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Dimensioning, testing and controlling towing and anchor-handling winches on vessels of less than 24 metres in length (L)

1. Purpose

There are requirements for dimensioning and testing of winches for towing and anchor-handling. A reliable emergency release mechanism is also required for releasing tow or load from the winch. This Circular provides guidance on how to interpret these requirements and what should be included as a minimum in the initial examination and testing and the annual inspection.

2. Legislation

Regulations of 19 December 2014 No. 1853 on the construction and supervision of small cargo ships (Construction and Supervision Regulations) sections 16, 18 and 85

Regulations of 22 December 2014 No. 1893 on supervision and certificates for Norwegian ships and mobile offshore (Certificate Regulations) section 34

3. General

Apart from the requirements of sections 16, 18 and 85 of the Construction and Supervision Regulations, section 34 of the Certificate Regulations and what follows from this Circular, there is no requirement for independent certification of the winch.

SWL

SWL stands for “safe working load” and refers to the safe working load of the equipment. In the Construction and Supervision Regulations, this is equivalent to the maximum pull with the wire wound on the drum in a single layer. ISO 7365 uses the term “drum load”.

BP

BP stands for “bollard pull” and refers to the ship’s maximum continuous pull¹.

¹ See RSV 10-2016 for the procedure for the carrying out of towing tests (in Norwegian only).

4. Emergency release

Maximum residual holding load of 20%

Emergency release means release of a wire in the event of an emergency, where the residual holding load due to the winch engine/gear or brake does not exceed 20% of the ship's BP because of the winch engine/gear or brake. Wire means a towing/anchor-handling line (steel wire, fibre hawser, fibre rope, chain) which is connected to the winch and used during towing/anchor-handling.

Alternative to the decoupling of winch drum

Historically, an emergency release has been understood as the release of a towing hook, i.e. a momentary physical release of the hawser. Similarly, ISO 7365 requires decoupling of the winch drum. The decoupling requirement of section 16 of the Construction and Supervision Regulations is also considered fulfilled if there is an alternative solution which releases the stability-critical loads inflicted on the ship through the wire, so that the ship regains its stability.

Emergency release must include all components

When the emergency release mechanism is activated, the tension on the line must be gone within 10 seconds, cf. section 16 of the Construction and Supervision Regulations. This means that all components, e.g. winch, guide pins, shark-jaw and other relevant equipment, are emergency released within the same 10 seconds, so that there are no obstacles on deck that could prevent the wire from moving out.

The emergency release must not be limited in time and must work in all situations, cf. section 16 of the Construction and Supervision Regulations.

Clutch

There is no requirement for the winch to be equipped with a clutch, but it must be possible to release the loads transmitted from the winch to the ship, cf. section 16 of the Construction and Supervision Regulations. The Norwegian Maritime Authority (NMA) recommends that new winches be constructed with a clutch. The selected solution must in any case be robust, and it must be ensured that the forces do not automatically return shortly after the emergency release has been activated. This means, for example, that the brakes are not engaged automatically after a certain period of time, and that an increase in release rate should not make the loads mentioned in 6.2 second bullet point increase beyond 20% of the ship's BP.

5. ISO 7365 – dimensioning and testing the winch

The winch must be constructed and dimensioned in accordance with section 18 (5) of the Construction and Supervision Regulations.

De-rating the winch capacity

The winch may be de-rated/programmed to reduce the maximum pull (SWL), which is maintained on several layers. That presupposes that:

- the set maximum pull cannot be increased by crew on board;
- the braking load does not exceed 50% of the value that the winch foundation is dimensioned for.

Use of fibre rope instead of wire

Point 4.5.2 of ISO 7365 requires that the diameter of the drum core must be at least 14 times the diameter of the design wire. Fibre ropes can sustain considerably smaller bend radius.

Nevertheless, if a fibre rope is used on the drum, the rope diameter should not exceed 0.25 times the diameter of the drum core. The rope manufacturer may, however, have other minimum diameter requirements for the drum core which must not be exceeded.

Limitations must be specified in the instructions

Any limitations to the winch in connection with towing and/or anchor-handling must be specified in instructions kept on board. These may, for example, include limitations on the amount of wire allowed on the drum, or weather/wave limitations.

Exemption from requirements for holding load

The requirement for the winch's holding load is given in point 4.4 of ISO 7365. The requirements of 4.4.2 set out that the holding load shall not be less than the breaking load of the wire, where the design wire is used as basis. The requirement for minimum holding load is also given in table 2 of ISO 7365.

For an anchor-handling winch, this requirement could be inappropriately strict. A holding load of up to 2.5 times the winch's SWL could also be a challenge to the ship stability. Therefore, a regulatory amendment to this requirement will be proposed, and in the meantime, we will inform about the opportunity to apply for an exemption from the holding load requirement for the winch, as currently specified in the Regulations.

A written application for exemption is required. Such exemption may be granted subject to the following conditions:

1. The winch must be equipped with at least one brake per drum.
2. The holding load of the brake at first layer must at least be 1.25 times the winch's SWL. Additionally, the brake must be able to stop the rotation of the drum at its maximum speed.
3. The brake must function in dead ship situations, and the holding load must not be affected by power cuts.
4. When the winch is to be used for towing purposes, the holding load must not be less than 80% of the breaking load of the towing wire.

Exemption from the requirement for tension control

The second sentence of section 18 (5) of the Construction and Supervision Regulations implies that in order to use a wire with a lower MBL than the design wire, the winch must be provided with tension control.

Tension control means a function providing the user with an opportunity to adjust the winch SWL in relation to the wire MBL.

As an alternative to tension control, the NMA may accept the installation of a load alarm device, as described in point 4.3 of ISO 7365. In that case, a written application for exemption is required. Such exemption may be granted subject to the following conditions:

1. During towing operations, a towing line with the following minimum documented breaking load must be used:

| BP (tonnes) | <40 | 40-90 | >90 |
|--------------------------------------|--------|--------------|--------|
| Minimum breaking load (MBL) (tonnes) | 3.0 BP | 3.8- (BP/50) | 2.0 BP |

2. Risk assessments must be carried out prior to different operations.
3. A load alarm device must be installed in accordance with point 4.3 of ISO 7365.

6. Inspection and supervision of towing and anchor-handling arrangements

Instructions from the manufacturer on how to examine and test the winch must be provided on board.

6.1. Initial examination and testing

When installing towing or anchor-handling arrangements with a winch, it must be documented that the requirements of sections 16 and 18 of the Construction and Supervision Regulations are met and that the arrangement has been installed, tested and inspected in accordance with sections 18 and 85 of the same Regulations and section 34 of the Certificate Regulations.

Acceptance of prototype testing

In accordance with section 16 second paragraph (e), emergency release must be possible at the winch's safe working load (SWL). The NMA may accept that only prototype testing has been carried out in order to see the consequence of a release at higher speed/force than specified in 6.2 third paragraph. During such a test, the speed must be high enough for the winch manufacturer to be able to guarantee that the emergency release will work if it has to be activated with a load corresponding to the winch's SWL, and we thus recommend a test speed not lower than the terminal velocity in sea water for a cubic concrete object with a weight equivalent to the SWL of the winch. For winches without a clutch, tests should be carried out up to a speed that will cause an engine breakdown, especially if there is any doubt as to whether an engine breakdown could affect the emergency release. In order for the emergency release function to be considered fulfilled, an engine breakdown must not result in residual brake forces exceeding 20% of the ship's BP. Information must be available on board describing what will happen if the winch is released at a higher speed/force than specified in 6.2 third paragraph.

Possibility for exemption for "existing" winches

For winches brought on board prior to the entry into force of the Construction and Supervision Regulations, it may occur that documentation and calculations showing that the winch meets the dimensioning requirements of section 18 (5) of the Construction and Supervision Regulations 18 (5) do not exist or cannot be obtained. For these winches, the NMA may accept that an assessment is made of the structure based on a SWL defined by the winch manufacturer in consultation with user. A written application for exemption is required, and the winch must be tested with the maximum pull at the outermost possible layer for this pull. During the test, one must be aware of undesirable deformations. If such deformations should occur, a reassessment of maximum pull must be carried out. If the winch is de-rated in accordance with 5 "De-rating the winch capacity", it should not be possible for the crew on board to change the maximum pull of the winch.

Final test

After the final test/SAT/CAT (Sea/Customer Acceptance Test), a signed test protocol/procedure must be submitted to the NMA or an approved company for information purposes. This document is to demonstrate that the intention of emergency release is fulfilled.

Software

It must be specified in the test procedure which software version was used at the time of the Factory Acceptance Test (FAT). If the software has been updated prior to the final tests/SAT/CAT on the ship, it must be considered which tests need to be conducted again during the final test.

6.2. Annual inspections

Inspection carried out by “qualified personnel”

According to section 85 of the Construction and Supervision Regulations and section 34 of the Certificate Regulations, documented inspections of the arrangement must be carried out at least once a year. The inspections must be carried out by qualified personnel. “Qualified personnel” means persons who have been trained by the manufacturer of the equipment to carry out such inspections and are considered competent by the shipping company.

Particulars of annual emergency release inspections

The annual emergency release inspection should, as a minimum, demonstrate that the following functions are ensured:

- The emergency release works as intended, more or less as a free release, and is in accordance with section 16 of the Construction and Supervision Regulations.
- It must be verified that the winch does not build up residual holding loads exceeding 20% of the ship’s BP.
- When components like winch, guide pins, shark-jaw and other relevant equipment are installed on deck, a test needs to be carried out in order to demonstrate that the equipment may be emergency released in an appropriate order within 10 seconds.

Furthermore, a dynamic test must be performed where the wire is drawn off the drum after the emergency release has been activated. As a starting point, the rate must be increased from zero to the rate corresponding to the maximum release rate sustained by the winches, as specified by the winch manufacturer.

The emergency release and emergency stop functions are to be tested from the control panel for the equipment and the conning position of the ship. The emergency release must be tested in dead ship situations, both with the brake activated and deactivated.

The emergency release must be tested with a force equivalent to the ship’s BP. This can be performed as a static test where the wire is attached to a point on deck.

The winch motor shall not re-engage automatically after an emergency release. This also applies in dead ship situations.

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