferdam and pump room, etc.
CHAPTER 3 SURVEY OF INERT GAS SYSTEM

The 2001 consolidated text of SOLAS 74, the 1988 SOLAS Protocol and the amendments (IMO sales No. IMO-110E) and the publication Inert Gas Systems (IMO Sales No. IMO-860E) are available for the design, function, operation, maintenance and emergency procedures etc., and must be followed as applicable. The consolidated text is referred to throughout this chapter as SOLAS and the publication on inert gas systems as IGS. Applicable paragraph numbers are referred to each item in brackets together with the paragraph number of SOLAS regulations.

Initial survey

The initial survey of an inert gas system is to confirm that the components, equipments, pipeline valves of the system have been installed in accordance with the requirements stipulated in SOLAS regulation II-2/4.5.5.3.2. Function testing of system, alarms and indicators should also be demonstrated.

A typical inert gas system arrangement is explained in IGS Pa. 3.1.1 Also, an example of an inert gas system arrangement designed by Maritime Protection A/S in Norway is attached – reference figures 3.1 and 3.2.

3.1 Survey during installation of the system

As there is no specific requirement for a pre-certification procedure of the inert gas plant at the manufacturer’s shop, the following components, equipment and system are to be inspected, based on the SOLAS requirement as well as guidelines for ‘inert gas systems’ (MSC/Circ.353) included in the publication Inert Gas Systems.

.1 Scrubber. Function of scrubber is given in IGS Pa.3.2.
  • Material (IGS Pa. 3.3.3).
  • Opening and sight glass IGS Pa 3.3.4.
  • Location of scrubber IGS Pa. 3.3.6 and FSS Code Ch.15.2.2.2.3.
Figure 3.1 *Inert gas system – basic layout*
Figure 3.2 Inert gas system – deck layout
.2 Blowers. Function of inert gas blowers is given in IGS Pa.3.4.
- Total capacity of blowers against total capacity of cargo pumps IGS Pa.3.4.1 and FSS Code Ch.15.2.2.1.2.
- Materials IGS Pa. 3.5.1 and 3.5.2.
- Drainage and washing arrangements IGS Pa. 3.5.3. and 3.5.4.
- Access openings for maintenance work and inspection IGS Pa. 3.5.5. and 3.5.6.
- Isolation arrangement for blowers IGS Pa. 3.9.8. and FSS Code Ch.15.2.2.3.2.
- Blower shaft and its support arrangement IGS Pa.3.5.7. and 3.5.8.
- Location of blower FSS Code Ch.15.2.2.3.3.

.3 Non-return devices. Function of deck water seal of different types, non-return valve and vent-valve are given in IGS Pa. 3.6.
- Materials for deck water seal IGS Pa.3.7.1.
- Locations FSS Code Ch.15.2.3.1.2.4.
- Water head height in deck water seal at back pressure in cargo tank to prevent backflow of gases IGS Pa.3.7.2.
- Opening and sight glass IGS Pa.3.7.4.

.4 Inert gas distribution system. The system, including the distribution system, is defined in IGS Pa.3.8.
- Flue gas off take points IGS Pa.3.9.1.
- Material and construction of flue gas isolating valve IGS Pa.3.9.2, 3.9.3 and FSS Code Ch.15.2.3.1.1.
- Materials and arrangement of piping system including expansion bellows IGS Pa. 3.9.4, 3.9.5, 3.9.7, 3.9.10, 3.9.11 and FSS Code Ch.15.2.2.3.1.
- Isolation arrangement of slop tank of combination carrier FSS Code Ch.15.2.3.2.3.
- Means to prevent flue gas leakage into scrubber during maintenance IGS Pa. 3.9.6 and FSS Code Ch.15.2.3.1.2.2.
- Pressure and vacuum valves (breathing) arrangement IGS Pa. 3.9.12 and FSS Code Ch.15.2.3.2.4.

.5 Arrangement for venting during cargo loading and ballasting. SOLAS II-2/4.5.3.4.2.
Arrangements for purging and gas-freeing function of such arrangement is explained in IGS Pa.3.11.

- Gas outlet pipe arrangement SOLAS II-2/4.5.6.3.1 and II-2/4.5.6.3.2.
- Blanking arrangement SOLAS II-2/4.5.6.3.3.
- Cross connection arrangement between cargo pipes and inert gas main FSS Code Ch.15.2.3.2.7.
- Pressure and vacuum breaker IGS Pa. 3.13 and SOLAS II-2/11.6.2.4.

Gas pressure regulating valve function of the regulating valve is given in IGS Pa. 3.10.

- Valve position indicator and pressure detection for control IGS Pa.3.9.9.
- Location of regulating valve FSS Code Ch.15.2.3.1.3.2.

Effluent and drain piping.

- Material and arrangement for the effluent piping from scrubber and deck water seal drain pipes IGS Pa. 3.15.1, 3.15.2 and 3.15.3.
- Water loop arrangement IGS Pa. 3.15.4 and FSS Code Ch.15.2.2.4.4.

Seawater supply

- Source of main water supply to scrubber IGS Pa. 3.16.1 and FSS Code Ch.15.2.2.2.1.
- Source of water supply to deck water seal IGS Pa. 3.16.2 and FSS Code Ch.15.2.2.4.1.
- Capacity of water supply pump IGS Pa. 3.16.3
- Water loop arrangement IGS Pa. 3.16.4 and FSS Code Ch.15.2.2.4.4.
- Protection from freezing IGS Pa. 3.16.4 and FSS Code Ch.15.2.2.4.3.

3.2 Function test after installation of inert gas system

The following are to be demonstrated:

1. The system is capable of delivering inert gas always maintaining a minimum pressure 200 mm water gauge with an oxygen content of not more than 5% by volume at any rate of flow IGS Pa.3.5.9 and FSS Code Ch.15.2.2.1.2.

2. Interlocking system between boiler soot blower and flue gas isolating valve FSS Code Ch.15.2.3.1.1.

3. Function of gas regulating valve for control and shut-off IGS Pa.3.10.1 and FSS Code Ch.15.2.3.1.3.1.

4. Function of inert gas recirculation line with control valve and air vent system IGS Pa.3.10.2.
.5 Function test of vent valve between non-return device and regulating valve IGS Pa.3.6.4 and FSS Code Ch.15.2.3.1.4.4.

.6 Gas tightness of scrubber and water seal to be tested.

3.3 Indicators and Recorders

Location, function as well as arrangement of the indicators and recorders to be confirmed.


.1 Gas temperature and pressure at the discharge side of gas blower FSS Code Ch.15.2.4.1.

.2 Pressure at inert gas supply main forward of non-return valve IGS Pa.3.14.9 and FSS Code Ch.15.2.4.2.

.3 Oxygen content of inert gas main IGS Pa.3.14.7 and FSS Code Ch.15.2.4.2.2.

.4 Pressure in the slop tank of combination carrier FSS Code Ch.15.2.4.2.3.

.5 Recommended monitoring for scrubber IGS Pa.3.14.4.5.

3.4 Alarm systems

Alarm systems are to be examined for arrangement, including their locations and function tested, with confirmation of setting values.

.1 Water supply to scrubber IGS Pa.3.14.4.1 and FSS Code Ch.15.2.4.3.1.1.

.2 Water level in scrubber IGS Pa.3.14.4.2 and FSS Code Ch.15.2.4.3.1.2.

.3 High gas temperature IGS Pa.3.14.4.3, 3.14.4.4 and FSS Code Ch.15.2.4.3.1.3.

.4 Failure of blower FSS Code Ch.15.2.4.3.1.4.

.5 Oxygen content FSS Code Ch.15.2.4.3.1.5 and 2.4.3.1.6.

.6 Failure of power supply to the automatic control system FSS Code Ch.15.2.4.3.1.6 and 2.4.3.3.

.7 Water supply to water seal IGS Pa.3.14.11 and FSS Code Ch.15.2.4.3.1.7 and 2.2.4.6.
.8 Gas pressure at inert gas main forward of non-return valve IGS. Pa.3.14.6 and 3.14.10 and FSS Code Ch.15.2.4.3.1.8, 2.4.3.1.9 and 2.4.3.3.

.9 Additional alarms for gas generator system FSS Code Ch.15.2.4.3.1.5.

3.5 Automatic shut-down systems

Automatic shut-down systems are to be demonstrated and setting valves to be confirmed as applicable.

.1 Shut-down of the blowers and regulating valve IGS Pa.3.14.1, 3.14.2 and 3.14.3 and FSS Code Ch.15.2.4.3.2 and 2.3.1.5.1.

.2 Shut-down of the regulating valve FSS Code Ch.15.2.3.1.5.2.

.3 Shut-down of the cargo pumps IGS Pa.3.14.10 and FSS Code Ch.15.2.4.3.4.

3.6 Portable gas indicators

Portable instruments for measuring oxygen and flammable vapour. Function and means of calibration to be checked IGS Pa.3.14.8, 3.14.12 and FSS Code Ch.15.2.4.2.4 and 2.4.2.5.

3.7 Inert gas system instruction manual

Instruction manuals of inert gas system stipulated in IGS Pa.11 are to be checked FSS Code Ch.15.2.4.4.

3.8 Mandatory annual survey

Extent of the survey is defined in Revised Survey Guidelines Under Harmonized System of Survey and Certification, Resolution A.948(23). Technical requirements are to be referred to the "initial survey" as applicable.

IGS Pa.9.8 may be noted for a reference.

3.9 Periodical survey

Periodical survey of inert gas system is required every 24 months by SOLAS regulation I/8.

In addition to the survey extent of the mandatory annual survey, the following are to be carried out:

.1 The following units are to be opened up for internal examination. Notes for the inspection are given in IGS as indicated.
   - Scrubber Pa.9.2 and 9.6.
   - Deck water seal Pa.9.4.
- Non-return valves Pa.9.5.
- Blowers may be opened up depending on the results of external visual examination and operation test Pa.9.3.

.2 Test of all alarm systems and automatic shut-down systems.

3.10 Checklist for mandatory annual survey

For the inert gas system, when fitted, the survey should consist of:

- External examination of the condition of all piping and components for signs of corrosion, gas leakage and effluent leakage;
- Confirmation of the proper operation of both inert gas blowers;
- Observation of the operation of the scrubber-room ventilation system;
- Checking of deck water seal for automatic filling and draining and checking for presence of water carry-over and checking the condition of the non-return valve;
- Examination of the operation of all remotely operated or automatically controlled valves and, in particular, the flue gas isolating valves;
- Observation of a test of the interlocking feature of soot blowers;
- Observation that the gas pressure regulating valve automatically closes when the inert gas blowers are secured;
- Check that as far as practicable, the following alarms and safety devices of the inert gas system using simulated conditions where necessary:
  - High oxygen content of gas in the inert gas main;
  - Low gas pressure in the inert gas main;
  - Low pressure in the supply of the deck water seal;
  - High temperature of gas in the inert gas main;
  - Low pressure or low water-flow rate;
  - Accuracy of portable and fixed oxygen-measuring equipment by means of calibration gas;
  - High water level in the scrubber;
  - Failure of the inert gas blowers;
  - Failure of the power supply to the automatic control system for the gas regulating valve and to the instrumentation for continuous indicating and permanent recording of pressure and oxygen content in the inert gas main;
  - High pressure of gas in the inert gas main;
  - Checking, if possible, the proper operation of the inert gas system on completion of the checks listed above.
CHAPTER 4 SURVEY OF FIXED CO$_2$ FIRE EXTINGUISHING SYSTEMS

4.1 Details of surveys

4.1.1 General

FSS Code Ch.5 gives the requirements to systems and components in CO$_2$ total flooding systems.

A total flooding system consists of a fixed supply of extinguishing gas which is stored under pressure in gas bottles or in a storage tank which is permanently connected to fix piping with fixed nozzles arranged to discharge the gas into an enclosed space.

CO$_2$ is used in machinery spaces and pump rooms and in dry cargo holds.

Pipes for conveying the gas shall be provided with control valves or cocks so marked as to indicate clearly the compartments to which the pipes are led. Suitable provision shall be made to prevent inadvertent admission of the gas to any compartment. Where cargo spaces fitted with such a system for fire protection are used as passenger spaces the gas connection shall be blanked during such use.

The piping shall be arranged so as to provide effective distribution of fire extinguishing gas.

The CO$_2$ extinguishing gas is normally stored as a pressurized liquid at normal temperature in gas bottles (high pressure system). CO$_2$ can also be stored in bulk in a low pressure system. In this case the agent is maintained at low pressure and temperature by refrigeration and is stored in an insulated tank.

4.1.2 Initial survey

An initial survey shall normally occur as necessary during and immediately following installation of a system.

The initial survey shall confirm that the drawings, calculations and other data, as accepted by the administration, accurately represents the installed system. Also, that the installed system complies with the relevant requirements pertaining to that system.

4.1.2.1 Pressurized components

Pressurized components are subject to design approval and hydrostatic testing. Gas cylinders, storage tanks, pre-welded manifold pipes and master valves (distribution valves, control valves) are to be certified and stamped by a recognized authority before the installation on board. The certificates are to be available for the inspector.

All pre-welded manifold pipes from cylinders up to master valves in release lockers and master valve for cargo spaces should be hydraulic-pressure tested to at least
130 kPa/cm². This test should preferably be carried out in the workshop. All water in the pipes should be dried out after the test and then be sure that the pipes are dry before the installation on board. This is important because any water remaining in the pipes may freeze to ice at a future release of CO₂ gas and clog the nozzle outlets. The pipe between master valve and valve assembly for cargo spaces must also be hydraulic pressure tested to at least 130 kPa/cm².

4.1.2.2 Location and access

The gas cylinders or bulk CO₂ tank should be stored in a CO₂ room where components are easily accessible, dry, well lighted and well ventilated and where there should be no risk to anyone from leakage. Access to a CO₂ room should not be obtained directly from boiler, machinery or accommodation spaces.

4.1.2.3 CO₂ cylinders

A CO₂ gas cylinder should be stamped to show its tare weight and water capacity. The weight of gas it may contain must not exceed that allowed for tropical conditions, which, in the case of CO₂, is two-thirds of a kilogram for each litre of water capacity of the cylinder. Each cylinder head valve assembly must be fitted with a safety disc and such discs are to be of a type guaranteed to burst at a pressure of between 177 and 193 bars.

Cylinder outlet valves, if arranged for remote release, should be capable of being operated manually in the event of malfunction of the remote release system.

In order to prevent inadvertent release of the cylinders or non-operation of the release arrangements when required, the clamping arrangements of CO₂ cylinders should be such as to prevent their rotation through external influences or vibration.

The cylinders should not be exposed to corrosion or subjected to a temperature exceeding 60°C (140°F). Suitable provision should be made for the cylinders to be weighed as necessary.

All CO₂ gas cylinders are to be checked for content of CO₂. This is most conveniently done by using a liquid level indicator. If temperature in the CO₂ room is exceeding 27°C it is not recommended to use the liquid level instrument and the content of each cylinder is to be found by weighing. Results from checking of content are to be recorded in a log book.

Documentation from CO₂ system supplier should confirm that each CO₂ gas cylinder is fitted with internal siphon pipe, which ensure discharge from the liquid content of the cylinders.
4.1.2.4 Bulk CO₂ system

In systems in which refrigerated liquid CO₂ stored in bulk is utilized, the design of the storage vessel and details of the relief devices, fittings, instrumentation and control equipment, together with details and specifications of the distribution pipe work arrangements should be approved by the National Authorities. Refrigerating units should be duplicated and arranged for automatic standby duties.

The system should be checked for alarms, instrumentation and automatic functions as follows:

- Reading of pressure gauge, to be in the range of 18 to 22 bar;
- Testing of automatic switch-over function for refrigerating units;
- Check the set pressure for safety relief valves and that discharge from the valves are led to open air;
- Check that the liquid level indicator is showing the correct content of CO₂ and that duplicate means are fitted to ascertain the content;
- Testing of alarm for high pressure and low pressure;
- Checking that alarm system and one refrigerating unit is operating from two sources of power supply, one of which should be the emergency source of electrical power.

4.1.2.5 Leakage tests

Leakage tests of CO₂ piping can be done by compressed air, connected to the air/test valve on discharge pipe in CO₂ room. All CO₂ nozzles are to be blanked off. CO₂ cylinder outlet valves are to be disconnected from release system during tests.

Air pressure should be approx. 7 bars. The piping should be tested in sections and checked for leakage. Any leakage inside CO₂ room or in any room where the CO₂ piping is passing through is not acceptable. Leakages inside protected spaces are acceptable.

After the leakage tests all CO₂ nozzles are to be refitted. At this stage it should be checked that each distribution valve has a correct name plate for the space/room served by the valve. By opening and closing each valve one by one it can be checked that air passing through is coming out in the correct room.

With all valves in release lockers in closed position and doors to release lockers shut and secured, a tightness test can also be done for manifolds and cylinder outlet valve connections. The manifold can be filled with CO₂ gas from a test cylinder and checked for leakages. With pressure maintained in the manifold all cylinder outlet valves are opened and closed manually one by one to check for leakages.

Same procedure can be applied for bulk CO₂ systems. After ensuring that distribution valves are secured in closed position, main outlet valve on the tank is opened and closed manually and the pressurized piping is checked for leakages.
4.1.2.6 Release tests

Release tests could follow immediately after the tightness test for manifolds with gas pressure maintained inside manifold pipes.

Distribution valves are to be disconnected from release system and secured in closed position. Cylinder outlet valves are to be reconnected to release system. System is released for each space both from CO₂ room and from remote release lockers. It is to be checked that all cylinder outlet valves connected to the space are fully opened by the release system. The same procedure is applied for a bulk CO₂ system.

The automatic start of CO₂ alarm and stop of ventilation fans inside protected spaces should be checked at release tests. The functions are normally connected to door switches in release lockers.

4.1.3 Periodical surveys

4.1.3.1 Renewal survey

The renewal survey is to be carried out every second year before expiry of the existing Safety Equipment Certificate.

The survey should include:

- Review of documentation onboard:
  1. Service report from recognized company for biennial checking of system,
  2. Weight control of CO₂ cylinders,
  3. Tests of alarms and instruments,
  4. Tests of pipelines blown through,
  5. Hydrostatic tests of bottles;
- Visual inspection of CO₂ bottles or CO₂ tank and pipelines;
- Visual inspection of release mechanism;
- Testing of alarms;
- Inspection of instructions posted.

4.1.3.2 Mandatory annual surveys

The mandatory annual survey of cargo ships include a part related to safety. The survey should include the following items:

- Visual examination of record books to check whether tests and servicing are recorded;
- Checking that instructions are properly posted;
- Visual examination to confirm that no unapproved modifications have been made;
• Checking as to whether any fire has occurred on board necessitating the use of the fixed fire extinguishing system.

4.1.3.3 Intermediate survey of tankers

The intermediate survey of tankers of 10 years of age and over is normally carried out within six months of the mid-point of the five-year survey cycle (2.5 years). The statutory part of this survey will take the place of either the second or third mandatory annual survey and will be to a greater extent.

4.2 Ingeniørfirma Heien-Larssen's proposal for test guidance for CO₂ fire extinguishing system

The installation is intended for CO₂ "total flooding" fire-extinguishing for engine room and other spaces requiring such, and CO₂ fire-extinguishing for cargo spaces, lamp room and paint room etc. (For reference, please examine figure 4.1.)

(In the following text, "CO₂" will only be used where it is essential for the correct understanding of the content.)
**Figure 4.1** Schematic Diagram of CO₂ "Total Flooding" Systems

To release CO₂ to extinguish fire:
1. Open door to the CO₂ release locker for the space on fire. This will automatically start alarm siren(s).
2. Pull all valve levers (a, b) outwards.
3. Pull CO₂ release handle C, whereby CO₂ gas will fill the space on fire in about 1½ minutes.

**CO₂ Cylinder Room**
- Wire release
- Valve to be locked in the "open" position
- Starting air vessels for main engine and auxiliary engines (or ship air service tank)
- Alarm siren
- CO₂ nozzle

**Engine Room**
- CO₂ release locker
  - A = CO₂ master valve
  - B = CO₂ starting valve
  - C = CO₂ release handle with wire
  - D = Electrical switches for starting alarm and stopping ventilation
  - CO₂ nozzles
  - Floor plate

**CO₂ Cylinder Room**
- Cylinder battery
- CO₂ start cylinders
- CO₂ release locker for
  - Engine room
  - Pump room

**Pump Room**
- Alarm siren

Nonreturn valve built in for each CO₂ cylinder connection.
4.2.1 Hydraulic pressure test

All pre-welded manifold pipes from cylinders up to master valves in release lockers and master valve cargo spaces should be hydraulic pressure tested to at least 130 kp/cm². This test should preferably be carried out in the workshop. All water in the pipes should be dried out after the test and then be sure that the pipes are dry before the installation on board. This is important because any water remaining in the pipes may freeze to ice at a future release of CO₂ gas and clog the nozzle outlets. The pipe between master valve and valve assembly for cargo spaces must also be hydraulic pressure tested to at least, 130 kp/cm².

Note: The pre-welded manifold pipes - supplied by Heien-Larssen - with connection for all the cylinders and pre-welded manifolds for the release lockers are delivered from our company pressure tested to 150 kp/cm², together with certificate. However, the yard needs only the pipes welded by them to 130 kp/cm² according to the rules, except SBC², which requires 150 kp/cm².

4.2.2 Leakage test of pipes between release lockers and CO₂ nozzle outlets for engine room, pump room, etc., and between master valve and CO₂ nozzle outlets for cargo holds, lamp room, paint room, etc. (downstream)

WARNING: All valve levers on the cylinders must be left off and kept away from the cylinder valves during the following test:

When all piping has been finalized between release lockers and CO₂ outlets and between valve assemblies for cargo holds and CO₂ outlets, the complete system between those four points must be pressure tested with compressed air according to the rules (the regulations of the Norwegian Shipping Control [NSC] require 7 kp/cm²).

1. Blank off all nozzle outlets with pipe-caps for all spaces.

2. Connect air hose with 7 kp/cm² - pressure to air blowing through valve in CO₂ room and keep the master valves shut.

3. Open air-purge-valve and this will fill the manifolds between cylinders, release lockers and master valve for cargo spaces.

Check for leakage on this piping system.

² See Berufs Genossenschaft
LEAKAGE TEST - ENGINE ROOM

4. Open release locker door for engine room, open master valves “A” (Ref.: Figure 4.1) and keep the air blowing through valve open. Check for leakage in pipe between release locker and engine room.

Note: Minimal leakages from pipe joints inside the engine room are of no importance.

Do the same test for pump room, etc.

LEAKAGE TEST - CARGO SPACES

5. Open master valve for cargo spaces. Open all valves in valve assembly for each cargo space, lamp room, paint room, etc.

Check for leakage between valve assembly and protected spaces.

Pipes passing through any room must be tight. However, please note: on feeding pipe with branches which are situated inside each room where the CO₂ gas will be blown out, minimal leakages from pipe joints are of no importance.

After final check, refit all nozzles in each protected room.

6. Check correct placing of name plates on valve assembly for cargo spaces, lamp room, paint room, etc., by opening one by one distribution valve and blow through each pipeline with compressed air.

7. Before carrying out test described under section 4.2.4, items 2 and 5: Blank-off all CO₂ outlets for engine room and pump room with a small piece of tape, just covering the outlet only.

Figure 4.2 CO₂ release locker for engine room, pump room, etc.
4.2.3 Leakage and release test - inside CO₂ room and up to release locker(s) (upstream)

Keep master valves "A" and stop valve "B" (Ref.: Figure 4.1) in release lockers shut. Master valves "A" must be secured by rope during both the leakage test and the release test. Shut and lock release locker door by padlock.

Master valve for cargo spaces, lamp room, paint room etc. must be shut and locked during both leakage and release test.

**WARNING:** Nobody must be present in rooms where CO₂ can be released during this test.

All valve levers on the cylinders must be left off and kept away from the cylinder valves during the leakage test.

**Note:** Either the yard's or manufacturer's representative must be present and take the responsibility for this test as regards safety of life.

**LEAKAGE TEST:**

When all piping has been finalized with the manifolds up to all master valves and with all cylinder valves connected to the manifolds, the complete system – according to the rules – must be pressure tested for tightness. (NSC requires a gas or air test of at least 25 kp/cm².)

1. Manifold pipe to be filled with CO₂ gas from external cylinders and all flanges to be checked for leakages.

2. Keep the CO₂ pressure in the manifold pipes. Then open and close, quickly – one by one – all the cylinder valves. A small portion of CO₂ gas will fill the connection pipe/hose up to the manifold.

3. Do the same test for start cylinders.

Check for leakages:

- Between nipple and cylinder valve;
- Between nipple and copper pipe/hose;
- Between copper pipe/hose and non-return valve.

Minimal leakages are acceptable – audible leakages must be tightened.

4. Keep the CO₂ pressure in the manifold pipes and start the release tests as follows:
RELEASE TEST - TOTAL FLOODING

Start the test with the room which requires the smallest number of cylinders, for example the pump room.

*Alternative 1:* Manual release of CO₂ cylinders from release locker for system without start cylinders and working piston

5. Keep the master valves "A³" in the release locker shut and secured.

6. All the cylinder valve levers with wire release for pump room are to be refitted to cylinder valves.

7. Pull hard on the release handle "C" to release all cylinders for the pump room. This is to check correct operation of wire release for cylinders (no clamps etc., blocking the release).

Close all the released cylinder valves.

8. Do the same test for other small spaces connected to other cylinders.

*Alternative 2:* Automatic release of CO₂ cylinders from release locker for systems with start cylinders and working pistons

9. Keep the master valves "A" shut and secured and starting valve "B" shut. Release start cylinders by pulling hard the release handle "C". This is to check correct operation of wire release for start cylinders (no clamps etc. blocking the release). Further, it proves that the starting valve for start cylinders blocks the operation for the working piston gang release. Close start cylinders except one, and leave the lever off.

10. All the cylinder valve levers with wire release for pump room are to be refitted to the cylinder valves, except valve levers for start cylinders.

11. Check release of all cylinders for pump room by opening starting valve "B" in the release locker. The pressure in the pipe and the open start cylinder will press the working piston down and release the cylinders for pump room.

Shut starting valve "B", shut and lock release locker door.

12. Close all the released cylinder valves, except the open start cylinder.

13. Ventilate pipes between working piston and starting valve "B" in release locker, by loosening a coupling/union.

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3 Ref.: figure 4.1 on page 34.
14. Pull back working piston and tighten up the coupling union.

15. Do the same test for other small spaces connected to other cylinders.

**ENGINE ROOM**

16. Keep the master valves "A" shut and secured and keep the starting valve "B" in the release locker shut.

17. All the cylinder valve levers with wire release for engine room to be refitted to the cylinder valves, except valve levers for start cylinders.

18. Release the cylinders for engine room from inside the release locker by opening the starting valve "B". The pressure in the pipe and the open start cylinder will press the working piston down and release the cylinders for engine room. Shut starting valve "B", shut and lock release locker door.

19. Close all the released cylinder valves - including the start cylinders - and leave the cylinder valve levers off and keep them away from the cylinder valves.

20. Check again that all the cylinder valves are shut and that all the valve levers are left off.

21. Keep the CO₂ pressure in the manifolds and do the following test.

**4.2.4 Test from release locker to engine room, pump rooms, etc. (downstream)**

Test of master valve operation with full CO₂ pressure and blowing through the pipes to each space with CO₂ gas.

**Warning:** All valve levers on the CO₂ cylinders must be left off and kept away during the following test. All cylinder valves must be shut.

**Note:** Either the yard's or Ingeniørfirma Heien-Larssen's representative must be present and take the responsibility for this test as regards safety of life.

During this test somebody must be present inside the protected room for hearing the CO₂ gas blowing out. The personnel present must stay away from the CO₂ outlet. For the engine room and pump room, stay on top of the rooms. For small rooms, such as the emergency generator room, open the door to the room and stay outside the entrance.

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4 Ref.: figure 4.1 on page 34
Be sure that all CO₂ outlets are blanked off with tape according to section 4.2.2 item 7.

Start the test with the room which requires the smallest number of cylinders, such as the pump room.

**PUMP ROOM**
1. Open the master valve slightly, for no more than 2 seconds and let some of the CO₂ in the manifolds blow into the pump room. This is done to be able to check that the master valves for the pump room can be opened under full CO₂ pressure. (During this test, please also refer to the following item 2).
2. Check visually that the tape has blown off all the CO₂ outlets in the above mentioned room.
3. Do the same test for other small spaces, such as the boiler room.

**ENGINE ROOM**
4. Open all master valves quickly and let the remaining CO₂ gas in the pipes and the manifolds blow out into the engine room. This is done to be able to check that the master valve for the engine room can be opened under full CO₂ pressure. During this test please refer to following items 5 and 6.
5. Check visually that the tape has blown off all the CO₂ outlets in engine room.
6. Check that the piping system resists the thermal shocks.
7. Ventilate pipes between the start cylinders and working piston by opening starting valve "B"⁵ and loosening one coupling/union between start cylinders and working pistons.
8. Pull back all working pistons and tighten up coupling/union.
9. Shut all valves, release locker doors and lock the doors with padlocks.

⁵ Ref.: figure 4.1 on page 34
4.2.5 Test of ventilation stop for engine room, pump room, etc.

Check for each room as follows:

*Alternative 1:* Ventilation stop by pressure switch
  - Start all ventilation fans.
  - Actuate the pressure switch by pressure or by hand.
  - Check that ventilation fans have stopped.
  - Reset pressure switch piston.

*Alternative 2:* Ventilation stop by electric switch actuated by release locker door
  - Start all ventilation fans.
  - Open and close release locker door.
  - Check that ventilation fans have stopped.

4.2.6 Test of alarm sirens for engine room, pump room, etc.

Check all sirens for each room as follows:

1. Open release locker door.
   Alarm siren(s) should start.

*Note:* The alarm siren(s) for engine room must also be tested during the trial trip, when auxiliary engines and main engine are running.

4.2.7 Final test before the CO₂ fire extinguishing system is set for normal operation

1. Check the alarm sirens by opening one by one all the release locker doors. Close and lock the release locker door, thereby securing the master valves in shut position.

2. Check that all CO₂ cylinder valve levers – including start cylinders – are correctly fitted on top of CO₂ cylinder valves.

3. Check that the CO₂ cylinder caps for the CO₂ cylinders are stored in a case or similar in CO₂ room. The screw-threads in the caps and on the cylinder neck must be filled with grease.

4. Check that the instructions for use have been placed as follows:
   - 1 in CO₂ room
   - 1 in wheelhouse
   - 1 in control room, in engine room or nearby in engineer officers' entrance to engine room.
5. Check that all engraved instruction plates for the complete CO₂ fire-extinguishing system have been correctly placed.

6. Check that the CO₂ fire-extinguishing system is secured with all the release locker doors closed and locked with a padlock, thereby keeping all the CO₂ master valves “A”\(^6\) and the starting valve "B" for start cylinders in shut position. Give the padlock keys to the officer in charge.

\(^6\) Ref.: figure 4.1, page 34
CHAPTER 5  SURVEY OF FIXED HALON 1301 FIRE EXTINGUISHING SYSTEMS

5.1  Details of surveys

5.1.1 General

Reg. II-2/5.3 of SOLAS 1974, as amended (2001 consolidated edition), gives the requirements to systems and components in halon 1301 total flooding systems.

A total flooding system consists of a fixed supply of extinguishing gas which is stored under pressure in gas containers/bottles which is permanently connected to fixed piping with fixed nozzles arranged to discharge the gas into an enclosed space.

Halon 1301 is used in machinery spaces and pump rooms and in cargo spaces intended solely for the carriage of new cars. When used in machinery spaces, the containers may be located within the space and individually distributed throughout that space (modular system). Alternatively, the containers can be located in a halon room (centralized system) as for a CO₂ system.

The halon 1301 extinguishing gas is normally stored as a pressurized liquid at normal temperature in containers of up to 100 kg halon content. The gas is super-pressurized by nitrogen to 25 bar or 42 bar to ensure rapid discharge of the halon.

Halonics have been identified as ozone depleting substances and due to this environmental effect international work is aiming at reduced production and consumption. IMO has urged its member governments to:

- Restrict the use of halons on board ships (Halon has been banned from use/installation on new building vessels built on or after 1 October 1994),
- Discourage the use of halon systems when equivalent fire extinguishing media are available,
- Reduce the amount of halons released to the atmosphere for the purpose of testing,
- Consider alternative fire extinguishing media.

5.1.2 Initial survey

An initial survey should normally occur as necessary during and immediately following installation of a system.

The initial survey shall confirm that the drawings, calculations and other data, as accepted by the administration, accurately represents the installed system. Also, that the installed system complies with the relevant requirements for that system.
5.1.2.1 Pressurized components

Pressurized components are subject to design approval and hydrostatic testing. Gas containers, pre-welded manifold pipes and master valves (distribution valves, control valves) are to be certified and stamped by a recognized authority before the installation on board. The certificates are to be available for the inspector.

All pre-welded manifold pipes from cylinders up to master valves in release lockers and master valve for cargo spaces should be hydraulically pressure tested at the manufacturer's workshop.

Gas containers should be stamped to show their tare weight and water capacity. The weight of gas it may contain must not exceed 1.12 kilograms for each litre of water capacity of the container. Each container release valve assembly must be fitted with a safety disc and a pressure gauge.

Container release valves, if arranged for remote release, should be capable of being operated locally in the event of malfunction of the remote release system.

5.1.2.2 Location and access

If the halon gas containers are stored in a separate room, they should be easily accessible, dry, well lighted and well ventilated. Access to a halon room should not be obtained directly from boiler, machinery or accommodation spaces. The containers should not be exposed to corrosion or subjected to a temperature exceeding 65°C (150°F). Suitable provisions should be made for the containers to be weighed as necessary. Each container is to be accessible for reading of pressure gauge and for checking of content by using a liquid level indicator.

5.1.2.3 Halon containers

All halon containers should be checked to verify that they are correctly charged. Provisions should be made for check weighing of containers or the use of a liquid level instrument. Results from checking of content are to be recorded in a log book.

Documentation from the halon system supplier should confirm that each halon container is fitted with internal siphon pipe, which ensures discharge from the liquid content of the container.

5.1.2.4 Leakage tests

Leakage tests of distribution piping can be done by compressed air, connected to the air/test valve connection on discharge pipe in halon room. All nozzles are to be blanked off. Halon container release valves are to be disconnected from release system during tests.

Air pressure should be approximately 7 bars. The piping should be tested in sections and checked for leakage. Any leakage inside halon rooms or in any room where the distribution piping is passing through is not acceptable. Leakages inside protected spaces are acceptable.
After the leakage tests all nozzles are to be refitted. At this stage it should be checked that each distribution valve has a correct name plate for the space/room served by the valve. By opening and closing each valve one by one, it can be checked that air passing through is coming out in the correct room.

With all valves in release lockers in the closed position and doors to release lockers shut and secured, a tightness test can also be done for manifolds and cylinder outlet valve connections.

5.1.2.5 Release test

The operation of a halon system should be tested, both locally and remotely. The test procedures should not require release of the halon agent. One acceptable method is to disconnect each container valve from the piping or manifold and blank off the valve outlet before the release test.

Before the release test, any electric or pneumatic power circuits in a modular system should be checked for compliance with requirements to type, location, fault monitoring and the availability of power sources.

The automatic start of halon alarm and stop of ventilation fans inside protected spaces should be checked at release tests. The functions are normally connected to door switches in release lockers.

5.1.3 Periodical surveys

5.1.3.1 Renewal survey

The renewal survey is to be carried out every second year before expiry of the existing Safety Equipment Certificate.

The survey should include:

- Review of documentation on board;
  1. Service report from recognized company for biennial checking of system,
  2. Weight control of halon containers,
  3. Tests of alarms and instruments,
  4. Tests of pipelines blown through,
  5. Hydrostatic tests of bottles.
- Visual inspection of halon containers,
- Visual inspection to verify that all distribution piping and nozzles are clear and properly supported and secured,
- Visual inspection of release mechanism,
- Testing of alarms and instrumentation,
- Inspection of instructions posted.
5.1.3.2 Mandatory annual surveys

The mandatory annual survey of cargo ships includes a part related to safety.

The survey should include:

- Visual examination of record books to check whether tests and servicing are recorded,
- Checking that instructions are properly posted,
- Visual examination to confirm that no unapproved modifications have been made,
- Checking as to whether any fire has occurred on board necessitating the use of the fixed fire extinguishing system.

5.1.3.3 Intermediate survey of tankers

The intermediate survey of tankers of 10 years of age and over is normally carried out every second year. The statutory part of this survey is identical to mandatory annual survey.

5.2 Halon 1301 marine fire-extinguishing installation

What follows is the instruction manual with system description for pneumatically operated halon valves for the Heien-Larsen Engineering Fire-Extinguishing Systems.

5.2.1 Halon 1301 - some important physical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical formula:</td>
<td>CF₃Br</td>
</tr>
<tr>
<td>Boiling point at 1 bar:</td>
<td>-57.8°C</td>
</tr>
<tr>
<td>Freezing point:</td>
<td>-1680°C</td>
</tr>
<tr>
<td>Critical temperature:</td>
<td>670°C</td>
</tr>
<tr>
<td>Critical pressure:</td>
<td>39.64 bar</td>
</tr>
<tr>
<td>Critical density:</td>
<td>745 kg/m³</td>
</tr>
<tr>
<td>Density, liquid at 20°C:</td>
<td>1.580 kg/m³</td>
</tr>
<tr>
<td>Density, gas at 20°C:</td>
<td>115.6 kg/m³</td>
</tr>
</tbody>
</table>

Halon 1301 is a colourless, odourless gas. In its gaseous state it is non-corrosive; dissolved in water it is highly corrosive.

Halon 1301 extinguishes fire by breaking the chain reaction which keeps the fire going. The gas can be regarded as an inhibiting agent, although the mechanism by which it acts is not yet thoroughly known.
Toxicity

In the concentrations normally employed, Halon 1301 is the least toxic gaseous extinguishing agent available today. However please note the maximum limits for safe exposure. These are as follows:

<table>
<thead>
<tr>
<th>Concentration (%/vol.)</th>
<th>Maximum exposure (humans):</th>
</tr>
</thead>
<tbody>
<tr>
<td>7% or less</td>
<td>5 minutes</td>
</tr>
<tr>
<td>7-10%</td>
<td>1 minute</td>
</tr>
</tbody>
</table>

These are the limits set by the National Fire Protection Association (NFPA). They assume that there has been no damage to the patient's central nervous system.

Should the patient have suffered abnormal mental strain (very likely in a fire on board), the combination of a high adrenalin concentration and Halon 1301 could cause a temporary disturbance in heart activity.

At temperatures above 510°C Halon 1301 decomposes. The most important products of decomposition are hydrogen bromide (HBr) and hydrogen fluoride (HF). The amount of these products given off depends largely on the extent of the fire and the material that is on fire. Quick emptying of halon containers will reduce the quantities of decomposition products.

Even in very small concentrations the characteristically acid smell of HBr and HF will have an irritating effect. There is, however, a sufficient margin of time from the moment irritation starts until the concentration can be considered dangerous. This is in itself a kind of built-in warning to fire-personnel to take avoiding action and either employ compressed air equipment or withdraw.

The hazards to personnel from poisonous smoke, heat, carbon monoxide (CO) and lack of oxygen during a fire are far greater than any harm through use of Halon 1301. Experience shows that the toxicity of Halon 1301 is very slight. Where a fire has been quickly extinguished with the help of halon gas, the total content of poisonous substances in the air will in most cases be less than if traditional non-toxic fire-fighting methods had been used. This is because of the reduced volume of smoke fumes and gases that are generated.

A concentration of 4.25%/volume will result in the immediate suppression of most surface fires and of fires involving flammable liquids or gases.

Halon 1301 is ideal for use where fires have started in:

- Computer installations
- Radio and TV transmitting equipment
- Telephone exchanges
- Electrical equipment such as generators, motors, switchgear, switchboards, control rooms and transformers
Laboratories
Inflammable gases or liquids
Offshore installations
Ships' engine rooms, pumping stations and other category A spaces.

Halon is not effective against fires in reactive metals and fires involving chemicals which contain their own oxidizer.

When a fire occurs it is very important that the extinguishing system is released at an early stage. Thus a deep seated fire is avoided. By extinguishing all open flame, a fast spreading of the fire is avoided.

These are the advantages of Halon 1301:

- The gas is clean and leaves no residue.
- It is easy and safe to store.
- It is electrically non-conductive.
- It penetrates into every corner of the hazard protected and suppresses incipient fires.
- Halon 1301 is ideal for automatic release systems.
- Low working concentrations make it relatively safe for personnel (it has a slightly narcotic effect on those exposed to it for longer periods).
- Extinguishes fires fast.

Halon 1301 is stored in seamless steel cylinders to which nitrogen is added at pressures of 25 or 42 bar at 20°C to pressurize the halon. The cylinders should be positioned on a deck or floor and clamped to a bulkhead, wall or pillar.

The cylinders are easy to handle and the content can be checked with a liquid level detector.

The cylinder valve can be actuated electrically, pneumatically or mechanically. It is fitted with a pressure gauge and a pressure switch. The safety disc is arranged so that the valve opens fully if the disc is broken.

Should a leakage occur in the valve, the super pressurized nitrogen will leak out first. The leakage alarm will thus be set off before the liquid phase halon starts to leak.

For a centralized system, the cylinders will be placed in a separate room outside the protected room: the gas is led to the room through piping. For a decentralized system, the cylinders are placed in the protected room. The nozzles are normally fitted directly on to the valves. Short lengths of piping can be used to obtain optimal gas distribution.
Release valves can be actuated electrically, pneumatically or mechanically, and no parts need to be replaced when a cylinder is refilled. Release valves require no maintenance and can be tested operationally without loss of gas.

5.2.2 Transportation of cylinders

Exercise great care when handling cylinders!

The cylinders should be treated very carefully in view of the high value of their contents.

Halon cylinders leave the filling station with guaranteed tight valves and undamaged components. Further, the top of the cylinder is equipped with a strong steel cap for protection of the valve during transportation/installation. The steel cap is fastened to the cylinder with the cylinder clamping, which later is to be used for fastening the cylinders on board.

With regard to the above, and to eliminate expensive refilling and transportation costs, the yard/receiver is to inform the persons in charge of transportation and installation of the Halon cylinders to make sure that the following are taken care of during transportation and installation:

5.2.2.1 Before the cylinders are transported from receiving place to installation place, the cylinder pressure and the valve components must be checked. For normal cylinder pressure, see drawing HL-H171, appendix 5.2. Be aware that a variation of 2 bar is normal, due to pressure gauge variations. Report irregularities before installation is started.

The steel caps must be kept on the cylinders all the way to the installation place, and during installation period/ship-building period.

The caps should be kept in storage, for use in case of refilling of the cylinders.

After the cylinders are placed and permanently fastened, once again check that valves and equipment are undamaged and tight. Use leakage detector or soapy water mist tightness test.

5.2.2.2 Both valve outlets are plugged on delivery. These plugs should not be removed until the installation is ready to be put in operation position. The plugs should be stored and used later in connection with operational testing and refilling.
5.2.3 Installation instruction for H-L Halon equipment

5.2.3.1 Halon cylinders:
Before installing, check that the cylinder and valve are undamaged.

Ensure that the pressure gauge shows correct pressure.

Check that the temporary plugs are still fitted to the valve outlets. (These are to be removed only for installation of discharge nozzles or feed pipes to discharge nozzles.)

When transporting the cylinder to its position, care should be taken to ensure that the valve and valve equipment are not damaged (see chapter 5.2.2). Cylinders can be mounted directly on to the surface of a deck or platform and up against a bulkhead or pillar.

The placing of cylinders is shown in the systems drawing HL-H57, appendix 5.1, shows cylinder mounting details.

NB! Do not remove the temporary plugs until cylinder installation has been completed!

Keep the plugs stored together with the spare parts. The plugs will be used for refill transportation.

5.2.3.2 Halon discharge nozzles:
Discharge nozzles are normally fitted directly on to the halon valves. Remove the temporary plugs and fit the nozzles as shown on the halon valve drawing. If the nozzle is connected to the cylinder by a feeding pipe, fit special pipe nipples to the valve outlets. The pipes must be mounted in such a way that they can be easily disconnected and removed from the valve outlets. (Temporary plugs must be fitted to the valve outlets before operational tests are carried out.)

5.2.3.3 Release locker:
Mount the release locker into the position shown on drawing HL-H66, appendix 5.10. The locker can be built into a bulkhead or be mounted directly on the bulkhead.

The pipelines connecting the halon valve actuators and the release locker are shown in the drawings HL-H150 and HL-H126, appendices 5.5 and 5.6 respectively, and on the basic diagram for the pneumatic release system (drawing HL-H89, figure 5.1). Use precision steel high-pressure piping with flared compression type steel fittings.

Piping to the actuators should be laid out in such a way that the two independent lines neither cross each other nor run close together and in parallel. This is to avoid
getting both lines fractured in the event of an explosion. Non-return valves (double type) ensure that the cylinders will be released even if one of the release lines from the release locker should be cut.

**Figure 5.1** Halon 1301 Pneumatic fire extinguishing schematics diagram for pneumatic release of halon (HL-H89)
5.2.3.4 Halon alarm display:
In accordance with the requirements of the authorities, the alarm display is to be placed in the bridge wheelhouse or in the engine control room.

Connection: see drawings HL-H155 and HL-H165, appendices 5.4 and 5.3 respectively.

Alarm display: see drawing HL-H68, appendix 5.9.

5.2.3.5 Halon alarm siren (typhon):
The alarm typhons/sirens should be placed as shown on the drawing. The alarm is normally equipped with a warning light.

Connections: see drawings HL-H89 and HL-H103, figure 5.1 and appendix 5.7 respectively.

5.2.3.6 Ventilation shut-down:
Ventilation systems are shutdown automatically when the release locker door is opened. One of the door switches is used for this purpose.

5.2.3.7 No parts on the halon valve must be loosened in order to make other connections fit.

TURN THE CYLINDER, NOT THE VALVE OR ANY PARTS ON IT.

5.2.4 Operational testing and starting up

5.2.4.1 If the temporary plugs have been replaced with nozzles/piping, ensure that discharge outlets on halon valves, piston and wall inside valve are free of dust particles and oiled before all temporary plugs are correctly refitted to the discharge outlets of the halon valve. This makes it possible to test the functioning of the system without loss of halon gas.

The following test may be carried out by the yard and an inspector from the authorities:

5.2.4.2 Test the leakage alarm on each halon cylinder by disconnecting the cable plug from the halon valve pressure switch. The lamp of the halon control panel marked "LOW PRESSURE HALON 130" will light up and the buzzer will sound. The halon alarm typhon/siren will also start up in the hazard area. The cable plug should then be reconnected and the test repeated for one halon cylinder at a time until all have been tested; see drawings HL-H68 and HL-H171, appendices 5.9 and 5.2 respectively.
5.2.4.3 Repeat the same test as above for the start cylinders in the halon release locker. The lamp on the control panel marked "LOW PRESSURE START CYLINDER" will light up and the buzzer sound. Depress the button marked "TEST". All lamps will light up and the buzzer sound. Please note: The halon alarm will not start up and sound during this test when the buzzer button is in off position.

5.2.4.4 Check the halon alarm and the ventilation shut-down by opening the release locker; see drawings HL-H66 and HL-H165, appendices 5.10 and 5.3 respectively.

5.2.4.5 Test of releasing loops

Blow through all releasing pipes with air, at 7 bar or more. When carrying out this test, all copper pipes/hoses must be disconnected from the releasing manifold in release locker after disconnecting one of the hoses from the release cylinders (1/4" pipe threads). All starting valves in the release locker must be open and the test can start; see drawings HL-H89 and HL-H66, figure 5.1 and appendix 5.10 respectively. (If using water for pressure testing, the remaining water in the pipes must be blown out before the test can continue.

5.2.4.6 Plug all copper pipes/hoses connected to the double non-return valve with enclosed plugs. Pressure test the releasing pipes to 130 bar with nitrogen, air or water. The pressure testing hose/pipe may be directly connected to releasing manifold in release locker after disconnecting one of the hoses from the release cylinders (1/4" pipe threads). All starting valves in the release locker must be open and the test can start; see drawings HL-H89 and HL-H66, figure 5.1 and appendix 5.10 respectively. (If using water for pressure testing, the remaining water in the pipes must be blown out before the test can continue.

5.2.4.7 All releasing loops are to be tested as follows:

Let the releasing copper pipes/hoses outlets remain plugged (drawing HL-H150, appendix 5.5). Connect compressed air at 7 bar or more into release locker as described above. Open releasing valve marked "G" (drawing HL-H66, appendix 5.10) and disconnect the pipe under the release locker connected to releasing valve marked "I" (drawing HL-H66, appendix 5.10). A fault in non-return valve will be discovered by air leakage through disconnected pipe. (Minor leakage is acceptable.)

In case of a fault, disconnect the pipe coming from valve "I" at each non-return valve. A defective non-return valve gives free air outlet and must be disconnected in order to clean and remove any dirt, particles, etc. Check that air is blowing freely through all copper pipes/hoses for each halon cylinder by loosening each plug. The same test as above is to be carried out for releasing loop "I". Pipe to valve "I" to be reassembled, valve "G" to be closed, valve "I" to be opened and pipe from valve "G" to be disconnected underneath the release locker.

The same test should be carried out for each section as above if there is more than 1 section. One section is shown on drawing HL-H89, figure 5.1.
5.2.4.8 Test

For systems with only one releasing loop to double non-return valve with 2 branch pipes, figure 5.1, should be tested as follows:

a) Blow through the pipes as described in item 5.2.4.5.
b) Pressure test the pipes as described in item 5.2.4.5.
c) Test pipe 1 by disconnecting pipe 2 on the double non-return valve, (placed outside the protected space). Follow the same procedure as described in item 5.2.4.7. Same test to be carried out for pipe 2.

*Figure 5.2 Decentralized system (pneumatic release)*
"RELEASING TEST"

The following test should only be carried out by Heien-Larssen engineers or a representative authorized by Heien-Larssen. Normally the authorities do not require this test to be carried out.

5.2.4.9 Release:
Before connecting the flexible hose/copper pipe to the releasing device on the halon valve, the releasing loops should be blown through with compressed air or CO₂ gas. One loop should be blown through at a time. Ensure that all outlets are completely free. The releasing loops are to be pressure tested with nitrogen or water up to 130 bar.

5.2.4.10 For the test an extra CO₂ cylinder should be connected to the release circuit in the halon release lockers (remember that the temporary plugs must remain fitted to the halon valve discharge outlets during the test).

5.2.4.11 Fit the flexible hose to the actuators on the halon valves, and carry out a trial release from the release locker in the following manner:

   a) Open the stop valves on both release loops.
   b) Open the valve on the test cylinder and close it again as soon as the pressure gauge registers 20-25 bar.
   c) Carry out an immediate complete pressure reduction in the releasing loops (for instance, with the help of an evacuation valve on the test cylinder pipe). The halon valves will then close again.
   d) To check that the halon valves have opened and then closed again, open the bleed nipple in the temporary plug in the halon outlet of each valve. The gas which filled the valve housing when the halon valve opened will now escape with an audible hiss (cylinder pressure).
   e) Remove the test cylinder, activate the release locker and lock the door. The key box with breakable glass front should be sited beside the release locker.
   f) Check the valves for leakage after approximately one hour. Use soapy water.

5.2.4.12 Making the system operational
   a) Ensure that the release locker is intact and that the start cylinders are full.
   b) Ensure that the key for the release locker is in the key box.
   c) Test the halon alarm from the release locker.
   d) Check the halon alarm display.
   e) Remove the temporary plugs from the halon valves and store them together with the halon spare parts, to be used in future tests and refills.
   f) Fit the discharge nozzles or, alternatively, the piping, to the outlet of the halon valve.
Figure 5.3 Centralized system
5.2.4.13 A description of the halon alarm display for pneumatic installations

(See appendix 5.9).

The unit is designed to monitor the halon fire extinguishing system and to give warning of low pressure in halon cylinders and start cylinders.

a) Under normal conditions only the green lamp ("POWER ON") will be on. The light can be dimmed by pressing the lamp to dim position.

b) Should leakage occur from one of the start cylinders, the yellow lamp ("LOW PRESSURE START CYL") will light up. The buzzer will sound.

c) A leakage from one of the halon cylinders will cause the red lamp ("LOW PRESSURE HALON 1301") to light up. The buzzer and the alarm siren/typhon will sound. The same signal will also be given after halon gas has been released from the system.

d) Where the fault situation is of longer duration, the buzzer and alarm siren can be switched off by using the switch "BUZZER ON/OFF".

e) The lamps in the control panel may be tested by pressing the "TEST" button.

5.2.5 Maintenance

The Halon cylinders and auxiliary equipment must be checked once a year.

The installation must be tested operationally on commissioning, and thereafter be certified every second year (each year for passenger ships).

For full operational testing of the installation, follow the procedures laid down in section 5.2.4.

A full operational test is recommended at least every 5th year.

A. Test the halon gas control unit by pressing the "TEST" button. All lamps on the panel should light up and the buzzer sound.

B. Open the door to the release locker. The alarm siren in the hazard area should start and the ventilation system should shut off.

C. Check the pressure monitoring circuit. Disconnect the cable plug from the pressure operated switch on the valve of the cylinder that is furthest away. "LOW PRESSURE HALON 1301" should light up and the buzzer sound. Reconnect the plug.

D. Check the pressure monitor on the start cylinder by disconnecting the cable from the pressure operated switch on the cylinders.

E. Check cylinder pressures.

F. Check halon cylinder valve with equipment for leakage by using soapy water or leakage detector.

NB! Remember that pressure varies with temperature.
5.2.6 Release procedure in case of fire in protected hazard area (Figure 5.1).

a) Ensure that the doors to the fire area are closed and that no persons are in the area.

b) Proceed to the release locker for the hazard area where the fire has been discovered. Open the door to the release locker.
   - The ventilation system will shut down.
   - Alarm siren(s)/typhon(s) will start up.
   - Stop diesel engines and other combustion engines.

c) Open stop valve No.1 (item C, figure 5.1).

d) Open the valve on start cylinder No.1 (item B, figure 5.1) by turning the hand wheel. The pressure gauge (item F, figure 5.1) should register stable pressure.

**IN THE EVENT OF A PRESSURE DROP, CLOSE STOP VALVE NO. 1** (due to rupture in release loop No.1).

e) Open stop valve No.2 (item D, figure 5.1).

f) Open valve on start cylinder No.2 (item B, figure 5.1).
   - Halon gas will now be released.
   - On the halon control panel in the wheelhouse the warning lamp "LOW PRESSURE HALON 1301" will light up.

5.2.7 Filling and refilling of cylinder

1. Disconnect nozzles or pipes from outlet of halon valve, remove any dirt from the inside of the valve and from the valve outlets by blowing compressed air (see 5.2.4.1). Fit the appropriate temporary plug with an O-ring (39 x 1.5 mm) to the valve outlets (item 1, drawing HL-H126 A, appendix 5.6). (Temporary plugs without O-rings should be packed with Teflon thread tape.)

   If valves are several years old, they should be overhauled and worn parts replaced before refilling takes place.

2. Moisture in the air/gas link in the cylinder should be removed by using a vacuum pumps. (Water combined with halon is corrosive.)

3. Connect the filling hose to the filling inlet in temporary plug with 1/4" bleeding screw or 1/4" plug.

4. The actuator on the top of the valve should be loosened by unscrewing about half a turn so that the valve piston remains in the open position during the filling process. (See drawing HL-H126 appendix 5.6.) (Gas leakage between the actuator and the valve top will be minimal during filling.)
5. Check that all valve components are screwed on tightly. (Pressure gauge, pressure switch, safety disc and top cover.)

6. The cylinder can now be filled rapidly.

7. The only way to be certain about the quantity filled is to weigh the cylinder. It is therefore often advantageous to have the cylinder on a weighing device during the filling operation.

8. The addition of nitrogen for super pressurization can be carried out either before or after filling with halon. (Shake the cylinder if the nitrogen filling is added after the halon filling.)

9. If in doubt, contact Heien-Larssen.

10. The system may be refilled all over the world without special couplings and spare parts.

5.2.8 Procedure in case of leakage

Leakage from a cylinder can be discovered in the following ways:

1. Through the leakage alarm. This is an alarm that is set off by low pressure in a cylinder alarm. It can be false due to a fault in the pressure switch. (This may be replaced, see item 5.2.9.) Always check the pressure gauge.

2. Significant drops in pressure registered by the pressure gauge. Remember that the pressure in the cylinder varies with temperature. Do not forget that a pressure gauge also can be faulty.

3. The localization of a leakage can be carried out either with an electronic leak detector or with soapy water.

Leakage from the joint between the valve and cylinder:

1. Attempt to screw the valve more tightly on the cylinder.

2. If this does not help, the valve screw thread must be repacked after the cylinder has been emptied into a storage container.
5.2.9 Changing of parts on the valve with gas in the cylinder

Whenever a leakage occurs on the top of the valve (or above nozzles), plug all outlets immediately.

Defective pressure gauge and pressure switch inserted according to drawing HL-H81, appendix 5.8, may be replaced without special care. These have a built-in non-return valve in the valve housing which prevents greater leakages during changing. (For valves with pressure gauge and pressure switch placed on top cover of valve (old type), halon outlet should be plugged before replacement; see 5.2.4.1 before inserting plugs.)

Changing of release unit and safety membrane plug may only be carried out with plugged Halon outlets. (See drawings HL-H81 and HL-H126, appendices 5.8 and 5.6 respectively.)

A leakage in already installed parts will usually disappear by tightening.
Appendix 5.1 Dimensions Halon 1301 cylinders and clamp equipment (drawing HL-H57)
Appendix 5.2 Details of Halon 1301 cylinder valve electrical connection for pressure switch (drawing HL-H171)
**Appendix 5.3** Wiring diagram for Halon controller and release locker low pressure alarm in engine room (drawing HL-H165)
Appendix 5.4 Wiring diagram for Halon 1301 alarm display pneumatic release (drawing HL-H155)
Appendix 5.5 Details of double non-return valve with copper pipe (drawing HL-H150)
Appendix 5.6 Halon valve type HL with nozzle, plug, hose and pipe (drawing HL-H126)
Appendix 5.8 Halon 1301 valve (drawing HL-H81)
Appendix 5.9 Halon 1301 alarm display dimensions (drawing HL-H68)
Appendix 5.10 Halon 1301 pneumatic release locker (drawing HL-H66)
CHAPTER 6  INSPECTION OF FIXED DECK FOAM SYSTEMS

Oil tankers must be equipped with a fixed deck foam system.

When testing the arrangement, the system should first be tested by using seawater. The throw of foam should, as far as possible, be equal to the throw of water.

On systems with separate piping for seawater and foam concentrate, each monitor must be tested separately, as each monitor must be separately adjusted for the required output.

It is normally sufficient to test 2 monitors.

The surveyor must check:

- That the throw of foam in calm weather is between 30 and 60 metres, depending on the capacity of the system and that the foam quality is satisfactory by letting foam splash down on the deck and measuring that the foam extends to a height of 7 to 10 cm;
- That instructions for use are posted and that all valves are correctly marked;
- The content of the foam concentrate in the concentrate tank;
- That the monitors can be moved 360 degrees horizontally, and that the vertical movement is satisfactory.
- That the isolation valves are operational.

Portable foam applicators should be tested by coupling to the fire main on deck.
CHAPTER 7 FIRE PUMPING ARRANGEMENT

In this chapter, the subject is confined to the fire pump with its prime mover and piping.

Other fire-fighting systems, such as fixed fire-extinguishing systems, portable fire extinguishers and fire detection and alarm systems, are included as separate sections of this course with appendices as appropriate.

7.1 Potential fire hazards

Potential fire hazards in the machinery space are to be discussed in connection with the machinery and electrical survey, as fire and explosion are the most common types of accidents occurring on board ships.

One authority states that 19% of the cases of total loss of ship is caused by fire and explosion. Apart from the total loss case, many reports claim that the general trend of fire and explosion accidents on board is largely initiated in the machinery space: the figures vary from 39% to 50%.

Most fires originate in the engine room as this is the most complex part of the ship with many sources of ignition. The presence of ignition sources and combustibles, for example, oil leakage combined with frequent repair work, is considered to be a major cause of engine room fires. Experience also shows that many engine room fires can be explained by poor maintenance and unsatisfactory cleaning. In any case, the potential fire hazard in the machinery space is high and due attention must be paid to this aspect during the machinery and electrical surveys.

Potential fire and explosion hazard is discussed, together with the counter measures, from the survey point of view in respect of

- Sources of ignition,
- Combustibles.

Sources of ignition

The hot surface of exhaust pipes or steam lines is the most frequent source of ignition for fire or explosions in a ship's engine room. It is essential that these be properly insulated. See SOLAS 2000 Amendments II-2/4.2.2.6.

One authority states that this type of ignition is involved in almost 50% of the cases. Electric fault or open flames are listed, while other causes include crankcase/scavenging port explosions and other reasons.
Electrical ignition

Excessive heat and electrical sparks due to faulty electrical equipment, cables and motors are considered to be sources of ignition. The faults can be:

- Temporary or non-approved fitting of equipment, most probably without protection, e.g. equipment is not of the approved type for the intended service, especially in a gas-dangerous zone, etc.
- Dirty equipment and motors;
- Overloading to more than the designed capacity of the electrical equipment and cables/wirings will cause these to overheat and damage insulation, with a consequent short circuit resulting in fire. This should be prevented by confirming that the correct rating of apparatus is applied, with the right size of fuses or breakers;
- Burnt contactors of the breaker switches or relay units can start electric sparks;
- Loose connections of wires can also be a source of sparking;
- Unprotected (naked) electric bulbs.

Hot work (open flame)

Hot work, such as electric/oxyacetylene gas welding or the use of a blow-torch etc. on board must be prepared with great caution. This control is not directly concerned with the survey work, but the surveyor may look into the combustibles which might be ignited by careless hot work.

Crankcase explosion

The crankcase and scavenging manifold of a diesel engine are provided with safety valves to avoid excessive pressure in the components. The cause of a crankcase explosion may be a hot bearing. In any case, the crankcase door must not be opened until at least 10 minutes after stopping the engine as the sudden entry of fresh air into a hot crankcase can cause an oil mist atmosphere explosion. A scavenging air space explosion may be due to accumulation of sludge ignited by the combustion gas leaking by damaged piston rings.

Combustibles

Fuel oil is clearly the combustible that is involved in most accidents: the figure is more than 60%. Lubricating oil is the next most frequently involved. Other combustibles, such as grease, electrical equipment, hydraulic oil, insulation and engine stores, etc. are also often involved.
Fuel oil

There have been many incidents reported of fuel oil being ignited on exhaust manifolds. The origin of the fuel oil can be a burst pipe, particularly in the high-pressure fuel oil pipes of a diesel engine. If it emits a fuel oil spray, producing a gaseous-like condition due to high-pressures - e.g. approx. 200-300 bar-ignition of this fuel may be similar in extent to an explosion. Experience shows that this type of accident is the most common cause of engine room fires. The pipe must be of a design and material approved by the administration and must be provided with a jacketed piping system.

In practice, the present means of shielding are;

- Jacketed flexible metallic hose of an approved type or rigid jacketed fuel oil piping from the injector pump to injectors;
- Protection cover for the whole fuel unit to cover up the cylinder covers and fuel pump, including the high-pressure pipes (for engines less than 375 KW);
- All other fuel oil pipes are to be shielded.

The surveyor should also pay attention to the condition of the fuel pipes and how they are secured. As the pressure in the pipes is not only high but also fluctuates considerably, this may cause vibration and fatigue leading to mechanical failure in the pipes if they are relatively long.

Leakage of fuel oil

The fuel pipes in the machinery space must be carefully examined for possible deterioration and deformation, which may create leakage. Sections of pipes behind cramping/securing may be more worn than other parts. Possible leakage from pipe couplings/flanges due to faulty gaskets and valves/filters must be checked.

Overflow

It often happens that, during bunkering or transferring of fuel oil, overfilling of tanks results in oil escaping into the engine room. The reason for this is that sounding pipes often terminate in the engine room instead of being carried up to the open air. The consequence is that accidental overfilling of tanks may cause fires in the engine room. The surveyor should check self-closing cocks for correct function and tightness.

Malfunction of components/system

Mechanical fault or break down of fuel pumps (booster, high pressure injection and transfer pumps etc.), fuel oil separator (purifier), fuel heater and filter, etc. can start a fire.
Each component should be in a satisfactory condition in connection with the periodical machinery survey, although the purifier is normally not subject to the machinery survey. However, in any case, the machinery must be surveyed from the fire prevention point of view at every annual, intermediate and periodical survey.

**Lubricating oil and hydraulic oil**

The same attention must be paid as to the fuel oil system, as in certain circumstances of high temperature and oil mist condition, the oil can be ignited. Particular attention should be paid to the condition of the high-pressure hydraulic oil system. See R0-Reg.II-2/4 in its entirety for details.

**General spillage and accumulated sludge**

This item is concerned mainly with the cleaning and is taken care of by the crew's routine work.

Spillage and subsequent sludge accumulation can be found in/on:

- Tank top
- Bilge well
- Purifier room and filters etc. where regular maintenance work is carried out
- Defective valve glands
- Drip trays and inside the protection coaming around settling tanks or other fuel units.

**Insulation**

- Oil-soaked pipe insulation should be replaced and the source of oil eliminated. All insulation should be made impervious to oil.

**Other combustibles**

- Kerosene used for cleaning work in an opened can.
- Loose rags, especially oil-soaked ones.
- Wood material placed near to a hot surface, e.g. in the funnel space.
- Flammable gas may leak from cargo area to machinery space; for example, through the shaft sealing arrangement of cargo pump driving shaft and cracks on boundary bulkhead.
- Soot in the boiler furnace, uptake and funnel duct may be self-ignited.
7.2 Initial survey of fire pumping arrangement

The fire pumping arrangement must be surveyed on the basis of the SOLAS and national requirements before a ship is put into service. Approval of the plan by the Administration should have been given, along with the SOLAS and its own national requirements if applicable. The requirements for fire pumping arrangement are given in SOLAS 2000 Amendments II-2/10. Unless otherwise stated, the requirements for the different components/system in this section will be given with the paragraph number of this regulation.

Initial survey - general

The initial survey and tests on board must confirm that the installation is in accordance with the approved plan and in compliance with the requirements.

Fire pumps are usually certified by the administration or a recognized organization, as regards to the design and material, on the basis of the required material specification and testing by a pressure testing and a pump performance test. The surveyor must check the certificate issued by the administration or recognized organization subsequent to such inspection and testing. The capacity of each pump, which is determined by the total capacity of the fire-fighting water supply and the number of pumps connected to the system, must be confirmed.

If the pump is intended not only for fire fighting, but also for other purposes, separation from oil system is to be checked: SOLAS 2000 Amendments II-2/10.2.2.1.

The centrifugal pump, if installed, is to be fitted with a non-return valve on the pump discharge side to prevent back-flow of the water.

The pipes and valves must not be impaired by the heat from a fire, nor must any of the other components chosen in this respect, unless they are adequately protected: SOLAS 2000 Amendments II-2/10.2.1.1 and 10.2.3.1.2.

Check the protection of the fire pipes against possible impact, for example, by cargo handling. SOLAS 2000 Amendments II-2/10.2.1.4.2.

Check the position of isolating valves separating the section of the fire main within a machinery space containing the fire main pump from the rest of the fire main: SOLAS 2000 Amendments II-2/10.2.1.4.1.

Pressure test the piping system at 1.5 times the designed pressure, with particular attention to the pipe joints and expansion glands, if fitted.

Check the setting and function of relief valves to prevent over-pressure of a fire main: SOLAS 2000 Amendments II-2/10.2.1.4.3.
Initial survey of passenger ship

In addition to the general requirements, the following are to be confirmed by a surveyor during survey of a passenger ship:

Check the total required capacity of the fire pumps: SOLAS 2000 Amendments II-2/10.2.2.2.1.

Check the number of fire pumps as required by the vessel’s gross tonnage:

- 4000 gross tonnage and upwards: 3 pumps;
- less than 4000 gross tonnage: 2 pumps.

Check that the fire pumps are located in separate compartments: SOLAS 2000 Amendments II-2/10.2.2.3.1.1.

For ships less than 1000 gross tonnage, alternative means of providing water for fire fighting is required, e.g. an emergency fire pump.

Operation test of fire pump to be carried out with two pumps running simultaneously and two adjacent hydrants in use: check the pressure at the fire main as minimum as required by the vessel’s gross tonnage: SOLAS 2000 Amendments II-2/10.2.2.4.2:

- 4000 gross tonnage and upwards: 0.31 N/mm² (3.16 bar)
- 1000 tons and upwards, but less than 4000 gross tonnage: 0.27 N/mm² (2.75 bar)
- Less than 1000 gross tonnage: to the satisfaction of the administration.

Note: That the pump discharge pressure must be higher than the pressure at the fire main due to the head and pressure loss in the pipes. If no pressure gauge is available at fire main, it is to be confirmed that any part of the ship is reached by two water jets with sufficient power.

The maximum pressure at any hydrant must be confirmed: SOLAS regulation II-2/10.2.2.3.1.

Check the ready availability of water supply on a passenger ship of 1000 gross tonnage and upwards with automatic starting of a pump: SOLAS 2000 Amendments II-2/10.2.1.2.1.1. The fire main is always pressurized so that by opening any hydrant the water supply can be available immediately.

This can be achieved by the following methods:

- One fire pump is always kept running. If pressure of fire main drops, a stand-by fire pump comes into operation automatically.
- A fire pump is connected to the pressure tank in which pressure and water level are kept constant with automatic start and stop of the pump.
Initial survey of cargo ship

In addition to the general requirements the following are to be confirmed by a surveyor.

Check the total capacity of the fire pumps: SOLAS 2000 Amendments II-2/10.2.2.4.1.2.

Check the number of pumps: SOLAS 2000 Amendments II-2/10.2.2.2.1 and 10.2.2.2.2.

- 1000 gross tonnage and upwards: 2 pumps.
- Less than 1000 gross tonnage: to the satisfaction of the administration.

Where a ship is arranged for a periodically unattended machinery space, the function of the ready availability of the water supply must be checked: SOLAS 2000 Amendments II-2/10.2.1.2.2.2.

This is achieved by either of the following methods:

- Remote start of a pump from the navigation bridge.
- Keeping one fire pump running continuously. If the pressure drops, a standby pump starts automatically or, at least, releases a low pressure alarm.

In a tanker, check the position of additional isolating valves in the fire main at the poop front and throughout the cargo block at a distance of no more than 40 meters: SOLAS 2000 Amendments II-2/10.2.1.4.4.

Operation test of main fire pump to be carried out with two pumps running simultaneously and two adjacent hydrants in use, as required in: SOLAS 2000 Amendments II-2/10.2.1.6.

- 6000 gross tonnage and upwards: 0.27 N/mm² (2.75 bar)
- 1000 tons and upwards,
  but less than 6000 gross tonnage: 0.25 N/mm² (2.55 bar)
- less than 1000 gross tonnage: to the satisfaction of the administration.

Note the minimum water-throw required.

Emergency fire pump

Installation of an emergency fire pump is required if:

- the ship is a cargo ship of 2000 gross tonnage and upwards and;
- a fire in any one compartment could put all the pumps out of action.

However, an emergency fire pump may also be installed in passenger ships of any size. The inspection and test must follow the procedure specified as follows:
Check the capacity of the pump: SOLAS 2000 Amendments II-2/10.2.2.4.1.

Check that the pressure at any hydrant when supplying two water jets is more than the minimum pressure required.

Check that the requirements for the diesel-drive power source for the pump are fulfilled: FSS Code Ch.12/2.2.2.1.

Another means of starting the system is required if the diesel engine exceeds 15 kW power. Such means can be:

- Accumulator battery,
- Air starting,
- Accumulator hydraulic power starting,
- Inertia starting.

Test of starting arrangement: FSS Code Ch.12/2.2.2.1.

- Manual starting if another means of starting is not provided.
- Electrical starting with an accumulator battery.

Check during testing that the capacity of the battery is sufficient for 6 starts within 30 minutes without recharging. If only one battery is provided, check that the automatic constant charging system for the battery functions correctly.

- **Air starting**: Check that the capacity of an air receiver, used solely for the purpose of an emergency fire pump connected from the ship's main air system with non-return valve fitted in the air inlet line, is sufficient to start the diesel engine 6 times. If the capacity of the receiver is not sufficient, a manual or independent-power-driven air compressor located adjacent to emergency fire pump must be provided and the compressor must have the capacity to fill the receiver to enable 6 starts within 30 minutes and at least two within the first 10 minutes. A demonstration of starting of engine and air compressor, if applicable, must be held.

- **Hydraulic starting**: Demonstration of the starting system to confirm the requirement of FSS Code Ch.12/2.2.2.1.

An emergency fire pump can also be driven by an electric motor. Check that the emergency generator supplying power to the motor is located outside the engine room and separated from it by an 'W' class division, and that the relevant electric cables do not pass through the compartment containing the main fire pump. For power supply from emergency generator, see: SOLAS regulation II-1/42.2.4 and 2000 Amendments II-1/43.2.5.

A fire pump driven by a hydraulic unit powered by the diesel engine is another means of driving the system.
The hydraulic units should be certified as a pressure unit as regards design and material specification and, upon installation on board, checked for possible leakage and pipe securing to prevent harmful vibration.

Check

- The fuel arrangement for the diesel engine of emergency fire pumps as well as the reserve fuel oil arrangement for the specified period: FSS Code Ch.12/2.2.2.2. Check the suction head height of the emergency fire pump: FSS Code Ch.12/2.2.1.3;
- The protection of suction/discharge pipings if they pass through the machinery space, if applicable: SOLAS 2000 Amendments II-2/10.2.1.4.1;
- Emergency fire pump room arrangement for fire protection access and ventilation arrangement: SOLAS 2000 Amendments II-2/10.2.2.3.2.2 and 10.2.2.3.2.3. A function test of the self-closing door or remote-operated door, if approved and fitted, is to be carried out;
- In a tanker, that the diesel engine of the emergency fire pump is installed in a gas-safe space (see electrical survey course for definition of a gas-safe space). Also check that the exhaust pipe of the diesel engine is provided with an effective spark arrester and is led to the atmosphere outside the gas-dangerous zone.

7.3 Periodical survey of fire pumping arrangement

The fire pumping arrangement must be regularly surveyed in connection with the Passenger Ship Safety Certificate and Cargo Ship Safety Equipment Certificate.

The periodical survey – renewal survey – must be carried out for a passenger ship every 12 months and for a cargo ship every 2 years, though a cargo ship is also subject to a mandatory annual survey or unscheduled inspection. This means that the fire pumping system must be surveyed and tested by a surveyor every year.

General survey requirements

Check that the fire pumping arrangement has not been altered without approval by the administration and is in compliance with the approved order.

Make a visual examination of the pump with attachments, pipes and valves, for possible damage, corrosion or unapproved repairs of the system.

If repair of the pipes is found or if the condition of pipes is in doubt, the pipes should be subjected to hydraulic testing at 1.5 times the design pressure.

Note that most authorities do not accept repair by fitting doubler plates to the fire main as being of a permanent nature.
The relief valve fitted in the fire main to prevent over-pressure is to be externally examined and, if found necessary, a function test, overhaul and/or resetting must be carried out.

The fire pump should be opened for internal inspection if its condition is in doubt.

**Periodical survey of a passenger ship**

Test the fire pumping system with two pumps running and two adjacent hydrants in use.

Check the pressure at fire main as required and examine the piping for possible leakage.

Close the isolating valves separating the compartments each containing main fire pump(s) and confirm that separation of the fire main does not impair fire fighting outside the machinery space.

Where an emergency fire pump is installed, the survey and test must be carried out as required.

Check the ready availability of water supply from any hydrant, particularly the automatic start of a fire pump.

**Survey of a cargo ship**

There must be an intermediate and a periodical survey in connection with the Cargo Ship Safety Equipment Certificate that must be renewed every five years.

Test pumping system with two pumps running simultaneously and two adjacent hydrants in use.

Check the pressure of fire main, as required.

Test the emergency fire pump. The following are required:

- Pressure at fire main as required.
- Starting test of diesel engine.
- Checking of fuel oil arrangement and reserve.
- Check fire pump room arrangement, including fire protection, for possible deterioration.
- Testing of self-closing or remote-operated door.
- Check condition of spark arrester of exhaust pipe of diesel engine in a tanker.
- Test the running of the fire pump for a reasonable time to ensure that the prime mover and pump can be run on full load for the required period, i.e. total 18 hours.
Close isolating valve between the main fire pump(s) and emergency pump and confirm the separation does not impair fire fighting outside machinery space.

If a ship is arranged for a periodically unattended machinery space, test the remote start, automatic start of fire pump or low pressure alarm of fire main as required.

In a tanker, check the condition and proper functioning as well as their protection of the isolating valves fitted in the fire main at the poop front.

**Cargo ship – mandatory annual survey of unscheduled inspection**

The survey extent is a visual examination of the system for possible deterioration. Carry out an operation test of the main fire pump and emergency fire pump separately.
CHAPTER 8  EXAMPLE OF A CHECKLIST

Surveys of structural fire protection, fire detecting and fire-fighting equipment as recommended in Resolution A.948(23)

1. Check the validity of all safety certificates.

2. Check whether the prescribed periodical surveys have been duly conducted.

3. Check that any new equipment has been properly approved before installation and that no changes have been made which would affect the validity of Passenger Ship Safety Certificate or Cargo Ship Safety Equipment Certificate.

4. Check the date when the last fire drill took place.

5. Check whether any fire has occurred on board necessitating the operation of the fixed fire extinguishing systems or the portable fire extinguishers since the last survey.

6. Check that fire control plans are properly posted.

7. Check as far as practicable that no significant changes have been made to the arrangement of structural fire protection.

8. Check the operation of manual and automatic fire doors.

9. Examine as far as possible and test as feasible the fire-and-smoke detection system.

10. Examine the fire-main system to see that each fire pump can be operated separately.

11. Check that fire hoses, nozzles and applicators are in good working condition and situated at their respective locations.

12. Examine the fixed fire-fighting system with respect to controls, piping, instructions and marking.

    Check maintenance and servicing, including date of last system tests.

13. Check that all portable fire extinguishers are in their proper position.

    Check maintenance and servicing. Conduct random check for evidence of discharged extinguishers.
14. Check that remote controls for stopping fans and machinery and shutting off fuel supplies in machinery spaces are in working order.

15. Examine the closing arrangements of ventilators, funnel annular spaces, skylights and doorways.

16. Check the fireman's outfits are complete and in good condition.

17. On tankers check that the deck foam system is in good operating condition.