# GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE

**Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use 2012 AMENDMENT NO.2**

Notice No.89 15th November 2012
Resolved by Technical Committee on 27th July 2012

ClassNK
NIPPON KAIJI KYOKAI

Notice No.89 15th November 2012
AMENDMENT TO THE GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE

"Guidance for the approval and type approval of materials and equipment for marine use" has been partly amended as follows:

Amendment 2-1

# Part 1 METALLIC MATERIALS

## Chapter 1 APPROVAL OF MANUFACTURING PROCESS OF ROLLED STEELS

### 1.2 Approval Application

Paragraph 1.2.1 has been amended as follows.

#### 1.2.1 Approval Application Form

Manufacturer who applies for the approval of the manufacturing process of rolled steels is to submit a copy of the approval application form (see **Form 1-1**) filled in with required data and information to the Society (branch office concerned). For applications for the approval of the manufacturing process of corrosion resistant steel for cargo oil tanks specified in **3.13, Part K of the Rules for the Survey and Construction of Steel Ships**, the approval application form **Form 1-2A** is to be used.

#### 1.2.2 Documents to be Submitted

Sub-paragraph -1 has been amended as follows.

**1** Three copies each of the documents given in **(1)** and **(2)** are to be submitted together with the approval application form specified in **1.2.1**.

(1) Approval test plan

(2) Technical data given in the following **(a)** through **(k)**

(a)~(j) (Omitted)

(k) Additional documents related to the approval of the manufacturing process of corrosion resistant steel for cargo oil tanks specified in **3.13, Part K of the Rules for the Survey and Construction of Steel Ships**

(i) Test plan for the corrosion resistance test for cargo oil tanks (including the timing of the Surveyor's presence)

(ii) Details of test equipment and test environment

(iii) Technical data for assessment criteria of the chemical composition range of elements to be added for improving the corrosion resistance for pre-shipment inspection

(iv) Technical background of the chemical composition range described in **(iii)** above

(v) The grades, brand names and maximum thickness of the corrosion resistant steel for cargo oil tanks

(vi) The brand names and the approval certificate numbers of the welding consumables to be applied

(~~k~~l) Where approval has already been granted by other Classification Societies, documentation of such approval tests performed
(~~l~~m) Other data deemed necessary by the Society

**1.3 Preliminary Examination**

Paragraph 1.3.1 has been amended as follows.

**1.3.1 Approval of Test Plan**

Prior to approval tests, the Society examines the approval test plan submitted in accordance with the requirements in **1.2.2-1**, and where deemed appropriate, the plan is approved and returned to the manufacturer.

**1.4 Approval Test**

**1.4.3 Details of Test**

Sub-paragraph -5 has been added as follows.

**5** For the corrosion resistant steel for cargo oil tanks specified in **3.13, Part K of the Rules for the Survey and Construction of Steel Ships**, the Society may require additional tests in the following cases:

(1) When the Society determines that since the chemical composition range is set by the theoretically analysis of each element based on existing data, the number of corrosion resistance test for cargo oil tanks is too few to adequately confirm the validity of the chemical composition range;
(2) When the Society determines that the data of the corrosion resistance test result obtained for setting the chemical composition range varies too widely;
(3) When the Society determines that the validity of the corrosion resistance test result for setting the chemical composition range is insufficient, or has some flaws;
(4) When the Surveyor has not attended the corrosion resistance tests for setting the chemical composition range, and the Society determines that additional testing is necessary in order to confirm the validity of the test result data; and
(5) Others as deemed necessary by the Society.

Paragraph 1.4.4 has been amended as follows.

**1.4.4 Attendance of the Society's Surveyor for Test**

The Society's Surveyor is to be present, as a rule, when the test samples for the approval test are being identified and when the approval test is being carried out. For the corrosion resistant steel for cargo oil tanks specified in **3.13, Part K of the Rules for the Survey and Construction of Steel Ships**, the attendance of the Surveyor may be omitted when tests are carried out in testing laboratories approved by the Society.

Table 1.1-2 has been amended as follows.

Table 1.1-2 Approval Test Items for Rolled Steels

| Rolled steels | | Kind of test (See Note[1]) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) | (s) | (t) | (u) | (v) |
| Rolled steels for hull | *KA* | ○ | ○ | | | ○ | ○ | | ○ | ○ | | ○ | | | | | | | | | | | ○ |
| | *KB* | ○ | ○ | | | ○ | ○ | | ○ | ○ | | ○ | ○ | | | | | | | | | | ○ |
| | *KD* | ○ | ○ | | | ○ | ○ | | ○ | ○ | | ○ | ○ | | | | | | | | | | ○ |
| | *KE* | ○ | ○ | | | ○ | ○ | | ○ | ○ | | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | | | ○ |
| | *KA*32, *KA*36, *KA*40 | ○ | ○ | | | ○ | ○ | | ○ | ○ | | ○ | ○ | | | | | ○ | ○ | ○ | | | ○ |
| | *KD*32, *KD*36, *KD*40 | ○ | ○ | | | ○ | ○ | | ○ | ○ | | ○ | ○ | | | | | ○ | ○ | ○ | | | ○ |
| | *KE*32, *KE*36, *KE*40 | ○ | ○ | | | ○ | ○ | | ○ | ○ | | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | | | ○ |
| | *KF*32, *KF*36, *KF*40 | ○ | ○ | | | ○ | ○ | | ○ | ○ | | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | | | ○ |
| | | | | | | | | | | | | | | | | | | | | | | | |

Notes :

(1)~(9) (Omitted)

(9) For the corrosion resistant steel for cargo oil tanks specified in **3.13, Part K of the Rules for the Survey and Construction of Steel Ships**, corrosion resistance test for cargo oil tanks is required in addition to those tests for rolled steels for hull given in the table.

Table 1.1-3 has been amended as follows.

Table 1.1-3 Approval Testing Method and Acceptance Criteria

| Approval test item | | Selected location of test samples (1) (2) | Length direction of test specimen (3) | Testing method | | Acceptance criteria |
|---|---|---|---|---|---|---|
| | | | | | | |
| Non-destructive test | Ultrasonic test or Eddy current test | All surface | — | Stainless crad steels | *JIS G* 0601 or equivalent method. | To meet the requirements of class *F* of *JIS G* 0601 |
| | | | | Steel with consideration for thickness directional characteristics | In accordance with the requirements in **Chapter 3**, **Part K of the Rules**. | In accordance with the requirements in **Chapter 3**, **Part K of the Rules**. |
| | | | | Round bars for chains | *JIS G* 0801 and *JIS G* 0202 or equivalent method. | To be free from any defects deemed to have negative effect. |
| Corrosion resistance test for cargo oil tanks(20) | | Top | — | In accordance with the requirements in **Annex 1.1**. | | In accordance with the requirements in **Annex 1.1**. |

Notes :

(1)~(19) (Omitted)

(20) The chemical composition of test specimens for corrosion resistance test for cargo oil tanks is to be set in accordance with the documents specified in **1.2.2** to make it possible to confirm the validity of the chemical composition range (upper limit, lower limit) of the elements to be added for improving the corrosion resistance.

## 1.5 Approval

Paragraph 1.5.1 has been amended as follows.

### 1.5.1 Notification and Announcement of Approval

**1** The Society grants approval of the manufacturing process of rolled steels or semi-finished products which have been deemed appropriate on the basis of the reports of the Surveyor and documents submitted in accordance with requirements in **1.2** through **1.4**. In this case, a "Certificate of Approval" is published including the name of works, kind of rolled steels, term of validity of approval etc. and the approved content etc. is described in "Particulars of Approval Conditions".

**2** Notwithstanding **-1** above, for the corrosion resistant steel for cargo oil tanks specified in **3.13, Part K of the Rules for the Survey and Construction of Steel Ships**, the Society grants approval of the manufacturing process for corrosion resistant steel for cargo oil tanks which have been deemed appropriate on the basis of the reports of the Surveyor and documents submitted in accordance with requirements in **1.2** through **1.4**. In this case, a "Type Approval Certificate" is published including the name of works, kind of corrosion resistant steel for cargo oil tanks, term of validity of approval etc. and at least the following items are described in "Particulars of Approval Conditions".

(1) Brands name and approval number

(2) Chemical composition range (additive elements for ensuring corrosion resistance) and corrosion resistance process of the steel

(3) Maximum thickness

(4) Applicable welding consumables and welding method

(5) Applicable area

~~2~~**3** Among those data submitted in accordance with the requirements in **1.2.2** and **1.4.5** which the Society deems necessary, a seal of approval is stamped and returned to the applicant.

~~3~~**4** Once a year, the Society announces rolled steels and semi-finished products which have been granted approval in the form of a table.

Paragraph 1.5.2 has been amended as follows.

### 1.5.2 Validity of Approval

Valid term of the "Certificate of Approval" specified in **1.5.1-1** and the "Type Approval Certificate" specified in **1.5.1-2** will be 5 *years* from the date of approval. In case when the renewal of approval is carried out in accordance with the requirements in **1.5.3**, valid term will be 5 *years* from the next day after the expiry date of the previous validity (hereinafter referred to as "date of renewal").

### 1.5.3 Renewal of Approval

Sub-paragraph -1 has been amended as follows.

**1** In case of application for renewal of approval, the applicant is to submit a "Certificate of Approval" (original) (in the case of the corrosion resistant steel for cargo oil tanks specified in **3.13, Part K of the Rules for the Survey and Construction of Steel Ships**, the "Type Approval Certificate" (original)) and three copies of the data showing actual manufacturing records (for example, chemical composition, mechanical properties and thickness or dimension expressed in the form of histogram or statistics) of the rolled steels or semi-finished products within the specific period together with application form (**Form 1-2**) (in the case of corrosion resistant steel for cargo oil tanks, **Form 1-2B**).

Sub-paragraph -3 has been amended as follows.

**3** The factory inspection specified in **-2** is to be completed within the valid term of "Certificate of Approval" or "Type Approval Certificate" in principle. However, for unavoidable circumstance, the factory inspection may be completed within a period of 3 *months* after the valid term upon the approval by the Society.

Paragraph 1.5.4 has been amended as follows.

**1.5.4 Changes in the Approved Content**

**1** In case of changes in the approved content such as those given in the following **(1)** through **(9)** are occurred, in response to the content of changes, three copies of documents corresponding to the requirements in **1.2.2** are to be submitted to the Society, in addition to a copy of "Application for Changes in the Approved Content of Manufacturing Process of Rolled Steels" and a "Certificate of Approval" (original).

(1) Addition to material grades
(2) Changes in the steel making process
(3) Changes in the casting making process
(4) Changes in the rolling process
(5) Changes in the limits of thickness
(6) Changes in the heat treatment process
(7) Changes in the chemical composition, added element etc.
(8) In case of a part of manufacturing process (rolling, heat treatment etc.) is assigned to other works
(9) Changes in the kind of semi-finished product being used

**2** For the corrosion resistant steel for cargo oil tanks specified in **3.13, Part K of the Rules for the Survey and Construction of Steel Ships**, in case of changes in the approved content such as those given in the above **-1(1)** through **(9)** and following **(1)** and **(2)** are occurred, in response to the content of changes, three copies each of documents corresponding to the requirements in **1.2.2** are to be submitted to the Society, in addition to a copy of "Application for Changes in the Approved Content of Manufacturing Process of Corrosion Resistant Steel for Cargo Oil Tanks" and the "Type Approval Certificate" (original).

(1) Changes in the chemical composition range of elements to be added for improving the corrosion resistance
(2) Changes in the applicable welding consumables

~~**2**~~**3** Upon studying the items of changes in approved content specified in **-1** or **-2**, the Society requests the factory inspection and approval test in accordance with the requirements in **1.4** as necessary. In cases where the applicable welding consumables specified in **-2(2)** are changed, the corrosion resistance test for corrosion resistant steel specified in **Annex 1.1** may be limited to only test for welded joints.

~~**3**~~**4** The Society is to examine the submitted data specified in **-1** or **-2** and reports of factory inspection and approval test specified in ~~**-2**~~**3**, and if the Society considers them appropriate, is to approve the changes in the approved content. In this case, as a rule, the validity of the "Certificate of Approval" specified in **-1** ~~is~~ or the "Type Approval Certificate" specified in **-2** are not changed.

Paragraph 1.5.5 has been amended as follows.

**1.5.5 Revocation of Approval**

In case any of the following **(1)** through **(5)** is relevant, the Society may revoke approval of the manufacturing process based on the requirements in this Chapter and give notice of the

revocation to the manufacturer. The manufacturer which noticed the approval is withdrawn is to return "Certificate of Approval" or "Type Approval Certificate" and "Particulars of Approval Conditions" in question to the Society.

(1) When the manufacturer does not pay the approval fees.
(2) When the rolled steels and semi-finished products, whose manufacturing process has previously been granted approval, no longer conform to the given requirements due to amendments or implementation of conventions, law, rule and regulations.
(3) In one case of following **(a)** through **(e)**, when the manufacturer does not take a proper action in spite of the Society requests the investigation and improvement etc.
    (a) When the unstable quality is recognized at tests or inspections
    (b) When the harmful defects caused by the material in the process of being worked after shipment are recognized
    (c) When the damages caused by the material at working condition are recognized
    (d) When the shortcomings are recognized on the quality system or manufacturing control system
    (e) When the approved content described on the "Particulars of Approval Conditions" specified in **1.5.1-1** or **1.5.1-2** were changed without the permission of the Society
(4) When manufacturers have not been carried out the renewal of approval according to the requirements in **1.5.3**.
(5) When a request for revocation is made by the manufacturer.

Form 1-2A has been added as follows.

Form 1-2A

To: NIPPON KAIJI KYOKAI Ref. No. _____

_____ branch Date: _____

(Name of branch office)

APPLICATION FOR APPROVAL OF MANUFACTURING PROCESS
OF CORROSION RESISTANT STEEL FOR CARGO OIL TANKS

We hereby request approval of the manufacturing process of corrosion resistant steel for cargo oil tanks described hereunder in accordance with the requirements in **1.2**, **Part K of the Rules for the Survey and Construction of Steel Ships**.

1. Name of works
2. Brands : (ex. XXCR1)
3. Material grade : (ex. KD36-RCW)
4. Areas of application : (ex. Upper deck and inner bottom plating)
5. Deoxidation practice : (ex. Fine grained killed steel)
6. System of constituents : (ex. Si-Mn-Al-Ni)
7. Control range of chemical composition (Additive elements for ensuring corrosion resistance)

| | | | | |
|---|---|---|---|---|
| (ex. Ni) | | | | |
| (ex. 0.2 to 0.4%) | | | | |

8. Heat treatment : (ex. Thermo-Mechanical Controlled Processing (TMCP))
9. Plate thickness for approval : (ex. Max. plate thickness: 25mm)
10. Steel making process : (ex. Basic oxygen furnace steel making process)
11. Steel casting process : (ex. Continuous casting)
12. Welding consumable : (ex. BT-999 (Manufacturer: NK Welding & Eng. Co., Ltd.))
13. Miscellaneous
14. Date for factory inspection
15. Date for selection of test samples
16. Date for approval test
17. Submitted documents
    (a) Approval test plan 3 copies
    (b) Technical data 3 copies

Name of works

_____

Address of works

_____

Personnel in charge

_____

Phone No. and Fax. No.

_____

(Signature )

Form 1-2B has been added as follows.

Form 1-2B

To: NIPPON KAIJI KYOKAI Ref. No. _____

_____ branch Date: _____

(Name of branch office)

APPLICATION FOR RENEWAL APPROVAL OF MANUFACTURING PROCESS OF CORROSION RESISTANT STEEL FOR CARGO OIL TANKS

We hereby request renewal approval of the manufacturing process of corrosion resistant steel for cargo oil tanks described in Type Approval Certificate hereunder in accordance with the requirements in **1.2**, **Part K of the Rules for the Survey and Construction of Steel Ships**.

1. Type Approval Certificate No. :
2. Validity of approval :
3. Data showing actual manufacturing records
   (a) Yes
   (b) No
4. Date for factory inspection :
5. Attached documents (check if appropriate)
   (a) Type Approval Certificate (original)
   (b) Data showing actual manufacturing records 3 copies
   (c) Others ( ) 3 copies

Name of works

_____

Address of works

_____

Personnel in charge

_____

Phone No. and Fax. No.

_____

(Signature )

# Part 4 NON-METALLIC MATERIALS AND COATING MATERIALS FOR HULL

## Chapter 3 APPROVAL OF RAW MATERIALS FOR HULL OF SHIPS OF FIBREGLASS REINFORCED PLASTICS

### 3.1 Scope

Paragraph 3.1.1 has been amended as follows.

#### 3.1.1 Application

This chapter applies to the approval and retention of approval of the raw materials to be used in the following **(1)** through **(3)** for *FRP* boats conforming to the requirements of **4.2.1 of the Rules for the Survey and Construction of Ships of Fibreglass Reinforced Plastics**:

(1) Fibreglass reinforcements
(2) Liquid resins for laminates
(3) Core materials for sandwich construction
(4) Structural adhesives

Annex 1.1 has been added as follows.

# Annex 1.1 Corrosion Resistance Test for Cargo Oil Tanks

## 1.1 Test on simulated upper deck conditions

### 1.1.1 Test condition

Tests on simulated upper deck conditions in cargo oil tanks are to satisfy each of the following conditions.

(1) Corrosion resistant steel and conventional steel are to be tested at the same time.

(2) The chemical composition of conventional steel is to comply with the requirements of **Table 1.1-1**. The elements other than those specified in **Table 1.1-1** are to be not greater than 0.02% each. The mechanical properties of the test specimen should be representative of steel used in its intended shipboard application.

Table 1.1-1 Chemical composition for conventional steel (%)

| *C* | *Mn* | *Si* | *P* | *S* | *Al* (acid soluble) | *Nb* |
|---|---|---|---|---|---|---|
| 0.13~0.17 | 1.00~1.20 | 0.15~0.35 | 0.01~0.02 | 0.002~0.008 | Min. 0.015 | Max. 0.02 |
| *V* | *Ti* | *Nb+V+Ti* | *Cu* | *Cr* | *Ni* | *Mo* |
| Max. 0.10 | Max. 0.02 | Max. 0.12 | Max. 0.10 | Max. 0.10 | Max. 0.10 | Max. 0.02 |

(3) The tests for corrosion resistant steel are to be carried out for 21, 49, 77 and 98 days. The tests for conventional steel are to be carried out for 98 days. The tests for welded joints are to be carried out for 98 days.

(4) There are to be five test pieces for each test period.

(5) The size of each test piece is 25 ± 1*mm* x 60 ± 1*mm* x 5 ± 0.5*mm*. The surface of the test piece is to be polished with an emery paper #600. The size of the test piece for a welded joint is 25 ± 1*mm* x 60 ± 1*mm* x 5 ± 0.5*mm*, including 15 ± 5*mm* width of the weld metal part.

(6) The surface of the test piece, except for the tested surface, is to be protected from corrosive environment in order not to affect the test results.

(7) The test apparatus consists of a double chamber, and the temperature of the outer chamber is to be controlled.

(8) Simulating the condition of the actual upper deck, the test cycle runs with distilled water and simulated COT gas (4 ± 1% $O_2$ - 13 ± 2% $CO_2$ - 100 ± 10*ppm* $SO_2$ - 500 ± 50*ppm* $H_2S$ - 83 ± 2% $N_2$). A sufficient distance between the surface of the test piece and the distilled water is to be kept to avoid splashing of distilled water. The minimum gas flow rate is 100 *cc*/*min* for the first 24 h and 20 *cc*/*min* after 24 h.

(9) The test pieces are to be heated for 19 ± 2 h at 50 ± 2°C and 3 ± 2 h at 25 ± 2°C and the transition time is to be at least 1 h. The time for 1 cycle is 24 h. The temperature of the distilled water is to be kept at not higher than 36°C, while the temperature of the test pieces is 50°C.

Fig. 1.1-1 Test piece of this test

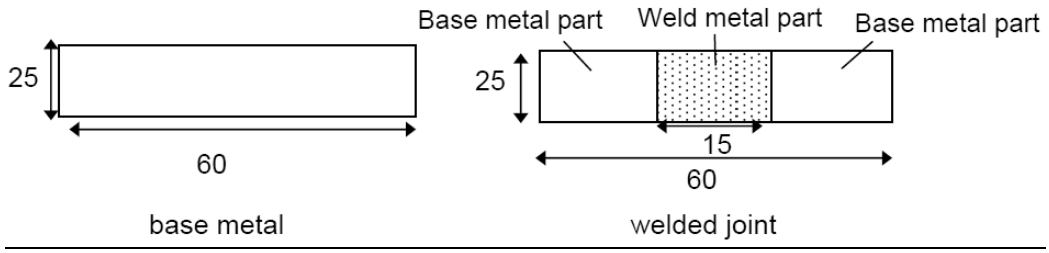
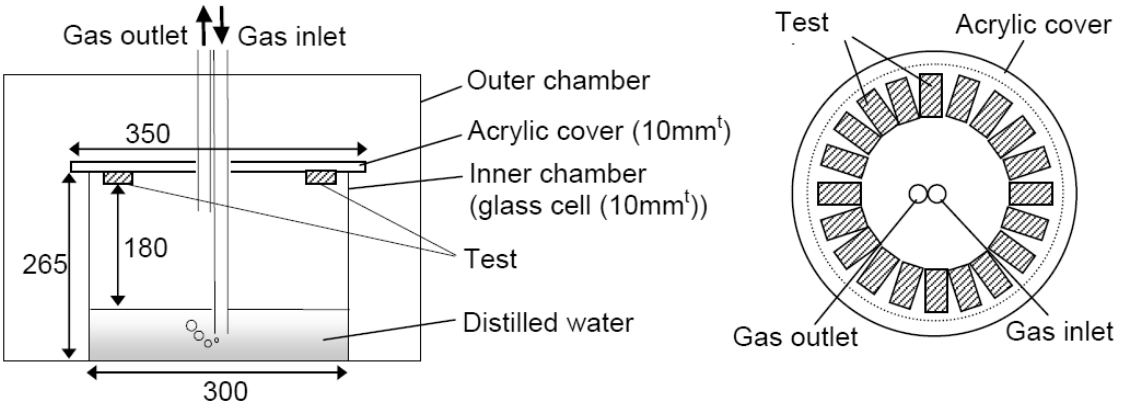



Fig. 1.1-2 An example of simulated corrosion test apparatus for upper deck




### 1.1.2 Test results of base metal

-1. Prior to the testing, measured data of size and weight of the test piece are to be reported.

-2. After the testing, the following measured data are to be reported.

(1) weight loss (difference between initial weight and weight after testing) of conventional steel ($W_C$) and corrosion resistant steel ($W_{21}$, $W_{49}$, $W_{77}$ and $W_{98}$)

(2) corrosion loss of conventional steel ($CL_C$) and corrosion resistant steel ($CL_{21}$, $CL_{49}$, $CL_{77}$ and $CL_{98}$), calculated by the following formulae:

$$CL_C(mm) = \frac{10 \times W_C}{S \times D}$$

$$CL_{21}(mm) = \frac{10 \times W_{21}}{S \times D}$$

$$CL_{49}(mm) = \frac{10 \times W_{49}}{S \times D}$$

$$CL_{77}(mm) = \frac{10 \times W_{77}}{S \times D}$$

$$CL_{98}(mm) = \frac{10 \times W_{98}}{S \times D}$$

$W_C$: weight loss of conventional steel ($g$) (average of five test pieces)
$W_{21}$: weight loss of corrosion resistant steel after 21 days ($g$) (average of five test pieces)
$W_{49}$: weight loss of corrosion resistant steel after 49 days ($g$) (average of five test pieces)

$W_{77}$: weight loss of corrosion resistant steel after 77 days ($g$) (average of five test pieces)
$W_{98}$: weight loss of corrosion resistant steel after 98 days ($g$) (average of five test pieces)
$S$: surface area ($cm^2$)
$D$: density ($g/cm^3$)
The test is considered to be carried out appropriately if $CL_C$ is between 0.05 and 0.11 (corrosion rate is between 0.2 and 0.4 *mm/year*). The concentration of $H_2S$ in simulated COT gas may be increased for adjusting $CL_C$.

(3) coefficients A and B of corrosion resistant steel, calculated from the test results for 21, 49, 77 and 98 days by least square method

Corrosion loss of corrosion resistant steel is described as follows:

$$CL = A \times t^B$$

$A$ (*mm*) and $B$: coefficient
$t$: test period (*days*)

(4) estimated corrosion loss after 25 years (*ECL*) calculated by the following formula:

$$ECL(mm) = A \times (25 \times 365)^B$$

**1.1.3 Test results of welded joint**

The surface boundary between base metal and weld metal is to be observed by microscope at 1,000 times magnification.

**1.1.4 Acceptance criteria**

The test results based on provisions of **1.1.2** and **1.1.3** are to satisfy the following criteria:
(1) $ECL(mm) \leq 2$ (for base metal); and
(2) no discontinuous surface (e.g., step) between the base metal and weld metal (for welded joint).

**1.1.5 Test report**

The test report is to include the following information:
(1) name of the manufacture;
(2) date of tests;
(3) chemical composition and corrosion resistant process of steel;
(4) test results according to **1.1.2** and **1.1.3**; and
(5) judgement according to **1.1.4**.

**1.2 Test on simulated inner bottom conditions**

**1.2.1 Test condition**

Tests on simulated inner bottom conditions in cargo oil tanks (COT) are to satisfy each of the following conditions.
(1) The test is to be carried out for 72 h for base metal, and 168 h for welded joint.
(2) There are to be at least five test pieces of corrosion resistant steel for base metal and welded joint, respectively. For comparison, at least five test pieces of base metal of conventional steel should be tested in the same condition.
(3) The size of each test piece is 25 ± 1*mm* x 60 ± 1*mm* x 5 ± 0.5*mm* for a specimen with base metal only, and is 25 ± 1*mm* x 60 ± 1*mm* x 5 ± 0.5*mm* for a specimen with welded joint

including 15 ± 5*mm* width of weld metal part as shown in **Figure 1.1-3**. The surface of the test pieces is to be polished with an emery paper #600, except a hole for hanging.

(4) The samples are hung in a solution from a fishing line (0.3*mm* to 0.4*mm* in diameter, made of nylon) to avoid crevice-like and/or localized corrosion. An example of a corrosion test configuration is shown in **Figure 1.1-4**.

(5) The test solution contains 10 mass*% NaCl* and its pH is 0.85 adjusted by *HCl* solution. The test solution should be changed to a new one every 24 h to minimize pH change of the test solution. The volume of the solution is more than 20$cc/cm^2$ (surface area of test piece). The temperature of the test solution is to be kept at 30 ± 2°C.

Fig. 1.1-3 Test piece for this test

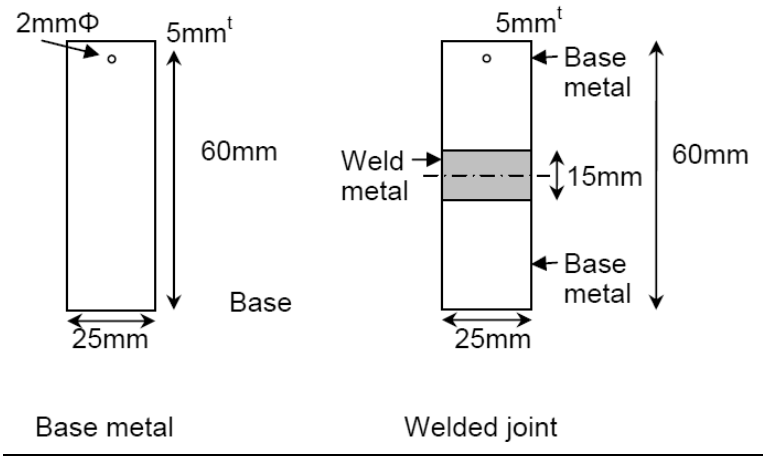
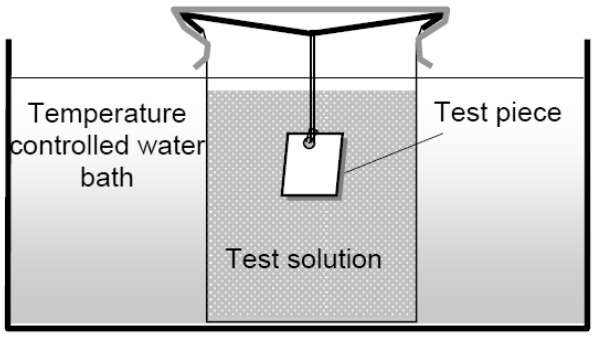



Fig. 1.1-4 Simulated corrosion test apparatus for inner bottom




### 1.2.2 Test results of base metal

-1. Prior to the testing, data of size and weight of test piece are to be measured and reported.

-2. After the testing, the following measured data are to be reported:

(1) weight loss (difference between initial weight and weight after testing)

(2) corrosion rate (*C.R.*) calculated by the following formula:

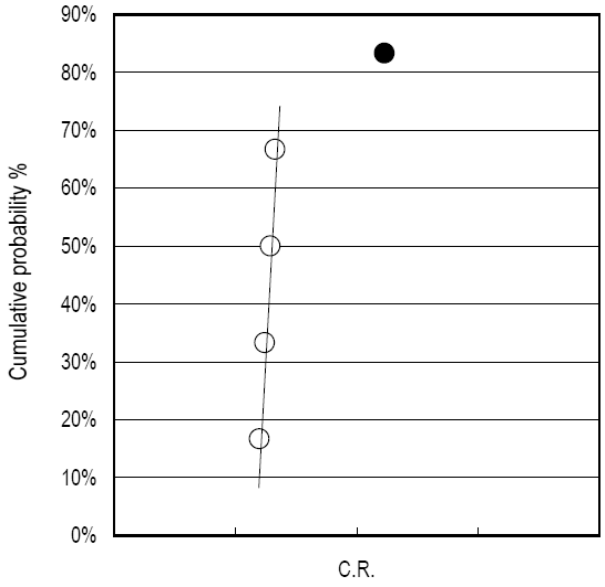
$$C.R.(mm/year) = \frac{365(days) \times 24(hours) \times W \times 10}{S \times 72(hours) \times D}$$

*W*: weight loss (*g*)

*S*: surface area ($cm^2$)
*D*: density ($g/cm^3$)

(3) To identify specimen which hold crevice and/or localized corrosion, the *C.R.* is to be plotted on a normal distribution statistic chart. *C.R.* data which deviate from the normal statistical distribution are to be eliminated from the test results. An example is shown in **Figure 1.1-5** for reference.
(4) calculation of average of *C.R.*'s data (*C.R.ave*)

Fig. 1.1-5 An example of plot of *C.R.*s on a normal distribution chart
(In this case *C.R.* data ● should to be abandoned and eliminated.)




**1.2.3 Test results of welded joint**

The surface boundary between base metal and weld metal is to be observed by microscope at 1,000 times magnification.

**1.2.4 Acceptance criteria**

The test results based on sections **1.2.2** and **1.2.3** are to satisfy the following criteria:
(1) *C.R.ave*(*mm/year*) ≤ 1.0 (for base metal); and
(2) no discontinuous surface (e.g., step) between the base metal and weld metal (for welded joint).

**1.2.5 Test report**

The test report is to include the following information:
(1) name of the manufacture;
(2) date of tests;
(3) chemical composition and corrosion resistant process of steel;
(4) test results according to **1.2.2** and **1.2.3**; and
(5) judgement according to **1.2.4**.

EFFECTIVE DATE AND APPLICATION(Amendment 2-1)

**1.** The effective date of the amendments is 15 November 2012.

Amendment 2-2

# Part 2 EQUIPMENT

## Chapter 7 LIFE-SAVING APPLIANCES

### 7.1 General

Paragraph 7.1.1 has been amended as follows.

**7.1.1 Application**

**1** This Chapter applies to tests and inspections for type approval/approval of appliances or equipment ~~under **Chapter 3 of the Rules for Safety Equipment**~~ with respect to the following **(1)** and **(2)**:

(1) Appliances or equipment under **Chapter 3 of the Rules for Safety Equipment** with respect to the following:

(~~1~~a) Lifeboats;

(~~2~~b) Rescue boats;

(~~3~~c) Inflatable liferafts;

(~~4~~d) Launching appliances for lifeboats, rescue boats and liferafts;

(~~5~~e) Engines for lifeboats and rescue boats (including reduction and reversing gears);

(f) Release mechanisms of lifeboats or rescue boats launched by falls other than free-fall lifeboats.

(2) Fall preventer devices fitted with lifeboats or rescue boats launched by falls other than free-fall lifeboats specified in **3.1.1-16, Chapter 3 of the Guidance for Safety Equipment**.

**2** Components constituting any part of the appliances or equipment referred to in **-1** above may be type approved/approved in accordance with this Chapter whenever applications are submitted.

### 7.3 Production Tests

Paragraph 7.3.4 has been amended as follows.

**7.3.4 Modifications to Tests, Inspections and Their Methods**

With due consideration to appliance and equipment design, methods of manufacture, production volume and implementation of the quality control system, the Society may accept equivalency to tests and/or inspections of the appliances or equipment as specified in **7.5** to **7.~~9~~11**.

Section 7.10 has been added as follows.

## 7.10 Release Mechanisms of Lifeboats or Rescue Boats Launched by Falls Other than Free-fall Lifeboats

### 7.10.1 Type Approval

**1** Drawings and documents to be submitted

Drawings and documents to be submitted are specified in **7.2.1-1(2)** to **(5)** and the following, each in triplicate:

(1) Specifications;
(2) Construction (including main dimensions and materials);
(3) Strength calculations;
(4) Handling and maintenance manuals;
(5) Other drawings and documents which are deemed necessary by the Society.

**2** Prototype test

A prototype test is to consist of the following tests and inspections. The procedures for tests on strength and performance are to be in accordance with **Chapter 1** "Procedures for Prototype Tests for Type Approval of Release Mechanisms" of **Annex 6** "Procedures for Prototype Tests for Type Approval and Production Tests of Release Mechanisms of Lifeboats or Rescue Boats Launched by Falls Other than Free-fall Lifeboats":

(1) External and construction inspections:
  (a) External and construction inspection;
  (b) Dimension measurement;
(2) Strength and performance tests:
  (a) On-load release test;
  (b) Off-load release test;
  (c) Being towed release test;
  (d) Resistance test;
  (e) Repeated loading test;
  (f) Release operation test;
  (g) Loading test.

### 7.10.2 Production Test

**1** Inspection

A production test is to consist of the examination of the implementation of the quality control system of the production site of the manufacturer and of the respective records, and of the following tests and inspections. The procedures for strength and performance tests are to be in accordance with **Chapter 2** "Procedures for Production Tests of Release Mechanisms" of **Annex 6** "Procedures for Prototype Tests for Type Approval and Production Tests of Release Mechanisms of Lifeboats or Rescue Boats Launched by Falls Other than Free-fall Lifeboats":

(1) External and construction inspections:
  (a) External and construction inspection;
  (b) Dimension measurement;
(2) Strength and performance tests:
  (a) Performance test;
  (b) Strength test.

**2** Inspection of Markings

Release mechanisms which have been subjected to the production test with satisfactory result are to be marked as specified in **7.3.3-4**.

Section 7.11 has been added as follows.

## 7.11 Fall Preventer Devices Fitted with Lifeboats or Rescue Boats Launched by Falls Other than Free-fall Lifeboats

### 7.11.1 Type Approval

**1** Drawings and documents to be submitted

Drawings and documents to be submitted are specified in **7.2.1-1(2)** to **(5)** and the following, each in triplicate:

(1) Specifications;
(2) Construction (including main dimensions and materials and, in cases where locking pins are used, including the construction of the hook);
(3) Strength calculations;
(4) Handling and maintenance manuals;
(5) Hook Manufacturer approval of modifications of the hook (in cases where locking pins are used);
(6) Other drawings and documents which are deemed necessary by the Society.

**2** Prototype test

A prototype test is to consist of the following tests and inspections. The procedures for tests on strength and performance are to be in accordance with **Chapter 1** "Procedures for Prototype Tests for Type Approval of Fall Preventer Devices" of **Annex 7** "Procedures for Prototype Tests for Type Approval and Production Tests of Fall Preventer Devices Fitted with Lifeboats or Rescue Boats Launched by Falls Other than Free-fall Lifeboats":

(1) External and construction inspections:
    (a) External and construction inspection;
    (b) Dimension measurement;
(2) Strength and performance tests:
    (a) Locking pins;
        i) On-load release test
        ii) Off-load release test
    (b) Strops or slings;
        i) Environmental test
        ii) Strength test

### 7.11.2 Production Test

**1** Inspection

A production test is to consist of the examination of the implementation of the quality control system of the production site of the manufacturer and of the respective records, and of the following tests and inspections. The procedures for strength and performance tests are to be in accordance with **Chapter 2** "Procedures for Production Tests of Fall Preventer Devices" of **Annex 7** "Procedures for Prototype Tests for Type Approval and Production Tests of Fall Preventer Devices Fitted with Lifeboats or Rescue Boats Launched by Falls Other than Free-fall Lifeboats":

(1) External and construction inspections:
    (a) External and construction inspection;
    (b) Dimension measurement;
(2) Strength and performance tests:
    (a) Locking pins;
        i) Performance test
        ii) Strength test

(b) Strops or slings;

i) Strength test

**2** Inspection of Markings

Fall preventer devices which have been subjected to the production test with satisfactory result are to be marked as specified in **7.3.3-4**.

# Annex 1 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL AND PRODUCTION TESTS OF LIFEBOATS

## Chapter 1 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL OF LIFEBOATS

### 1.1 Material Test

#### 1.1.2 Material Test for Buoyant Materials [6.2.2～6.2.7]

Sub-paragraph -2 has been amended as follows.

**2** Test for Water Absorption [2.6.5～2.6.~~8~~7]

### 1.2 Strength and Performance Tests

#### 1.2.8 Release Mechanism Test [6.9]

Sub-paragraph -1 has been amended as follows.

**1** Davit-launched Lifeboats [6.9.1～6.9.~~2~~5]

(1) The lifeboat with its engine fitted is to be suspended from the release mechanism just clear of the ground or the water. The lifeboat is to be loaded so that the total mass equals 1.1 times the mass of the lifeboat, all its equipment and the number of persons for which the lifeboat is to be approved. The lifeboat is to be released simultaneously from each fall to which it is connected without binding or damage to any part of the lifeboat or the release mechanism.

(2) It is to be confirmed that the lifeboat will simultaneously release from each fall to which it is connected when fully waterborne in the fully loaded condition without a mass of the number of persons for which the lifeboat is to be approved, and in a 10% overload condition.

~~(3) The release mechanism is to be mounted on a tensile strength testing device. The load is to be increased to at least six times the safe working load of the release mechanism without failure of the release mechanism. The safe working load of the release mechanism is a load exerted to the release mechanism when it is assumed that a mass of the fully equipped lifeboat when loaded with the number of persons for which the lifeboat is to be approved is applied evenly to the lifeboat falls and over, and is the one determined by the manufacturer.~~

(3) It is to be demonstrated that the release mechanism can release the fully equipped lifeboat when loaded with weights equal to the mass of the number of persons for which the lifeboat is to be approved, when the lifeboat is being towed at speeds up to 5 knots. In lieu of a waterborne test, this test may be conducted as follows:

(a) a force equal to 25% of the safe working load of the hook is to be applied to the hook in the lengthwise direction of the boat at an angle of 45° to the vertical. This test is to be conducted in the aftward as well as the forward direction;

(b) a force equal to the safe working load of the release mechanism is to be applied to the hook in an athwartships direction at an angle of 20° to the vertical. This test is to be conducted on both port and starboard sides;

(c) a force equal to the safe working load of the hook is to be applied to the hook in a direction half-way between the positions of tests **(a)** and **(b)** above (i.e., 45° to the longitudinal axis of the boat in plan view) at an angle of 33° to the vertical. This test is to be conducted in four positions. There is to be no damage to the hook as a result of this test, and in the case of a waterborne test, there is to be no damage to the lifeboat or its equipment.

~~(4) It is to be demonstrated that the release mechanism can release the fully equipped lifeboat when loaded with weights equal to the mass of the number of persons for which the lifeboat is to be approved, when the lifeboat is being towed at speeds up to 5 knots. In lieu of a waterborne test, this test may be conducted as follows :~~

~~(a) a force equal to 25% of the safe working load of the hook is to be applied to the hook in the lengthwise direction of the boat at an angle of 45° to the vertical. This test is to be conducted in the aftward as well as the forward direction;~~

~~(b) a force equal to the safe working load of the release mechanism is to be applied to the hook in an athwartships direction at an angle of 20° to the vertical. This test is to be conducted on both port and starboard sides;~~

~~(c) a force equal to the safe working load of the hook is to be applied to the hook in a direction half-way between the positions of tests 1 and 2 (i.e., 45° to the longitudinal axis of the boat in plan view) at an angle of 33° to the vertical. This test is to be conducted in four positions. There is to be no damage to the hook as a result of this test, and in the case of a waterborne test, there is to be no damage to the lifeboat or its equipment.~~

(4) A release mechanism is to be conditioned and tested as follows:

(a) the lifeboat release and retrieval system and the longest used connection cable/linkage associated with the system is to be mounted and adjusted according to instructions from the original equipment manufacturer and then loaded to 100% of its safe working load and released. Load and release is to be repeated 50 times. During the 50 releases, the lifeboat release and retrieval system are to be released simultaneously from each fall to which it is connected without any binding or damage to any part of the lifeboat release and retrieval system. The system is to be considered as "failed" if any failure during the conditioning or unintended release occurs when load is applied but the system has not yet been operated;

(b) the lifeboat release and retrieval system are to then be disassembled, the parts examined and wear recorded. The release and retrieval system are to then be reassembled;

(c) the hook assembly, whilst disconnected from the operating mechanism, is to then be tested 10 times with cyclic loading from zero load to 1.1 times the safe working load, at a nominal 10 seconds per cycle. However, if the release mechanism has been specifically designed to operate as an off-load hook with on-load capability using the weight of the boat to close the hook, the cyclic load is to be from no more than 1% to 1.1 times the SWL. For cam-type designs, the test is to be carried out at an initial cam rotation of 0º (fully reset position), and repeated at 45º in either direction, or 45º in one direction if restricted by design. The specimen is to remain closed during the test. The system is to be considered as "failed" if any failure during this test or any unintended release or opening occurs;

(d) the cable and operating mechanism are to then be reconnected to the hook assembly; and the lifeboat release and retrieval system are to then be demonstrated to operate satisfactorily under its safe working load. The actuation force is to be no less than 100 N and no more than 300 N. If a cable is used, it is to be the maximum length specified by the manufacturer, and secures in the same manner it would be secured in the lifeboat. The demonstration is to verify that any interlocks, indicators and handles are still functioning

and are correctly positioned in accordance with the operation and safety instruction from the original equipment manufacturer;

(e) the release mechanism is deemed to have passed the testing in **(4)** when the tests **(a)** to **(d)** above have all been conducted successfully. The system is to be considered as "failed" if any failure during this test or any unintended release or opening occurs.

(5) Another testing piece of the release mechanism tested in **(4)** above is to be tested as follows:

(a) the actuation force of the release mechanism is to be measured loaded with 100% of its safe working load. The actuation force is to be no less than 100 N and no more than 300 N. If a cable is used, it is to be of the maximum length specified by the manufacturer, and secured in the same manner it would be secured in a lifeboat. The demonstration is to verify that any interlocks, indicators and handles are still functioning and are correctly positioned in accordance with the operation and safety instruction from the original equipment manufacturer;

(b) the release mechanism is to be mounted on a tensile strength testing device. The load is to be increased to at least six times the working load of the release mechanism without failure of the release mechanism.

Sub-paragraph -2 has been amended as follows.

**2** Free-fall Lifeboats [6.9.~~5~~6～6.9.~~6~~7]

### 1.2.10 Lifeboat Towing and Painter Release Test [6.11]

Sub-paragraph -2 has been amended as follows.

**2** Davit-launched Lifeboat Painter Release Test [6.11.2～6.11.3]

((1) is omitted)

(2) The painter release mechanism is to be tested in several distinct directions of the upper hemisphere not obstructed by the canopy or other constructions in the lifeboat. The direction specified in **1.2.8-1(4~~3~~)** is to be used if possible.

# Annex 2 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL AND PRODUCTION TESTS FOR RESCUE BOATS

## Chapter 1 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL OF RESCUE BOATS

### 1.2 Strength and Performance Tests

#### 1.2.2 Inflated Rescue Boats [7.2]

Sub-paragraph -10 has been amended as follows.

**10** Swamp Test [7.2.1~~4~~1]

It is to be demonstrated that the rescue boat, when fully swamped, is capable of supporting its full equipment, the number of persons each weighing 82.5 *kg* for which it is to be approved and a mass equivalent to its engine and ~~full tank~~fully filled fuel tank. It is also to be demonstrated that the rescue boat does not seriously deform in this condition.

# Annex 3 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL AND PRODUCTION TESTS OF INFLATABLE LIFERAFTS

## Chapter 1 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL OF INFLATABLE LIFERAFTS

### 1.1 Material Test [5.17.13]

**1.1.1**

Materials for main buoyancy chambers, canopy supports, floors, floor buoyancy chambers and canopy are to be subjected to the following tests. The materials when tested are to meet the following requirements. When there are any difficulties in carrying out these tests, other testing means deemed to be equivalent may be acceptable.

Sub-paragraph -2 has been amended as follows.

**2** Tests and performance criteria

(1) Test samples are to be randomly selected; and test pieces cut from each sample as required by the relevant ISO standard or as otherwise prescribed for each individual test.

(2) Fabric used for manufacture of buoyancy tubes, inflatable supports for canopies and floors are to meet the following requirements.

(a) Tensile strength

When tested by the method described in ISO 1421:1998 the tensile strength is to be a minimum 2255 *N*/50 *mm* width for warp and weft. Maximum elongation, for the above is to be 30% over a 200 *mm* gauge length, the elongation is to be expressed as a percentage of the initial test length between the jaws. Where two layers of floor fabric are provided to form an inflatable floor the main floor is to be as specified. The inner/outer layer may have a minimum tensile strength of 1470 *N*/50 *mm* widths in warp and weft direction.

(b) Tear strength

When tested with the apparatus described in ISO 1421:1998, the tear strength is to be 1030 *N* minimum in warp and weft directions. Where two layers of the floor fabric are provided to form an inflatable floor, the main floor is to be as specified. The inner/outer layer may have a minimum tear strength of 735 *N* in warp and weft directions. The preparation of the test specimens is to be as follows:

i) from the test sample cut 3 specimens each in warp and weft directions, 76 *mm*±1 *mm* wide and 400 *mm* long, with the length closely parallel to the warp and weft yarns. Space the selection across the full length and width of the sample. Make a 12.5 *mm* cut across the middle of each specimen at right angles to the length.

ii) grip the specimen under test securely and evenly in the grips, which is to be 200 *mm* apart, so that the specimen length is closely in the direction of the pull. Operate the machine in accordance with ISO 1421:1998. The maximum load sustained is recorded as the wound tear strength, and the average for the 3 specimens is calculated.

(c) Surface receptiveness and adhesion of surface coating

i) When tested by the method described in ISO 2411:2000, the surface receptiveness on either face is not to be less than 75 *N*/ 50 *mm* width.

ii) For dry surface coating adhesion a minimum of 75 *N*/ 50 *mm* is required.

iii) For wet surface coating adhesion as described in 2.2.3.8 a minimum of 50 *N*/ 50 *mm* is required.

iv) Each coated face is to be tested. The specimens are to be made up as in ISO 2411:2000 bonding like coated face to like coated face.

((v) to (vii) are omitted)

viii) After testing in .4 for adhesion of coating to the base textile the specimen is to be immersed for 24 *h* in a 3% aqueous solution of sodium chloride at 20℃±2℃. At the end of the immersion period the specimen is to be removed from the solution and, while still wet tested by the method specified in ISO 2411:2000.

(d) Effects of ageing

i) Folding test

When tested as prescribed below there is to be no cracks, separation of plies or brittleness visible when the samples are inspected under a magnification of 2.

ii) Tensile test

When tested as prescribed below the tensile strength after ageing is to be not less than 90% of the original tensile strength before ageing.

iii)-1 Ultra-violet resistance

This test is to be performed in accordance with the methods specified in ISO 4892-4:~~1994~~2004 - Open-flame carbon-arc lamps, as follows:

(Sub-paragraphs (1) to (3) are omitted)

iii)-2 Alternative Ultra-violet resistance

Alternatively, this test may be performed in accordance with the methods specified in ISO 4892-2:2006 with amendment 1:2009 - Xenon Arc type testing. The specimens are to be exposed under conditions specified in **Table 1**, using a controlled irradiance water cooled Xenon Arc apparatus for a total exposure time of 150 *h*. Only the intended outside surface of the fabric is to be exposed to the arc. The tensile strength of the material is to be tested after exposure following the procedure in **(2)(a)**. The tensile strength is to be not less than 90% of the original strength before aging. The exposed material is to be bent, with heavily coated side out, around a 3.2 *mm* mandrel and each coated face examined visually for cracking. There is to be no cracking during this examination. The performance requirements specified in this subparagraph relate to the behaviour of individual specimens under particular conditions of test. As the spectrum of light from the Carbon Arc differs from that of the Xenon Arc, caution is to be exercised in interpreting the test results of both methods.

Table 1

| Exposure conditions | Dark cycle (1 *hour*) | Light cycle (2 *hours*) | | |
|---|---|---|---|---|
| Automatic irradiance (Filter Q/B) | Nil | 0.55 $W/m^2 - nm$ at 340 *nm* | | |
| Black panel | 38℃±2℃ | 70℃±2℃ | | |
| Dry bulb temperature | 38℃±2℃ | 47℃±2℃ | | |
| Relative humidity | 95±5% | 50±5% | | |
| Conditioning water | 40℃±4℃ | 45℃±4℃ | | |
| Water spray | 60 *min* on front and back of specimen | 40 | 20 | 60 |
| | | Nil | Front | Nil |

((iv) to (vi) are omitted)

(e) Low temperature flexing

i) When tested at a temperature no higher than -50℃ by the method prescribed below, there is to be no visible cracking of the sample when inspected under a magnification of 2. The test is to be independently applied to each face of the coated fabric.

ii) The apparatus, preparation of test specimens and test procedure is to be as described in ISO 4675:1990, except that:

1) when tested at the specified low temperature no specimen is to show cracks

2) there is to be 6 test specimens, 3 cut with the long side closely parallel to the warp and 3 cut with the long side closely parallel to the weft direction.

(f) Flex cracking

After the specimen has been conditioned by exposing the outer face to a 3% aqueous solution of sodium chloride for seven days at 20℃±2℃, it is to be tested as described in ISO 7854:1995. After 200,000 flexings, no cracking or delamination is to be visible when inspected under a magnification of 2.

((g) to (i) are omitted)

(j) Resistance to blocking

i) When tested by the method prescribed below, fabric is to exhibit no blocking.

ii) The preparation of specimens and test procedure is to be in accordance with ISO 5978:1990 except that the duration of time under load is to be 7 days.

((k) is omitted)

(l) Ozone resistance

i) When tested by the method prescribed below, no cracks is to be visible at a magnification of 5.

ii) The preparation of samples and test procedure is to be in accordance with specification ISO 3011:1997. The following conditions are to apply.

(Omitted)

Section 1.2.11 has been added as follows.

### 1.2.11 Swamp Test [5.11]

~~It is to be demonstrated that when the liferaft is fully swamped it remains seaworthy. The swamped inflatable liferaft is to be tested in at least 10 waves at least 0.9 *m* high. The waves may be produced by the wake of a boat, or by other acceptable means. During this test self-draining arrangements fitted in the floor of the liferaft are to be closed to prevent the ingress of water. Unless the configuration of both sides of a canopied reversible liferaft are identical, this test is to be repeated for both sides of the liferaft.~~

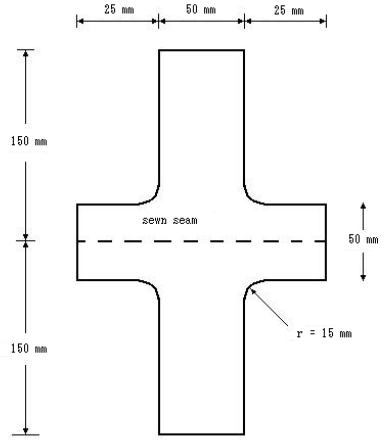
It is to be demonstrated that the liferaft, when fully swamped, is capable of supporting its full equipment and the number of persons for which it is to be approved. It is also to be demonstrated that the liferaft does not seriously deform in this condition.

Section 1.2.19 has been amended as follows.

### 1.2.19 Seam Strength Test [5.17.9]

**1** It is to be demonstrated that sample seams, prepared in the same condition as in production, can withstand a test load equal to the minimum specified liferaft fabric tensile strength. Sewn seams on outer canopy fabric is to withstand a test load of at least 70% of the minimum specified fabric tensile strength when tested by the method described in ISO 1421:1998 and by using test samples as shown in **Fig.1** below.

Fig. 1 Sample specification for sewn canopy seams




Samples of all types of sewing used in production are to be tested.
Seam construction in both warp and weft direction is to be tested.
The test specimens are to be cut out from pre-sewn samples of fabric and no locking of thread ends ~~shall~~is to take place.

**2** Weld strength

(1) When tested by the method prescribed below, the load required to initiate failure of the weld ~~should~~is to be not less than 175 *N*;

(2) Specimens are to be prepared and tested as given in **-3(3)** below.

**3** Hydrolysis tests are to be conducted on sample welded seams where thermoplastic coated materials are to be used. The tests are to be conducted as follows;

(1) When tested by the method prescribed below, the weld strength of the sample seam is to achieve 125 *N*/ 25 *mm* minimum.

(2) Test method

(a) Store the test specimens for 12 weeks over water in a closed container at 93±2℃.

(b) After the conditioning as above, dry the specimens for 1 *h* at 80±2℃, and condition at 20±2℃, 65% RH for 24 *h*.

(3) Welded test samples are to be prepared as follows:
Two samples of fabric 300 *mm* x 200 *mm*, cut with the short side parallel to the warp direction, are to be superimposed face to back for double coated fabrics, or coated face to coated face for single or asymmetrically coated fabrics. They are to be welded with a tool 10 *mm*±1 *mm* width of convenient length. 25 *mm* wide test specimens are to be cut transversely to the line of the weld. The test samples are to be mounted in a test machine as in ISO 1421:1998. The maximum peel load is to be recorded.

Annex 6 has been added as follows.

# Annex 6 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL AND PRODUCTION TESTS OF RELEASE MECHANISMS OF LIFEBOATS OR RESCUE BOATS LAUNCHED BY FALLS OTHER THAN FREE-FALL LIFEBOATS

## Chapter 1 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL OF RELEASE MECHANISMS

### 1.1 Strength and Performance Tests

#### 1.1.1 Release Mechanism Test [6.9.1～6.9.5]

**1** The lifeboat with its engine fitted is to be suspended from the release mechanism just clear of the ground or the water. The lifeboat is to be loaded so that the total mass equals 1.1 times the mass of the lifeboat, all its equipment and the number of persons for which the lifeboat is to be approved. The lifeboat is to be released simultaneously from each fall to which it is connected without binding or damage to any part of the lifeboat or the release mechanism.

**2** It is to be confirmed that the lifeboat will simultaneously release from each fall to which it is connected when fully waterborne in the fully loaded condition without a mass of the number of persons for which the lifeboat is to be approved, and in a 10% overload condition.

**3** It is to be demonstrated that the release mechanism can release the fully equipped lifeboat when loaded with weights equal to the mass of the number of persons for which the lifeboat is to be approved, when the lifeboat is being towed at speeds up to 5 knots. In lieu of a waterborne test, this test may be conducted as follows:

(1) a force equal to 25% of the safe working load of the hook is to be applied to the hook in the lengthwise direction of the boat at an angle of 45° to the vertical. This test is to be conducted in the aftward as well as the forward direction;

(2) a force equal to the safe working load of the release mechanism is to be applied to the hook in an athwartships direction at an angle of 20° to the vertical. This test is to be conducted on both port and starboard sides;

(3) a force equal to the safe working load of the hook is to be applied to the hook in a direction half-way between the positions of tests **(1)** and **(2)** above (i.e., 45° to the longitudinal axis of the boat in plan view) at an angle of 33° to the vertical. This test is to be conducted in four positions. There is to be no damage to the hook as a result of this test, and in the case of a waterborne test, there is to be no damage to the lifeboat or its equipment.

**4** A release mechanism is to be conditioned and tested as follows:

(1) the lifeboat release and retrieval system and the longest used connection cable/linkage associated with the system is to be mounted and adjusted according to instructions from the original equipment manufacturer and then loaded to 100% of its safe working load and released. Load and release is to be repeated 50 times. During the 50 releases, the lifeboat release and retrieval system are to be released simultaneously from each fall to which it is connected without any binding or damage to any part of the lifeboat release and retrieval system. The system is to be considered as “failed” if any failure during the conditioning or unintended release occurs when load is applied but the system has not yet been operated;

(2) the lifeboat release and retrieval system are to then be disassembled, the parts examined and

wear recorded. The release and retrieval system is to then be reassembled;

(3) the hook assembly, whilst disconnected from the operating mechanism, is to then be tested 10 times with cyclic loading from zero load to 1.1 times the safe working load, at a nominal 10 seconds per cycle. However, if the release mechanism has been specifically designed to operate as an off-load hook with on-load capability using the weight of the boat to close the hook, the cyclic load is to be from no more than 1% to 1.1 times the SWL. For cam-type designs, the test is to be carried out at an initial cam rotation of 0º (fully reset position), and repeated at 45º in either direction, or 45º in one direction if restricted by design. The specimen is to remain closed during the test. The system is to be considered as "failed" if any failure during this test or any unintended release or opening occurs;

(4) the cable and operating mechanism are to then be reconnected to the hook assembly; and the lifeboat release and retrieval system are to then be demonstrated to operate satisfactorily under its safe working load. The actuation force is to be no less than 100 N and no more than 300 N. If a cable is used, it is to be the maximum length specified by the manufacturer, and secures in the same manner it would be secured in the lifeboat. The demonstration is to verify that any interlocks, indicators and handles are still functioning and are correctly positioned in accordance with the operation and safety instruction from the original equipment manufacturer;

(5) the release mechanism is deemed to have passed the testing in **-4** when the tests **(1)** to **(4)** above all have been conducted successfully. The system is to be considered as "failed" if any failure during this test or any unintended release or opening occurs.

**5** Another testing piece of the release mechanism tested in **-4** above is to be tested as follows:

(1) the actuation force of the release mechanism is to be measured loaded with 100% of its safe working load. The actuation force is to be no less than 100 N and no more than 300 N. If a cable is used, it is to be of the maximum length specified by the manufacturer, and secured in the same manner it would be secured in a lifeboat. The demonstration is to verify that any interlocks, indicators and handles are still functioning and are correctly positioned in accordance with the operation and safety instruction from the original equipment manufacturer;

(2) the release mechanism is to be mounted on a tensile strength testing device. The load is to be increased to at least six times the working load of the release mechanism without failure of the release mechanism.

# CHAPTER 2 PROCEDURES FOR PRODUCTION TESTS OF RELEASE MECHANISMS

## 2.1 Strength and Performance Tests

### 2.1.1 Performance Test [5.3.1]

The test is to be in accordance with **1.1.1-1** and **-2**.

### 2.1.2 Strength Test [5.3.4]

The connection of each release gear which is fixed to lifeboats or rescue boats launched by falls is to be subjected to a load equal to the weight of the lifeboat or rescue boat with its full complement of persons and equipment (or two times the weight of the lifeboat or rescue boat with its full complement of persons and equipment in the case of single fall systems). There is to be no damage to the release gear or its connection to the lifeboat or rescue boat.

Annex 7 has been added as follows.

# Annex 7 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL AND PRODUCTION TESTS OF FALL PREVENTER DEVICES FITTED WITH LIFEBOATS OR RESCUE BOATS LAUNCHED BY FALLS OTHER THAN FREE-FALL LIFEBOATS

## Chapter 1 PROCEDURES FOR PROTOTYPE TESTS FOR TYPE APPROVAL OF FALL PREVENTER DEVICES

### 1.1 Strength and Performance Tests

#### 1.1.1 Locking Pins

In cases where hooks are drilled to provide a locking pin insertion point, the test specified in Part.2, 5.3.1 of *IMO Resolution MSC*.81(70) is to be carried out.

#### 1.1.2 Strops or Slings

In cases where strops or slings with fittings (e.g., shackles) are used as a fall preventer device, the tests are to be carried out in accordance with the following **(1)** to **(3)**:

(1) Environment tests as specified in Part.1, 1.2.1 of *IMO Resolution MSC*.81(70) or equivalent;

(2) Tests for rot-proof, colour-fast and resistant to deterioration from exposure to sunlight and that they are not unduly affected by seawater, oil or fungal attack as specified in Part.1, 2.4 of *IMO Resolution MSC*.81(70) or equivalent; and,

(3) Verification tests designed for a minimum safety factor of 6.
(However, the safety factor is to be based upon the safe working load, which is to be not less than the total weight of the lifeboat when loaded with its full complement of persons and equipment)

# Chapter 2 PROCEDURES FOR PRODUCTION TESTS OF FALL PREVENTER DEVICES

## 2.1 Strength and Performance Tests

### 2.1.1 Performance Test (in cases where locking pins are used) [5.3.1]

The test is to be carried out in accordance with **1.2.8-1(1)** and **1.2.8-2(2)** "Release Mechanism Test - Davit-launched Lifeboats" of **Annex 1** "Procedures for Prototype Tests for Type Approval and Production Tests of Lifeboats".

### 2.1.2 Strength Test

**1** Locking Pins [5.3.4]

The connection of each release gear which is fixed to lifeboats or rescue boats launched by falls is to be subjected to a load equal to the weight of the lifeboat or rescue boat with its full complement of persons and equipment (or two times the weight of the lifeboat or rescue boat with its full complement of persons and equipment in the case of single fall systems). There is to be no damage to the release gear or its connection to the lifeboat or rescue boat.

**2** Strops or Slings

It is to be verified that a factory acceptance test of 2.2 times safe working load does not result in failure.

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

**1.** The effective date of the amendments is 1 January 2013.

**2.** Notwithstanding the amendments to the Guidance, the current requirements may apply to life-saving appliances other than those for which the application for approval is submitted to the Society on or after the effective date.

Amendment 2-3

# Part 1 METALLIC MATERIALS

## Chapter 5 APPROVAL OF MANUFACTURING PROCESS OF ALUMINIUM ALLOYS

### 5.2 Approval Application

Sub-paragraph 5.2.2 has been amended as follows.

**5.2.2 Data to be submitted**

**1** (omitted)

**2** For aluminium alloys specified in **Table K8.3(a)**, **Part K of the Rules**, in the *H*111, *H*112, *H*116 and *H*321 tempers intended for use in marine hull construction or in marine applications where frequent direct contact with seawater is expected, the manufacturer is to submit the documents which exhibits the relationship between microstructure and resistance to corrosion in addition to the requirements in preceding **-1**. This documents is to include a reference photomicrograph (approx. 500x) intended for use in metallographic examination as specified in **8.1.8**, **Part K of the Rules**. A reference photomicrograph are to be taken for each of the alloy-tempers under the conditions specified in *ASTM B*928 9.4.1 and thickness ranges relevant from samples which have passed the corrosion test as specified in **K8.1.8(2)**, **Part K of the Guidance for the Survey and Construction of Steel Ships**.

### 5.4 Approval Test

Table 1.5-1 has been amended as follows.

Table 1.5-1 Approval Test Items for Aluminium Alloys

| Products | Material grade | Temper grade | Kind of Test[1), 2)] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Chemical analysis | Macrostructure | Microstructure | Tensile test at room temperature | Tensile test at low temperature[3)] | Tensile test of notched round bar[3)] | Tensile test in the direction of thickness[4)] | Bend test | Tear test[3)5)] | Corrosion test[6)] |
| Rolled Products | 5083*P* | *O* | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | | *H*111 | ○‖ | ○‖ | ○‖ | ○‖ | | | | ○‖ | | ○‖ |
| | | *H*112 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*116 | ○ | ○ | ○ | ○ | | | | ○ | | ○ |
| | | *H*321 | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ |
| | 5086*P* | *O* | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*111 | ○‖ | ○‖ | ○‖ | ○‖ | | | | ○‖ | | ○‖ |
| | | *H*112 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*116 | ○ | ○ | ○ | ○ | | | | ○ | | ○ |
| | 5383*P* | *O* | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*111 | ○‖ | ○‖ | ○‖ | ○‖ | | | | ○‖ | | ○‖ |
| | | *H*116 | ○ | ○ | ○ | ○ | | | | ○ | | ○ |
| | | *H*321 | ○ | ○ | ○ | ○ | | | | ○ | | ○ |
| | 5059*P* | *O* | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*111 | ○‖ | ○‖ | ○‖ | ○‖ | | | | ○‖ | | ○‖ |
| | | *H*116 | ○ | ○ | ○ | ○ | | | | ○ | | ○ |
| | | *H*321 | ○ | ○ | ○ | ○ | | | | ○ | | ○ |
| | 5754*P* | *O* | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*111 | ○‖ | ○‖ | ○‖ | ○‖ | | | | ○‖ | | ○‖ |
| | 5456*P* | *O* | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*116 | ○ | ○ | ○ | ○ | | | | ○ | | ○ |
| | | *H*321 | ○ | ○ | ○ | ○ | | | | ○ | | ○ |
| | 6061*P* | *T*6 | ○ | ○ | ○ | ○ | | | | ○ | | |
| Extruded shapes | 5083*S* | *O* | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | | *H*111 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*112 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | 5086*S* | *O* | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*111 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*112 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | 5383*S* | *O* | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*111 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *H*112 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | 5059*S* | *H*112 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | 6005*AS* | *T*5 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *T*6 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | 6061*S* | *T*6 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | 6082*S* | *T*5 | ○ | ○ | ○ | ○ | | | | ○ | | |
| | | *T*6 | ○ | ○ | ○ | ○ | | | | ○ | | |

Notes:

(1) Each test item indicated with a ○ mark in the Table are to be performed for approval tests for each aluminium alloys.
(2) When deemed necessary by the Society, tests related to fatigue tests, weld joint tests, corrosion resistance tests, stress corrosion cracking tests etc., or submission of reference data relating to these tests are requested.
(3) This test is carried out for aluminium alloys used at extremely low temperature such as tanks for liquefied gas carrier.
(4) This test is carried out for test sample with thickness more than 100*mm*.
(5) Other tests may be applied, subject to the approval by the Society.
(6) This test is carried out for aluminium alloys intended for use in marine hull construction or in marine applications where frequent direct contact with seawater is expected.

## EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

**1.** The effective date of the amendments is 1 January 2013.

**2.** Notwithstanding the amendments to the Guidance, the current requirements may apply to materials for which the application for survey is submitted to the Society before the effective date, or materials used for ships for which the date of contract for construction* is before the effective date.

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

**3.** Notwithstanding the amendments to the Guidance, the current requirements may apply to manufacturing process for which the application for approval is submitted to the Society before the effective date.

**IACS PR No.29** (Rev.0, July 2009)

**1.** The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

**2**. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

(1) such alterations do not affect matters related to classification, or
(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

**3.** If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

**4.** If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:
This Procedural Requirement applies from 1 July 2009.

Amendment 2-4

# Part 6 MACHINERY

## Chapter 7 APPROVAL OF VENTING SYSTEMS AND RELATED EQUIPMENT FOR OIL TANKERS

### 7.4 Approval Test

#### 7.4.2 Details of Tests and Inspections

Sub-paragraph -2(4)(a)iii) have been amended as follows.

(4) Tests and inspections
  (a) General
    iii) ~~For devices to be installed in ships dedicated to the carriage of products, for which IIB or IIC is marked in the column *i"* of **Table S17.1, Part S of Rules for the Survey and Construction of Steel Ships**, a flashback test and an endurance burning t~~Tests are to be carried out with ~~appropriate~~the following media.
      1) Ethylene, for devices to be installed in ships dedicated to the carriage of products, for which apparatus group II*B* or no apparatus group is assigned in the column ***i"*** of **Table S17.1, Part S of Rules for the Survey and Construction of Steel Ships**.
      2) Hydrogen, for devices to be installed in ships dedicated to the carriage of products, for which apparatus group II*C* is assigned in the column ***i"*** of **Table S17.1, Part S of Rules for the Survey and Construction of Steel Ships**.
      3) Gasoline vapours, technical hexane vapours or technical propane, for devices to be installed in ships dedicated to the carriage of products except **1)** and **2)** above.

Sub-paragraph -2(4)(a)vii) have been deleted.

~~vii) For flame arresters to be fitted in ships other than those of 500 *gross tonnes* or more engaged in international voyages, an endurance burning test may be dispensed with. And for high velocity devices to be fitted in such ships, a flashback test and an endurance burning test may be dispensed with. In this case, such arresters are to be expressed with "non-endurance burning/non-flashback proof type".~~

Sub-paragraph -2(4)(b)i) has been amended as follows.

i) Flashback test
  A flashback test is to be carried out in accordance with the following:
  1) The tank, the flame arrester assembly and the plastic bag enveloping the flame arrester are to be filled with the most easily ignitable ~~propane~~media specified in **(a)iii)** above/air mixture.

Sub-paragraph -2(4)(b)ii) has been amended as follows.

ii) Endurance burning test
An endurance burning test is to be carried out in accordance with the following:
1) (omitted)
2) Endurance burning is to be achieved by using the most easily ignitable ~~gasoline vapour/air mixture or the most easily ignitable technical hexane vapour~~media specified in **(a)iii)** above /air mixture with the aid of a continuously operated pilot flame or a continuously operated spark igniter at the outlet.

Sub-paragraph -2(4)(d)i)2) has been amended as follows.

2) The tank, the plastic bag, the pipes and the detonation flame arrester are to be filled with the most easily ignitable ~~propane~~media specified in **(a)iii)** above/air mixture.

Sub-paragraph -2(4)(f)ii)1) has been amended as follows.

ii) Flashback test
A flashback test is to be carried out in accordance with the following to ascertain that no flashback occurs.
1) The test rig and the high velocity device are filled with the most easily ignitable ~~gasoline vapour, hexane vapour or propane~~media specified in **(a)iii)** above/air mixture. The mixture is to be ignited with the aid of a permanent pilot flame or a spark igniter at the outlet. A flashback test is to be carried out with the device in the upright position and then inclined at 10° from the vertical. For some device designs further tests with the device inclined in more than one direction may be necessary.

## 7.6 Handling after the Approval

### 7.6.2 Marking

Sub-paragraph (1)(f) has been amended as follows.

(f) Compliance with *MSC/Circ*.677, as may be amended

Sub-paragraphs (2)(c) and (f) have been amended as follows.

(c) Dimensions of opening for installation, type of opening (*i.e.* distinction between intake and exhaust) ~~and~~, position (*i.e.* for installation in the middle of air duct, includes limit distance from edge of opening) and the apparatus group (no apparatus, II*A*, II*B* or II*C*)

(f) Compliance with the requirements of *MSC/Circ*.677, as may be amended (Where any test is dispensed with in accordance with the provisions of **7.4.2-2(4)**, such condition is to be clearly marked.)

EFFECTIVE DATE AND APPLICATION (Amendment 2-4)

**1.** The effective date of the amendments is 15 November 2012.

**2.** Notwithstanding the amendments to the Guidance, the current requirements may apply to equipment other than those for which the application for approval is submitted to the Society on or after the effective date.