INTERNATIONAL STANDARD

**ISO 19898**

First edition
2019-08

# Ships and marine technology — Life-saving appliances and arrangements — Means of recovery of persons



Reference number
ISO 19898:2019(E)



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Published in Switzerland

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# Foreword

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

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

Regulation 17–1 in Chapter III of the 1974 International Convention for Safety of Life at Sea (SOLAS 1974), as amended, requires ship-specific plans and procedures for recovery of persons from the water, considering the Guidelines for the development of plans and procedures for recovery of persons from the water (MSC.1/Circ.1447).

This document has been developed to provide specific performance and test requirements for recovery devices and systems and to assist stakeholders when preparing the ship-specific plans and procedures for recovery of persons from the water. This document can also be applied to recovery devices and systems on ships which do not fall within the scope of chapter III of the SOLAS Convention such as, but not limited to, those referenced in Resolution MSC.346(91).

# Ships and marine technology — Life-saving appliances and arrangements — Means of recovery of persons

## 1 Scope

This document specifies requirements for the general performance, materials, stowage, marking and testing of recovery devices and systems, including specific appliances. It also specifies requirements for the manufacturer concerning production, type approvals, instructions for use and accompanying documentation.

It is intended to assist in the selection of ship-specific recovery devices suitable for the purpose of safely recovering persons from the water or from survival craft.

## 2 Normative references

The following reference 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.

The 1974 International Convention for the Safety of Life at Sea (SOLAS 1974), as amended

IMO Resolution MSC.48(66), International Life Saving Appliances (LSA) Code, as amended

IMO Assembly resolution A.658(16), Use and fitting of retro-reflective materials on life-saving appliances

IMO resolution MSC.81(70), Revised recommendation on testing of life-saving appliances, as amended

IMO resolution A.520(13), Code of practice for the evaluation, testing and acceptance of prototype novel life-saving appliances

## 3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

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

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

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

**3.1**
**person(s) in water**
**PIW**
one or more persons in a state of distress in the water being the object of the recovery operation

**3.2**
**recovery device**
device for one phase of *person in water (PIW)* (3.1) recovery, e.g. reaching out to PIW, securing PIW in, or lifting/hoisting PIW on board the vessel

**3.3**
**recovery system**
*recovery device* (3.2) for more than one phase of *person in water (PIW)* (3.1) recovery, including at least the securing in and the lifting/hoisting phases

**3.4**
**reaching out device**
*recovery device* (3.2) designed to reach out to a *person in water (PIW)* (3.1) from a vessel

EXAMPLE Lifeline, crane boom, boat, etc.

**3.5**
**securing recovery device**
*recovery device* (3.2) designed to secure *person in water (PIW)* (3.1) in before the lifting/hoisting phase of PIW recovery

EXAMPLE Net, bag, stretcher, basket, platform, cage, etc.

**3.6**
**lifting**
*person in water (PIW)* (3.1) lifting phase by manually-operated lifting devices

**3.7**
**hoisting**
*person in water (PIW)* (3.1) lifting phase by mechanically-operated lifting devices

**3.8**
**manually operated**, adj.
type of operation which is not mechanical

**3.9**
**mechanically operated**, adj.
type of operation which is executed with power such as hydraulic or electrical machine power, air compression or pyrotechnic

**3.10**
**lifting height**
distance from the surface of the water to the recovery deck in the vessel's lightest seagoing condition, including rail or bulwark height where applicable

**3.11**
**rescue craft**
power driven waterborne vehicle helmed by trained rescue persons, dedicated to recover *person in water (PIW)* (3.1)

**3.12**
**close range rescue craft**
**CRRC**
small one or two person *rescue craft* (3.11) for close range operation, typically a personal water craft with a platform at the stern with freeboard close to water

**3.13**
**recovery cycle time**
time it takes to operate one cycle of *person in water (PIW)* (3.1) recovery, from the fully operational mode through recovery operation to fully operational mode

**3.14**
**safe working load**
**SWL**
maximum permissible load determined after testing according to the relevant regulations

# 4 General requirements

**4.1** Based on risk assessment, the ship specifics and the number of crew, the vessel shall have plans and procedures for recovery of person(s) from the water, and be equipped with suitable device(s) to recover a PIW in a horizontal or deckchair position.

**4.2** Information and instruction documents related to the recovery devices and systems shall be made available by the manufacturer for the crew, the company managers, the representatives of the Administration or the organizations authorised by the Administration to study and/or inspect.

These documents shall include the following:

1) list of dedicated recovery devices and systems on board, their location and, when applicable,

2) file with information and instruction material for each dedicated PIW recovery device and system on board.

**4.3** Devices or systems for reaching out, securing and lifting/hoisting shall comply with this document.

**4.4** The fitting and servicing of recovery devices or systems covered by this document shall be done in accordance with the manufacturers' instructions by companies or persons properly trained and familiar with the devices and systems.

# 5 Requirements for general performance, material, stowage and marking

## 5.1 Performance requirements

To ensure a safe recovery of persons, the recovery device or system shall meet the following performance requirements:

1) it shall ensure a safe transfer of person(s) under dynamic conditions;

2) it shall protect the persons against a risk of injury from impact with the vessel's side or other structures including the recovery device or system itself;

3) it shall be designed for rescue in a horizontal or deckchair position;

4) it shall ensure that persons in the water can be simply secured, and prevented from dropping or sliding out of the recovery appliance during the lifting/hoisting phase;

5) it shall provide a minimum buoyancy of 100 N for each person when intended for support of persons in water;

6) it shall be usable with a crane;

7) it shall be of sufficient strength to enable a safe recovery when fully loaded (safety factor of 6);

8) if it is to be used in conjunction with a shipboard launching appliance or another shipboard appliance, such launching appliances shall meet the applicable requirements of SOLAS 1974 and the LSA Code;

9) it shall have a launching time of not more than 5 min; and

10) any storage bag, case or carrying container shall, when applicable, be self-draining and not trap water.

### 5.2 Material/suitability for the environment

To ensure a safe recovery of persons the recovery device or system shall meet the following material and environment requirements:

1) be manufactured using materials suitable for use in the marine environment;

2) be constructed with proper workmanship and materials for the purpose;

3) be equipped with suitable means for controlling, fixing alongside, bowsing, etc. as required, including protecting from the vessel's side, propeller and other appendages as necessary;

4) bot be damaged in stowage throughout the air temperature range of –30 °C to +65 °C;

5) if it is likely to be immersed in seawater during its use, operate throughout the seawater temperature range of –1 °C to +30 °C;

6) be rot-proof, corrosion-resistant and not unduly affected by seawater, oil or fungal attack;

7) be resistant to deterioration, if exposed to sunlight;

8) when fitted with a reaching out line, control lines, lifting lines or distance (attachment) lines, the lines shall be of buoyant material;

9) be of a highly visible colour on all parts above water-level to assist detection;

10) be fitted with retro-reflective material to assist detection according to IMO (resolution A.658(16), as it may be amended;

11) when it is to be used in a seaway, be capable of satisfactory operation in that environment;

12) as applicable, be provided with electrical short-circuit protection to prevent damage or injury; and

13) when intended for carriage to the recovery deck, weigh not more than 20 kg per person required to carry it, including the carrying bag, case or carrying container.

### 5.3 Stowage, marking

To ensure a safe recovery of persons, the recovery device or system shall meet the following stowage and marking requirements:

1) be clearly marked with its maximum capacity in the number of persons it is designed for, based on a mass of 82,5 kg per person;

2) if installed at a fixed location, be installed as far forward of the vessel's screws or thrusters as practical;

3) be safely stowed and in a state of readiness for immediate use;

4) be clearly marked with certification identity and any operational restrictions; and

5) if it is movable, be stored at conspicuous place and be easily transferrable to its places of likely use.

## 6 Functional requirements for specific PIW recovery devices or systems

### 6.1 General

Specific PIW recovery devices or systems shall meet the general requirements of Clauses 4 and 5 in addition to the requirements for the appropriate category given in this Clause.



## 6.2 Requirements for reaching out devices in the form of lifelines

Reaching out recovery devices (lifelines) shall;

1) be of a diameter of not less than 8 mm;

2) be of non-kinking buoyant line;

3) be with a breaking strength of not less than 5 kN;

4) be equipped with buoyant throw-load and chest loop at the outer end;

5) be of minimum length 30 m plus the lifting height when used manually and minimum 50 m plus lifting height when used with mechanically operated throwing device; and

6) enable throwing the device with reasonable accuracy at least 20 m distance on flat ground when manually thrown, and 50 m when thrown with mechanically operated throwing device.

## 6.3 Requirements for manually operated recovery systems

Manually operated securing and lifting/hoisting systems shall enable lifting only one person at a time from water, or a floating object, for example with lifting lines, block and tackle or winch.

When equipped with a manually operated reaching out device, the device shall meet the requirements of 6.2.

## 6.4 Requirements for light mass recovery lifting booms

A light mass recovery lifting boom reaching 1 m to 2 m abeam of the vessel side midship, with a lifting hand gear in the form of block and tackle and/or winch, may be allowed for lifting one person at a time over a maximum of 10 m lifting height above water. It shall have a minimum SWL of 250 kg for lifting. There shall be no dangerous outstanding obstacles on the vessel side where the recovery lifting boom is to be used.

The block and tackle or winch shall be equipped with a secure brake mechanism.

The boom shall be tested when fixed on the vessel to 6 times its SWL.

## 6.5 Requirements for recovery systems combining climbing, securing and lifting/hoisting possibilities

Recovery systems combining climbing, securing and lifting/hoisting from water shall, when deployed, enable able-bodied persons in the water to step into the climbing device, secure themselves to the ships movement and climb on board or be ready to be lifted/hoisted on board in a deckchair or horizontal position.

The vertical length shall, as a minimum, be equal to the lifting height plus 2 m with an adverse list of 20 °. The upper end shall be secured to the vessel and the lower end shall be loaded allowing the end to sink into the water in a lowered position. The system shall stay vertical and spread out horizontally at the ships side when deployed, and be so arranged to prove easy to climb from water in adverse sea or weather conditions.

Each horizontal mesh section of the net structure shall hold a mass equal to 6 times the mass of 82,5 kg for each started 200 mm when measured from the centre of the joints, with joints as manufactured. See 8.3.5 and Figure 3.

Recovery devices combining climbing and lifting/hoisting from the water, designed for vessels with less lifting height than 2 m on the vessel in the lightest seagoing state, shall be a minimum of 1,2 m wide ±5 %. On vessels with more lifting height than 2 m, the securing device for horizontal or deckchair

lifting/hoisting shall be a minimum of 1,6 m wide ±5 % and enable direct lifting (not rolling) of the person from the water.

### 6.6 Requirements for mechanically operated securing and hoisting recovery systems

The recovery system shall be capable of retrieving from the water to the rescue deck 6 times the mass of the securing device and the maximum number of persons which the recovery device is designed for.

The recovery system and any arrangement used to install to the ship shall be designed with a calculated factor of safety of 6, based on the ultimate tensile strength of the materials used and the SWL of the system.

Relevant tensile strength tests should be carried out in order to demonstrate satisfaction of the above requirement.

The recovery system shall be so constructed that only a minimum amount of routine maintenance is necessary. All parts requiring regular maintenance by the ship's crew shall be readily accessible and easily maintained.

A mechanically operated hoisting recovery device shall as applicable meet the intent of the requirements in SOLAS and the LSA Code.

On the lower end of the hoisting wire/line, there shall be a rope or webbing strap with snap hook, security lock and control line, when used near a PIW.

### 6.7 Requirements for inflatable securing PIW recovery devices.

An inflatable securing device shall, as applicable, meet the intent of the requirements in SOLAS and the LSA Code.

An inflatable securing device with a freeboard of more than 300 mm shall have arrangements enabling able persons to use both legs and arms to board the craft from the water, and enabling the crew to bring and secure helpless persons from the water in a deckchair or horizontal position.

### 6.8 Requirements for PIW rescue craft

A securing device in the form of rescue craft shall, as applicable, meet the intent of the requirements in SOLAS and the LSA Code.

Rescue craft with more freeboard than 300 mm shall have arrangements enabling able persons to use both legs and arms to board the craft from the water and enabling the crew to bring and secure helpless persons from the water, in a deckchair or horizontal position in Beaufort 6 sea state conditions.

When the rescue boat is a CRRC, it shall be equipped with a lowering and hoisting mechanism which enables hoisting of the PIW in a safe deckchair or horizontal position on board the vessel.

The operator of the CRRC should not have to use significant force and time to recover a person from the water onto the rescue craft and should be able to secure a passive PIW on the craft without leaving the helm.

## 7 Requirements for the manufacturer

### 7.1 Production and quality control

The manufacturer shall maintain a quality system to ensure that each recovery device or system meets the requirements of this document.



Tests shall be documented and test reports shall be marked with the serial number of the recovery device or system that are tested. The test reports shall be kept by the manufacturer and be accessible to the Administration inspectors or to accredited inspectors for 5 years from the test date.

The party who is responsible for the manufacture shall have a copy of all approval information on the recovery device or system, detailed instructions on the manufacturing procedure and record of inspection, service and deliveries concerning sold recovery devices and systems.

## 7.2 Information for the evaluation for type approval certificates

The manufacturer shall forward to the certification body, as confidential matter, the following information for the evaluation of the type approval for the recovery device(s) and system(s):

1) relevant information on the manufacturer and the development of the recovery device(s) or system(s);

2) type name and versions with detailed description and demarcation of the recovery device(s) and system(s) to be type-approved including, as applicable, instructions for fitting the device(s) or system(s) to the vessel and for capability requirements of mechanically operated device(s) needed;

3) detailed information on the material, assembling technique and variations, both as text and diagrams;

4) description of the quality control;

5) instructions to fitting, inspection and service partners in the form of updatable manual;

6) requirements to appointed sales, fitting, inspection and service operations for the recovery device or system;

7) list of spare parts and accessories;

8) relevant test reports from independent test laboratories and other services accepted by the certification body; and

9) name, registration number, address and other contact details.

As an appendix and/or sample, the manufacturer shall also forward the following with the type approval application:

10) copy of a valid quality certificate and type approvals;

11) if required, a sample of the recovery device(s) or system(s) complete as required in this document; and

12) as relevant, all documents required as in 7.4; and

13) as applicable, references of use and capability.

The certification body can require additional information as needed to issue a type approval certificate.

## 7.3 Instructions and markings

Each recovery device and system shall be marked with the name of the manufacturer, the type and version identity, a unique serial number and the production month and year, enabling tracking of the device in production, sale and service.

Markings should include also any operational limitations, such as SWL or the maximum number of persons that can be recovered with the device the system, at the same time.

Clear instructions for use and packing shall be supplied with each recovery device and system. The instructions shall be fixed on the cover or casing of the device or system and another instruction card shall be supplied which can be hung-up in a conspicuous place on the vessel.

## 7.4 Documents to accompany each recovery device or system

With each recovery device or system, the manufacturer shall issue to the customer, on company paper, the following:

1) an information sheet with the description of the operational capabilities and the specification of the recovery device or system;
2) instructions for use and packing of the device;
3) a general sample of training plan and training schedule in the use of the recovery device or system;
4) fitting, inspection and service requirements and instructions;
5) an information link to the list of certified fitting, inspection and service partners;
6) the list of available spare parts and accessories;
7) the manufacturing certificate; and
8) the original copy of type approval certificates.

## 7.5 Information to be supplied by the manufacturer

The manufacturer shall specify the following in the product information, as applicable:

1) the name, address and other contact details such as telephone numbers, email addresses and internet web addresses;
2) the type name and version of the recovery device or system;
3) the operations which the recovery device or system is designed for, including limitations or operational restrictions;
4) the lifting height it is made for;
5) the mechanically operated recovery device or system specifics needed;
6) the method of range achievement and the out-reaching range from aside vessel;
7) the capacity in number of persons to be lifted/hoisted at a time, and the associated safe working load;
8) the relevant tensile strength;
9) the maximum sea or weather conditions in Beaufort scale, which the device is designed for;
10) the number of personnel required for operation;
11) the system recovery cycle time;
12) the launching time;
13) a description of other advantages and limitation of the recovery device or system that may be appropriate, and in particular, any installation details, including interface to other devices and to the vessel, and if a helper is needed over the side to reach out and secure helpless persons in the securing recovery devices; and
14) risk items related to the use of the recovery device or system.

# 8 Test requirements

## 8.1 General

**8.1.1** All recovery devices and systems shall be tested at sea to the operation capability at given weather and sea state in Beaufort wind scale, in order to meet the requirements of Clauses 4 to 6.7, as applicable, witnessed by the representative from the administration and/or the selected certification body or person accepted by the administration or the selected certification body. The report of such tests shall be forwarded with the type approval application documents to the certification body for evaluation for type approval.

**8.1.2** Mechanically operated recovery systems shall, as applicable, meet the test requirements in paragraph 8 in Res .MSC.81(70)Part 1 as well as the test requirements in paragraphs 3.4 – 3.5.2.5 in annex to resolution A.520(13).

**8.1.3** Inflatable securing devices shall, as applicable, meet the test requirements in paragraph 5 in Res. MSC.81(70) Part 1, as well as the test requirements in paragraphs 3.2.1 – 3.5.2.5 in annex to resolution A.520(13).

**8.1.4** Rescue crafts shall, as applicable, meet the test requirements in paragraphs 7 and 8 in Res. MSC.81(70) Part 1, as well as the test requirements in paragraphs 2 and 3.2 – 3.5 in annex to resolution A.520(13).

**8.1.5** Movable recovery devices and systems shall be weighed and their mass shall be less than 20 kg per person required to carry the device or system.

## 8.2 Functional tests

The intent of the functional test should be to demonstrate that the device can be used as per the manufacturer´s instructions in certain sea state and wind conditions (e.g. calm sea state) in conjunction with any lifting/hoisting and launching appliances, if applicable.

**8.2.1** A check shall be made before the recovery device or system is tested, to establish whether it is ready for immediate use packed in its casing according to the manufacturer´s instructions.

One person acquainted with the manufacturer's instructions on the use of the recovery device or system shall be able to take the device or system from its place of storage and bring it ready for entering into the water, within 5 min or as specified by the manufacturer, whichever is shorter. Two assistants may help.

The launching time and recovery cycle time shall be measured, documented and filmed on video uncut and enclosed as evidence of the test. The test shall be repeated 5 times.

The recovery device or system launching time and recovery cycle time shall be in accordance with the times given in the documents from the manufacturer.

**8.2.2** The securing device shall be proved to enable easy entering and lifting and/or hoisting the maximum number of persons specified by the manufacturer, in a deckchair or horizontal position. It shall be tested in the following manner in a swimming pool or in safe water at quay side.

1) As many persons as the securing device is intended for lifting/hoisting, each fitted with an inflated inflatable life-jacket, shall, one after the other, swim a distance as near as possible to 25 m and, on completion of this distance, swim into or board the device and secure themselves in the securing device ready for hoisting. This shall be repeated five times and considered satisfactory when 80 % attempts have succeeded. The recovery cycle time shall be documented.

2) One person acting as a helper in the water, fitted with a life-jacket and acquainted with the device, shall swim a distance as near as possible to 10 m with another person fitted with a lifejacket and acting the part of a person who is incapable of making any efforts to save him or herself in the water. The helper shall then secure the incapable person in a deckchair or horizontal position in the securing device.

3) The maximum number of persons specified by the manufacturer shall be lifted/hoisted in a deckchair or horizontal position, as described and illustrated in the instructions, and inclined about 30° in the direction in which it is most likely that the person would fall out of the securing device, without the person(s) falling out.

4) The securing device shall be lifted with the maximum number of persons specified by the manufacturer. At least one of the persons shall be lifted in a deckchair or horizontal position. It shall then be rotated 90° without the person(s) falling out of the device. This shall not apply to securing devices secured to the side of the ship, such as climbing devices.

5) Each test shall be carried out five times with subjects of different sizes and care shall be taken that they do not sustain injuries.

6) The height and mass of the subjects shall be equally mixed as follows:

| Height | Mass |
|---|---|
| — 1,40 m – 1,60 | <60 kg |
| — 1,60 m – 1,80 | >70 kg |
| — over 1,80 m | >80 kg |

**8.2.3** Manually operated reaching out devices shall be tested in calm weather. The throw shall be made five times in a horizontal plane. No cast shall be shorter than 20 m and no cast shall land outside a 15° segment from the point of launching.

**8.2.4** It shall be demonstrated over water that the manually operated lifting device can be used in a secure manner to lift one person at a time (82,5 kg/person) in a deckchair or horizontal position, with the lifting height as specified by the manufacturer.

## 8.3 Load tests

**8.3.1** Load bearing parts of the securing and lifting devices shall be tested to hold 6 times the load required including the total number of people the device is designed for (82,5 kg/person) and the mass of the securing device. It shall not show any damage.

**8.3.2** When the recovery system is permanently fastened to the vessel or the device is to be pulled by a crane boom and the vessel´s force, it shall be pulled in the seawater at a speed of 2 m/s in weather/sea state Beaufort 6. The recovery device or system shall not show any damage.

**8.3.3** Hoisting devices shall, as applicable, be tested as specified in the paragraphs 8 to 8.2.18 in Res. MSC.81(70) Part 1.

**8.3.4** Ropes and webbings shall prove their tensile strength as an average from 5 tests. The tensile strength shall be tested using a testing device certified by an institution recognized by the certification body.

## 8.4 Tensile testing of vertical sections and meshes in climbing devices

**8.4.1** The manufacturer shall provide five samples for tensile testing of vertical sections as shown in Figure 1, five samples for tensile testing of vertical sections with horizontal joints as shown in Figure 2



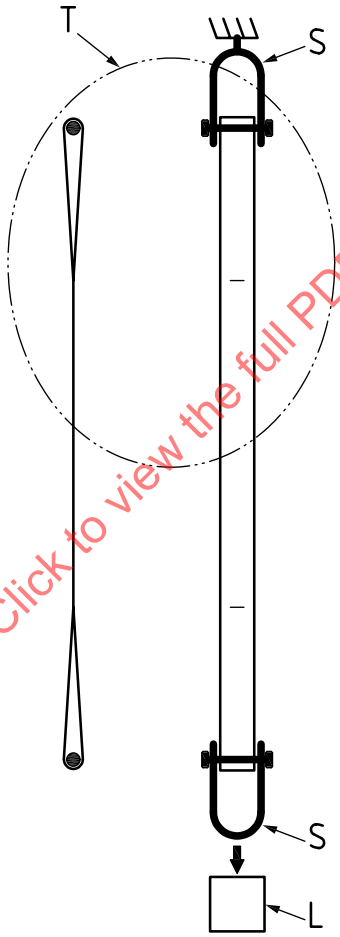
and five tensile test samples of the mesh as shown in Figure 3. Each tensile test sample shall be tested using a certified testing device as shown in Figures 1 to 3.

Two of each tensile test samples shall be tested using a certified testing device after the temperature cycling test given in paragraphs 1.2 of Res. MSC.81(70) Part 1.

Each horizontal mesh section of a climbing net structure shall hold the mass of one person (of a mass of 82,5 kg) for each started 200 mm when measured from the centre of the joint. It shall be tested with joints as manufactured, to 6 times the mass of 82,5 kg/person. See Figure 3.

The distance between horizontal mesh sections shall be measured from the centre of the joints and shall be 275 mm ± 5 cm . When made of a rigid structure, it may have a middle step.

Dimensions in mm






**Key**

S shackle

L load

T testing area

**Figure 1 — Upper end section test drawing**