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# Ships and marine technology — Embarkation ladders

*Navires et technologie marine — Échelles d'embarcation*



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# Contents

Page

# Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 1, *Maritime safety.*

This fourth edition cancels and replaces the third edition (ISO 5489:2008), which has been technically revised.

The main changes are as follows:

— normative references in Clause 2 have been updated;

— Clause 3 (Terms and definitions) has been added;

— Clause 4 has been harmonized with ISO 799-1: 2019;

— Annexes A and B have been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

# Introduction

This document is intended to supplement existing requirements of the International Maritime Organization (IMO) for embarkation ladders. Since IMO instruments do not include specific requirements for prototype testing of embarkation ladders for approval, these types of tests have been included in this document and therefore go beyond the scope of the existing IMO requirements. The inclusion of these tests is considered necessary in order to ensure that specifications embarkation ladders are aligned with the performance requirements prescribed in IMO instruments and in this document.

# Ships and marine technology — Embarkation ladders

## 1 Scope

This document specifies requirements for a ship's embarkation ladder that is provided to enable passengers and crew to safely embark to waterborne survival crafts along a vertical portion of the ship's hull. It is applicable to merchant ships required to carry embarkation ladders under Chapter III of the 1974 International Convention for the Safety of Life at Sea (SOLAS)[1], as amended. Embarkation ladders complying with this document can be used by National maritime administrations on their ships in order to comply with the requirements of SOLAS.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 877-2, *Plastics — Methods of exposure to solar radiation — Part 2: Direct weathering and exposure behind window glass*

ISO 1181, *Fibre ropes — Manila and sisal — 3-, 4- and 8-strand ropes*

ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods*

ISO 15510, *Stainless steels — Chemical composition*

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

## 4 Materials

### 4.1 Wooden parts

Each wooden part shall be made of hardwood (ash, oak, beech, teak, or other hardwood having equivalent properties) free from knots. Wood shall not be treated or coated with paint, varnish or other coatings that changes the friction coefficient or hides the natural grain. Where parts of the steps outside the side ropes are varnished in order to prevent cracking of the influence of the moisture, deterioration, corrosion, and mould formation, the varnish on the wooden parts should not hide the grain of wood or significantly change the coefficient of the friction.

## 4.2 Side ropes

### 4.2.1 General arrangement

Each side rope shall be mildew-resistant manila rope meeting ISO 1181, Quality 1, or a spun thermoset polyester rope with a polypropylene core of a colour that contrasts with the spun polyester.

Each side rope shall have a breaking strength of at least 24 kN, and the specification of the diameter of side ropes should be 20 mm to 22 mm (63 mm to 69 mm circumference).

### 4.2.2 Alternative side rope arrangement

Alternative side ropes of synthetic material may be used, if they

a) meet the breaking strength and size requirements of 4.2.1,

b) are at least as resistant to elongation under load as the standard ropes described in 4.2.1,

c) have an exterior surface suitable to be grasped by bare hands, similar to manila or spun polyester,

d) are of a thermoset polymer, resistant to deterioration from ultraviolet light, and

e) provide a visual indication of excessive wear, similar to the spun polyester/polypropylene construction described in 4.2.1.

## 4.3 Metallic materials

**4.3.1** Each metal fastener shall be made of material which is inherently corrosion-resistant or treated to be corrosion-resistant.

**4.3.2** Each ferrous metal part, which is not stainless steel, shall be coated in accordance with ISO 1461.

**4.3.3** Each stainless-steel part shall be of a marine grade alloy with a corrosion resistance at least equal to grade "4401-316-00I" in ISO 15510.

**4.3.4** Each aluminium part shall be 5254 alloy, or another grade containing not more than 0,06 % copper, in accordance with ISO 209.

**4.3.5** Metals in contact with each other shall be galvanically compatible or insulated to prevent galvanic corrosion in a marine environment.

## 4.4 Step fixtures

Step fixtures for securing each step of a ladder shall have rope seizing or an arrangement such as seawater-resistant aluminium clamps to prevent the steps and chocks from loosening. Cable ties, u-clamps, and worm driven clips are not acceptable.

## 4.5 Plastic materials

Each plastic material (including the nylon material) shall be of a type that retains at least 30 % of its original tensile strength and at least 80 % of its original impact strength when subjected to the one-year outdoor weathering test described in Method A of ISO 877-2.

## 4.6 Quality of materials

Each part of a ladder shall be free of splinters, burrs, sharp edges, corners, projections, or other defects that can injure a person using the ladder.

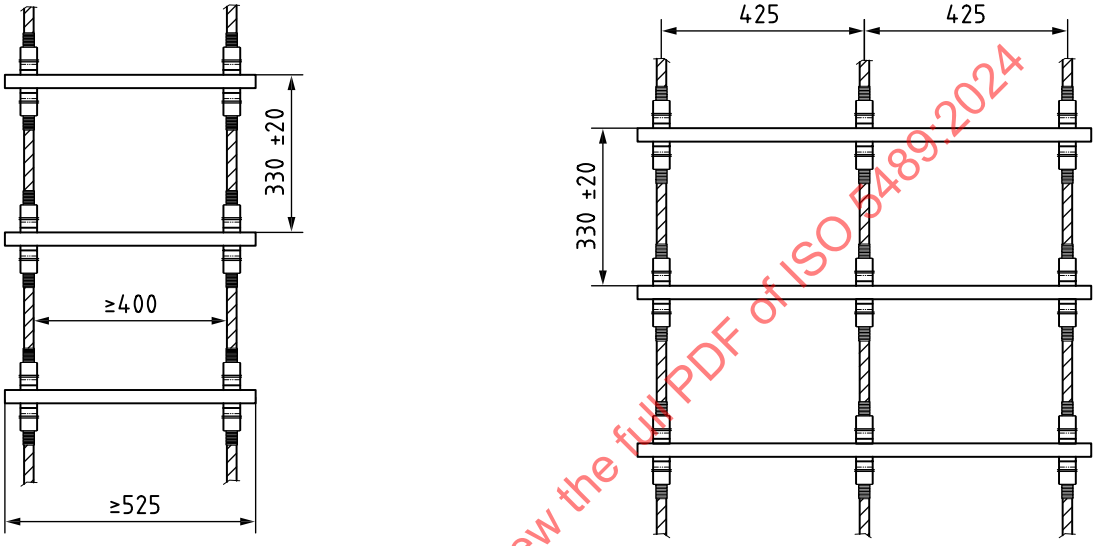
### 4.7 Rope seizing

Seizing shall consist of three-ply tarred marline of minimum breaking strength 800 N with a minimum diameter of 4 mm, or other suitable material of equivalent strength and diameter. All seizings shall be figure-of-eight racking seizings with a minimum length of seizing 32 mm.

## 5 Constructions

Figures 1, 2, and 3 illustrate construction for embarkation ladders.

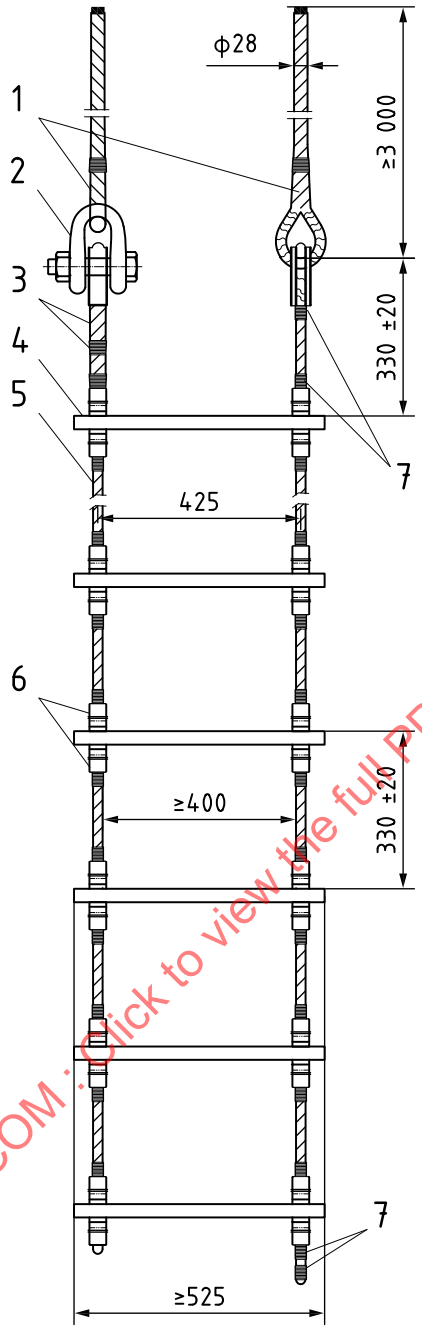
Dimensions in millimetres




**a) Convention** **b) Three-string**

**Figure 1 — Construction for embarkation ladder**

Dimensions in millimetres



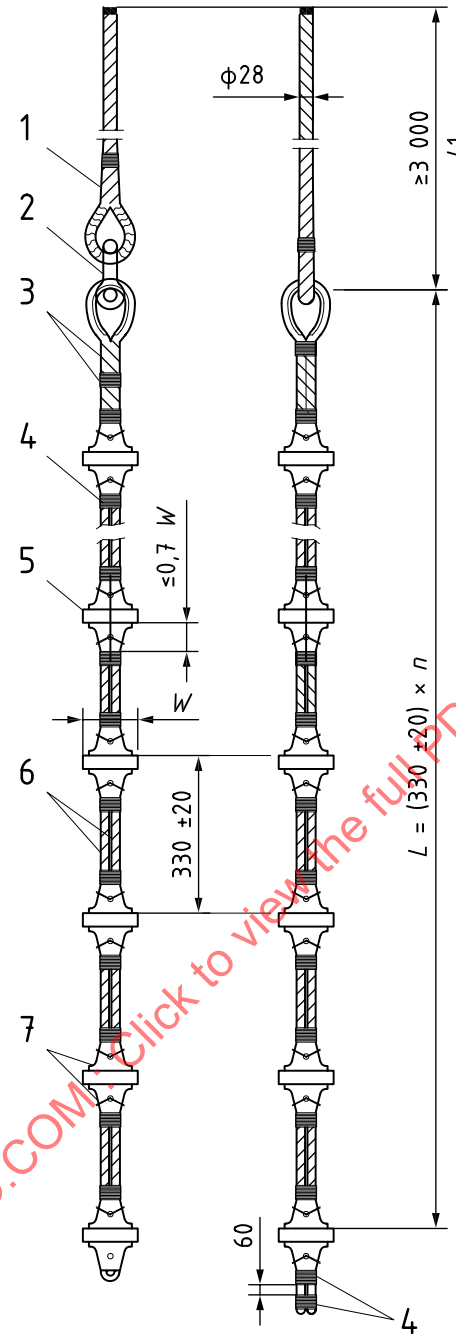



**Key**

1 alternative arrangements of securing rope
2 shackle
3 splice and rope seizing
4 step
5 side rope
6 step fixture
7 rope seizing or seawater resistant purpose-designed aluminium clamp

**Figure 2 — Construction details of embarkation ladder**

Dimensions in millimetres






**Key**

| | | | |
|---|---|---|---|
| 1 | alternative arrangements of securing rope | *L*1 | length of securing rope |
| 2 | shackle | *L* | length of ladder |
| 3 | splice and rope seizing | *W* | width of the step |
| 4 | rope seizing | *n* | number of steps in the ladder |
| 5 | step | | |
| 6 | side rope | | |
| 7 | step fixture | | |

**Figure 3 — Ladder construction using rope seizing and step fixtures**

**5.2** Each ladder shall have two side ropes on each side. Ladders may also be constructed as three-string ladders with a third set of ropes in the middle of the ladder, as illustrated in Figure 1. In a three-string

ladder, the third set of ropes shall meet the same requirements as the side ropes. Each step in the ladder shall be supported by each side rope. Three-string ladders are only acceptable for small and medium ships.

**5.3** Each step in the ladder shall be supported by side ropes. Each side of the ladder shall consist of a continuous loop of rope with the joint above the top step or below the bottom step.

**5.4** Each of the side ropes shall

a) be wholly continuous rope without any knots, joints, or splices except as specified in 5.5, and

b) not be painted or otherwise coated or covered.

**5.5** The ends of the side ropes shall be finished as follows:

a) If the ends of the side ropes terminate just above the top step (highest step), they shall round a thimble and the end shall be joined with a short splice. A single eye splice or thimble shall be large enough to accommodate at least two passes of side rope.

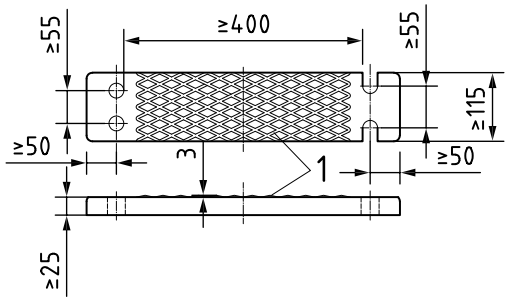
b) The side ropes shall not have fittings or form loops at the bottom of the ladder that can be used to attach additional ladder sections or tripping lines.

c) If the ends of the side ropes on each side terminate just beneath the lowest step, the rope ends shall be securely fastened or otherwise treated to prevent fraying. The rope ends shall pass through the holes in the lowest step and use similar step fixtures as the other steps. A rope seizing, as per the other steps, shall be made immediately under step fixtures. A second rope seizing shall be provided 60 mm under the first seizing, as shown in Figure 3. The loose ends of the rope shall be whipped as close as possible to the second rope seizing to protect against fraying. A common whipping length is 25 mm. The loose ends of the rope shall be as short as possible, but not less than 50 mm below the second seizing. No loops are allowed.

d) The ends of each side rope that do not terminate in a splice or fitting shall be served, whipped or otherwise treated to prevent fraying.

**5.6** Each side rope shall pass through a separate hole in each step. The centre of each hole shall be at least 50 mm from the short edge of the step as shown in Figure 4. Alternative arrangements using slots are shown in Figure 4 and are permitted only for replacement steps. The slots shall be in the longer edge of the replacement step.

Dimensions in millimetres




**Key**

1 grooved, patterned or textured non-skid surface area

**Figure 4 — Alternative hole and slot types for side ropes of typical ladder step and replacement step**

**5.7** Each pair of side ropes shall be secured together both above and below each step, with specially designed step fixtures (chocks or widgets) and a seizing method which holds each step level when the ladder is hanging freely. Alternative acceptable arrangements are shown in Figures 2 and 3.

The securing arrangement implemented shall preserve the creation of a gap between the step fixtures (chocks or widgets) and the secured step. It shall not be possible to introduce a cylindrical measuring pin of a diameter 10 mm between the step and its step fixtures (chocks or widgets).

**5.8** If step fixtures are used to secure the side ropes and hold the step in place, the step fixtures shall not extend above or below the step surfaces by more than a distance equal to 0,7 times of $W$ (where $W$ is the width of the step), so that the step is not prevented from rolling if caught between a boat and the hull of the ship.

**5.9** If a seizing method is used to secure steps and side ropes, step fixtures shall be used above and below the step. The step fixtures shall be designed to lead and support the side ropes from the step to the point above or below the step where the side ropes are seized together. The step fixtures shall be designed so that they stay in place when the ladder is rolled or the step is turned.

**5.10** The clear space between the side ropes on one side of the ladder and those on the other side shall be at least 400 mm. This distance shall be uniform throughout the length of the ladder (see Figures 1, 2 and 3).

**5.11** Each side rope shall be arranged so that, when the ladder is in use along the vertical hull of a ship, the side rope cannot come in contact with the ship's side.

**5.12** An extension securing rope shall be fitted to each side rope eye splice or thimble by means of an eye splice or shackle, as shown in Figures 2 and 3.

**5.13** The length of each securing rope shall be at least 3 m. The securing rope shall not be directly cut or spliced to the side rope.

**5.14** A securing rope, if used to aid in rigging the ladder, shall be shackled at the upper end of each side rope of the ladder, as shown in Figures 2 and 3. Both securing ropes shall be of equal length and shall have a breaking strength of at least 48 kN. Securing ropes shall be fitted with a thimble. The other end shall be treated to prevent fraying. A suitable method to prevent fraying is a whipping.

**5.15** The spacing from the top of one step to the top of the next step shall be 330 mm ± 20 mm and shall be uniform throughout the length of the ladder (see Figure 3).

**5.16** Each step shall be of one-piece construction of either hardwood, or resilient plastic or rubber material complying with Clause 4.

**5.17** The top face of each step shall be in rectangular form with a width not less than 115 mm. Its surface is grooved or patterned or of a textured non-skid type. The step surface shall be designed so that it does not retain water. A textured non-skid surface shall be integrated with the step and shall be either moulded or cut into the step with the nominal depth of 3 mm. Non-skid adhesive sheeting should not be used. See Figure 4.

**5.18** Each step shall be at least 25 mm thick at its thinnest point. In determining this thickness, the following shall not be included: the depth of grooves in the top face of the step, the diameter of any hole extending from one side of the step to the other, and the thickness of any non-skid treatment. See Figure 2.

**5.19** Each step shall be arranged so that it can bear on the vertical hull of the ship when the ladder is in use.

**5.20** The manufacturer shall offer replacement steps that can replace a removed step without the need for unstringing and restringing the ladder. Replacement steps shall meet all the requirements in this document for steps, and each step shall be supplied with all parts necessary to install the step in the ladder.

**5.21** Each embarkation ladder shall be capable of being rolled up for storage. Each ladder shall be capable of unrolling freely and hanging vertically.

**5.22** The four lowest steps of the ladder shall be made only of resilient synthetic or rubber materials. The rest of the ladder steps shall be of either hardwood or synthetic material.

**5.23** For the convenience of manoeuvring the embarkation ladder to the required height, the permanent marking is made every 15 steps (approximately every 5 m).

## 6 Testing and inspection

### 6.1 Prototype test for approval

A prototype ladder and its components shall be subjected to the tests and meet the criteria specified in Table 1. A fully assembled ladder shall be used in the tests. Any step or other part of the ladder which is permanently deformed because of testing shall not be used in a ladder which is placed in service. If the ladder fails one of the tests, the cause of the failure shall be identified, and any needed design changes made. After a test failure and any design change, the failed test, and any other previously completed tests affected by the change shall be redone.

**Table 1 — Prototype tests**

| Test | Item to be tested | Test procedure | Acceptance criteria |
|---|---|---|---|
| Visual examination | Fully assembled ladder. | Compare to construction requirements in Clause 4, and the manufacturer's drawings. | The ladder shall comply with the construction requirements in Clause 4, and shall be constructed in accordance with the manufacturer's drawings. |
| Step flexibility | Six steps, which shall include at least one of each different type, including replacement steps, if different from steps used in the ladder's original construction. | Place each step on a pair of supports located where the side ropes would normally pass through the step. Apply a static load uniformly for a period of at least one minute over a 100 mm wide contact area at the centre of the step. The load shall be 3,0 kN, except that the load shall be 1,4 kN for step limited to use as one of the four lowest steps in the ladder. | Deflection at the centre of the step shall not exceed 25 mm under load.<br>There shall be no residual deflection after the load is removed and the step is allowed to recover. |
| Step friction | One step of each different material of construction and step surface design.<br>One reference step constructed of clean oak, 115 mm wide and 480 mm long. The step surface shall have grooves 3 mm wide, 3 mm deep, and 15 mm apart. The grooves shall run parallel to each other and parallel to the long edge of the step.<br>One metal block of a mass between 1,5 kg and 3,0 kg. The metal block shall have a flat surface no more than 100 mm wide by 135 mm long. The flat surface shall have leather or composition shoe-sole material attached to it. | Set the reference step in a level position. Place the metal block at the centre of the stepping surface on the reference step, with the shoe sole material resting on the stepping surface of the reference step, and with the longer edge of the metal block running across the reference step over both edges. Slowly raise one edge of the step with the metal block on it. Measure the angle at which the block begins to slide.<br>Repeat the procedure with the standard reference step and the block under water.<br>Repeat the procedure in both dry and wet conditions using each different ladder step. | The angles at which the block begins to slide on the dry and wet embarkation ladder step shall be greater than or equal to the corresponding angles measured for the standard reference step. |
| Step fixture | Tightness of step fixtures | Insert a cylindrical measuring pin of a diameter 10 mm between the step and its step fixtures. | The measuring pin shall not be able to insert the gap between the step and its step fixtures. |
| Step surface durability | One step of each different material of construction and step surface design.<br>A metal block of the type described under the step friction test, arranged to enable a vertical load of 380 N to be applied to it as it slides back and forth over the step under test. | Secure the step in a horizontal position, with the loaded block resting on it. Move the block back and forth from one end of the step surface to the other and back in the same line, for a total of 1 500 cycles.<br>Repeat the step friction test on the worn step in both dry and wet conditions, making sure the sliding block is resting completely on the worn surface of the step. | The angles at which the block begins to slide on the dry and wet embarkation ladder step shall be greater than or equal to the corresponding angles measured for the standard reference step. |

**Table 1** *(continued)*

| Test | Item to be tested | Test procedure | Acceptance criteria |
|---|---|---|---|
| Ladder and step attachment strength | Fully assembled ladder of longest length to be approved | Suspend the ladder vertically hanging to its full length or extend the ladder to its full length on a horizontal surface, with the top end of the ladder secured using its own attachments. Apply a static load of 8,8 kN widely distributed over the bottom step for a period of at least one minute, so that the load is applied evenly between the side ropes through the step attachment fittings. Repeat the procedure at five different steps, except that the ladder is not required to be hanging at full length and only the step under test. Its side rope attachments and the side ropes immediately above the step attachment fittings are required to be subjected to the load. | Steps shall not break or crack.<br>Attachments between any step and a side rope shall not loosen or break.<br>Side ropes shall not sustain any observable damage, elongation, or deformation that remains after the test load is removed. |
| Unrolling | Fully assembled ladder of longest length to be approved | Attach the rolled-up ladder to anchoring fixtures in a place away from any wall or structure that would prevent it from falling freely, and where it can hang vertically. Allow the ladder to unroll freely. | The steps and attachments shall not be cracked, broken, or loosened.<br>The ladder shall not sustain damage that would make it unsafe to use. |

## 6.2 Product inspection

Each production of embarkation ladders shall be confirmed by visual inspection that all the requirements in Clauses 4 and 5 are met. The manufacturer shall keep the record of the product inspection.

# 7 Designation

**7.1** Ladders conforming to this document shall be designated by the following indications, in the order given:

a) Name: “Embarkation ladder ISO 5489”;

b) “S” followed by the number of steps; and

c) “L” followed by the length in m.

EXAMPLE The designation for a 5 m embarkation ladder consisting of 15 steps, conforming to this document, is "Embarkation ladder ISO 5489-S15-L5”.

**7.2** Spare or additional components for ladders conforming to this document shall be designated by reference to this document.

EXAMPLE The designation of a replacement step for a ladder conforming to this document is "Replacement step ISO 5489".

## 8 Marking

**8.1** The bottom of at least two steps of the ladder shall be marked with:

a) the name and address of the manufacturer;

b) the manufacturer's model designation;

c) "ISO 5489" and "SOLAS";

d) the year of assembly or reassembly of the ladder;

e) identification of the approving maritime administration, along with any approval indications required by that administration, and;

f) where used, identification of a recognized organization acting on behalf of the maritime administration.

**8.2** The bottom of each replacement step shall be marked with:

a) the name and address of the manufacturer;

b) the manufacturer's model designation;

c) the words "REPLACEMENT STEP ONLY";

d) "ISO 5489" and "SOLAS";

e) the year of production of the step;

f) identification of the approving maritime administration, along with any approval indications required by that administration, and

g) where used, identification of a recognized organization acting on behalf of the maritime administration.

## 9 Production tests and inspections

Production tests and inspections of embarkation ladders approved as conforming to this document should be carried out as described in Annex A.

## 10 Maintenance

**10.1** Damaged steps shall be replaced with replacement steps meeting 5.20 and of the type supplied or specified by the ladder manufacturer. A ladder shall not include more than two replacement steps every 10 m. A ladder shall not include more than six replacement steps in total.

**10.2** If a ladder requires a third replacement step in 10 m, it shall be rebuilt. A ladder constructed with spun polyester side ropes with the inner core showing at any place throughout the length of the ladder is no longer serviceable. Such ladders shall be rebuilt to the original manufacturer's standard using new side ropes, undamaged steps in place of all damaged steps and replacement steps.

**10.3** Each ladder shall be subjected to the ladder and step attachment strength test in Table 1 at approximately 30-month intervals. Each ladder that fails the test shall be rebuilt according to 10.2 or scrapped. The ladder shall be stamped or tagged near the bottom of the ladder with the date of the test and the identification of the person or company performing the test. The person or company performing the test shall also provide a test certificate for the owner of the ladder that indicates the details of the test, including the date, and the identification of the person or company performing the test.

**10.4** Care and maintenance of natural fibre rope embarkation ladders shall be in accordance with Annex B.

# Annex A
(informative)

# Recommended production tests and inspections

## A.1 General

The manufacturer should have a quality assurance system in place that is acceptable to the approving maritime safety administration to ensure that production ladders are produced to the same standard as the original prototype ladder tested for approval.

## A.2 Sample selection and testing of steps

Steps should be separated into lots of 100 steps or less. Steps of different types should be in separate lots. One step selected at random from each lot should be subjected to the step strength test described in Table A.1. If the step fails the test, ten more steps should be selected at random from the lot and tested as described in Table A.1. If any of the ten steps fails the test, each step in the lot should be tested before it is used in a ladder.

**Table A.1 — Production tests**

| Test | Item to be tested | Test procedure | Acceptance criteria |
|---|---|---|---|
| Step strength | Ladder step | Place supports under each end of the step where the side ropes pass through the step. Apply a static load of 8,8 kN widely distributed over a 100 mm wide area at the centre of the step. | The step shall not break or crack.<br>There shall be no residual deflection after the load is removed and the step is allowed to recover. |
| Ladder and step attachment strength | Fully assembled ladder at least 3 m long | Suspend the ladder vertically hanging to its full length or extend the ladder to its full length on a horizontal surface, with the top end of the ladder secured using its own attachments. Apply a static load of 8,8 kN widely distributed over the bottom step for a period of at least one minute, so that the load is applied evenly between the side ropes through the step attachment fittings. | Steps shall not break or crack.<br>Attachments between any step and a side rope shall not loosen or break.<br>Side ropes shall not sustain any observable damage, elongation, or deformation that remains after the test load is removed.<br>The measuring pin, having a diameter of 10 mm, shall not be able to insert the gap between the step and its step fixtures. |

## A.3 Sample selection and testing of ladders

A visual examination as described in Table 1 and the tests in Table A.1, should be conducted by the maritime safety administration that approved the ladder, or an organization acting on its behalf. This should be completed at least annually, on a ladder taken from the production line to ensure that it complies with the requirements of Clauses 4 and 5.

# Annex B
(informative)

# Natural fibre rope embarkation ladders — Care and maintenance

## B.1 General

Due to its strength, superior grip, good abrasion resistance and low stretch qualities, manila is generally the rope of choice when constructing lifeboat and liferaft embarkation ladders, pilot ladders and Jacob's ladders. In some cases, ropes made from other natural fibres may be used. Following an incident involving the failure of a pilot ladder as shown in Figure B.1, this annex has been written to provide guidance on the care and maintenance of natural fibre rope ladders[2].

## B.2 Properties, stowage and care

Although natural fibre rope has properties that make it ideal for use in many marine applications, it is susceptible to damage and loss of strength due to a number of factors if it is not stowed and handled carefully.

Abrasion or cuts may occur during routine handling. Bulwarks, fish plates, deck edges, decks and any other surfaces which can come into contact with the ladder should therefore be smooth and free from obstructions or defects which can chafe or cut the rope.

Natural fibres are susceptible to dry rot and mildew, therefore the rope is normally treated with chemical preservatives in the factory to provide resistance to such problems. However, rope ladders should not be stowed when wet as the preservatives may become less effective over time.

Although natural fibre rope is resistant to alkalis and some chemicals, rope ladders should not be stored together with acids, detergents or paint, as these products and their fumes can cause the fibres to deteriorate quickly. Figure B.2 shows an embarkation ladder resting on a deck which is exposed to attack by water and cleaning chemicals.



**Figure B.1 — Pilot ladder side rope which failed as a pilot climbed the ladder (Photo: TCI Dakar)**

**Figure B.2 — Embarkation ladder resting on deck exposed to attack by water and cleaning chemicals**

Rope ladders should not be dragged over decks that require cleaning. Abrasive material such as cargo particles or blasting grit can penetrate the strands and contact with hydraulic oil or fuel residues can cause damage.

If a rope ladder is dirty, it should be washed with fresh water. Soap or detergent should not be used as these products can affect the natural oils and chemical preservatives in the rope. High-pressure water guns should also be avoided as these can force dirt or grit into the fibres. The ladder should be allowed to dry naturally prior to storage, avoiding the use of hot air blowers or heated compartments. Once dry, the ladder should be shaken to remove any particles that may remain.

Ideally, rope ladders should be stored in a cool, dry, well-ventilated compartment and stowed or hung in a manner that allows maximum exposure to the air. If kinks are present, these should be removed beforehand. However, embarkation ladders for lifeboats and liferafts are required, by their very nature, to be stowed on deck, as are pilot ladders on some vessels.

Consequently, rope ladders stored outside should be inspected more frequently to ensure that they are still in good condition. In sub-zero temperatures, they should be thawed thoroughly before use, as frozen rope fibres are more susceptible to breakage.

In order to protect rope ladders stored outside from the effects of rot, mildew, chemicals, acids and detergents, they should be stowed on a suitable grating. Wooden pallets, cut down to size, are ideal for this purpose. The height of the grating should be such that the ladder will not come into contact with free water on deck that may contain potentially harmful products.

Natural fibre rope is also susceptible to actinic degradation due to ultraviolet radiation, particularly in tropical areas. Rope ladders stored outside should therefore be covered when not in use to protect them from the effects of sunlight. Coverings also protect ladders from precipitation and frost. An embarkation ladder stowed clear of the deck and suitably covered is shown in Figure B.3.

The shipboard ends of rope ladders stored outside on gratings are often shackled to padeyes, and it is not uncommon to find the rope between the grating and the padeyes uncovered and in contact with the deck. This can result in accelerated deterioration in the vicinity of the eye thimbles due to prolonged exposure to sunlight and water which can contain chemicals. Protecting the rope between the grating and the padeyes should not be over-looked when stowing and covering a rope ladder.