W29 Requirements for manufacture of anchors

(June 2005)
(Rev.1 Oct 2026)

1. General requirements

1.1 Scope

~~These Rules apply to the~~ This document gives anchor design types, and the requirements for materials, manufacture, inspection and testing of these anchor types, and certification of anchors~~, shanks and anchor shackles produced~~ made from ~~cast or forged~~ steel~~, or fabricated by welded~~ castings, steel forgings, and rolled ~~steel plate~~steels. The typical main anchor components are fluke, shank, stock, pin and ~~bars. Frequent reference~~anchor shackle.

This document is ~~made~~applicable to anchors intended for the application in accordance with UR A1.

With regard to holding power tests at sea for high holding power (HHP) and super high holding power (SHHP) anchors, refer to UR A1.

1.2. Design

1.2.1 Types of anchors
The types of anchors ~~covered~~ include:

a) Ordinary anchors~~. Refer to UR A1.4.1.1~~:

~~i)~~ - Stockless anchors, refer to UR A1.4.1.
~~ii)~~ - Stocked anchors, refer to national or international standard.

b) High Holding Power (HHP) anchors~~.~~, ~~R~~refer to UR A1.4.1.2

c) Super High Holding Power (SHHP) anchors, ~~not exceeding 1500kg in mass~~ refer to UR A1.4.1.3.

1.2.2 Basic specification and dimensions

Anchors are to be designed to meet the requirements in accordance with UR A1.

Any changes to the ~~design~~qualified or approved design including materials selection made during manufacture are to ~~have prior written agreement from~~ be agreed with the Classification Society based on a substantiated proposal.

Anchor holding power test at sea is to be carried out and is part of design requirements for HHP and SHHP anchors, see 4.2 and UR A1.4.

Note: UR (June 2005) is to be uniformly implemented by IACS Societies in respect of anchors, the manufacturing of which is commenced on or after 1 January 2007.
Rev. 1 2026 of this UR is to be uniformly implemented by IACS Societies in respect of anchors, the manufacturing of which is commenced on or after 1 January 2028.

2. Materials

2.1 Starting ~~M~~materials for anchors

~~All anchors are~~ The starting materials of anchor components are to be manufactured by manufacturers approved by the Classification Society,~~from materials~~ meeting the requirements of the UR Ws as ~~indicted below:~~indicated in Table 1.

~~Cast steel anchor flukes, shanks, swivels and shackles are to be manufactured~~for HHP and ~~tested in accordance with the requirements of UR W8 and comply with the requirements for castings for welded construction. The steel is to be fine grain treated with Aluminium. If test programme B is selected in Section~~SHHP anchors, see 4.2 ~~then Charpy V notch (CVN) impact testing of cast material is required. Special consideration is to be given to the use of other grades of steels for the manufacture of swivels.~~ and UR A1.4.

a) ~~Forged steel anchor pins, shanks, swivels and shackles are to be manufactured and tested in accordance with the requirements of UR W7. Shanks, swivels and shackles are to comply with the requirements for carbon and carbon-manganese steels for welded construction. Special consideration is to be given to the use of other grades of steels for the manufacture of swivels.~~
b)

Table 1 Starting materials for main anchor components

Component	UR to be complied with	Description
Fluke (anchor head) 1)	W8	2), 3), 4)
	W11	Fabricated fluke intended for fabricated anchor, see 3.2.
Shank 1)	W7	3), 4)
	W8 2)	
	W11 5)	Fabricated shank intended for fabricated anchor, see 3.2.
Shackle 6) Swivel 6), 7)	W7	3), 4)
	W8 2)	
	W18	4)
Stock	W7	3), 4)
	W8 2)	
	W11	

Pin	W7 [3]	[4]
	W11	
	W18 [8]	
Others	Subject to agreement with the Classification Society.	

Notes:

1) For stocked anchors, such as admiralty anchors, fluke and shank may be cast as a single piece.
2) The steel is to be fine grain treated with minimum 0.020% aluminium (total content).
3) Carbon and carbon-manganese steel intended for hull application of weldable quality is required.
4) Charpy V-notch (CVN) impact testing is to be carried out at 0°C with the minimum average absorbed energy in accordance with the referenced UR W. Stricter requirements may be given to the CVN impact test, depending on design and application.
5) See 3.2.1.
6) Swivels and swivel shackles are to be manufactured to at least Grade 2, referring to UR W18. Special consideration will be given to other grades of steel.
7) For the acceptance of swivel to replace anchor shackle, approval by the Classification Society is required, see 1.2.2.
8) Bars of Grades 2 and 3 produced by wrought methods (rolling or forging) are acceptable, cast bar is not permitted.

2.2 Starting ~~M~~materials for SHHP anchors

In addition to the requirements of 2.1 above, SHHP anchors are to be produced in accordance with the ~~material toughness~~ requirements of UR A1.4.~~4.~~ 5.

2.3 Evaluation for acceptance of materials specified by other standards

Materials specified to international, national or proprietary standards may be considered for acceptance by the Society provided such specifications give reasonable equivalence to the requirements as specified in each individual UR W.

As a minimum, the following particulars are to be specified for alternative materials:
— relevant standard/specification and grade
— manufacturing process
— chemical composition
— heat treatment and/or delivery condition
— sampling for mechanical properties testing, e.g. sampling process, sampling frequency, at what stage of manufacturing process, location of sample within the product, sizes.
— mechanical properties
— dimensional tolerances
— if relevant, non-destructive testing

Further particulars may be required as relevant at the discretion of the Classification Society.

3. Manufacture of anchors

Approval of anchor manufacturers is at the discretion of the Classification Society. The following requirements as a minimum are required to verify the anchor manufacturing process:

a) Anchors are to be manufactured in accordance with the manufacturer's established procedures agreed with the Classification Society. The procedures are to typically describe each operational and controlling step, outlining the appropriate requirements on design, starting materials for anchor components, heat treatment, repair, anchor assembly and the relevant fabrication methods as appropriate, inspection and tests.
b) Works inspection is to be carried out to evaluate the capability of anchor manufacturer in terms of quality control, traceability and identification system, production equipment, test equipment and facilities (including the relevant maintenance and calibration), inspection and tests, and all applicable operations that contribute to the quality of the finished anchor.
c) For fabricated anchor and fabricated anchor components, see 3.2.
d) For anchor holding power tests at sea, see 1.2.2 and 4.

3.1 Tolerance

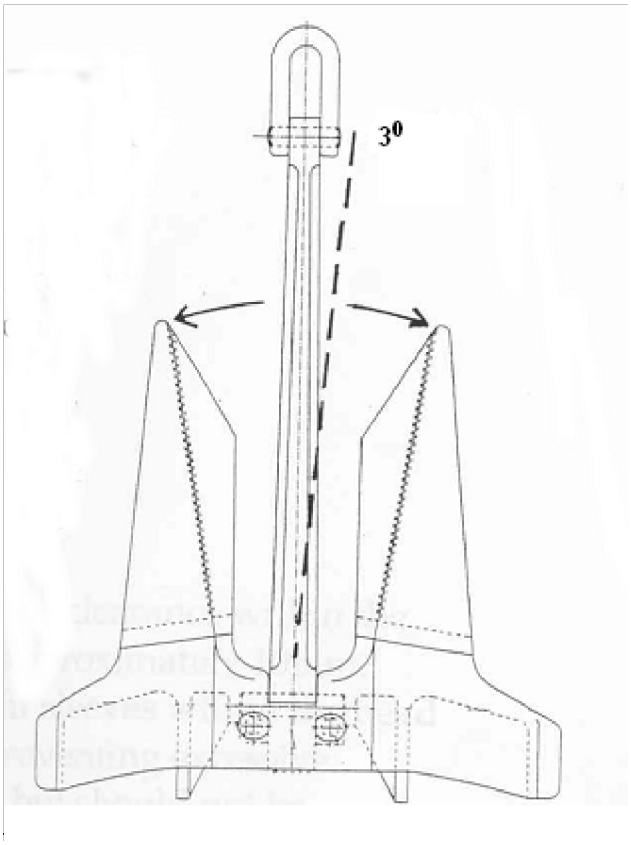
If not otherwise specified on standards or on drawings demonstrated to be appropriate, the following assembly and fitting tolerance are to be applied.

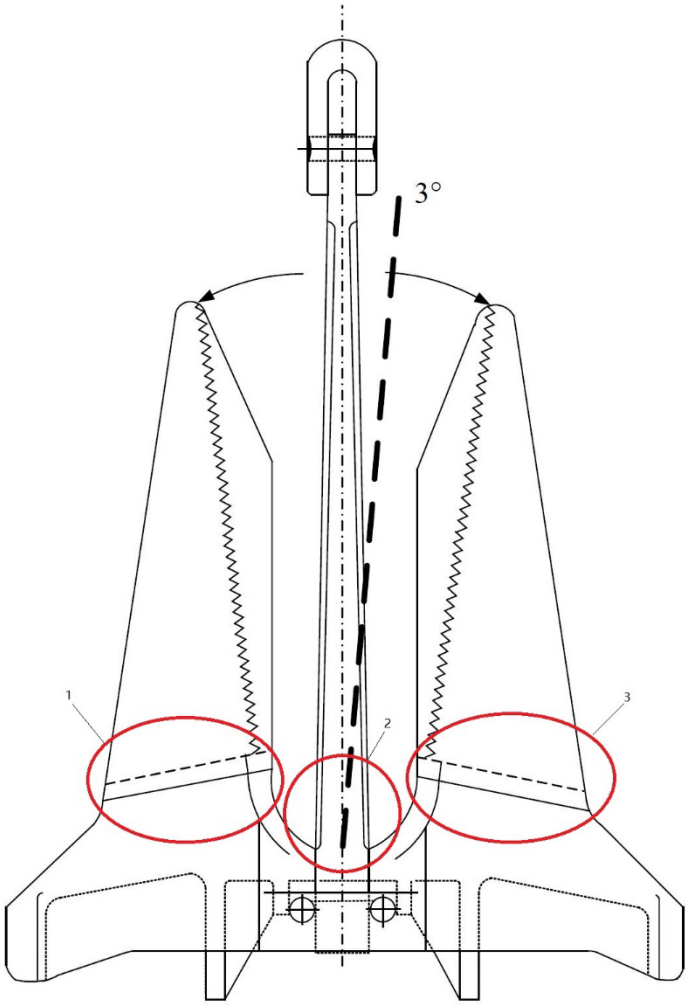
The clearance either side of the shank within the shackle jaws is to be no more than 3mm for small anchors up to 3 tonnes weight, 4mm for anchors up to 5 tonnes weight, 6mm for anchors up to 7 tonnes weight and is not to exceed 12 mm for larger anchors.

The shackle pin is to be a push fit in the eyes of the shackle, which are to be chamfered on the outside to ensure a good tightness when the pin is clenched over on fitting. The shackle pin to hole tolerance is to be no more than 0.5mm for pins up to 57mm and 1.0mm for pins of larger diameter.

The trunnion pin is to be a snug fit within the chamber and be long enough to prevent horizontal movement. The gap is to be no more than 1% of the chamber length, unless otherwise agreed with the Society, see also [1.2.2].

The lateral movement of the shank is not to exceed 3 degrees, see Figure 1.


3⁰



Key (see table 3):
1: High stress areas
2: High stress areas
3: High stress areas
Note: The manufacturer may be required to submit FEM analysis for high stress areas different from those in Figure 1 at the discretion of the Classification Society.

Figure 1 Allowable lateral movement of shank and high stress areas

3.2 ~~Welding of anchors~~ Cutting and welding

3.2.1 Cutting

For shank made by cutting including shearing of ~~fabricated anchors is to be done~~rolled plate, the procedure for cutting and subsequent treatment should be developed in accordance with ~~procedures approved by~~ established industry practice and/or a recognized standard (e.g. EN 1090-2: 2018+A1:2024), subject to agreement with the Classification Society. The procedure should, at a minimum, address the following:

a) For thermal cutting, excessive local hardening and carburized layer are to be avoided.

b) For cutting by shearing, the effect of work hardening and risk of cracked edges are to be evaluated.

c) Qualification of cutting method (e.g. thermal cutting or shearing) may be requested at the discretion of the Classification Society.

d) Quality of cut surface and associated dimensional tolerances should be in accordance with Rec 47 for gas cutting, or with a recognized standard applicable to thermal cutting method such as ISO 9013: 2017+A1:2024 or AWS C4.6M, depending on the design requirements.

3.2.2 Welding

All welding, including welding of fabricated anchors and fabricated anchor components, securing of pins, weld repair etc., is to be carried out by qualified welders~~, following the approved welding procedures qualified~~ in accordance with UR ~~W28,~~ W32 or a standard recognized by Classification Society (e.g. ISO 9606-1:2017, ASME BPVC IX:2025, AWS D1.1:2025), using approved welding procedure specification (WPS) qualified following the principles given in UR W28, and with approved welding consumables ~~manufactured~~ in accordance with ~~the requirements of~~ UR W17. ~~NDE~~

Non-Destructive Testing (NDT) is to be carried out in accordance with ~~the requirements of~~ 4.~~2 Product tests~~1.6.

3.3 Heat treatment

~~Components for cast~~Cast or forged ~~anchors~~anchor components are to be properly heat treated~~;~~ fully annealed~~;~~, normalised or normalised and tempered in accordance with UR W7 and UR W8, respectively.

Fabricated ~~anchors~~anchor components and components repaired by welding may require stress relief after welding depending upon e.g. weld thickness~~.~~ and size of defects. Stress relief heat treatment is to be carried out as indicated in the accepted procedures and the approved ~~welding procedure. Stress relief temperatures are not to exceed the tempering temperature of the~~ WPS qualified with appropriate Post-Weld Heat Treatment (PWHT), and is to be carried out with due regard to any adverse effects of the properties of welds and base material.

3.4 Freedom from defects

All parts are to have a clean surface consistent with the method of manufacture and be free from cracks, notches, inclusions and other defects that would impair the performance of the product.

3.5 Repairs

Any necessary repairs ~~to forged~~by grinding and ~~cast anchors~~/or welding to starting materials (e.g. castings, forgings, rolled products) are to be agreed ~~by~~with the

~~Surveyor~~Classification Society and carried out in accordance with the repair criteria indicated in the applicable requirements of UR W7 ~~and~~, UR W8~~.~~, W11 or W18 as relevant.

Repair by welding~~Repairs~~ to welds of fabricated ~~anchors~~anchor and fabricated anchor components are to be agreed ~~by~~with the ~~Surveyor~~Classification Society and carried out in accordance with ~~qualified weld procedures, by qualified welders, following the parameters of the welding procedures used in construction.~~ 3.2.

PWHT may be required after repair, see 3.3.

3.6 Anchor assembly

Assembly and fitting are to be done in accordance with the design details.

Securing of the anchor pin, shackle pin or swivel nut by welding is to be ~~done~~carried out in accordance with ~~an approved procedure~~3.2.

4. Testing and Certification

4.1 ~~Proof load test~~ Product tests on anchors

4.1.1. Product test programme and involvement of the Classification Society

~~Proof load tests are to be carried out by an approved testing facility.~~

Each ~~Proof load testing for Ordinary, HHP and SHHP~~ anchor~~s~~ component is to be ~~carried out~~manufactured, tested and qualified in accordance with ~~the pertinent requirements of~~ UR W7, UR W8, UR W11 and UR W18, respectively, see section 2~~-~~.

In addition, each product is to be tested and inspected according to the test programme as specified in Table 2.

~~Table 1 Applicable programmes for each product form~~

~~Product test~~	~~Product form~~		
	~~Cast components~~	~~Forged components~~	~~Fabricated/Welded components~~
~~Programme A~~	~~Applicable~~	~~Not applicable~~	~~Not applicable~~

~~Programme B~~	~~Applicable (1)~~	~~Applicable~~	~~Applicable~~

~~Notes : (1) CVN impact tests are to be carried out to demonstrate at least 27 joules average at 0ºC. Refer to 2.1 a).~~

~~Table 2 Product test requirements for programme A and B~~

~~Programme A~~	~~Programme B~~
~~Drop test~~ ~~Hammering test~~ ~~Visual inspection~~ ~~General NDE~~ =	– = ~~Visual inspection~~ ~~General NDE~~ ~~Extended NDE~~

Table 2 Product test programme

Test methods		Survey [1]	Description
~~Drop test [2]~~	~~W, R~~	~~See 4.1.2 [3]~~	
Drop test[2]		W, R	See 4.1.2 [3]
Hammering test [2]		W, R	See 4.1.3 [3]
Proof load test		W, R	See 4.1.4
Visual appearance inspection		W, R	See 4.1.5
NDT		W, R	See 4.1.6
Mass, dimensional and geometrical inspection		W, R	See 4.3

Note:

1) Involvement of the Classification Society:
   - Review (R): Examination of records of activities performed or results achieved.
   - Witness (W): A point where the Classification Society may be present for supervision or survey, at their discretion, it includes, but is not limited to, checking compliance with procedures/instructions for manufacture, testing and inspection, observing workmanship, traceability, etc.

2) Drop test and hammering test may be replaced by an alternative test program subject to special approval at the discretion of the Classification Society, by conducting tests such as extended-NDT as specified in UR W29 (Rev. June 2005), including production metallurgical examination. The equivalence of an

alternative test program is to be technically justified and documented and supported by long term data. Reference to the applied alternative test programme and the corresponding test report are to be stated on anchor certificate.

3) Applicable for cast components. Additional metallurgical examination may be required at the discretion of the classification society for cast components.

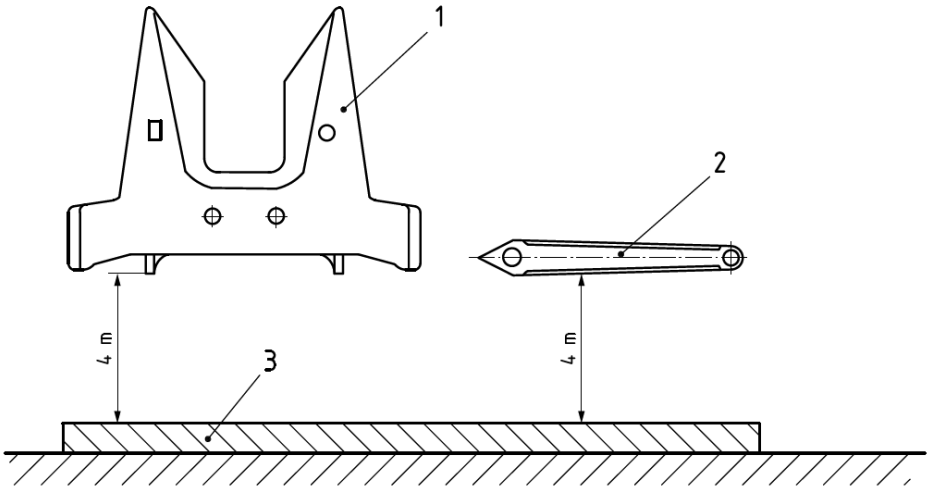
4.1.2 Drop test for cast components

Each cast fluke and shank is to be individually raised to a height of 4m and subsequently dropped on to a solid steel foundation. Drop test may be required for other cast components at the discretion of the Classification Society.
The solid steel foundation is to be constructed of a steel slab with thickness of at least 50 mm that is laid over on the top of a solid foundation (e.g. a concrete block with thickness of at least 1 m) to resist the impact of the dropped component.

The anchor fluke is to be hung vertically (head-down), the shank is to be hung horizontally, see Figure 2.

After drop test, each cast component is to be visually inspected to free from crack defects.

In case fracture is detected, repairs are not permitted and the component is to be rejected.



Key
1 fluke
2 shank
3 steel foundation

Figure 2: Drop test in accordance with ISO 24061:2021

4.1.3 Hammering test for cast components

After the drop test, hammering test is to be carried out on each cast component, which is slung clear of the ground, using a non-metallic sling, and hammered to check if the sound is clear or not, and verify the soundness of the component.

If there is any abnormal sound, the tested component may be re-inspected using a suitable NDT method. In case crack caused by drop test is detected, repairs are not permitted and the component is to be rejected.

A hammer of weighing 3 kg to 7 kg is to be used.

4.1.4 Proof load test

Proof load test is to be carried out by a testing facility recognised by the classification society. Proof testing equipment is to be subject to annual calibration.

Proof load test is to be carried out for each Ordinary, HHP and SHHP anchor in accordance with the pertinent requirements of UR A1.4.4.

4.1.5 Visual appearance inspection

After proof load test, visual appearance inspection of all accessible surfaces is to be carried out.

Unless otherwise agreed, visual appearance inspection is the responsibility of the manufacturer. The quality of appearance is to meet the requirements of a national or international standard.

4.1.6 Non-destructive testing

After proof load test, non-destructive testing (NDT) is to be carried out as indicated in Table 3.

IACS Rec 68 and Rec 69 are regarded as examples of acceptable standards specifying suitable minimum requirements for steel forgings and steel castings, respectively.

MT is to be applied for ferromagnetic materials and welds, and PT is to be applied for non-ferromagnetic materials and welds.

If defects are detected by NDT, repairs are to be carried out in accordance with 3.5 and Table 3.

Table 3 NDT for anchor

Items	Locations	NDT method [1)]	Reference
Cast components	Risers and gates High stress areas [2)]	MT and UT (or PT and UT [3)]	UR W8 and Rec 69
	Repairs	See 3.5 [4)]	
	Other surfaces	MT or PT [5)]	
Forged components	Machined areas	MT or PT [5)]	UR W7 and Rec 68

	High stress areas [2]	MT and UT (or PT and UT) [6]	
	Repairs	See 3.5 [4]	
Components made from rolled steel [7]	Cutting/machined surfaces	MT or PT [5]	Rec 68
	High stress areas [2] Pin holes areas	MT or PT	Rec 68
		UT [8]	UR W14 or a recognized standard
	Repairs	See 3.5 [4]	UR W11 [9] and W33
Fabricated components, assembly welds [10]	All welds	MT and UT (or PT and UT) [11]	UR W33
	Weld repairs	See 3.5 [4]	

Note:

1) Where advanced ultrasonic testing methods are applied, e.g. PAUT or TOFD, see IACS UR W34 for the general approach in adopting and application of these advanced methods
2) See Figure 1.
3) UT is required for cast shank at the discretion of the Classification Society.
4) Same NDT as originally applied.
5) Extent of MT or PT is at the discretion of the Classification Society.
6) UT is to be required when the component's design and geometry allow for effective testing, e.g. forged shank.
7) Typically applies to anchor shank, excluding anchor pin. See also [3.2.1].
8) UT is not required in case Z-quality steel in compliance with W14 is used.
9) If weld repair depth exceeds 3 mm, UT may be required by the Classification Society in accordance with an approved procedure.
10) See 3.6 for example assembly welds.
11) UT is to be required for full-penetration joints only.

~~**4.2.2 Drop test**~~

~~Each anchor fluke and shank is individually raised to a height of 4m and dropped on to a steel slab without fracturing. The steel slab is to be suitable to resist the impact of the dropped component.~~

~~4.2.3 Hammering test~~

~~the drop test, hammering tests are carried out on each anchor fluke and shank, which is slung clear of the ground, using a non-metallic sling, and hammered to check the soundness of the component. A hammer of at least 3kg mass is to be used.~~

~~**4.2.4 Visual inspection**~~

~~After proof loading visual inspection of all accessible surfaces is to be carried out.~~

~~**4.2.5 General non-destructive examination**~~

~~After proof loading general NDE is to be carried out as indicated in the following Tables 3 and 4.~~

~~**Table 3 General NDE for Ordinary and HHP anchors**~~

Location	Method of NDE
Feeders of castings	PT or MT
Risers of castings	PT or MT
Weld repairs	PT or MT
Forged components	Not required
Fabrication welds	PT or MT

Table 4 General NDE for SHHP anchors

Location	Method of NDE
Feeders of castings	PT or MT and UT
Risers of castings	PT or MT and UT
All surfaces of castings	PT or MT
Weld repairs	PT or MT
Forged components	Not required
Fabrication welds	PT or MT

IACS Recommendation No. 69 “Guidelines for non-destructive examination of marine steel castings” is regarded as an example of an acceptable standard for surface and volumetric examination.

4.2.6 Extended non-destructive examination

After proof loading general NDE is to be carried out as indicated in the following Table 5.

Table 5 Extended NDE for Ordinary, HHP and SHHP anchors

Location	Method of NDE
Feeders of castings	PT or MT and UT
Risers of castings	PT or MT and UT
All surfaces of castings	PT or MT
Random areas of castings	UT

~~Weld repairs~~	~~PT or MT~~
~~Forged components~~	~~Not required~~
~~Fabrication welds~~	~~PT or MT~~

~~IACS Recommendation No. 69 "Guidelines for non-destructive examination of marine steel castings" is regarded as an example of an acceptable standard for surface and volumetric examination.~~

~~4.2.7 Repair criteria~~

~~If defects are detected by NDE, repairs are to be carried out in accordance with 3.5. For fracture and unsoundness detected in a drop test or hammering test, repairs are not permitted and the component is to be rejected.~~

4.2 Holding power test at sea for HHP and SHHP anchors

For design approval of HHP and SHHP anchors, in addition to 4.1 a holding power test at sea is to be carried out, refer to UR A1.4.2. The additional requirements may be applied in accordance with ISO 24061:2021 Annex C.

4.3 Mass, ~~and~~ dimensional and geometrical inspection

Unless otherwise agreed, the verification of mass ~~and~~, dimensions and geometries is the responsibility of the manufacturer. The Surveyor is only required to monitor this inspection. The mass of the anchor is to exclude the mass of the swivel, unless this is an integral component.
The mass of the anchor is to comply with UR A1.

~~4.4 Retests~~

~~Mechanical retest are permitted in accordance with the requirements of UR W2~~.

4.4 **~~4.5~~** Marking
Anchors which meet the requirements are to be stamped on the shank and the fluke. The markings on the shank are to be approximately level with the fluke tips. ~~-~~On the fluke, these markings are to be approximately at a distance of two thirds from the tip of the bill to the center line of the crown on the right~~-~~hand fluke looking from the crown towards the shank. The markings are to include at least:

~~- Mass of anchor~~
- Mass of anchor (also the letters `HHP' when approved as high holding power anchors or 'SHHP' when approved as super high holding power anchors).
- Society 's stamp
- Manufacturer 's mark
- Identification, e.g. test No. or certificate No.
- ~~Society's stamp~~
- ~~Manufacturer's mark~~

~~Additionally~~For cast shank and fluke, the unique ~~cast~~ identification ~~is to~~shall be cast on the ~~shank and~~ component itself. Additionally, any other markings deemed necessary are at the ~~fluke~~discretion of the Classification Society, e.g. month and year of test.

4.5 ~~**4.6**~~ Certification

Anchors which meet the requirements are to be certified by the Classification Society. The certificate is to include at least ~~with~~ the following items:

- ~~Manufacturer's~~Manufacturer 's name
- Type
- Mass
- Proof loads
- Drop test and hammering test results; in case of applied alternative test program:
- References to the alternative test programme and the corresponding test report
- Results of the non-destructive testing
- -Fluke and ~~Shank~~shank identification numbers
- ~~- Grade of materials —~~
- ~~Proof test loads~~
- ~~Heat treatment~~
- Marking applied to anchor.

At the discretion of the Society, additional items shall be stated in the certificate, such as material grade, heat treatment, chemical composition, and mechanical test results of the anchor components.

For the starting materials, see paragraph 2, the certificates shall fulfil the corresponding requirements as per the applicable URs.

4.6 ~~**4.7**~~ Painting

All types of anchors are not to be painted until all tests and inspections have been completed.

END