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Entwurf**Luft- und Raumfahrt –
Drehflügler-Rettungsinsel –
Anforderungen, Prüfung und Kennzeichnung;
Englische Fassung prEN 4886:2022**

Aerospace series –
Rotorcraft life raft –
Requirements, testing and marking;
English version prEN 4886:2022

Série aéronautique –
Radeaux de sauvetage de giravion –
Exigences, essais et marquage;
Version anglaise prEN 4886:2022

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Gesamtumfang 58 Seiten

DIN-Normenausschuss Luft- und Raumfahrt (NL)

Nationales Vorwort

Der Verband der Europäischen Luft-, Raumfahrt- und Verteidigungsindustrie – Normung (ASD-STAN) ist vom Europäischen Komitee für Normung (CEN) für zuständig erklärt worden, Europäische Normen (EN) für das Gebiet der Luft- und Raumfahrt auszuarbeiten. Durch die Vereinbarung vom 3. Oktober 1986 wurde ASD Assoziierte Organisation (ASB) des CEN.

Das vorliegende Dokument (prEN 4886:2022) wurde von ASD-STAN, Fachbereich Kabine, unter Mitwirkung deutscher Experten des DIN-Normenausschusses Luft- und Raumfahrt (NL) erarbeitet.

Das zuständige deutsche Normungsgremium ist der NA 131 BR „Beirat des DIN-Normenausschusses Luft- und Raumfahrt (NL)“.

Der vorliegende Norm-Entwurf enthält zur technischen Kommentierung einen Europäischen Norm-Entwurf (prEN) ausschließlich in Englischer Fassung aus der CEN-Umfrage.

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Entsprechend Beschluss 57/9 des Technischen Ausschusses des Beirats des DIN-Normenausschusses Luft- und Raumfahrt (NL) sind die europäischen Luft- und Raumfahrt-Normungsergebnisse zweisprachig, in Deutsch und Englisch, in das Deutsche Normenwerk zu überführen. Aus diesem Grund wird die Norm beide Sprachfassungen enthalten.

Für die in diesem Dokument zitierten Dokumente wird im Folgenden auf die entsprechenden deutschen Dokumente hingewiesen:

ISO 105-A02	siehe	DIN EN ISO 105-A02
ISO 105-E02	siehe	DIN EN ISO 105-E02
ISO 105-X12	siehe	DIN EN ISO 105-X12

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

Nationaler Anhang NA (informativ)

Literaturhinweise

DIN EN ISO 105-A02, *Textilien — Farbechtheitsprüfungen — Teil A01: Allgemeine Prüfgrundlagen — Teil 2: Prüfverfahren*

DIN EN ISO 105-E02, *Textilien — Farbechtheitsprüfungen — Teil E02: Farbechtheit gegen Meerwasser*

DIN EN ISO 105-X12, *Textilien — Farbechtheitsprüfungen — Teil X12: Farbechtheit gegen Reiben*

English Version

Aerospace series - Rotorcraft life raft - Requirements, testing and marking

Série aérospatiale - Radeaux de sauvetage de giravion -
Exigences, essais et marquage

Luft- und Raumfahrt - Drehflüglernerrettungsinsel -
Anforderungen, Prüfung und Kennzeichnung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (prEN 4886:2022) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

Introduction

This document prescribes the minimum standards of design and performance for rotorcraft life rafts, carried on rotorcraft operating in a hostile sea area or over very rough sea conditions. Life rafts are designed to provide protection following ditching or water impact, after escape from the rotorcraft and while awaiting rescue.

The document aims to ensure that the equipment user is able to carry out the necessary emergency procedures whilst being provided with an appropriate level of protection under foreseeable conditions of use. It aims to ensure that the equipment has no detrimental effect on the health and safety of the user or on the performance of other equipment.

This document is applicable to all rotorcraft. Rotorcraft include helicopters, tilt rotor/wing and gyroplanes. For the purpose of this document the term helicopter is used generically hereinafter.

1 Scope

This document specifies minimum requirements for life rafts carried on helicopters operating in a hostile sea area or over very rough sea conditions. Life rafts covered by this document are for use by helicopter crew members and passengers in the event of a ditching or water impact.

They are intended either for integration into the helicopter, or stowed in the cabin before being manhandled out of the helicopter. This document does not cover air-drop life rafts.

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.

EN 4856, *Rotorcraft — Emergency Breathing Systems (EBS) — Requirements, testing and marking*

EN 4862:—,¹ *Rotorcraft — Rotorcraft constant wear lifejackets — Requirements, testing and marking*

EN 4863:—,² *Aerospace series — Rotorcraft immersion suits — Requirements, testing and marking*

EN ISO 811, *Textiles — Determination of resistance to water penetration — Hydrostatic pressure test (ISO 811)*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227)*

ISO 105-A02, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour*

ISO 105-E02, *Textiles — Tests for colour fastness — Part E02: Colour fastness to sea water*

ISO 105-X12, *Textiles — Tests for colour fastness — Part X12: Colour fastness to rubbing*

AATCC Test Method 183:2014, *Test Method for Transmittance or Blocking of Erythemally Weighted Ultraviolet Radiation through Fabrics*

ASTM D1434-82, *Standard test method for determining gas permeability characteristics of plastic film and sheeting*

ASTM D1655, *Standard specification for aviation turbine fuels*

ASTM D4060, *Standard test method for abrasion resistance of organic coatings by the Taber Abraser*

CIE publication No. 15, *Colourimetry*

DEF STAN 91-91, *Turbine fuel, aviation kerosene type, JET A-1; NATO Code: F-35; JSD: AVTUR*

EASA, *Certification Specifications for Large Aeroplanes, CS-25, Book 1 — Appendix F*

EUROCAE, ED-14G, *Environmental conditions and test procedures for airborne equipment; Section 11, Fluids susceptibility*

FTMS (Federal Standard) 191A, *Textile test methods*

¹ Under preparation. Current stage is: ASD-STAN prEN 4862:2022.

² Under preparation. Current stage is: ASD-STAN prEN 4863:2022.

IATA Guidance material (Kerosene Type), NATO Code F-35

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

MIL-STD-3009, Lighting, aircraft, night vision imaging system (NVIS) compatible

SAE, ARP5825, Design requirements and test procedures for dual mode exterior lights

3 Terms and definitions

For the purposes 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/ui>
- IEC Electropedia: available at <https://www.electropedia.org>

3.1

life raft

flexible water craft which, when inflated, floats stably in the water and provides protection to the user in the event of a ditching or water impact

3.2

reversible life raft

life raft that, when inflated, is fully functional when either-side-up

3.3

rotorcraft

heavier-than-air aircraft that depends principally for its support in flight on the lift generated by one or more rotors

3.4

helicopter

rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors

3.5

ditching

controlled emergency landing on water, deliberately executed in accordance with Rotorcraft Flight Manual procedures, with the intent of abandoning the rotorcraft as soon as practical

3.6

water impact

helicopter contact with water that is unintentional or exceeds the ditching capability of the helicopter for water entry

3.7

hostile sea area

open sea area north of 45 N and south of 45 S

Note 1 to entry: For a full definition of 'hostile environment' see Air Operations Rule definition in Commission Regulation (EU) No 965/2012 amended by 2016/1199, Annex (1)(a).

3.8

very rough sea

sea areas with a significant wave height (H_S) of 4 to 6 m and wind speeds of 51,9 to 87,0 km/h

3.9

significant wave height

H_S

average value of the height (vertical distance between trough and crest) of the highest third of the waves present

3.10

deployment

sequence of events resulting in inflation of the life raft

3.11

actuation

action which makes a device start to work, in this case initiating inflation of the life raft

3.12

primary inflation system

means to inflate a combination of the primary buoyancy chamber, boarding facility if inflatable and canopy if inflatable, which inflate from the main gas cylinder following actuation of a single device

3.13

primary buoyancy chamber

one of the inflatable compartments necessary to meet the minimum buoyancy requirements of this document

3.14

minimum operating pressure

pressure required to meet the minimum buoyancy requirements of this document

3.15

cracking pressure

minimum pressure differential needed between the inlet and outlet of a valve at which the first indication of flow occurs

3.16

boarding facility

device attached to the life raft designed to assist users to enter the life raft

3.17

canopy

device which protects the occupants of a life raft from the external environment

3.18

stabilising system

means of improving stability achieved by the use of a water pocket(s) or water scoop(s)

Note 1 to entry: Other means may be used that provide equivalent performance.

3.19

aspirator

device that uses the Venturi effect to draw ambient air into the life raft buoyancy chambers during inflation

3.20

life line

line around the external periphery of the primary buoyancy chambers which can be reached and grasped by a person in the water

3.21

grab line

line around the internal periphery of the primary buoyancy chambers, for use by the occupants while manoeuvring and when seated within the life raft

3.22

retaining line

cord that is attached between the life raft and the helicopter, designed to release the life raft without damage should the helicopter sink

3.23

short retaining line

retaining line provided to position the life raft during occupant transfer from the helicopter into the life raft, thereby easing boarding

3.24

long retaining line

retaining line provided to allow the life raft to drift away from the helicopter but remain attached to it at a safe distance, thus facilitating survivor(s) location by rescuers

3.25

inflation line

long retaining line that is used to inflate a life raft (Category B)

3.26

sea anchor

device which when deployed is used to create drag and reduce leeway/drift

3.27

rescue line

throw line used to haul a person in the water to the life raft/boarding facility, attached to the life raft at one end and to a quoit at the other end

3.28

quoit

inherently buoyant ring designed to be thrown to a person in the water, to assist the person in reaching the life raft

Note 1 to entry: The quoit is attached to a rescue line.

3.29

survivor locator light

device which emits light intended to aid in the location of the user in an emergency

3.30

radar reflector

means to reflect radar waves to improve the visibility of the life raft on radar screens and hence increase the likelihood of detection

3.31

visual signalling device

device designed to help in the location of the life raft and occupants, which provides a visible sign

Note 1 to entry: For example, a high intensity strobe light, orange smoke signal or hand-held flare.

3.32

emergency locator transmitter

ELT

equipment which broadcasts distinctive signals on designated emergency frequencies

3.33

survival ELT

ELT that is tethered to a life raft and manually deployed by a life raft occupant, activated either manually or automatically (e.g. by water activation)

3.34

personal locator device

PLD

device carried on the body that is able to transmit a signal to enable electronic detection and location of a person in the water

Note 1 to entry: In the maritime environment a PLD may be known as an Autonomous Maritime Rescue Device (AMRD).

3.35

survival equipment kit

equipment that is attached to a life raft to aid and sustain occupants whilst awaiting rescue

Note 1 to entry: For example, bailing bucket, first aid kit, sea sickness tablets and other life-saving equipment including means to sustain life, as listed in Commission Regulation (EU) 965/2012, CAT.IDE.H.305.

3.36

lifejacket

garment or device which, when correctly worn and used in water will provide the user with buoyancy positioned to provide protection from drowning and increase the likelihood of survival and rescue

3.37

helicopter constant wear lifejacket

lifejacket worn on the body throughout a helicopter flight, provided to protect the user in the event of a ditching or water impact

3.38

immersion suit

garment designed to protect the user's body from the cooling effects of immersion in water

Note 1 to entry: Cooling effects include cold shock and hypothermia.

Note 2 to entry: An immersion suit may be integrated or worn with a separate constant wear lifejacket.

3.39

integrated immersion suit

immersion suit that incorporates the functionality of a lifejacket

3.40

buoyancy element

inflatable chamber incorporated into an integrated immersion suit that, when inflated, provides the suit with the functionality of a lifejacket

3.41

helicopter immersion suit

immersion suit worn on the body throughout a helicopter flight, provided to protect the user in the event of a ditching or water impact

3.42

immersion suit system

helicopter immersion suit (with or without thermal insulation) and its components and accessories including either a constant wear lifejacket or buoyancy element and/or emergency breathing system, as applicable

3.43

sprayhood

cover fitted to a lifejacket or integrated immersion suit that can be brought in front of the face, incorporating an area of transparent material, used to protect the airways from water and wave splash and intended to increase the likelihood of survival in rough water conditions

3.44

declared absolute life

maximum period of time that the life raft may remain in service from the date of manufacture

4 Description

4.1 Design features

The main features of a life raft designed to this document, herein referred to as a life raft, are:

- buoyancy chambers;
- floor;
- canopy and the means to support the canopy;
- boarding facility;
- inflation system(s).

The following items of attached equipment are mandatory features of a life raft:

- life line(s);
- grab line(s);
- long and short retaining lines;
- sea anchor;

- stabilizing system;
- rescue line and quoit;
- internal and external survivor locator lights;
- buoyant knife/belt cutter;
- radar reflector;
- visual signalling device;
- survival ELT;
- survival equipment kit;
- valise or container (Category B life rafts only).

Optional accessories include but are not limited to:

- means of life raft containment.

4.2 Performance levels

4.2.1 Category A

Category A life rafts are designed to be integrated with the helicopter structure and are provided with an interface that allows remote deployment and activation.

4.2.2 Category B

Category B life rafts are designed to be manhandled out of the helicopter, manually deployed and activated by the helicopter occupants.

5 Requirements

5.1 Design

5.1.1 Occupancy ratings

5.1.1.1 An average occupant weight of 98 kg³ shall be used when determining the capacity of the life raft, taking into account the weight of the occupant's clothing and personal equipment.

5.1.1.2 The normal rated capacity of the life raft shall be taken as the number of occupants that can be accommodated when each occupant is provided with a minimum width of back support of 460 mm, a minimum height of back support of 200 mm and a minimum floor area of 0,33 m².

5.1.1.3 The minimum overload rating for the life raft shall be rounded up to the nearest whole number of occupants to the normal rated capacity times 1,5 with a minimum floor area of 0,22 m² for each occupant.

5.1.1.4 Testing shall be carried out in accordance with 6.1.

³ Value from CAA FOD 27/2005 for a male helicopter occupant.

5.1.2 Buoyancy

5.1.2.1 The life raft shall incorporate a minimum of two independent primary buoyancy chambers. The life raft may incorporate secondary buoyancy chambers to improve performance.

5.1.2.2 The life raft shall have a high level of tolerance to such accidental damage that may be incurred from contact with the exterior of the helicopter while the life raft is on the water adjacent to the helicopter. This may be achieved by providing adequate redundancy or protection of the floor and primary buoyancy chambers.

5.1.2.3 Any additional inflatable compartments, e.g. canopy supports, boarding facilities and floor, shall be so designed and arranged that damage to them will not significantly affect the primary buoyancy of the life raft. In particular, puncture of additional inflatable compartments such as canopy supports, boarding facilities and floor shall not affect the buoyancy of the primary buoyancy chambers.

5.1.2.4 Testing shall be carried out in accordance with 6.1.

5.1.3 Canopy

5.1.3.1 A canopy(s) shall be provided covering the total area of the life raft, capable of being occupied and supported above the heads of seated occupants when either side up. The canopy(s) shall be permanently attached to the life raft.

5.1.3.2 The canopy(s) fitted to life rafts with a normal rated occupancy of greater than 6 persons shall include a minimum of two entry points. Life rafts with a normal occupancy rating of 6 persons or less need only be provided with one entry point. Where two entry facilities are provided they shall be positioned 180° apart.

5.1.3.3 Testing shall be carried out in accordance with 6.1.

5.1.4 Floor

Provision shall be made to insulate those areas of the floor that are in contact with the occupants of the life raft. The insulation shall be at least equal to that given by a 25 mm thick air cushion. Testing shall be carried out in accordance with 6.1.

NOTE Where the insulation is provided by inflation of the floor diaphragm this document takes no account of its buoyancy.

5.1.5 Boarding facility

5.1.5.1 Boarding facility(s) shall be designed to assist entry from the water and shall have sufficient hand-holds to aid boarding (see also 5.4.8.3). Testing shall be carried out in accordance with 6.1.

5.1.5.2 Life rafts with a normal rated occupancy of greater than 6 persons shall include a minimum of two life raft boarding facilities. Life rafts with a normal occupancy rating of 6 persons or less need only be provided with one boarding facility. Where two boarding facilities are provided they shall be positioned 180° apart. Testing shall be carried out in accordance with 6.1.

5.1.5.3 There shall be means inside the life raft to assist persons to pull themselves into the life raft from the boarding facility. Testing shall be carried out in accordance with 6.1.

5.1.5.4 The design of the boarding facility(s) shall be such that a clothed user, wearing an immersion suit system with the lifejacket or buoyancy element fully inflated, can board the life raft without assistance (see also 5.4.8 and 5.6.4). Testing shall be carried out in accordance with 6.1.

5.1.6 Seaworthiness

The life raft and its associated equipment shall be designed to be seaworthy and maximize occupant survivability in all operating conditions, meeting the requirements defined at 5.7.

5.2 Materials and components

5.2.1 General

All materials used shall be suitable for their intended application and compatible with other materials used in the life raft's construction. Testing shall be carried out in accordance with 6.1.

The choice and combination of materials and protective treatments shall be such that, during the period between inspections, any deterioration of the life raft will not render the life raft unserviceable. Testing shall be carried out in accordance with 6.1.

Before conducting the tests required in 5.2.5, 5.2.6, 5.2.7, 5.2.8, 5.2.9 and 5.2.10, material samples shall be conditioned at a temperature of $(70 \pm 3)^\circ\text{C}$ for at least 168 h, in accordance with FTMS 191A, Method 5850. After the exposure, samples shall be allowed to cool to $(21 \pm 1)^\circ\text{C}$ for a period of 16 to 96 h. Following conditioning materials shall retain at least 90 % of their original strength, adhesion and air holding properties.

5.2.2 Resistance to temperature

The materials used shall be resistant to changes caused by the effects of temperature. Due consideration shall be taken of the possible temperature variations during stowage.

When tested in accordance with 6.4.3 there shall be no degradation of the materials or functionality of the life raft (see 5.4.1).

5.2.3 Resistance to fluids

5.2.3.1 Material used in the construction of buoyancy chambers and floors shall resist the detrimental effects of helicopter oils and hydraulic fluids, when tested in accordance with EUROCAE ED-14G, section 11 (as amended). The material shall display no visible signs of cracking, flaking, swelling or separation.

5.2.3.2 Fabric, including seams, used in the construction of buoyancy chambers and floors, shall resist the detrimental effects of water. Fabric and seam samples shall be preconditioned at a temperature of $(58,0 \pm 2,0)^\circ\text{C}$ and a relative humidity of $(95 \pm 4)\%$ for a period of 50 days. The permeability of the material shall not increase as a result of the conditioning. Fabric and seam strength and coat adhesion shall not be reduced by more than 20 % of their original values, and they shall not fall below the minimum values prescribed in 5.2.5, 5.2.6, 5.2.7 and 5.2.9.

5.2.3.3 Primary canopy fabric(s) shall be waterproof. It shall be resistant to a hydrostatic head of greater than 5 000 mm when tested in accordance with EN ISO 811, using a water temperature of $(20,0 \pm 2,0)^\circ\text{C}$.

5.2.4 Resistance to fuel

The life raft materials used in the construction of buoyancy chambers and floors, including fabric and seam samples, shall be resistant to aviation fuel (Jet A1 in accordance with DEF STAN 91-91, ASTM D1655, IATA Guidance material (Kerosene Type) and NATO Code F-35). The materials shall display no visible signs of cracking, flaking, swelling or separation.

Testing shall be carried out in accordance with 6.3.2.

Following testing, and without rinsing or cleaning the sample(s), the requirements of 5.2.5, 5.2.6 and 5.2.7 shall then be met. It is not necessary to condition these samples in accordance with 5.2.1.

5.2.5 Tensile and tear strength

Air-retentive textile woven fabric used for buoyancy chambers shall have a tensile strength, after conditioning according to 5.2.1, of at least:

- Warp – 840 N;
- Weft (fill) – 840 N.

Testing shall be carried out in accordance with the Grab Test method of EN ISO 1421 method 2.

Air-retentive textile woven fabric used for buoyancy chambers shall have a tear strength, after conditioning according to 5.2.1, of at least:

- Warp - 58 N;
- Weft (fill) - 58 N.

Testing shall be carried out in accordance with the Trapezoid Test method of EN 1875-3.

5.2.6 Adhesion

Coated fabric shall have the following minimum peel strengths:

- Ply Adhesion – 877 N/m of width (43,8 N/5 cm of width) at $(21 \pm 1) ^\circ\text{C}$, using a separation rate of 51 to 64 mm/min.;
- Coat Adhesion – 877 N/m of width (43,8 N/5 cm of width) at $(21 \pm 1) ^\circ\text{C}$, using a separation rate of 51 to 64 mm/min.

For ply adhesion of cemented seams, testing shall be carried out in accordance with FTMS 191A, Method 5960. For coat adhesion, testing shall be carried out in accordance with FTMS 191A, Method 5970.

For lightly-coated fabric, or fabric for which the coating is imbedded in the fabric, test results may be based upon adhesive bond separation, rather than coating-fabric separation.

5.2.7 Seam strength

Seams used in the life raft construction shall have the following minimum seam shear strength after conditioning in accordance with 5.2.1:

- 30 647 N/m of width (1 532 N/5 cm of width) at $(24 \pm 1) ^\circ\text{C}$;
- 7 005 N/m of width (350 N/5 cm of width) at $(60 \pm 1) ^\circ\text{C}$.

Testing shall be carried out in accordance with FTMS 191A, Method 5100.

A test sample shall consist of two strips, each being a maximum size of 5,1 cm wide by 12,7 cm long, bonded together. Samples may be gripped by the test machine across the full 5,1 cm of width and may be multi-layered to guard against premature material failure. A separation rate of $30,5 \text{ cm/min} \pm 1,3 \text{ cm/min}$ shall be used. The average strength of at least three samples shall be reported.

Seams used in the life raft construction shall have the following minimum peel strengths:

- 877 N/m of width (43,8 N/5 cm) at $(21 \pm 1) ^\circ\text{C}$, using a separation rate of 51 to 64 mm/min.