TÜRK LOYDU

Chapter 14 – Fishing Vessels
January 2023

This latest edition incorporates all rule changes. The latest revisions are shown with a vertical line. The section title is framed if the section is revised completely. Changes after the publication of the rule are written in red colour.

Unless otherwise specified, these Rules apply to ships for which the date of contract for construction as defined in TL- PR 29 is on or after 1st of January 2023. New rules or amendments entering into force after the date of contract for construction are to be applied if required by those rules. See Rule Change Notices on TL website for details.

"General Terms and Conditions" of the respective latest edition will be applicable (see Rules for Classification and Surveys).

If there is a difference between the rules in English and in Turkish, the rule in English is to be considered as valid. This publication is available in print and electronic pdf version. Once downloaded, this document will become UNCONTROLLED. Please check the website below for the valid version.

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Fishing Vessels

Section 6 – Fishing Gear and Lifting Appliances

Section 7 – Structural Fire Protection

Section 8 – Fire Protection and Fire Fighting

Section 9 – Machinery

Section 10 – Refrigerating Installations

Section 11 – Electrical Installations

AMENDMENTS

Revision	RCS No.	EIF Date*
Section 02	02/2023	01.07.2023

* Entry into Force (EIF) Date is provided for general guidance only, EIF dates given in Rule Change Summary (RCS) are considered valid. In addition to the above stated changes, editorial corrections may have been made.

SECTION 1

GENERAL

A. Application

1. Definition of fishing vessels

Fishing vessels under the terms of these Rules are seagoing ships used for commercially catching fish or other living resources of the sea with a length **L** of 12,0 m and above.

2. Approach

These Rules are based on the **TL** Rules defined in 3.1, summarizing in the following Sections additional aspects of fishing vessels for hull structures, machinery and electrical installations as well as automation.

International requirements are included as far as they are relevant for Classification by **TL**.

3. Rules, guidelines and regulations

3.1 Basic TL Rules and guidelines

The following **TL** Rules are relevant for fishing vessels:

- Classification and Surveys
- Chapter 1, Hull Structures,
- Chapter 2, Material,
- Chapter 3, Welding,
- Chapter 4, Machinery,
- Chapter 4-1,Automation,
- Chapter 5, Electrical Installation,

3.2 National regulations

Legal national regulations of the flag state have to be considered in addition by the designer and operator of fishing vessels.

In cases where flag state gives waivers/exemptions or relaxation from a statutory requirement (national or international) which also directly/indirectly effects the requirements set out in this chapter, same waivers/exemptions or relaxations may be applied by **TL**.

Similarly, in cases where national/international regulations to be applied set a requirement superior to a requirement in this chapter, the superior requirement is to be applied.

For Türkiye, refer to following regulations;

- Regulation for Safety of Fishing Vessels as amended Official Gazette No:26089 dated 23.02.2006 (In Turkish) as amended.
- Regulation on Health and Safety Measures in Operations on Fishing Vessels as amended Official Gazette No:28741 dated 20.08.2013 (In Turkish) as amended.

Amendments, validity of regulations and additional requirements/regulations should be checked during application.

3.3 International regulations

The following international regulations may apply:

- Torremolinos International Convention for the Safety of Fishing Vessels, 1977 amended by Protocol of 1993 as applied by the relevant Flag State Administration for fishing vessels with a length ≥ 45 m (did not enter into force on an international basis)
- European Communities, Commission Directive 97/70/EC of 11 December 1997 as amended for fishing vessels with a length ≥ 24 m
- The International Convention on Load Lines, 1966, as amended (ICLL)
- The International Code on Intact Stability, 2008 (2008 IS Code), Resolution MSC.267(85) , as amended
- Code for Safety of Fishermen and Fishing Vessels, IMO 2005

- Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels, FAO/ILO/IMO 2005

4. Equivalence

Vessels deviating from the **TL** Rules in their types, equipment or some of their parts may be classed, provided that their structures or equipment are found to be equivalent to the **TL** requirements for the respective Class.

B. Class Notations

1. Type of vessel

Fishing vessels fulfilling these rule requirements will get the descriptive Class Notation **FISHING VESSEL.**

2. Special equipment

Special Class Notations for fishing vessels, such as

- **BST** (Cargo refrigeration installation),
- **QUICK FREEZING**
- **CFG** (Certified fishing gear)

may be assigned. The detailed requirements for these Notations are defined in the relevant Sections of these Rules.

3. Range of service

In general the requirements in these Rules are valid for unrestricted service of the fishing vessels. If only a restricted service is planned the Notations **Y** (Restricted International Service), **K50, K20**, **K6** (Coastal Service), **L1** or **L2** (Harbour Service) will be fixed to the Character of Classification and the special requirements for these ranges of service will be applied.

4. Further details

The Character of Classification and further Notations are defined in the **TL** Rules, Classification and Surveys, Section 2, D. If an additional class notation (e.g. **AUT**) is assigned for a fishing vessel, relevant **TL** Rules are to be referred.

C. Ambient Conditions

1. General operating conditions

The selection, layout and arrangement of the vessel's structure and all shipboard machinery shall be such as to ensure faultless continuous operation under defined standard requirements for ambient conditions. For further details, see Chapter 4, Machinery, Section 1, C.

Variable requirements for unusual types and/or tasks of fishing vessels can be discussed case by case, but shall not be less than the standard design condition.

2. Inclinations and movements of the vessel

The standard design conditions for static and dynamic inclinations of fishing vessels are defined in Chapter 4, Machinery, Section 1, C.

3. Environmental conditions

The design environmental conditions for fishing vessels are contained in Chapter 4, Machinery, Section 1, C.

D. Definitions

The length **L** [m] is the rule length as defined in Chapter 1, Hull, Section 1, H, 2.1.

The length $\mathbf{L_c}$ [m] is the length as defined in Torremolinos International Convention for the Safety of Fishing Vessels. (see A, 3.3)).

Other definitions are provided in related TL Rules (see A, 3.1) particularly refer to TL Rules, Classification and Surveys, Section 2, A, 1 and Chapter 1, Hull, Section 1, H.

E. Documents for Approval

1. The documents to obtain Class defined in the have to be submitted to **TL** in Turkish or English language.

2. The survey of the vessel's construction will be carried out on the basis of approved documents. The drawings must contain all data necessary for assessment and approval. Where deemed necessary, calculations and descriptions of the vessel's elements are to be submitted. Any non-standard symbols used are to be explained in a key list. All documents must show the number of the project and the name of the owner and/or shipyard.

3. The supporting calculations shall contain all necessary information concerning reference documents (parts of the specification, drawings, superior computations, computations for elements, following calculations). Literature used for the calculations has to be cited, important but not commonly known sources shall be added as copy.

The choice of computer programs according to the "State of the Art" is free. The programs may be checked by **TL** through comparative calculations with predefined test examples. A generally valid approval for a computer program is, however, not given by **TL.** Direct calculations may be used in the following fields:

- Global strength
- Longitudinal strength
- Beams and grillages
- Detailed strength

For such calculations the computer model, the boundary condition and load cases are to be agreed upon with **TL**.

The calculation documents are to be submitted including input and output.

4. The detailed requirements for the documentation are defined in the different Sections.

5. **TL** reserves the right to demand additional documentation if that submitted is insufficient for an assessment of the ship or essential parts thereof. This may especially be the case for plants and equipment related to new developments and/or which are not tested on board to a sufficient extent.

6. The drawings are to be submitted in electronic plan approval system (EPAS). All calculations and supporting documentation for examination at a sufficiently early date to ensure that they are approved and available to the Surveyor at the beginning of the manufacture or installation of the ship or of important components.

7. Once the documents submitted have been approved by **TL** they are binding on the execution of the work. Subsequent modifications and extensions require the approval of **TL** before becoming effective.

SECTION 2

CLOSURE CONDITIONS, BUOYANCY and STABILITY

A. General

1. Classification

Fishing vessels with a length **L** ≥ 12 m will be assigned Class only after it has been demonstrated that the closure conditions, buoyancy, subdivision and their stability are adequate for the service intended.

2. Basic Regulations

The regulations to be applied besides the International Convention on Load Lines, 1966, as amended (**ICLL**) are summarized in Section 1, A.3. The requirements and measures contained in these regulations are integrated in this Section.

3. Closure Conditions

A closure/freeboard plan showing all openings, cut-outs, passages, etc. in deck and shell will be sent for approval to the **TL** Head Office.

4. Stability

4.1 Adequate intact stability means compliance with standards laid down by the relevant Administration. **TL** reserve the right to deviate therefrom, if required for special reasons, taking into account the fishing vessel's size and type.

4.2 Evidence of approval by the competent Administration of the flag state concerned may be accepted for the purpose of Classification.

4.3 Fishing vessels with proven damage stability will be assigned the symbol **FS** see **TL** Rules Classification and Surveys, Section 2, D.2.7.

4.4 The compliance with the requirements of this Section is to be checked by calculation and tests according to G. with the prototype, if any, or with the actual fishing vessel itself in the fully loaded, ready for use condition. Trials are to be carried out under the supervision of a **TL** Surveyor.

Details regarding the execution of the trials are laid down by **TL** Head Office, see also G.

5. Documents to be Submitted for Approval

For the condition of drawings and documents which are necessary for approval see Section 1, E.

6. Definitions

Definitions for this section are are given in Chapter 1, Hull, Section 26, A.2.

7. Anti-heeling Devices

7.1 If tanks are used as heeling devices, effects of maximum possible tank moments on intact stability are to be checked. A respective proof has to be carried out for several draughts and taking maximum allowable centres of gravity resulting from the stability limit curve as a basis.

7.2 If a fishing vessel is equipped with antiheeling arrangements which may produce heeling angles of more than 10°, **TL** Rules, Chapter 4, Machinery, Section 16, P.1.4 have to be observed.

7.3 All devices have to comply with **TL** Rules, Chapter 5 - Electric, Section 7, G.

B. Openings and Closures in Hull, Deck and Superstructures

1. General

1.1 Coaming heights for openings leading below the working deck, to enclosed superstructures or to spaces considered buoyant in the stability calculation are in general to be in accordance with the requirements of this Section as far as reasonable and practicable.

1.2 Where applicable, sill or coaming heights should comply with National Administration requirements.

1.3 Doors, hatches and ventilation ducts including their covers, lock tumblers and securing arrangements must be adequately dimensioned. Details are to be submitted for approval.

1.4 All doors and escape hatches must be operable from both sides.

1.5 For ships other than fishing vessels, e.g. vessels processing their catch, with **L** ≥ 24 m the requirements of the International Convention on Load Lines (**ICLL**) have to be observed.

2. Doors

2.1 Watertight doors

2.1.1 The number of openings in watertight bulkheads, as required by F.1., shall be reduced to the minimum compatible with the general requirements and operational needs of the fishing vessel. The openings shall be fitted with watertight closing appliances to the satisfaction of the Administration, see Table 2.1.

Watertight doors shall be of equivalent strength to the adjacent unpierced structure.

2.1.2 Fishing vessels with L < 45 m

Doors may be of the hinged type, which shall be capable of being operated locally from each side of the door and shall normally be kept close at sea. A notice shall be attached to the door on each side to state that the door shall be kept closed at sea.

2.1.3 Fishing vessels with L ≥ 45 m

Doors shall be of the sliding type in:

- Spaces where it is intended to open them at sea and if located with their sills below the deepest operating waterline, unless the Administration considers it to be impracticable or unnecessary taking into account the type and operation of the fishing vessel
- The lower part of a machinery space where there is access from it to a shaft tunnel

Otherwise the doors shall be of the hinged type.

2.1.4 Sliding doors

2.1.4.1 Sliding doors shall be capable of being operated when the fishing vessel is listed up to 15° either way.

2.1.4.2 Sliding doors, whether manually operated or otherwise, shall be capable of being operated locally from each side of the door. In fishing vessels with **L** ≥ 45 m these doors shall also be capable of being operated by remote control from an accessible position above the working deck, except when the doors are fitted in crew accommodation spaces.

2.1.4.3 Means shall be provided at remote operating positions to indicate when a sliding door is open or closed.

2.2 Weathertight doors

2.2.1 All access openings in bulkheads of enclosed superstructures and other outer structures through which water could enter and endanger the fishing vessel, shall be fitted with doors permanently attached to the bulkhead, framed and stiffened so that the whole structure is of equivalent strength to the unpierced structure, and weathertight when closed, see Table 2.1.

2.2.2 The means of securing the doors weathertight shall consist of gaskets and clamping devices or other equivalent means and shall be permanently attached to the bulkhead or to the doors themselves, and shall be so arranged that they can be operated from each side of the bulkhead. The Administration may, without prejudice to the safety of the crew, permit the doors to be opened from one side only for freezer rooms, provided that a suitable alarm device is fitted to prevent persons being trapped in those rooms.

2.2.3 Height of door sills

2.2.3.1 The height above deck of sills in those doorways, in companionways, erections and machinery casings which give direct access to parts of the deck exposed to the weather and sea shall be at least according to Table 2.2, first column. The heights of sills

on superstructure decks shall be at least according to Table 2.2, second column.

2.2.3.2 Where operating experience has shown justification and on approval of the Administration, the heights on the working deck, except in the doorways giving direct access to machinery spaces, may be reduced according to Table 2.2, third column.

Where operating experience has shown justification and on approval of the Administration, the height of sills on superstructure decks may be reduced to values not less than defined in Table 2.2, forth column.

3. Openings for Fishing Operations

3.1 Deck openings which may be open during fishing operations shall normally be arranged near the vessel's centreline. However, the Administration may approve different arrangements if satisfied that the

safety of the vessel will not be impaired.

3.2 Fish flaps on stern trawlers shall be power operated and capable of being controlled from any position which provides an unobstructed view of the operation of the flaps.

3.3 Where it is essential for fishing operations, flush deck scuttles of the screw, bayonet or equivalent type and manholes may be fitted, provided these are capable of being closed watertight and such devices shall be permanently attached to the adjacent structure. Having regard to the size and disposition of the openings and the design of the closing devices, metal-to-metal closures may be fitted if the Administration is satisfied that they are effectively watertight.

3.4 Openings other than hatchways, like manholes and flush scuttles in the working or superstructure deck shall be protected by enclosed structures fitted with weathertight doors or their equivalent. Companionways shall be situated as close as practicable to the centreline of the vessel.

4. Hatchway Openings and Hatch Covers

4.1 General

4.1.1 All hatchways shall be provided with covers. For vessels with 12 m ≤ **L** < 24 m hatchways which may be opened during fishing operation shall normally be arranged near the vessel's centreline.

4.1.2 The height above deck of the hatchway coamings shall be as defined in 2.2.3.1.

4.2 Wooden hatchway covers

4.2.1 The use of wooden hatchway covers is generally not recommended in view of the difficulty of rapidly securing their weathertightness. However, where fitted they shall be capable of being secured weathertight.

4.2.2 The finished thickness of wood hatchway covers shall include an allowance for abrasion due to rough handling. In any case, the finished thickness of these covers shall be at least 4 mm for each 100 mm of unsupported span subject to a minimum of 40 mm and the width of their bearing surface shall be at least 65 mm.

4.2.3 Arrangements for securing wood hatchway covers weathertight shall be provided to the satisfaction of the Administration.

4.3 Hatchway covers other than wood

4.3.1 Where operating experience has shown justification, and on the approval by the Administration, the height of coamings according to 2.2.3.1 may be reduced, or the coamings omitted entirely, provided that the safety of vessels is not thereby impaired. In this case, the hatchway openings shall be kept as small as practicable and covers be permanently attached by hinges or equivalent means and be capable of being rapidly closed and battened down, or by equally effective arrangements to the satisfaction of the Administration.

Table 2.1 Requirements for openings and closures

Closure components	Closure requirements			
	Working deck	Superstructure deck	Working deck for special conditions	Superstructure deck for special conditions
Doors in watertight bulkheads	watertight			
Doors in enclosed superstructures	weathertight			
Hatchways	weathertight			
Openings for fishing operations	weathertight		Watertight **(1)**	
Ventilator coamings	weathertight		Open **(1)**	
Air pipes	weathertight		weathertight	
Sidescuttles to spaces below working deck, to spaces within closed structures	watertight			
Windows	watertight			
(1) *For coaming heights see Table 2.2*				

Table 2.2 Minimum coaming heights

Closure components	Height requirements [mm]			
	Working deck	Superstructure deck	Working deck for special conditions	Superstructure deck for special conditions
Door sills **L** = 12 m **L** ≥ 24 m 12 m < **L** < 24 m	 300 600 linear interpolation	 300 300 linear interpolation	 150 380 **(1)** linear interpolation	 150 150 **(1)** linear interpolation
Hatchways **L** = 12 m **L** ≥ 24 m 12 m < **L** < 24 m	 300 600 linear interpolation	 300 300 linear interpolation	 reduced **(2)** reduced **(2)** linear interpolation	 reduced **(2)** reduced **(2)** linear interpolation
Openings for fish operations	Acc. to hatchways		Flush possible **(3)**	
Ventilator coamings 12 m ≤ **L** < 24 m 24 m ≤ **L** < 45 m **L** ≥ 45 m	 760 760 900	 450 450 760	 2500 **(4)** 3400 **(4)** 4500 **(4)**	 1000 **(4)** 1700 **(4)** 2300 **(4)**
Air pipes	760	450	reduced **(5)**	reduced **(5)**
Sidescuttles, windows	500 above deepest waterline		< 1000 fixed type sidescuttles	

(1) *For doorways not giving access to machinery spaces, if operation experience justifies and with approval by the Administration.*

(2) *For covers other than wood, if operation experience has shown justification and with approval by the Administration.*

(3) *Where essential for fishing operations, manhole cover, etc. may be fitted.*

(4) *Closing appliances need not be fitted.*

(5) *Reduction may be accepted by the Administration to avoid interference with fishing operations.*

4.3.2 For the purpose of strength calculations, it shall be assumed that hatchway covers are subjected to the weight of cargo intended to be carried on them or to the following static loads, whichever is the greater:

- 10,0 kN/m^2 for vessels with **L** < 24 m

- 17,0 kN/m^2 for vessels with **L** ≥ 100 m

- linear interpolation for values of **L** in between

The Administration may reduce the loads to not less than 75 % of the above values for covers to hatchways situated on the superstructure deck in a position abaft a point located 0,25 **L** from the forward perpendicular.

4.3.3 Where the covers are made of normal hull structural steel, the maximum stress calculated according to 4.3.2 multiplied by 4,25 shall not exceed the minimum ultimate strength of the material. Under these loads the deflections shall not be more than 0,0028 times the span.

4.3.4 Covers made of materials other than normal hull structural steel shall be at least of equivalent strength to those of normal hull structural steel and their construction shall be of sufficient stiffness ensuring weathertightness under the loads specified in 4.3.2.

4.3.5 Hatch covers shall be fitted with clamping devices and gaskets sufficient to ensure weathertightness or other equivalent arrangements to the satisfaction of the Administration.

5. Machinery Space Openings

5.1 Machinery space openings shall be framed and enclosed by casings of a strength equivalent to the adjacent superstructure. External access openings therein shall be fitted with doors complying with the requirements of Table 2.2 or with hatch covers other than wood complying with the provisions of 4.3.

5.2 Openings other than access openings shall be fitted with covers of equivalent strength to the unpierced structure, permanently attached thereto and capable of being closed weathertight.

6. Ventilators

6.1 General

Ventilators shall have coamings of equivalent strength to the adjacent structure and shall be capable of being closed weathertight by closing appliances permanently attached to the ventilators or adjacent structure. Where the coaming of any ventilator exceeds 900 mm in height it shall be specially supported.

6.2 Fishing vessels with 12 m ≤ L < 24 m

6.2.1 Ventilators shall be arranged as close to the vessels centreline as possible and, where practicable, shall extend through the top of a deck erection or companion way.

6.2.2 On the working deck the height above deck of coamings of ventilators other than machinery space ventilators shall not be less than 760 mm and on superstructure decks not less than 450 mm. When the height of such ventilators may interfere with the working of the vessel their coaming heights may be reduced to the satisfaction of the competent Authority, see Table 2.2.

6.2.3 The height above deck of machinery space ventilator openings shall be to the satisfaction of the competent Authority.

6.2.4 Closing appliances need not be fitted to ventilators the coamings of which extend more than 2,5 m above the working deck or more than 1,0 m above a deckhouse top or superstructure deck.

6.3 Fishing vessels with 24 m ≤ L < 45 m

6.3.1 The height above deck of ventilator coamings, other than machinery space ventilator coamings, shall be at least 760 mm on the working deck and at least 450 mm on superstructure decks, see Table 2.2.

6.3.2 Closing appliances need not be fitted to ventilators the coamings of which extend to more than 3,4 m above the working deck or more than 1,7 m above the superstructure deck.

6.4 Fishing vessels with L ≥ 45 m

6.4.1 The height above deck of ventilator coamings, other than machinery space ventilator coamings, shall be at least 900 mm on the working deck and at least 760 mm on the superstructure deck, see Table 2.2.

6.4.2 Closing appliances need not be fitted to ventilators the coamings of which extend to more than 4,5 m above the working deck or more than 2,3 m above the superstructure deck.

6.5 Machinery space ventilators

If the Administration is satisfied that it is unlikely that water will enter the vessel through machinery space ventilators, closing appliances to such ventilators may be omitted.

7. Air Pipes

7.1 The height of air pipes above deck to the point where the water may have access below shall be at least 760 mm on the working deck and at least 450 mm on the superstructure deck. The Administration may accept reduction of the height of an air pipe to avoid interference with the fishing operations, see Table 2.2.

7.2 Where air pipes to tanks and void spaces below deck extend above the working or the superstructure decks, the exposed parts of the pipes shall be of strength equivalent to the adjacent structures and fitted with appropriate protection. Openings of air pipes shall be provided with means of closing, permanently attached to the pipe or the adjacent structure.

8. Sounding Devices for Fishing Vessels with L ≥ 24 m

8.1 Sounding devices shall be fitted for:

- All tanks and cofferdams
- Bilges of those compartments which are not readily accessible at all times during the voyage

8.2 Where sounding pipes are fitted, their upper ends shall be extended to a readily accessible position and, where practicable, above the working deck. Their openings shall be provided with permanently attached means of closing. Sounding pipes which are not extended above the working deck shall be fitted with automatic self-closing devices.

9. Inlets and Discharges

9.1 Discharges led through the shell either from spaces below the working deck or from enclosed superstructures or deckhouses on the working deck fitted with doors complying with the requirements of 2.2 shall be fitted with efficient and accessible means for preventing water from passing inboard. Normally each separate discharge shall have an automatic non-return valve with a positive means of closing from a readily accessible position. Such a valve is not required if the Administration considers that the entry of water into the vessel through the opening is not likely to lead to dangerous flooding and that the thickness of the piping is sufficient. The means for operating the positive action valve shall be provided with an indicator showing whether the valve is open or closed.

For fishing vessels with 12 m ≤ **L** < 24 m the open inboard end of any discharge system shall be above the deepest operating waterline at an angle of heel satisfactory to the Administration.

9.2 In (manned) machinery spaces main and auxiliary sea inlets and discharges essential for the operation of machinery may be controlled locally. The controls shall be accessible and shall be provided with indicators showing whether the valves are open or closed.

For fishing vessels with 12 m ≤ **L** < 24 m suitable warning devices shall be incorporated to indicate leakage of water into the space.

9.3 Fittings attached to the shell and the valves required by these Rules shall be of steel, bronze or other approved ductile material. All pipes between the shell and the valves shall be of steel, except that in vessels constructed of material other than steel, other

suitable materials may be approved by the Administration.

9.4 Scuppers sufficient in number and size to provide effective drainage of water are to be fitted in the weather deck and in the working deck within weathertight closed superstructures and deckhouses. Decks within closed superstructures are to be drained to the bilge. Scuppers from superstructures and deckhouses which are not closed weathertight are to be led outside.

10. Sidescuttles, Windows, Skylights

10.1 In general all windows have to be built in accordance with ISO standards 1751 (side scuttles) and/or 3903 (rectangular windows) respectively and are to be tested accordingly in the presence of a **TL** Surveyor.

10.2 For all fishing vessels sidescuttles to spaces below the working deck and to spaces within the enclosed structure on that deck shall be fitted with hinged deadlights capable of being closed watertight.

10.2.1 For fishing vessels with **L** < 24 m deadlights or a suitable number of storm shutters shall be provided where there is no method of preventing water from entering the hull through a broken window or sidescuttle.

10.3 No sidescuttles shall be fitted in such a position that its sill is less than 500 mm above the deepest operating waterline.

10.4 For fishing vessels with **L** ≥ 24 m sidescuttles fitted less than 1000 mm above the deepest operating waterline shall be of the fixed type.

10.5 Sidescuttles, together with their glasses and deadlights shall be of an approved construction (to the satisfaction of the Administration for fishing vessels with **L** < 24 m). Those prone to be damaged by fishing gear shall be suitably protected.

10.6 Toughened safety glass or its equivalent shall be used for the wheelhouse windows.

11. Freeing Ports

11.1 Where bulwarks on weather parts of the working deck form wells, the minimum freeing port area A on each side of the vessel for each well on the working deck shall be determined in relation to the length and the bulwark height in the well as follows:

$$A = K.\ l\ [m^2]$$

l = Length of well [m]

= Not to be taken as greater than 70 % of **L**

K = 0,035 for vessels with **L** = 12 m

= 0,07 for vessels with **L** ≥ 24 m

= To be defined by linear interpolation for lengths in between

Where the bulwark is more than 1,2 m in average height, the required area A shall be increased by 0,004 m^2 per metre length of the well and for each 100 mm difference in height.

Where the bulwark is less than 0,9 m in average height, the required area A shall be decreased by 0,004 m^2 per metre length of the well and for each 100 mm difference in height.

11.2 The freeing port area calculated according to 11.1 shall be increased where the Administration considers that the vessel's sheer is not sufficient to ensure that the deck is rapidly and effectively freed of water.

11.3 Subject to the approval of the Administration the minimum freeing port area for each well on the superstructure deck shall not be less than one half the area A given in 11.1.

On vessels with **L** < 24 m, where the superstructure deck forms a working deck for fishing operations the minimum area on each side shall not be less than 75 per cent of the area A.

11.4 Freeing ports shall be so arranged along the length of bulwarks as to ensure that the deck is freed from water most rapidly and effectively. Lower edges of freeing ports shall be as near the deck as practicable.

11.5 Poundboards and means for stowage of the fishing gear shall be arranged so that the effectiveness of freeing ports will not be impaired. Poundboards shall be constructed that they can be locked in position when in use and shall not hamper the discharge of shipped water.

11.6 Freeing ports over 300 mm in depth shall be fitted with bars spaced not more than 230 mm and not less than 150 mm apart or provided with other suitable protective arrangements. Freeing port covers, if fitted, shall be of approved construction. If devices are considered necessary for locking freeing port covers during fishing operations they shall be to the satisfaction of the Administration and easily operable from a readily accessible position.

11.7 In vessels intended to operate in areas subject to icing, covers and protective arrangements for freeing ports shall be capable of being easily removed to restrict ice accretion. The size of openings and means provided for removal of these protective arrangements shall be to the satisfaction of the Administration.

11.8 On vessels with **L** < 24 m where wells or cockpits are fitted in the working deck or superstructure deck with their bottom above the deepest operating waterline, effective non-return means of drainage overboard shall be provided. Where bottoms of such wells or cockpits are below the deepest operating waterline, drainage to the bilge will have to be provided.

C. Draught Marking

1. A maximum permissible operating draught shall be approved by TL and shall be such that, in the associated operating condition, the stability criteria according to E. and F. are satisfied.

2. Datum draught marks shall be provided at the bow and stern, port and starboard and be adequate in number for assessing the condition and trim of the vessel. The marks shall be permanent and easily to be read.

D. Intact Buoyancy

1. All fishing vessels shall have a sufficient reserve of buoyancy at the design waterline to meet the intact stability requirements of this Section. This reserve of buoyancy shall be calculated by including only those compartments which are:

- Watertight
- Accepted as having scantlings and arrangements adequate to maintain their watertight integrity
- Situated in locations below a boundary, which may be a watertight deck or an equivalent structure of a non-watertight deck covered by a weathertight structure as defined in 3.

2. Arrangements shall be provided for checking the watertight integrity of those compartments taken into account in 1.

3. Where entry of water into structures above the boundary as defined in 1., third item, would significantly influence the stability and buoyancy of the vessel, such structure shall be:

- Of adequate strength to maintain the weathertight integrity and be fitted with weathertight closing appliances; or
- Provided with adequate drainage arrangements; or
- An equivalent combination of both above measures

4. The means for closing openings in the boundaries of weathertight structures shall be such as to maintain weathertight integrity in all operational conditions.

E. Intact Stability

1. General

Adequate stability of the fishing vessel shall be proven. Insofar as fishing gear, vessel type and propulsion plant installation do not demonstrate any unusual characteristics, the criteria listed below are used for determining stability for the operating conditions defined in 3.1.

Note

Compliance with the stability criteria does not ensure immunity against capsizing. Good seamanship is therefore an essential prerequisite for a stability-safe fishing vessel.

2. Stability Criteria

2.1 Minimum stability criteria

The following minimum stability criteria have to be fulfilled unless **TL** is satisfied that operating experience justifies alterations therefrom:

- the area under the righting lever curve (GZ curve) shall not be less than 0,055 metre-radian up to φ = 30°
- the area under the righting lever curve shall not be less than 0,09 metre-radian up to φ= 40° or the angle of flooding θ_f (angle of heel at which non-weathertight openings immerse; small openings through which progressive flooding cannot take place need not to be considered as open)
- the area under the righting lever curve (GZ curve) between the angles of heel 30° and 40° or between 30° and the angle of flooding θ_f, if this angle is less than 40°, shall not be less than 0,03 metre-radians
- the righting lever GZ shall be at least 0,20 m at an angle of heel φ ≥ 30°
- the maximum righting arm shall occur at an angle of heel preferably exceeding 30°, but not less than 25°
- the initial metacentric height GM_0 shall be not less than 0,35 m for single deck vessels
- the initial metacentric height GM_0 may be reduced for vessels with complete superstructures and with **L** ≥ 70 m to the satisfaction of the Administration, but shall in no case be less than 0,15 m

2.2 Where arrangements other than bilge keels are provided to limit the angles of roll, the Administration shall be satisfied that the stability criteria given in 2.1 are maintained in all operating conditions.

2.3 Where ballast is provided to ensure compliance with paragraph 2.1, its nature and arrangement shall be to the satisfaction of the Administration.

2.4 Subject to Administration approval, If any of these criteria are not complied with, the corresponding condition may be accepted by **TL** if proof of equivalent safety is provided.

2.5 Simplified stability criterion for L < 30 m

2.5.1 For decked fishing vessels with a length **L** < 30 m, the following approximate formula for the minimum metacentric height GM_{min} can be used as a criterion for all operating conditions, but it is not a replacement of the criteria according to 2.1.:

$$GM_{min} = 0{,}53 + 2 \cdot B_{w1} \cdot \left\{ 0{,}075 - 0{,}37 \frac{f}{B_{w1}} + 0{,}82 \cdot \left(\frac{f}{B_{w1}} \right)^2 - 0{,}014 \cdot \frac{B_{w1}}{H} - 0{,}032 \cdot \frac{l_s}{L_{w1}} \right\}$$

B_{wl} = Extreme breadth of the vessel in the waterline in maximum load condition [m]

L_{wl} = Length of the vessel in the waterline in maximum load condition [m]

l_s = Actual length of the enclosed superstructure extending from side to side of the vessel [m]

f = Smallest freeboard measured vertically from the top of freeboard deck at side to the actual waterline

2.5.2 The above formula is applicable for vessels with the following parameters:

- $0,02 < f / B_{wl} < 0,20$
- $l_s / L_{wl} < 0,60$
- $1,75 < B_{wl} / \mathbf{H} < 2,15$
- Sheer fore and aft ≥ standard sheer according to **ICLL**, Reg. 38(8)
- Superstructures with a height ≥ 1,8 m are to be included

For vessels with parameters outside of the above limits the formula should be applied with special care.

3. Conditions for Stability

The proof of adequate stability shall be provided for at least the following conditions.

3.1 Operating conditions

3.1.1 The number and type of operating conditions to be considered shall be to the satisfaction of **TL** and shall include the following as appropriate:

- Departure for the fishing grounds with full fuel, stores, ice, fishing gear, etc.
- Departure from the fishing grounds with full catch
- Arrival at home port with full catch and 10 % stores, fuel, etc.
- Arrival at home port with 10 % stores, fuel, etc. and a minimum catch of 20 % of full catch

Under all other operating conditions, including those which produce the lowest values of the stability parameters, the minimum stability criteria according to 2. have to be met.

3.1.2 For the operating conditions defined in 3.1.1 the calculations shall include the following:

- Allowance for the weight of the wet fishing nets and tackle, etc. on deck
- Allowance for the ice accretion according to 3.7
- Homogeneous distribution of the catch, unless this is inconsistent with practice
- Catch on deck, if anticipated, in operating conditions for departure of the fishing grounds with full catch and arrival at home port with 10 % stores, etc.
- Water ballast if carried in tanks which are especially provided for this purpose or in other tanks also equipped for carrying water ballast
- Allowance for free surface effect of liquids

3.2 **TL** reserve the right to deviate from the a.m. regulations when particular circumstances warrant this. This will especially be the case for a change in the vessel's mode or area of operation which effect the stability considerations of this Section.

3.3 Free liquid surfaces

3.3.1 Tanks

The contribution of free liquid surfaces to the heeling moment has to be considered.

Note

If no other information is available, the following densities of liquids may be used:

– freshwater 1,000 t/m³
– bilge water 1,005 t/m³
– waste water 1,050 t/m³
– fuel 0,830 t/m³
– lubricants 0,900 t/m³
– fire extinguishing foams 1,150 t/m³

3.3.2 Flooding of fish holds

The angle of heel at which progressive flooding of fish holds could occur through hatches which remain open during fishing operations and which cannot be rapidly closed shall be at least 20° unless the stability criteria of 2. can be satisfied with the respective fish holds partially or completely flooded.

The catch shall be properly secured against shifting by portable fish-hold divisions or other adequate means to avoid dangerous trim or heel of the vessel.

3.4 Particular fishing methods

Fishing vessels engaged in particular fishing methods where additional external forces are imposed on the vessel during fishing operations, shall meet the stability criteria of 2. also under such conditions.

Particular care should be taken when the pull from the fishing gear results in dangerous heel angles. This may occur when fishing gear fastens onto an underwater obstacle or when handling fish gear, particularly on purse seiners, or when one of the trawl wires tears off. The heel angles caused by the fishing gear in these situations shall be eliminated by employing devices which can relieve or remove excessive forces applied through the fishing gear. Such devices shall not impose a danger to the vessel through operating in circumstances other than those for which they were intended.

3.5 Severe wind and rolling (weather criterion)

3.5.1 Fishing vessels with L ≥ 45 m

3.5.1.1 Scope

Fishing vessels shall be able to withstand, to the satisfaction of **TL**, the effect of severe wind and rolling in associated sea conditions taking account of the seasonal weather conditions, the sea states in which the vessel will operate, type of vessel and its mode of operation.

The criterion supplements the stability criteria given in 2. The more stringent criteria of 2. and the weather criterion shall govern the minimum requirements for fishing vessels of **L** ≥ 45 m having large windage area.

3.5.1.2 Weather criterion

3.5.1.2.1 The ability of the vessel to withstand the combined effects of beam wind and rolling shall be demonstrated for each standard condition of loading with reference to Fig. 2.1 as follows:

- The vessel is subjected to a steady wind pressure acting perpendicular to the vessel's centreline which results in a steady wind heeling lever l_{w1}

- From the resultant angle of equilibrium θ_0 , the vessel is assumed to roll owing to wave action to an angle of roll θ_1 to windward. Attention shall be paid to the effect of steady wind so that excessive resultant angles of heel are avoided.

Note

*The angle of heel under action of steady wind θ_0 should be limited to a certain angle to the satisfaction of **TL**. As a guide 16 ° or 80 % of the angle of deck edge immersion, whichever is less, is suggested.*

- The vessel is then subjected to a gust of wind pressure which results in a gust wind heeling lever l_{w2}

- Under the circumstances area b shall be equal to or greater than area a

- free surface effects, see 3.3 shall be accounted for in the standard conditions of loading as defined in 3.1

The angles in Fig. 2.1 are defined as follows:

θ_0 = Angle of heel under action of steady wind

θ_1 = Angle of roll to windward due to wave action

θ_2 = Angle of down flooding θ_f or 50° or θ_c, whichever is less, where

θ_f = Angle of heel at which openings in the hull, superstructures or deckhouses which cannot be closed watertight, immerse. In applying this criterion, small openings through which progressive flooding cannot take place need not be considered as open

θ_c = Angle of second intercept between wind heeling lever and GZ curve

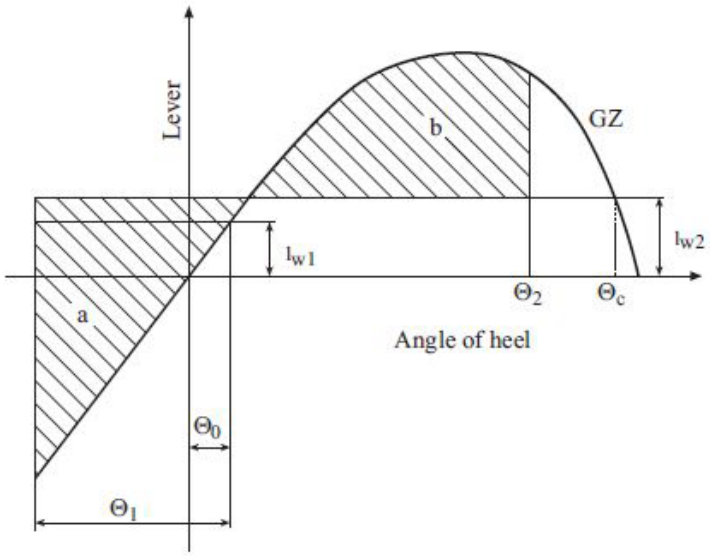

Fig. 2.1 Severe wind and Rolling

3.5.1.2.2 The wind heeling levers l_{w1} and l_{w2} referred to in 3.5.1.2.1 are constant values at all angles of inclination and shall be calculated as follows:

$$l_{w1} = p_w \cdot A \cdot \frac{Z}{1000 \cdot g \cdot \Delta} \quad [m]$$

$l_{w2} = 1{,}5 \cdot l_{w1}$ [m]

p_w = Wind pressure [N/m^2]

= 504 N/m^2

= The value may be reduced for vessels in restricted service, subject to approval by **TL**

A = Projected lateral area of the portion of the vessel and deck cargo, if applicable, above the waterline [m^2]

Z = Vertical distance from the centre of A to the centre of the underwater lateral area or approximately to a point at one half of the draught [m]

g = 9,81 m/s^2

Δ = Displacement according to Section 1,D.

3.5.1.2.3 The angle of roll θ_1 referred to in 3.5.1.2.1 shall be calculated as follows. For vessels with antirolling devices the angle of roll shall be determined without taking into account the effect of such systems.

$$\Theta_1 = 109 \cdot k \cdot X_1 \cdot X_2 \cdot \sqrt{r \cdot s} \quad [°]$$

k = Factor as follows:

= 1,0 for a round-bilged vessel having no bilge or bar keels

= 0,7 for a vessel having sharp bilges

= As shown in Table 2.5 for a vessel having bilge keels, a bar keel or both

X_1 = Factor as shown in Table 2.3

X_2 = Factor as shown in Table 2.4

$$r = 0{,}73 \pm \frac{OG}{T_d}$$

OG = Distance between the centre of gravity and the waterline [m]

the sign + is to be used for the centre of gravity above the waterline

the sign – is to be used for the centre of gravity below the waterline

T_d = Mean moulded draught of the vessel [m]

s = Factor as shown in Table 2.6

Table 2.3 Values for factor X_1

B/T_d	X_1
≤ 2,4	1,00
2,5	0,98
2,6	0,96
2,7	0,95
2,8	0,93
2,9	0,91
3,0	0,90
3,1	0,88
3,2	0,86
3,3	0,84
3,4	0,82
≥ 3,5	0,80

Intermediate values in the Tables 2.3 to 2.6 shall be obtained by linear interpolation.

Table 2.4 Values for factor X_2

C_B	X_2
≤ 0,45	0,75
0,50	0,82
0,55	0,89
0,60	0,95
0,65	0,97
≥ 0,70	1,00

Table 2.5 Values for factor k

$(A_k \cdot 100) / (L.B)$	k
0	1,00
1,0	0,98
1,5	0,95
2,0	0,88
2,5	0,79
3,0	0,74
3,5	0,72
≥ 4,0	0,70

Table 2.6 Values for factor s

T	s
≤ 6	0,100
7	0,098
8	0,093
12	0,065
14	0,053
16	0,044
18	0,038
≥ 20	0,035

The parameters in the Tables are defined as follows :

T = Rolling period [s]

$$= \frac{2 \cdot C \cdot B}{\sqrt{GM}}$$

$$C = 0{,}373 + \frac{0{,}023 \cdot B}{T_m} - \frac{0{,}043 \cdot L_{w1}}{100}$$

L_{wl} = Waterline length [m]

T_m = Mean moulded draught of the vessel [m]

A_k = Total overall area of the bilge keels or area of the lateral projection of the bar keel, or sum of these areas [m^2]

GM = Metacentric height corrected for free surface effect [m]

3.5.2 Fishing vessels with 24 m ≤ L < 45 m

For fishing vessels with a length 24 m ≤ **L** < 45 m the value of the wind pressure p_w can be taken from Table 2.7.

Table 2.7 Wind pressure

h [m] (1)	1	2	3	4	5	6 and over
p_w [N/m^2]	316	386	429	460	485	504
(1) *h is the vertical distance from the centre of the projected vertical area of the vessel to the waterline*						

3.6 Water on deck

3.6.1 Fishing vessels shall be able to withstand, to the satisfaction of TL, the effect of water on deck. The seasonal weather conditions and the sea states in which the vessel will operate, the type of vessel and the mode of operation have to be taken into account.

3.6.2 Bow height

3.6.2.1 The bow height H_B is defined as the minimum vertical d istance from the deepest waterline to the top of the highest exposed deck measured at **FP**.

3.6.2.2 The bow height shall be sufficient, to the satisfaction of **TL**, to prevent excessive shipping of water and shall be determined taking account of the seasonal weather conditions, the sea states in which the vessel will operate, the type of the vessel and its mode of operation.

3.6.2.3 Guidance for calculating bow height

The determination of the required bow height H_B may be based upon the following formula:

$$H_B = k_1 \cdot L\left(1 + \frac{L}{k_2}\right) \quad [m]$$

k_1, k_2 = Coefficients depending upon areas of operation according to Table 2.8.

3.6.2.4 Where the bow height required is obtained by sheer, this shall extend from the stem for a length of at least 0,15 **L** abaft **FP**. Where it is obtained by a forecastle, such forecastle shall extend from the stem at least 0,07 **L** abaft **FP**.

If the length of the forecastle exceeds 0,15 **L** due consideration should be given to the fitting of a bulkhead with adequate closing appliances. If no such bulkhead is fitted adequate arrangements should be provided for removing water from the open forecastle.

3.6.2.5 Where a bulwark is fitted this may be taken into account for a height of 1 m, provided that the bulwark extends from the stem to a point at least 0,15 **L** abaft **FP**.

3.6.2.6 When a vessel is always trimmed by the stern in service conditions, the minimum trim may be allowed in the calculation of bow height.

Note:

3.6.3 Guidance for the calculation of the effect of water on deck

3.6.3.1 *The ability of the vessel to withstand the heeling effect due to the presence of water on deck should be demonstrated by a quasi-static method. According to Fig. 2.2 the following condition shall be satisfied with the vessel in the worst operating condition:*

$$C_{wod} = A_a / A_b \geq 1$$

A_a = *area between heeling lever curve due to water on deck and righting lever GZ curve, see Fig. 2.2*

A_b = *area below righting lever GZ curve and between heeling lever curve due to water on deck and an angle of inclination $\varphi = 40°$ or the angle of flooding θ_f, whichever is less*

Table 2.8 Definition of coefficients k_1 and k_2

Area of operation	L	k_1	k_2
Extreme conditions with significant wave height ≤ 8 m	24 m ≤ L < 110 m	0,09	-270
	L ≥ 110 m	4,959 / L	600
Extreme conditions with significant wave height > 8 m	24 m ≤ L < 110 m	0,117	-220
	L ≥ 110 m	5,990 / L	1484

3.6.3.2 *For the calculation of the static heeling moment due to water on deck Mw the following assumptions should be made:*

- *at the beginning the vessel is in the upright position*
- *during heeling, trim and displacement are constant and equal to the values for the vessel without water on deck*
- *the effect of freeing ports should be ignored*
- *the deck well is filled to the top of the bulwark at its lowest point and the vessel heeled up to an angle at which this point is immersed*

3.6.3.3 *For the determination of the dynamic heeling moment the following formula should be used:*

$$M_{wod} = K \cdot M_w$$

K = *coefficient for dynamic effects taking in account for rolling period, dynamic effects of water flow, disposition and configuration of deck wells and deckhouses, area of operation, etc.*

= *1,0 for static approach*

> *1,0 for angle of deck immersion $\theta_D < 10° - 15°$, or for angle of bulwark top immersion $\theta_B < 20° - 25°$*

< *1,0 for $\Theta D > 20°$, or for $\Theta B > 30°$*

3.6.3.4 *Other methods for the calculation of the effect of water on deck using the dynamic approach have to be approved by **TL**.*

3.7 Ice accretion

3.7.1 Fishing vessels intended for operation in areas where ice accretion is known to occur shall be:

- Designed to minimize the accretion of ice
- Equipped with such means of removing ice as **TL** may require

3.7.2 Standard assumptions

For fishing vessels operating in areas defined in 3.7.3 the following ice loads shall be assumed:

- 0,30 kN/m^2 on exposed weatherdecks and gangways
- 0,075 kN/m^2 for the projected lateral area of each side of the vessel above the waterline

The projected lateral area of discontinuous surfaces of rail, spars (except masts) and rigging of vessels having no sails and the projected lateral area of other small objects shall be computed by increasing the total projected area of continuous surfaces by 5 % and the static moments of this area by 10 %.

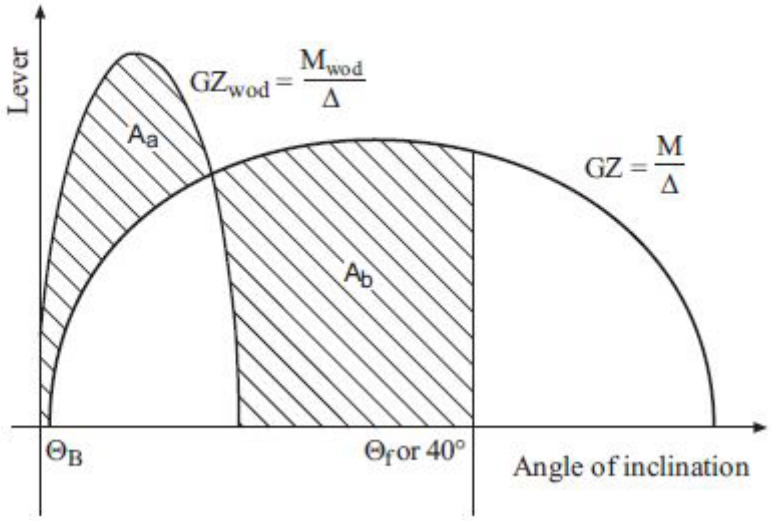

Fig. 2.2 Heeling and righting levers for water on deck

3.7.3 Special icing areas

3.7.3.1 Loads in excess of twice the standard loads defined in 3.7.2 may be expected in following area:

- the area north of latitude 43° N bounded in the west by the North American coast and east by the rhumb line running from latitude 43° N longitude 48° W to latitude 63° N longitude 28° W and then along longitude 28° W

3.7.3.2 One half to twice the standard loads defined in 3.7.2 may be expected in the following areas:

- The area north of latitude 65°30 N, between longitude 28° W and the west coast of Iceland; north of the north coast of Iceland; north of the rhumb line running from latitude 66° N, longitude 15° W to latitude 73°30 N, longitude 15° E, north of latitude 73°30 N between longitude 15° E and 35° E, and east of longitude 35° E

- North of latitude 56° N in the Baltic Sea

- All sea areas north of the North American continent, west of the areas defined above and in 3.7.3.1

- The Bering and Okhotsk Seas and the Tartary Street during the icing season

- South of latitude 60° S

F. Subdivision and Damage Stability

1. Bulkheads

1.1 At least the following watertight bulkheads are to be fitted in all fishing vessels:

- one collision bulkhead

- one afterpeak bulkhead

- one bulkhead at each end of the machinery space

1.2 Collision bulkhead

1.2.1 The collision bulkhead is a watertight bulkhead up to the working deck in the forepart of the vessel located at the following distance x [m] aft from **FP**:

- for vessels with L ≥ 45 m: 0,05 L ≤ x ≤ 0,08 L

- for vessels with L < 45 m: 0,05 L ≤ x ≤ 0,05 L + 1,35 m

- in any case: 2,0 m ≤ x

Where any part of the underwater body extends forward of **FP**, e.g. a bulbous bow, the distance x defined above shall be measured from a point at mid-length of the extension forward of **FP** or from a point 0,015 . L forward of **FP**, whichever is less.

1.2.2 The bulkhead may have steps or recesses provided they are within the limits defined in 1.2.1.

1.2.3 Where a long forward superstructure is fitted, the collision bulkhead shall be extended weathertight to the deck next above the working deck. The extension need not be fitted directly above the bulkhead below provided it is located at a distance x defined in 1.2.1 and

the part of the deck which forms the step is made effectively weathertight.

1.2.4 Pipes piercing the collision bulkhead shall be fitted with suitable valves operable from above the working deck and the valve chest shall be secured at the collision bulkhead inside the forepiek. No door, manhole, ventilation duct or any other opening shall be fitted in the collision bulkhead below the working deck.

The number of openings in the collision bulkhead above the working deck shall be reduced to the minimum compatible with the design and normal operation of the vessel. Such openings shall be capable of being closed weathertight.

2. Double Bottom

2.1 At least for fishing vessels with a length L ≥ 75 m a double bottom shall be fitted extending from the collision bulkhead to the afterpeak bulkhead.

2.2 The double bottom has to protect the vessel's bottom up to the turn of the bilge. For this purpose, the intersecting line of the outer edge of the margin plate with the shell plating is not to be lower at any part than a horizontal plane, passing through the point of intersection with the frame line amidships of a transverse diagonal line inclined 25 degrees to the base line and cutting the base line at B/2 from the centreline of the vessel, see Fig. 2.3.

2.3 The double bottom need not be fitted in way of deep tanks, provided that the efficiency of the watertight subdivision is not impaired by such an arrangement.

2.4 The bottoms of drain sumps are to be situated at a distance of at least 460 mm from the base line. Only above the horizontal plane determined from 2.2, the bottoms of drain wells may be led to the shell plating. Exemptions for the depth of drain wells may also be granted in shaft tunnels and pipe tunnels.

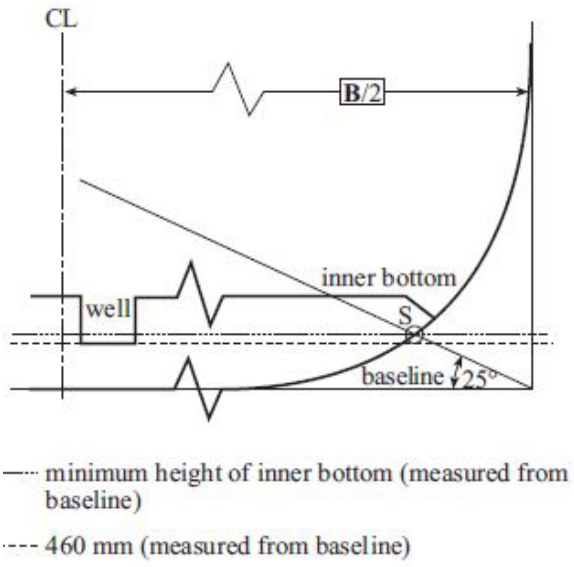

Fig. 2.3 Double bottom with drain sumps location

3. Damage Stability

3.1 General

For fishing vessels with a length **L** ≥ 100 m where the total number of persons carried on board is 100 or more, a damage stability investigation with flooding of any one compartment between adjacent transverse bulkheads is required. The vessel shall be capable of remaining afloat with positive stability.

3.2 Assumptions

3.2.1 Damage extensions

The assumed extent of damage shall be as follows:

- the vertical extent of damage in all cases is assumed to be from the base line upwards without limits

- the transverse extent of damage is equal to $B_{wl}/5$ measured inboard from the side of the vessel in y-direction at the level of the deepest operating waterline

- if a damage of a lesser extent than in the two first conditions results in a more severe condition, such lesser extent shall be assumed

- if there are steps or recesses in a transverse bulkhead of no more than 3,05 m in length within the transverse extent of assumed damage, such transverse bulkhead shall be considered intact and the adjacent compartments may be flooded singly

- if the steps or recesses in a transverse bulkhead exceed 3,05 m, the two compartments adjacent to this bulkhead shall be considered as flooded

- the step form at the junction of the afterpeak bulkhead and the afterpeak tank top shall not be regarded as a step in the bulkhead

- where a main transverse bulkhead is situated within the transverse extent of assumed damage and is stepped in way of a double bottom or side tank by more than 3,05 m, the double bottom or side tanks adjacent to the stepped portion of the main transverse bulkhead shall be considered as flooded simultaneously

- where bulkheads are spaced at a distance less Than ⅓ . $L^{2/3}$, one or more of these bulkheads shall be assumed as non-existent in order to achieve the minimum spacing between bulkheads

- if pipes, ducts or tunnels are situated within the assumed transverse extent of damage, arrangements are to be made so that progressive flooding cannot thereby extend to compartments other than those assumed to be floodable in the calculation for each case of damage

- where operating experience has shown that other values are more appropriate, those values may be agreed with **TL**

3.2.2 Permeability

For damage stability calculations, the permeability for each space or part of a space shall be used as set out in Table 2.9.

Direct calculation of permeability shall be used where a more onerous condition results, and may be used where a less onerous condition results compared with Table 2.9.

Table 2.9 Values of permeability

Definition of spaces	Permeability μ [%]
Control stations, accommodation rooms, kitchens, pantries, workshops	95
Machinery and ventilation rooms	85
Storage rooms, refrigerating rooms	60
Tanks, bunkers, cells	0 or 95 **(1)**
Void spaces	95
(1) *Whichever results in more severe requirements*	

3.3 Conditions of equilibrium

The final waterline after damage to anyone compartment shall be either:

- the line of openings at which progressive flooding to spaces below would occur or according to requirements defined by TL

- the line to the after end of the top of the poop superstructure deck at the centreline, subject to the first four conditions of 3.4.

Unsymmetrical flooding shall be kept to a minimum consistent with effective arrangements. Where it is necessary to correct large angles of heel, the means adopted shall, where practicable, be self-acting.

3.4 Stability criteria

The fishing vessel is considered to survive the conditions of damage specified in 3.2.1 provided the vessel remains afloat in a condition of stable equilibrium according to 3.3 and satisfies the following criteria for

residual stability:

- the positive residual righting lever curve shall have a minimum range of 20° beyond the angle of equilibrium
- a residual righting lever is to be obtained within the range of the positive stability of at least 0,1 m
- the area under the righting lever curve shall be at least 0,0175 metre-radians, measured from the angle of equilibrium to the angle at which progressive flooding occurs
- the angle of heel in the final condition of flooding shall not exceed 20°
- the initial metacentric height of the damaged vessel in the final condition of flooding for the upright position shall be positive and not less than 50 mm

Relaxation from these damage stability requirements will be permitted by **TL** only if the proportions, arrangements and other characteristics of the vessel are more favourable to stability after damage.

G. Inclining Test

1. Every vessel shall undergo an inclining test upon its completion and the actual displacement and position of the centre of gravity shall be determined for the light ship condition.

2. Where alterations are made to the vessel affecting its light ship condition and the position of the centre of gravity, the vessel shall, if **TL** considers this necessary, be re-inclined and the stability information revised.

3. **TL** may allow the inclining test of an individual vessel to be dispensed with provided basic stability data are available from the inclining test of a sister vessel and it is shown to the satisfaction of **TL** that reliable stability information of the exempted vessel can be obtained from such basic data.

4. A report of each inclination test carried out in accordance with this Section or of each calculation of the lightship condition particulars shall be submitted to **TL** for approval. The approved report shall be placed on board of the vessel in the custody of the skipper and should incorporate such additions and amendments as **TL** may require in any particular case.

H. Stability Information

1. General

1.1 Suitable stability information shall be supplied to enable the skipper to assess with ease and certainty the stability of the vessel under various operating conditions. Such information shall include specific instructions to the skipper warning him of those operating conditions which could adversely affect either the stability or the trim of the vessel. A copy of the stability information shall be submitted to **TL** for approval.

1.2 The approved stability information shall be kept on board, readily accessible at all times and inspected at the periodical surveys of the vessel to ensure that it has been approved for the actual operating conditions.

1.3 Where alterations are made to a vessel affecting its stability, revised stability calculations shall be prepared and submitted to **TL** for approval. If **TL** decides that the stability information has to be revised, the new information shall be supplied to the skipper and the superseded information removed.

2. Scope for Intact Stability

The following information has to be provided.

2.1 Basic information

- Stability calculations including GZ curves of the operating conditions defined in E.3.1
- Instructions warning of conditions critical from stability standpoint, e.g. instructions to keep the ballast tanks full when necessary for adequate stability
- Maximum permissible operating draught associated with each operating condition
- When appropriate, minimum required operating draught

2.2 Information having regard to the type of vessel, service, etc.

2.2.1 If GZ calculations are intended:

- Information for determination of weights, positions of centres of gravity, free surface effects of tanks, fish holds and pounds
- Information relating to form stability and hydrostatic parameters
- Displacement and disposition of centres of gravity of light ship condition with regard to permanent ballast

2.2.2 When rolling tests are used:

- Information for the determination of metacentric height GM_0 by means of a rolling test
- Information giving required minimum metacentric height GM_0 for the practical range of draughts

2.2.3 In form of simplified information supplementary or alternative information which permits safe operation without recourse to calculations or Rolling tests.

2.3 Operational requirements

- Instructions for filling and emptying tanks with free liquid surfaces
- Information on the proper use and control of any anti-rolling devices
- Information on the weight and arrangement of permanent ballast

3. Scope for Damage Stability

For vessels which require investigation of damage stability according to F.3.1 the following additional information has to be provided.

3.1 General

- Information on the use of ballast and other liquid systems to correct heel and trim
- Forms for recording daily tank statements
- Instructions for loading in order to maintain the vessel afloat after flooding

3.2 Damage control plan

3.2.1 There shall be permanently exhibited or readily available on the navigating bridge, for the guidance of the skipper and the officers in charge of the fishing vessel, a plan showing clearly:

- For each deck and compartment the boundaries of the watertight compartments, the openings therein with the means of closure and position of any controls thereof
- For doors, a description of degree of tightness, operating mode, normal position, operating circumstances (opened while at sea, not normally used while at sea, not used while at sea)

- Arrangements for the correction of any list due to flooding

3.2.2 General precautions shall consist of a listing of equipment, conditions and operational procedures, considered to be necessary to maintain watertight integrity under normal vessel operations.

3.2.3 Specific precautions shall consist of a listing of elements (i.e. closures, securing of equipment/loads, sounding of alarm, etc.) considered to be vital to the survival of the vessel and its crew.

SECTION 3

SPECIAL REQUIREMENTS for HULL STRUCTURES

A. General

1. Application

The provisions of this Section shall apply to all types of fishing vessels.

2. Basic rules

2.1 For metal hulls of decked fishing vessels the design and construction shall be based on the **TL** Rules Chapter 1, Hull. But these Rules shall only be valid, where they are not superseded by the special requirements defined in this Section.

2.2 For glass fibre reinforced plastic hulls the design and construction shall be based on the **TL** Rules, Chapter 9, Yachts. These Rules have to be completed by the reinforcements defined in this Section.

2.3 The design and construction of other types of hull structures shall be agreed case by case with **TL.**

3. Definitions

The definition of the main parameters of the hull structure is given in Section 1, D.

B. Special Measures for the Hull Structure

1. Strengthening at the shell side for side trawlers

The following additional strengthening is required for side trawlers:

1.1 The thickness of the sheerstrake is to be increased by at least 3 mm in way of the trawl gallows. It is recommended to also increase the thickness of the sheerstrake between the forward and aft gallows throughout by 2 mm.

1.2 In way of the path of the bobbins at the aft gallows during hauling operations, the side plating above the middle of the bilge turn is to be 50 per cent greater in thickness than required.

1.3 At the forward gallows, the side plating above the upper turn of the bilge is to be strengthened correspondingly.

1.4 The seams at the lower edge of the sheerstrake and the upper turn of the bilge are to be protected by half round bars running from the fore to the aft gallows, and by further half round bars arranged between them or diagonally in such a way that the welds cannot be worn by the trawl wire ropes.

1.5 In way of the strengthened shell plating under the aft gallows, intermediate frames are to be arranged, which are to be connected to the deck and the plate floors, or to be supported by a stringer at the lower edge of the strengthened plates. The section modulus of intermediate frames is not to be less than 75 per cent of that of the frames they are fitted between.

1.6 The bulwarks at the operating side are to be 2 mm thicker, and under the gallows 3 mm thicker than required by the **TL** Rules Chapter 1, Hull, Section 7, C, 11. In way of the slip hook, the thickness of bulwarks is not to be less than 10 mm.

2. Strengthening at the shell side for vessels mooring at sea

2.1 Basic assumptions

The requirements for vessels of a fishing fleet mooring together at sea provide for a damping protection of the hull for which purpose pneumatic fenders or other equivalent damping arrangements may be used. These requirements are based on assumptions that the vessels will be moored at a sea state not above 6 **(1).**

2.2 Regions for side strengthening

The following regions have to be distinguished, compare Fig. 3.1.

(1) *Sea states relating to wind and sea conditions according to international agreement ranging from sea state 0 (best) to 9 (worst*).

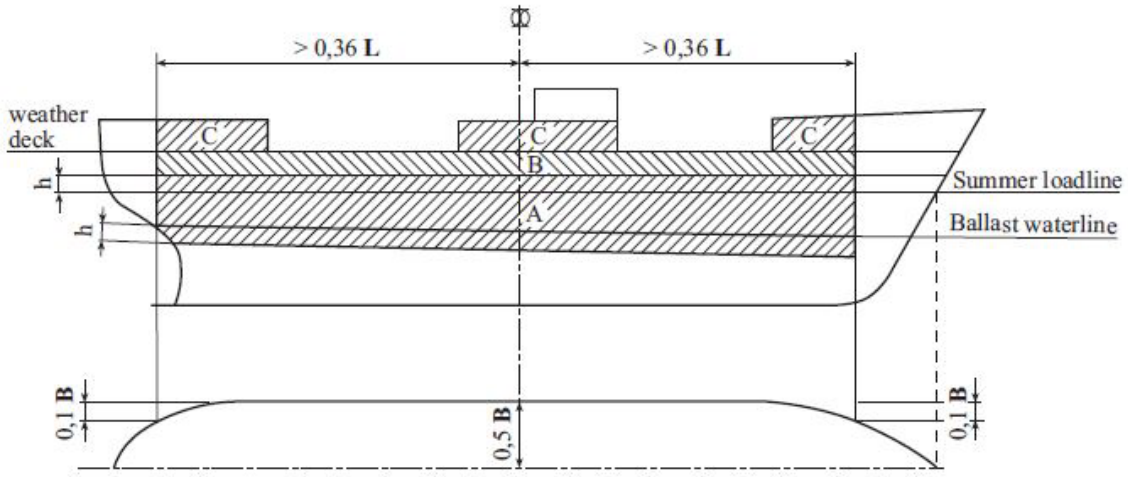

Fig. 3.1 Regions for strengthening at the shell side for vessels mooring at sea

2.2.1 Depth dimension

- Region A locating between the line drawn lower than the ballast waterline by the value of h and the line drawn higher than the summer loadline by the value of h

  h = 0,8 m for sea state ≤ 4

  = 1,2 m for sea state 5

  = 2,0 m for sea state 6

- Region B located between the upper boundary of region A and the weather/strength deck.

- Region C located between the strength deck and the first tier superstructure deck including forecastle and poop.

2.2.2 Length dimension

- regions A, B and C are situated between sections of the vessel where the breadth of the vessel is equal to 0,8 . B

- for special purpose ships, like transport ships or ships with centralized fish processing plants, the regions are to extend at least 0,36 . L forward and aft from the midship section

2.2.3 Additional fender areas

For big special purpose ships, one or more fender areas are to be additionally established. The boundaries shall be formed by sections lying within 0,05 . L forward and aft of the edges of the fender. Extreme positions of fenders and all specific variations of planned mooring have to be considered.

2.2.4 Exceptions

Where superstructure sides are inclined to the centre line of the vessel at not less than 0,1 of superstructure height or are fitted inboard at not less than the same distance no additional strengthening is required.

Where the inclination or the distance between the vessel side and the superstructure is less than this value, the strengthening of their frames and side plating shall be determined by linear interpolation proceeding from the requirements in 2.4.

2.3 Design pressure

The design pressure on the sides and superstructure sides of vessels moored at sea is to be obtained from the following formulae:

For region A:

$$p_A = \alpha_1 \cdot \alpha_2 \cdot \left[190 + 51 \cdot \sqrt{\Delta \cdot z \cdot 10^{-3}} - 0{,}464 \right] \quad \left[kN/m^2 \right]$$

For regions B and C:

$$p_{BC} = \alpha_1 \cdot \alpha_2 \cdot \left[129 + 59 \cdot \sqrt{\Delta \cdot z \cdot 10^{-3}} - 0{,}464 \right] \quad \left[kN/m^2 \right]$$

α_1 = Factor for ship displacement and sea conditions according to Table 3.1

α_2 = Factor for region of strengthening according to Table 3.2

Δ = Design ship displacement [t]

= For fishing vessels: to the summer load line

= For special purpose ship: of the largest ship mooring alongside

464 t ≤ Δ ≤ 7500 t

n = Number of moorings, alongside the ship whose displacement has been adopted as the design value in formulae for p

z = Distance [m] from the mid-span of member calculated to the summer loadline

= Where a special purpose ship has the freeboard depth h_S greater than the freeboard depth h_F for the largest fishing vessel, the value of z is to be reduced by the difference ($h_S - h_F$)

= In region A z = 1,0

= In any case z ≥ 0

Table 3.1 Factor α_1 for ship displacement and sea conditions

Ship displacement Δ [t]	Sea state no.		
	≤ 4	5	6
≤ 2000	1,00	1,15	1,60
> 2000	0,82	1,00	1,16

Table 3.2 Factor α_2 for region of strengthening

Region of strengthening	Fishing vessel
Region A	1,00
Region A with fender area	-
Region B **(1)**	1/ (0,22 z + 0,6)
Region C **(1)**	1/ (0,12 z + 1,28)
(1) *In the regions B and C, α_2 is assumed between 1,1 and 1,4*	

2.4 Scantlings

2.4.1 Plating

In strengthened areas the thickness of side plating and sheer strake is not to be less than:

$$t_S = 21{,}7 \cdot a \sqrt{\frac{p}{1{,}1 \cdot R_{eH}} - 0{,}242} + t_K \quad [mm]$$

p = p_A or p_{BC} for regions A or for regions B and C according to 2.3

R_{eH} = minimum nominal upper yield strength [N/mm²]

t_K = 4,0 mm for region A in case trawling is effected from the side of the fishing vessel

= 1,2 for regions B and C

= 3,0 mm elsewhere

2.4.2 Framing

2.4.2.1 The section modulus W of the frames is not to be less than:

$$W = 4{,}1 \cdot p \cdot a \cdot \ell^2 \cdot \frac{k}{m} \quad \left[cm^3\right]$$

p = p_A for region A or p_{BC} for regions B and C according to 2.3

ℓ = Span of frame [m] measured along the chord between upper edge of inner bottom plating and lower edge of deck at side, see Fig. 3.2

k = Material factor

= 1,0 for normal strength hull structural steel

= for other steels, see Chapter 1, Section 3, A.2.

= for aluminium, see Chapter 1, Section 3, A.4.

R_{eH} = Minimum nominal upper yield stres [N/mm²]

$$m = 6{,}8 \cdot k_1 \cdot k_2 \cdot k_3 \cdot \frac{\ell^2}{\ell - 0{,}75}$$

k_1, k_2, k_3 = see Table 3.3

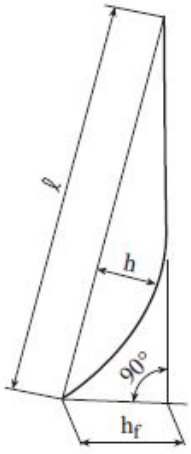

Fig. 3.2 Parameters for determination of framing

2.4.2.2 If a longitudinal framing system is applied for tween deck spaces, the section modulus of the side longitudinals is not to be less than:

$$W = 0{,}11 \cdot p \cdot \mathbf{a} \cdot \ell^2 \cdot k \ [cm^3]$$

ℓ = Spacing of web frames [m]

2.5 Arrangement of strengthening

2.5.1 In strengthened regions transverse framing is to be adopted to the vessel's sides. In single deck ships, the deck and bottom in these regions are also to be framed transversely. In multi-deck ships, transverse framing is to be adopted for the deck located on the fender level. Longitudinal framing of sides is permissible in the upper tween deck space only. In this case, the spacing of web frames is not to exceed three frame spacings or 2,4 m, whichever is less.

2.5.2 In the region A, intermediate frames are recommended through the region length in fishing vessels and within fender areas in special purpose ships.

2.5.3 In any case, it is recommended that symmetrical sections be used and the minimum possible web depth be ensured for the particular section modulus.

2.5.4 Between the ship’s side and vertical stiffener nearest to it, transverse bulkheads are to have horizontal stiffeners with a section height not less than 75 % of the vertical stiffener height. In ships with L ≤ 80 m, horizontal stiffeners are to be spaced not more than 600 mm apart and with L ≥ 150 m, not more than 800 mm apart. For ships with intermediate lengths, linear interpolation may be used to determine this distance. The ends of horizontal stiffeners are to be welded to vertical stiffeners and sniped at the ship's sides.

2.5.5 Bilge keels of ships with L ≤ 80 m are to be, as far as practicable, so arranged that a tangent drawn to the frame and passing through the outer free edge of the bilge keel would form an angle of not less than 15° with the vertical axis. For ships with L ≥ 150 m, this angle may be zero. For ships of intermediate lengths, the above angle is to be obtained by linear interpolation.

Table 3.3 Definition of factors k_1, k_2 and k_3

Factors	Number of load distributing side stringers		
	0	**1**	**2 and more**
k_1	1,0	$hv = 0,75$: $1,0 + 0,017 \cdot \frac{\ell}{a}$ $hv = 1,0$: $1,0 + 0,034 \cdot \frac{\ell}{a}$	$hv = 0,75$: $1,1 + 0,017 \cdot \frac{\ell}{a}$ $hv = 1,0$: $1,1 + 0,034 \cdot \frac{\ell}{a}$
k_2	1,0	1,12	1,15
k_3	$1,0 + 6,8 \cdot \sqrt{\frac{h_f}{\ell} \cdot \left(\frac{h_f}{\ell} + 0,28\right)} - 12,5 \cdot \frac{h_f}{\ell}$	$1,0 + 7,0 \cdot \frac{h_f}{\ell} - 8,0 \cdot \frac{h}{\ell}$	

h_v = *Ratio of height of load distributing side stringer to height of frame*

h_f = *Distance [m] between a section at the lower support of frame and a tangent to the frame contour in way of the section at the upper support, as measured normal to the tangent, see Fig. 3.2*

h = *Maximum deflection of frame according to Fig. 3.2 [m]*

2.5.6 In tween decks the frame lower ends are to be welded to the deck plating. The upper ends of frames are to be carried to the deck plating and welded thereto. Beams are to be carried to the inner edges of frames with a minimal gap. Beam knees are to have a face plate or flange.

The ends of intermediate frames are to be attached to longitudinal intercostals, decks or platforms.

2.5.7 Side longitudinals are to be attached to transverse bulkheads with knees. Height and width of the knees are to comply with the basic Rules.

2.5.8 The bulwark is to be inclined towards the centre line of the ship - or be fitted inboard of the ship's side - at not less than 0,1 of its height.

Bulwark stays welded to sheerstrake are to be so constructed as to prevent deck plating damage in case of bumping.

3. Provisions at the stern

3.1 In stern trawlers the thickness of the bottom plating in way of the "overhanging" part of the stern shall not be less than:

$$t = 2,6 \cdot a \cdot \sqrt{L \cdot k} \cdot f_2 + \Delta t \quad [mm]$$

k = Material factor according to 2.4.2.1

$$f_2 = \sqrt{1,1 - \frac{1}{2}\left(\frac{a}{b}\right)^2}$$

f_{2max} = 1,0

a = Smaller breadth of plate panel

b = Larger breadth of plate panel

Δt = Thickness increase for vessel speed v_0 greater than 1,2 .√ L [kn] or 10 kn

= 0,5 mm for each knot exceeding the above values

Δ_{tmin} = 0,5 mm

Δ_{tmax} = 2,0 mm

The stern ramp is to be so constructed as to avoid flat of bottom in way of stern counter.

3.2 In stern trawlers the shell strake in way of the construction waterline from stern to the aft perpendicular is recommended to have a thickness as required for the stern ramp in 4. for protection against local damage. Where the longitudinal framing system is adopted, the side girders are to be fitted not more than two longitudinal frame spacings apart.

4. Provisions at the stern ramp

4.1 The ramp should be preferably stiffened in its longitudinal direction. The transition radius between deck and ramp should be as large as possible, but should not be less than 300 mm.

The connection of stern ramp sides to transom plating and of ramp deck to bottom plating are to have a radius of rounding not less than 200 mm. This connection may be made by using a bar not less than 70 mm in diameter.

Stern ramp sides are, in general, to be carried downwards to the shell plating and forward to the after peak bulkhead and are to be smoothly tapered into deck girders and transverses.

Where the catch is dragged onto the weather deck, it is recommended that the stern ramp be longitudinally framed with transverses fitted at intervals not exceeding four frame spacings. The stern ramp longitudinals are to be spaced not more than 600 mm apart.

4.2 The plate thickness of the aft ramp of stern trawlers is not to be less than:

$$t = (8+ 0,1 \cdot L) \sqrt{k} \text{ [mm]}$$

$$t_{min} = 12 \cdot \sqrt{k} \text{ [mm]}$$

4.3 The thickness of inner plating of the ramp forming the ramp sides is not to be less than.

$$t_{min} = (5,5 + 0,02 \cdot L) \sqrt{k} + 2 \text{ [mm]}$$

In the lower part adjacent to the ramp, a strengthened strake is to be provided having a thickness of not less than the thickness required under 5.2. See Fig.3.3.

4.4 Protection from excessive wear, especially by wire ropes when dragging the catch, should be provided by the following measures:

- Protection of transom plating with half-round bars of at least 70 mm in diameter, which are to be fitted inclined and secured by welding

- Protection of junction line of rounding and flat side with half-round steel bars welded along the line, but not farther than 200 mm from the transom

- For vessels engaged in pelagic fishing, protection and stiffening of the stern ramp sides with longitudinal half-round steel bars of at least 70 mm in diameter, welded to the sides and spaced not more than 200 mm apart; the edge of the upper bar is not to be less than 650 mm above the ramp deck plating

- Alternatively protection by doubling plates at the top and bottom roundings over the full breadth of the ramp and doubling strips at least 400 mm wide at the sides over the ramp length

5. Strengthening of the weather deck

Under trawl winches, trawl gallows, windlasses and centre fairleads, beams and substructures of adequate strength are to be fitted. The thickness of the deck plating is to be suitably increased, even if wood sheathing will be fitted

C. Fish Holds

1. General

1.1 Basic requirements

The following basic requirements shall be met during operation of the fish holds:

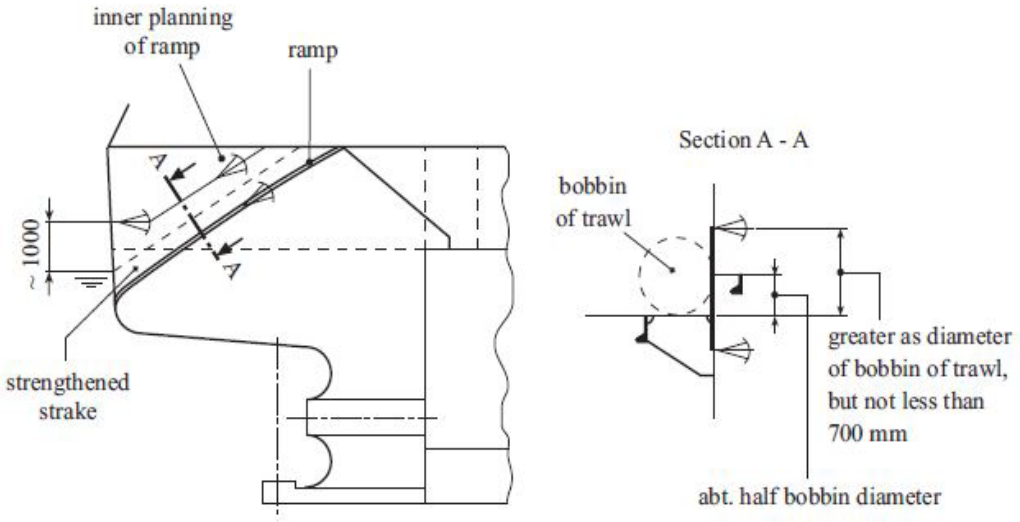

Fig. 3.3 Strengthening arrangement at the stern ramp

- During loading of fish holds with a longitudinal bulkhead, the level of cargo shall be at any time approximately the same on both sides of the bulkhead

- Cargo not carried in tanks, is drained before loading

- Fish holds fully loaded with fish treated with preserving agent have to be checked concerning uncontrolled swelling

1.2 No sharp corners or projections shall be allowed in fish holds or fish tanks, compare D., to facilitate cleaning and reduce inherent dangers to workers in these holds or tanks.

1.3 Pipes and chains or conduits passing through the fish hold shall, if practicable, be installed flush with ceilings or boxed in and adequately insulated in a manner facilitating access for inspection and maintenance.

1.4 In fish holds, and also fish processing spaces, in which non-packed salted catch or salt is stored or which are exposed to the detrimental effect of catch wastes and seawater, the plating thickness is to be increased by 1 mm as compared to that required by the relevant Sections of the basic Rules. Where the structure is so influenced from both sides, relevant thickness is to be increased by 2 mm.

2. Fish flaps

Fish flaps of stern trawlers shall be power operated and capable of being controlled from any position which provides an unobstructed view of the operation of the flaps.

3. Portable fish hold divisions

3.1 General

3.1.1 Task of the portable fish hold divisions is to properly secure the catch against shifting which could cause dangerous trim or heel of the vessel.

3.1.2 Every portable fish hold division is to extend from the bottom of the hold to the deck.

3.1.3 One longitudinal division is to be fitted where the greatest internal cargo hold breadth is 6 m. If the breadth exceeds 6 m, at least 2 longitudinal divisions are to be fitted so that the distance between longitudinal divisions or between these and the vessel‘s side does not extend 3 m. Longitudinal divisions are to be positioned symmetrically to the vessel’s centre line.

3.1.4 It is assumed that in vessels having one longitudinal division, the level of cargo is at any time during loading approximately the same on both sides of the division.

3.1.5 The requirements of 3.1.2 to 3.1.4 are based on the assumption that the portable fish hold divisions consist of vertical uprights with horizontal wooden boards, see Fig. 3.4.

3.1.6 The longitudinal distance l between uprights or between permanent transverse bulkheads and uprights should normally not exceed 2,0 m.

3.1.7 Arrangements and details of the fish hold divisions are to be submitted for approval.

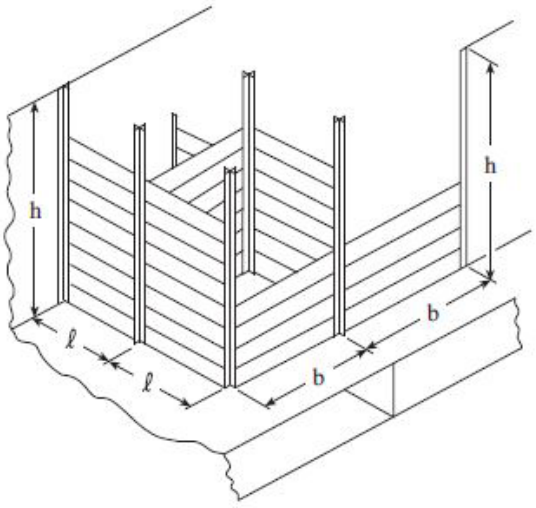

Fig. 3.4 Arrangement of uprights and horizontal boards

3.2 Uprights

3.2.1 The section modulus of steel or aluminium uprights is not to be less than:

$$W = c \cdot h^3 \, (b + \ell) \, k \; [cm^3]$$

The minimum section modulus is $40 \cdot k$ [cm^3]

c = 1,6 where one longitudinal division is fitted

= 2,0 where two or more longitudinal divisions are fitted

h = Free span of upright [m]

b = Distance between the uprights in the vessel's transverse direction [m]

ℓ = Distance between uprights in the vessel's longitudinal direction [m]

k = Material factor see B.2.4.2.1

3.2.2 The uprights are to be secured at top and bottom as to allow transmission of reaction forces in adjacent structures.

3.2.3 If openings are cut in the uprights for fitting of the upper boards, the boards in the opening are to be locked in position to prevent their slipping out of the guide.

3.3 Portable boards

3.3.1 The section modulus of the portable shifting boards is to be determined by the following formula:

$$W = k \cdot 0{,}8 \cdot e \cdot p \; \ell'^2 \; [cm^3]$$

e = Vertical width of board [m]

ℓ' = Span of board [m] according to Fig. 3.4

= b in vessel's transverse direction

= l in vessel's longitudinal direction

The design pressure p at the lowest board is the greater of the following values:

$$p_1 = 10 \cdot h_1 \cdot (1 + a_V/g) \quad [kN/m^2]$$

or

$$p_2 = 10 \cdot \left[h_1 \cdot \cos 20° + \left(\frac{b'}{2} + y \right) \cdot \sin 20° \right] \quad \left[kN/m^2 \right]$$

h_1 = h + 0,5 m [m]

h = Height from bottom of fish hold to top of hold [m], compare Fig. 3.4

b' = Upper breadth of hold [m]

y = Distance of load centre from the vertical longitudinal central plane of tank [m]

a_V = Acceleration factor according to **TL** Rules, Chapter 1, Hull, Section 5,B.2.

3.3.2 In order to prevent galvanic corrosion, insulation is to be fitted at connections or contact surfaces between steel and aluminium.

Corrugated boards are to be made of seawater resistant aluminium.

The minimum thickness of wooden boards should be 65 mm.

4. Removable bulkheads of steel or aluminium

4.1 Removable steel or aluminium bulkheads which are used in connection with hatches are to be double plated with the stiffeners placed horizontally. Internal surfaces of steel bulkheads are to be covered by a corrosion-resistant coating.

4.2 The plate thickness is to be at least:

$$t = c \cdot s \cdot \sqrt{h} + 0,5 \text{ [mm]}$$

$$t_{min} = 6 \text{ mm}$$

c = 3,4 for steel

= 4,7 for aluminium

S = Stiffener spacing [m]

h = Height [m] from upper edge of bulkhead to lower edge of plating

4.3 The section modulus of horizontal stiffeners is not to be less than:

$$W = c \cdot \ell^2 \cdot s \cdot h \text{ [cm}^3\text{]}$$

c = 7,0 for steel

= 13,5 for aluminium

ℓ = Stiffener span [m]

s = Stiffener spacing [m]

h = Height [m] from midpoint of stiffener span to top of bulkhead

For aluminium materials with a guaranteed 0,1% tensile proof stress $R_{p0,1}$ which exceeds 125 N/mm^2, the value of W can be reduced in direct proportion. If however, the materials guaranteed $R_{p0,2}$ value is greater than 70 % of the guaranteed ultimate tensile strength R_m, the lower value is to be used as a basis for scantlings.

4.4 The moment of inertia of stiffeners is not to be less than:

$$I = c \cdot \sqrt[3]{W^4} \quad \left[\text{cm}^4\right]$$

c = 2,2 for steel

= 5,75 for aluminium

W = as given in 4.3 for steel

4.5 Guides for removable bulkheads are to have brackets at 1 m spacing. The depth of the support at the sides of removable bulkheads is to be at least equal to the bulkhead thickness and not less to 65 mm. The minimum thickness of sections or plates, which form the guides is 10 mm.

If necessary, removable bulkheads are to be equipped with a securing arrangement to prevent the bulkhead from floating.

4.6 Removable aluminium bulkheads are to be constructed of a seawater-resistant alloy.

In order to prevent galvanic corrosion, insulation is to be fitted at connections or contact surfaces between steel and aluminium.

D. Fish Tanks

Tanks for the transport of fish in refrigerated seawater (RSW) have to meet the following requirements.

1. Scantlings

In general, RSW tanks are open at the top and as the tank is filled with fish, the equivalent volume of water flows over on the weather deck. Therefore, the tank can be dimensioned according to the **TL** Rules defined in Chapter 1, Hull, Section 12 using a pressure p_1 as defined in C.3.3.1 but with h = distance from load centre to top of overflow.

2. Filling and drainage

For filling, drainage, sounding, etc. compare Section 4.

E. Fish Processing Holds

1. General

Design and testing of fish processing machinery is not subject to Classification by **TL**. However, approval of foundations of the machinery taking into account the forces and their integration into the hull structure as well as safety aspects for the vessel resulting from the processing procedure are part of Classification.

2. Bulkheads

Where in processing holds located above the bulkhead deck the distance between the bulkheads forming the boundaries of that space exceeds 30 m, partial bulkheads extending inboard for not less than 0,5 of the tween deck height are to be fitted on the bulkhead deck at each side of the vessel in line with watertight bulkheads.

The thickness of the partial bulkhead plating is to be not less than that of the top strake of the corresponding watertight bulkhead below the deck where the considered processing hold is located.

Partial bulkheads are to be strengthened with horizontal stiffeners according to the basic Rules. Strengthening with vertical stiffeners is permitted with fitting the horizontal stiffeners between the side shell and the nearest vertical stiffener in compliance with B.2.5.4.

Partial bulkheads are to be interconnected with deck transverses supported by pillars in a required number. Alternative structural arrangements may be used if approved as equivalent by **TL**.

Where multi-tier deckhouses are arranged above the processing holds, rigid supporting members (bulkheads, partial bulkheads) are to be fitted within the processing holds.

3. Foundations

The assembly drawings of the main components of the processing plant with the information of weight, centre of gravity and possibility of bolting them to the deck of the processing hold have to be submitted to **TL**. In addition, the dynamic behaviour of the machinery has to be documented. It is recommended to summarize this data in a load plan. The calculation of the individual foundations for the main components has to be submitted to **TL** for approval.

4. Discharge of refuse and water

It has to be ensured that all kinds of refuse and water accumulating in the course of processing the catch may be discharged or carried outboards without endangering the vessel. For details see Section 4, D.

F. Membrane Type Tanks for Brines

1. General

1.1 Membrane type tanks for brines are tanks consisting of a liquid tight barrier (membrane) which is supported through insulation by a load bearing tank structure. The load bearing tank is normally formed by the hull structure (bulkheads, decks, shell, inner bottom).

1.2 The load bearing tank structure is to comply with the relevant requirements for decks, shell, inner

bottom, etc., but must at least have scantlings complying with the requirements stipulated in B.

1.3 Prefabricated membrane tanks are to be dimensioned such that they are capable of being transported without undue overstressing the membrane walls.

1.4 Details of the membrane and the insulation material (preferably, polyurethane foam) are to be submitted for approval.

2. Testing for tightness of the membrane

2.1 The tanks are to be suitably tested for tightness by applying a test pressure (air pressure) of not less than 0,15 bar gauge.

2.2 Hollow spaces between the membrane and the hull are to be tested for tightness as stipulated under 2.1.

2.3 Prior to installation of the membrane, shell, decks, bulkheads, etc. are to be hose tested for tightness.

3. Foam material, foam application

3.1 The foam material shall have sufficient compressive strength to transmit the liquid pressures from the membrane to the hull.

3.2 The foam application is to be carried out according to manufacturer's instructions.

3.3 It is to be assured that all hollow spaces between hull and membrane are completely filled with foam.

G. Side Doors

1. General

1.1 In general, doors shall not extend below the load waterline.

1.2 At the corners of the doors strengthened plates are to be provided which are to extend over a length of at least 1,5 frame spacings each beyond the doors.

1.3 Doors shall be designed to preferably open outwards.

1.4 Door openings in the shell are to have well rounded corners and adequate compensation is to be arranged with web frames at sides and stringers or equivalent above and below.

2. Scantlings

2.1 In general the strength of side doors is to be equivalent to the strength of the surrounding structure.

2.2 Doors are to be adequately stiffened. Where necessary, stiffeners are to be supported by girders. Means are to be provided to prevent movement of the doors when closed. Adequate strength is to be provided in the connections of the lifting/manoeuvring arms and hinges to the door structure and to the ship structure.

2.3 Where doors also serve as vehicle ramps, the design of the hinges should take into account the vessel’s angle of trim which may result in uneven loading on the hinges.

2.4 Where doors also serve as vehicle ramps, plate thickness and stiffeners will be specially considered.

2.5 Thickness of the door plating, section modulus and shear area of stiffeners and girders are to be determined according to the **TL** Rules, Chapter 1,Hull, Section 23.

2.6 The girder system is to have sufficient stiffness to ensure integrity of the boundary support of the door. Edge stiffeners/girders should be adequately stiffened against rotation.

For edge girders supporting main door girders between securing devices, the moment of inertia is to be increased in relation to the additional force.

3. Closing and securing devices of doors

3.1 The design force for closing and securing devices are to determined according to the **TL** Rules, defined in Chapter 1, Hull, Section 23, C.

3.2 The closing and/or supporting devices are to be fitted not more than 2,5 m apart and as close to corner as possible. However, a large number of small devices should be avoided. The total vertical and horizontal force may normally be considered as equally distributed between the devices.

SECTION 4

HULL OUTFIT

A. Sheathings and Ceilings

1. Deck sheathings

1.1 Generally the different deck sheathings of a fishing vessel on the weatherdeck, on superstructures and deckhouses have to meet the following requirements:

- Protection of the hull structure against corrosion in a standard climate to be defined by the owner
- Good connection to the deck area
- Fire-resistant or at least of low flammability
- Special requirements of the owner

1.2 The surface of all decks shall be so designed or treated as to minimize the slip hazard for personnel. In particular, decks of working areas, such as machinery spaces, in galleys, at winches and where fish is handled as well as at the foot and head of ladders and in front of doors, shall be provided with anti-skid surfaces.

1.3 Before applying the deck sheathing the surface preparation of the relevant deck area has to be prepared according to the specification of the sheathing supplier.

1.4 The compliance with the requirements defined in 1.1 and 1.2 has to be shown by the supplier by tests with a reasonable number of specimens according to recognized standards and approved by **TL**. The samples have to be brought up on the relevant structural deck material utilized for the fishing vessel (steel, aluminium, GRP, etc.).

2. Bottom ceiling

2.1 If a vessel contains holds for the transport of materials or fish products a tight bottom ceiling is to be fitted on the bottom of such a hold. It is recommended, that the thickness of a wooden ceiling is not less than 60 mm. If no ceiling is provided, **TL** will decide whether the thickness of the load bearing bottom areas has to be increased case by case.

If operation of fork lift trucks is planned, only steel decks without wooden ceiling have to be provided.

2.2 On single bottoms, ceilings are to be removable for inspection of bottom plating at any time.

2.3 Ceilings on double bottoms are to be laid on battens not less than 12,5 mm thick providing a clear space for drainage of water or leakage oil. The ceiling may be laid directly on the inner bottom plating, if embedded in preservation and sealing compound.

2.4 It is recommended to fit double ceilings under deck openings used for loading/unloading.

2.5 The manholes are to be protected by a steel coaming welded around each manhole and shall be fitted with a cover of wood or steel, or by other suitable means.

3. Ceiling at tank bulkheads

Where tanks are intended to carry liquids at temperatures exceeding 40 °C, their boundaries facing holds for transport or storage shall be fitted with a ceiling. At vertical walls, sparred ceilings may be sufficient. The ceiling may be dispensed only with consent of the Flag State Administration.

B. Air Pipes, Overflow Pipes, Sounding Pipes

1. Each tank is to be fitted with air pipes, overflow pipes and sounding pipes. The air pipes are in general to be led to above the exposed deck. For the arrangement and scantlings of pipes see Chapter 4, Machinery, Section 16. For the height from the deck to the point where the water may have access see Section 2, Table 2.2.

2. Suitable closing appliances are to be provided for air pipes, overflow pipes and sounding pipes. Where fishing gear or materials, etc. are carried on deck, the closing appliances are to be readily accessible at all times. In vessels for which flooding calculations are to be made, the ends of the air pipes are to be above the damage waterline in the flooded condition.

Where they immerse at intermediate stages of flooding, these conditions are to be examined separately.

3. Closely under the inner bottom or the tank top, holes are to be cut into floor plates and side girders as well as into beams, girders, etc., to give the air free access to the air pipes. Besides, all floor plates and side girders are to be provided with limbers to permit the water or oil to reach the pump suctions.

4. Sounding pipes are to be extended to directly above the tank bottom. The shell plating is to be strengthened by thicker plates or doubling plates under the sounding pipes.

C. Ventilators

1. The height of ventilator coamings and the relevant closing appliances on the exposed deck, quarter deck and on exposed superstructure decks are defined in Section 2, B.6. For the case of fire, draught-tight fire dampers are to be fitted.

2. Ventilators of holds are not to have any connection with other spaces.

3. The thickness of the coaming plates is to be 1,0 mm larger than the thickness of the surrounding deck.

4. The thickness of ventilator posts should be at least equal to the thickness of coamings as per 3. The wall thickness of ventilator posts of a clear sectional area exceeding 1600 cm^2 is to be increased according to the expected loads.

5. Generally, the coamings and posts shall pass through the deck and shall be welded to the deck plating from above and below. Where coamings or posts are welded on the deck plating, fillet welds of a = 0,5 × t (t = thickness of the thinner plate) should be adopted for welding inside and outside, where applicable.

6. Coamings and posts particularly exposed to wash of the sea are to be efficiently connected with the vessel's structure. Coamings of a height exceeding 900 mm are to be specially strengthened.

7. Where beams are pierced by ventilator coamings, carlings of adequate scantlings are to be fitted between the beams in order to maintain the strength of the deck.

D. Waste and Water Discharge in Fish Holds

1. Cargo fish holds

1.1 There is to be a good drainage of water, oil or brine from the cargo. Trunks and gutters are to be located such that they will provide at all times good drainage from all layers of cargo, throughout the hold.

1.2 In each bin there is to be drainage to a bilge well through vertical drainage trunks of perforated plates, grating, etc. The minimum acceptable perforated circumference per trunk is 0,3 m. The number of trunks and the total length of perforated circumference are defined in Table 4.1. The perforations are to consist of holes with a diameter of 4 to 8 mm or equivalent.

Table 4.1 Drainage arrangements in cargo fish holds

Area A of bin below deck [m^2]	Minimum number of drainage trunks per bin	Total length of perforated trunk circumference per bin [m]
A < 10	2	0,8
10 ≤ A < 15	3	1,0
15 ≤ A < 20	3	1,2
20 ≤ A < 25	4	1,4
25 ≤ A < 30	4	1,6
30 ≤ A < 35	5	1,8

1.3 Each cargo hold shall have a bilge well at its after end. If the length of the watertight compartment exceeds 9 m, there shall also be a bilge well at the forward end.

1.4 Bilge wells of not less than 0,2 m^3 capacity are to be arranged in fish holds. They are to be equipped with an arrangement for rinsing the bilge sections, which is to be secured against unintentional operation.

1.5 From each bilge well, a separate branch suction line shall be led to the machinery space. The internal diameter of this line is to be as required for main bilge lines. Minimum diameter is 50 mm.

1.6 The bilge distribution chest valves are to be of screw-down non-return type. The valve chest collecting branch suction lines from the cargo fish holds are to have no connections from dry compartments. The valve chest is to be directly connected to the largest bilge pump. In addition, a connection is to be provided to another bilge pump. All valves are to be fitted in readily accessible positions.

1.7 Means for back-flushing bilge suctions shall be provided. The connecting of water supply may be done by portable means, e.g. hoses.

2. Cargo fish tween deck

2.1 If fish shall be carried loose in tween deck satisfactory arrangement of drainage has to be provided. The drainage may be led to the bilge well in the hold below or arranged as described in 1.

2.2 For tween deck compartments having no openings where sea may penetrate and where the fish processing requires no supply of water, drainage to bilge well in the machinery space may be accepted. The drainage pipes shall have a self-closing valve at the machinery space side.

3. Fish processing areas

3.1 It has to be ensured that all kinds of refuse and water accumulating in the course of processing of the catch may be discharged or carried outboards without endangering the vessel. The bilge pumps are to have sufficient power.

3.2 Where the fish processing holds are located below the weather deck, the refuse and water accumulating in the course of processing are to be discharged outboards through suitable pumps or conveyor worms. The respective outlets at the shell shall be located as near as possible to the weather deck and are to be closable by means of sluice valves. Where the discharge line is raised up above the weather deck, a swing check valve may be fitted instead of a sluice valve.

Where the pumps are sucking from outboard, a blocking device is required to prevent water from being pumped into the tween deck space.

3.3 Stone shoots in fish processing decks are to be fitted as high as practicable. The lowest point of the inner openings shall not come to water at inclinations of less than 15°, vessel fully loaded. In addition to the watertight covers of the stone shoots swell shutters are to be fitted at the shell.

3.4 Bilge wells

For bilge wells see 1.4 and 1.5.

4. Fish tanks

The requirements for fish tanks are included in Section 3, D.

5. Fish pounds

Fixed and removable parts of the fish pounds for holding the catch on and below deck shall be of adequate size. Fish pounds on deck shall be constructed in such a way that water can drain out of them without hindrance.

E. Protective Measures

1. General measures

1.1 A lifeline system shall be designed to be effective for all needs, and the necessary wires, ropes, shackles, eye bolts and cleats shall be provided.

1.2 Deck openings provided with coamings or sills of less than 600 mm in height shall be provided with guards, such as hinged or portable railings or nettings. The Administration may exempt small openings such as fish scuttles from compliance with these requirements.

1.3 Skylights or other similar openings shall be fitted with protective bars not more than 350 mm apart, compare Section 2, B.11.6. The Administration may exempt small openings from compliance with this requirement.

2. Deck openings

2.1 Hinged covers of hatchways, manholes and other openings shall be protected against accidental closing. In particular, heavy covers on escape hatches shall be equipped with counterweights and so constructed as to be capable of being opened from each side of the cover.

2.2 Dimension of access hatches shall be not less than 600 mm by 600 mm or 600 mm diameter.

2.3 Where practicable, hand-holds shall be provided above the level of the deck over escape openings.

2.4 Hatch covers are to be dimensioned and arranged according to the **TL** Rules, Chapter 1, Hull, Section 15, B.

3. Bulwarks, rails and guards

3.1 Efficient bulwarks or guard rails shall be fitted on all exposed parts of the working deck and on superstructure decks if they are working platforms. The height of bulwarks or guard rails above deck shall be at least 1m. Where this height would interfere with the normal operation of the vessel, a lesser height may be approved by the Flag State Administration.

3.2 The minimum vertical distance from the deepest operation waterline to the lowest point of the top of the bulwark, or to the edge of working deck if guard rails are fitted, shall ensure adequate protection of the crew from water shipped on deck, taking into account the sea states and the weather conditions in which the vessel may operate, the areas of operation, type of vessel and its method of fishing and shall be to the satisfaction of the Administration.

3.3 Guard-rails are to be constructed in accordance with DIN 81702 or equivalent standards. Equivalent constructions of sufficient strength and safety can be accepted. Clearance below the lowest course of guard rails to the foot bar shall not exceed 230 mm, other courses shall not be more than 380 mm apart. Rails shall be free from sharp points, edges and corners and shall be of adequate strength.

In a vessel with rounded gunwales guard rail supports shall be placed on the flat part of the deck. Guard rail stanchions are not to be welded to the shell plating and the distance between stanchions shall not be more than 1,5 m.

3.4 Means such as guard rails, lifelines, gangways or under deck passages to protect the crew in moving between accommodation, machinery and other working spaces shall be provided to the satisfaction of TL. Storm rails shall be fitted as necessary to the outside of all deckhouses and casings to secure safety of passage or work for the crew.

3.5 Stern trawlers shall be provided with suitable protection such as doors, gates or nets at the top of the stern ramp at the same height as the adjacent bulwark or guard rails. When such protection is not in position a chain or other means of protection shall be provided across the ramp.

4. Stairways and ladders

For the safety of the crew, stairways and ladders of adequate size and strength with handrails and non-slip treads shall be provided to the satisfaction of **TL**. See also F.4.9.

F. Signal and Radar Masts

1. General

1.1 Drawings of masts, mast substructures and hull connections are to be submitted for approval.

1.2 Loose and accessory parts are to comply with the **TL** Rules, Chapter 50 - Rules for the Construction and Survey of Lifting Appliances. All parts which shall be supervised and certified by **TL** are to be individually tested.

1.3 Other masts than covered by 2. and 3. as well as special construction forms, shall as regards dimensions and design, in each case be individually agreed with **TL**.

2. Signal masts

The following requirements apply to single tubular or equivalent rectangular sections made of steel with an ultimate tensile strength of 400 N/mm², which are typically designed to carry only signals (navigation lanterns, flag and day signals).

2.1 Stayed masts

2.1.1 Stayed masts may be constructed as simply supported masts (rocker masts) or may be supported by one or more decks (constraint masts).

2.1.2 The diameter of stayed steel masts at the uppermost support is to be at least 20 mm for each 1 m height of mast h from the uppermost support to the fixing point of shrouds. The length of the mast top above the fixing point of shrouds is not to exceed 1/3 h.

2.1.3 Masts according to 2.1.2 may be gradually tapered towards the fixing point of shrouds to 75 per cent of the diameter at the uppermost support. The plate thickness is not to be less than 1/70 of the diameter or at least 4 mm (see 4.1).

2.1.4 Wire ropes for shrouds are to be thickly galvanized. It is recommended to use wire ropes composed of a minimum number of thick wires, as for instance a rope construction 6 × 7 with a tensile breaking strength of 1570 N/mm^2 on which Table 4.2 is based. Other rope constructions shall be of equivalent stiffness.

2.1.5 Where masts are stayed forward and backwards by two shrouds on each side of the vessel, steel wire ropes are to be used according to Table 4.2.

Table 4.2 Definition of ropes for stays

h [m]	6	8	10	12	14	16
Rope diameter [mm]	14	16	18	20	22	24
Nominal size of shackle, rigging screw, rope socket	1,6	2,0	2,5	3,0	4,0	4,0
h = height of shroud fixing point above shroud foot point						

2.1.6 Where steel wire ropes according to Table 4.2 are used, the following conditions apply:

$$b \geq 0{,}3 \cdot h$$

$$0{,}15 \cdot h \leq a \leq b$$

a = the longitudinal distance from a shroud's foot point to its fixing point

b = the transverse distance from a shroud's foot point to its fixing point

Alternative arrangements of stayings are to be of equivalent stiffness.

2.2 Unstayed masts

2.2.1 Unstayed masts may be completely constrained in the uppermost deck or be supported by two or more decks. In general, the fastenings of masts to the hull of a vessel should extend over at least one deck height.

2.2.2 The scantlings for unstayed steel masts are given in the Table 4.3.

2.2.3 The diameter of masts may be gradually tapered to D/2 at the height of 0,75 l_m.

Table 4.3 Scantlings of unstayed steel masts

Length of mast l_m [m]	6	8	10	12	14
D x t [mm]	160x4	220x4	290x4,5	360x5,5	430x6,5
l_m = *Length of mast from uppermost support to the top* *D = Diameter of mast at uppermost support* *t = Plate thickness of mast*					

3. Radar masts

These masts are typically of 3-leg, box girder or frame work design.

3.1 For dimensioning the dead loads, acceleration forces and wind loads are to be considered.

3.2 Where necessary additional loads, e.g. loads caused by the sea, fastening of crane booms or tension wires are also to be considered.

3.3 The design loads for 3.1 and 3.2 as well as the allowable stresses can be taken from **TL** Rules, Chapter 50 - Rules for the Construction and Survey of Lifting Appliances

3.4 In case of 3-leg masts the individual leg forces shall be calculated with the before mentioned forces acting in the direction of a considered leg and rectangular to the two other legs.

3.5 Single tubular or rectangular masts mounted on the top of box girder or frame work masts may be dimensioned according to 2.

3.6 In case of thin walled box girder masts a stiffening and/or additional buckling stiffeners may be necessary.

4. Structural details

4.1 Steel masts closed all-round shall have a wall thickness of at least 4 mm.

For masts not closed all-round the minimum wall thickness is 6 mm.

For masts used as funnels a corrosion addition of at least 1 mm is required.

4.2 The foundations of the mast integrated in the deck structure are to be dimensioned in accordance with the acting forces.

4.3 Doubling plates at mast feet are permissible only for the transmission of compressive forces.

4.4 In case of tubular constructions all welded fastenings and connections have to be of full penetration weld type.

4.5 If necessary, slim tubular structures are to be additionally stayed or supported in order to avoid vibrations.

4.6 The dimensioning normally does not require a calculation of vibrations. However, in case of undue vibrations occurring during the vessel's trial a respective calculation will be required.

4.7 For determining scantlings of masts made from aluminium or austenitic steel see Section 3.

4.8 At masts solid steel ladders have to be fixed at least up to 1,50 m below top, if they have to be climbed for operational or maintenance purposes. Above the ladders, suitable handgrips are necessary.

4.9 If possible from the construction point of view, ladders have to be at least 0,30 m wide. The distance between the rungs shall be 0,30 m. The horizontal distance of the rung centre from fixed structural components shall not be less than 0,15 m. The rungs shall be aligned and be made of square steel bars 20/20 set up on edge.

4.10 Platforms on masts which have to be used for operational reasons, shall have a rail of at least 0,90 m in height with one intermediate bar. Safe access from the mast ladders to the platform is to be provided.

4.11 If necessary on masts a safety installation consisting of foot, back, and hand rings enabling safe work in places of operating and maintenance has to be provided.

G. Life-Saving Appliances

1. It is assumed that for the arrangement and operation of lifeboats and other life-saving appliances the regulations defined by the Administration are complied with. For regulations and guidelines see Section 1, A.3.

2. The designing and testing of life saving appliances are not part of Classification. However, approval of the hull structure in way of the launching appliances, taking into account the reaction forces from the relevant appliances, is part of Classification.

SECTION 5

ANCHORING and MOORING EQUIPMENT

A. General

1. Scope

Anchor equipment designed for quick and safe operation shall be provided which consists of anchoring equipment, anchor chains and wire ropes, stoppers and a windlass or other arrangements for dropping and hoisting the anchor and for holding the vessel at anchor in all foreseeable service conditions.

Vessels shall be provided with adequate mooring equipment for safe mooring in all operating conditions.

2. Materials

Vessels built under survey of **TL** and which are to have the mark + stated in their Certificate and in the Register Book have to be equipped with anchors and chain cables complying with the **TL** Rules – Material and having been tested on approved machines in the presence of a **TL** Surveyor. For vessels having the Class Notation **K50/K20/K6/L1/L2** affixed to their Character of Classification proof is sufficient that the anchors and chain cables have been properly tested.

B. Equipment Numeral

1. Equipment numeral Z_F

The equipment numeral Z_F is to be calculated as follows:

$$Z_F = \sqrt[3]{\Delta^2} + 2 \cdot h \cdot B + \frac{A}{10}$$

Δ = Moulded displacement [t] in seawater having a density of 1,025 t/m^3 to the summer load waterline

h = Effective height from the summer load waterline to the top of the uppermost house

= a + Σhi

a = Distance [m] from the summer load waterline, amidships, to the upper deck at side

Σh_i = Sum of height [m] on centreline of each tier of superstructures and deckhouses having a breadth greater than B/4. Deck sheer, if any, is to be ignored.

For the lowest tier "h" is to be measured at centre line from the upper deck or from an assumed deck line where there is local discontinuity in the upper deck

A = Area [m^2], in profile view of the hull, superstructures and houses, having a breadth greater than B/4, above the summer load waterline within the length L and up to the height h

Where a deckhouse having a breadth greater than B/4 is located above a deckhouse having a breadth of B/4 or less, the wide house is to be included and the narrow house ignored.

Screens of bulwarks 1,5 m or more in height above deck at side are to be regarded as parts of houses when determining h and A, e.g. the area specially marked in Fig. 5.1 is to be included in A.

2. Application

Anchors, chain cables and the recommended mooring ropes are to be determined in accordance with the equipment numbers Z_F according to 1.

2.1 Vessels with $Z_F > 720$

Where Z_F exceeds 720 the requirements of the **TL** Rules defined in Chapter 1, Hull, Section 17 apply.

2.2 Vessels with $Z_F \leq 720$

For vessels with Z_F less or equal to 720 and no Class Notation **K50/K20/K6/L1/L2,** Table 5.1 applies. The index "F" will be affixed to their equipment register number in the Certificate and in the Register Book.

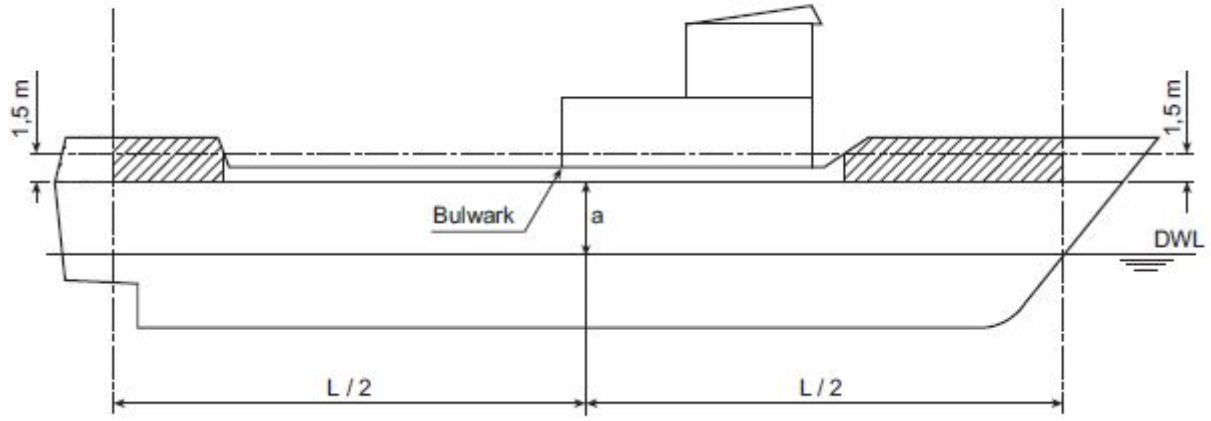

Fig. 5.1 Bulwark relevant for equipment numeral

2.3 Vessels with Notation K50/K20/K6/L1/L2

For vessels with the Class Notation **K50/K20/K6/L1/L2** and where Zf exceeds 720, the reductions defined in Chapter 1, Hull, Section 17 may be applied with **TL** consent.

Similarly, for vessels with Class Notation **K50/K20, K6, L1 or L2** and where Z_F less or equal to 720 the equipment numeral Z_F, Table 5.1 apply.

For ships having the navigation notation **K50**, **K20**, **K6**, **L1**, or **L2**, the equipment in anchors and chain cables may be reduced. The reduction consists of taking one numeral lower in Table 5.1.

For vessels with Class Notation **K20, K6, L1, or L2**, the reductions in Table 5.2 may also be applied. The application of Table 5.2 and use of one anchor are subject to TL's approval. The index "F" will be affixed to their equipment register number in the Certificate and in the Register Book.

C. Anchors

1. Arrangement

The rule bower anchors are to be connected to their chain cables and positioned on board ready for use.

Normally each anchor should be stowed in the hawse and hawse pipe in such a way, that it remains firmly secured in seagoing conditions.

Other equivalent arrangements may be possible and have to be in accordance with relevant maritime Administration rules. If an anchor arrangement is located at the aft part of the vessel, it has to be guaranteed, that the propeller will be protected against damage by chain cable or steel wire. Anchor manoeuvring has to be carried out with the propulsion engine in the standby condition.

2. Anchor design

2.1 Anchors have to be of approved design. The mass of the heads of patent (ordinary stockless) anchors, including pins and fittings, is not to be less than 60 per cent of the total mass of the anchor.

2.2 For stock anchors, the total mass of the anchor, including stock, shall comply with the values in Tables 5.1 and 5.2. The mass of the stock shall be 20 percent of this total mass.

2.3 The mass of each individual bower anchor may vary by up to 7 per cent above or below the required individual mass provided that the total mass of all bower anchors is not less than the sum of the required individual masses.

3. High holding power anchors

3.1 Where special anchors are approved by **TL** as "High Holding Power Anchors" (HHP), the anchor mass may be 75 per cent of anchor mass as per Table 5.1
"High Holding Power Anchors" are anchors which are suitable for the vessel's use at any time and which do not require prior adjustment or special placement on sea bed.

3.2 For approval as a "High Holding Power Anchor", satisfactory tests are to be made on various types of bottom and the anchor is to have a holding power at least twice that of a patent anchor ("Admiralty Standard Stockless") of the same mass. These tests have to be approved by **TL**.

3.3 Dimensioning of chain cable and of windlass is to be based on the undiminished anchor mass according to Table 5.1

4. Holding equipment for vessels with 12 m ≤ L < 24 m

Scallop rakes and comparable items may be used in lieu of anchors if they are of equivalent holding power.

D. Chain Cables

1. Chain cable diameters given in Tables 5.1 and 5.2 apply to chain cables made of chain cable materials specified in the requirements of the **TL** Rules, Chapter 2, Materials, Section 10 for following grades:

- Grade K 1 (ordinary quality)
- Grade K 2 (special quality)
- Grade K 3 (extra special quality)

Grade K 1 material used for chain cables in conjunction with "High Holding Power Anchors" shall have a tensile strength R_m of not less than 400 N/mm^2.

Grade K 2 and K 3 chain cables have to be purchased and quenched and tempered after production from recognized manufacturers only.

2. The total length of chain given in Table 5.1 and Table 5.2 is to be divided in approximately equal parts between the two bower anchors.

3. Short link chain cables in accordance with DIN 766, or equivalent, of same proof load may be taken in lieu of stud link chain cables of up to 16 mm diameter.

4. For connection of the anchor with the chain cable approved Kenter-type anchor shackles may be chosen in lieu of the common Dee-shackles. A forerunner with swivel is to be fitted between anchor and chain cable. In lieu of a forerunner with swivel an approved swivel shackle may be used. However, swivel shackles are not to be connected to the anchor shank unless specially approved. A sufficient number of suitable spare shackles are to be kept on board to facilitate fitting of the spare anchor at any time. On Owner's request the swivel shackle may be dispensed with.

5. The attachment of inboard ends of chain cables to the vessel's structure is to be provided with a mean suitable to permit, in case of emergency, an easy slipping of chain cables to sea, operable from an accessible position outside the chain locker.

The inboard ends of chain cables are to be secured to the structures by a fastening able to withstand a force not less than 15 % nor more than 30 % of the rated breaking load of the chain cable.

E. Ropes instead of Chain Cables

1. Vessels with 30 m ≤ L < 45 m

1.1 The chain cable of one or two anchors may be replaced by a steel wire rope.

1.2 Where steel wire ropes are fitted in lieu of chain cables, the following is to be observed:

Table 5.1 Anchor, chain cables and ropes

No. for register	Equipment numeral Z_F	2 bower anchors	Stud link chain cables (1) for bower anchors				Recommended mooring ropes		
		Weight per anchor	Total length	Diameter			Number	Length	Breaking load
				d_1	d_2	d_3			
-	-	[kg]	[m]	[mm]	[mm]	[mm]	-	[m]	[kN]
1	2	3	4	5	6	7	8	9	10
101 F	-30	70	137,5	11	11	11	2	40	25
102 F	30-40	80	165	11	11	11	2	50	30
103 F	40-50	100	192,5	11	11	11	2	60	30
104 F	50-60	120	192,5	12,5	12,5	12,5	2	60	30
105 F	60-70	140	192,5	12,5	12,5	12,5	2	80	30
106 F	70-80	160	220	14	12,5	12,5	2	100	35
107 F	80-90	180	220	14	12,5	12,5	2	100	35
108 F	90-100	210	220	16	14	14	2	110	35
109 F	100-110	240	220	16	14	14	2	110	40
110 F	110-120	270	247,5	17,5	16	16	2	110	40
111 F	120-130	300	247,5	17,5	16	16	2	110	45
112 F	130-140	340	275	19	17,5	17,5	2	120	45
113 F	140-150	390	275	19	17,5	17,5	2	120	50
114 F	150-175	480	275	22	19	19	2	120	55
115 F	175-205	570	302,5	24	20,5	20,5	2	120	60
116 F	205-240	660	302,5	26	22	20,5	2	120	65
117 F	240-280	780	330	28	24	22	3	120	70
118 F	280-320	900	357,5	30	26	24	3	140	80
119 F	320-360	1020	357,5	32	28	24	3	140	85
120 F	360-400	1140	385	34	30	26	3	140	95
121 F	400-450	1290	385	36	32	28	3	140	100
122 F	450-500	1440	412,5	38	34	30	3	140	110
123 F	500-550	1590	412,5	40	34	30	4	160	120
124 F	550-600	1740	440	42	36	32	4	160	130
125 F	600-660	1920	440	44	38	34	4	160	145
126 F	660-720	2100	440	46	40	36	4	160	160

Remarks:

(1) *Studless chain cables in accordance with DIN 766 of at least same proof load may be taken in lieu of stud link chain cables up to 16 mm diameter*

d_1 *= chain diameter Grade K 1 (ordinary quality)*

d_2 *= chain diameter Grade K 2 (special quality)*

d_3 *= chain diameter Grade K 3 (extra special quality)*

Table 5.2 Equipment reduction for restricted service

Restriction of voyage	Stockless bower anchors		Stud-Link chain cables	
	Number	Mass change per anchor	Length reduction	Diameter reduction
3 nm from the coast line (L1 and L2)	2	-%30	-%20	-%10
6 nm from the coast line (K6)	2	-%30	-%20	-%10
20 nm from the coast line (K20)	2	-%20	-	--
Alternatively				
3 nm from the coast line (L1 and L2)	1	-	-%50	-
6 nm from the coast line (K6)	1	-	-%50	-
20 nm from the coast line (K20)	1	+%40	-%40	-

1.2.1 The length of the rope is to be equal to 1,5 times the corresponding tabular chain cable length. The breaking load of the rope is not to be less than the breaking load of the tabular chain cable of Grade K 1.

1.2.2 A short length of chain cable is to be fitted between anchor and wire rope having a length of 12,5 m or equal to the distance between anchor in stowed position and winch, whichever is less.

1.2.3 Wire rope winches are to be fitted which comply with the requirements defined in Section 6.

1.2.4 Wire ropes of trawl winches may be used as anchor chain cables. Lead blocks and guide rollers shall be suitably fitted and arranged to prevent the ropes from chafing at deckhouses, superstructures, deck plating and equipment on deck. Where the rope diameter is 18 mm and greater the guide rollers are to be permanently fitted. The trawl winch is to comply with the requirements of Section 6.

2. Vessels with L < 30 m

The chain cables of both anchors may be replaced by steel wire ropes. The requirements of 1.2 have to be considered.

3. Vessels with 12 m ≤ L < 24 m

For vessels with **L** < 24 m, a manila or synthetic fibre rope of not less than 20 mm diameter may be fitted instead of the steel wire rope for the second anchor (see 1.). The breaking load of a manila rope is not to be less than the breaking load of the chain cable.

Suitable means for holding the vessel at anchor (rope winch, bollard) and for lifting the anchor (rope drum or warping head of a rope winch or a trawl winch) are to be provided. The requirements of Section 6 are to be observed.

4. Anchors of 60 kg or less

Where anchors of 60 kg or less are fitted, the following applies:

4.1 Manila or synthetic fibre ropes may be fitted for both anchors. The length of the rope is not to be less than 1,5 times the required chain length. The rope diameter is not to be less than 20 mm.

4.2 Between anchor and anchor rope a short length of chain according to 1.2.2 is to be fitted.

4.3 In lieu of the rope winch required according with 1.2.3 other suitable means for holding the vessel at anchor and lifting the anchor may be fitted, e.g. bollard, warping head of trawl or rope winch. The requirements of Section 6 are to be observed. In special cases and upon application of the owner, the winch may be dispensed with if it is proved by trials that the anchor can be dropped and lifted by hand without exposing the crew to any danger.

F. Chain Locker

1. The chain locker is to be of capacity and depth adequate to provide an easy direct lead of the cables through the chain pipes and self-stowing of the cables.

The minimum required stowage capacity without mud box for the two bow anchor chains is as follows:

$$S = 1{,}1 \cdot d^2 \cdot \frac{\ell}{100000} \quad [m^3]$$

d = Chain diameter [mm] according to Table 5.1 and Table 5.2

ℓ = Total length of stud link chain cable according to Table 5.1 and Table 5.2

The total stowage capacity is to be distributed on two chain lockers of equal size for port and starboard chain cables. The shape of the base areas shall as far as possible be quadratic with a maximum length of 33 d. As an alternative, circular base areas may be selected, the diameter of which shall not exceed 30 – 35 d.

Above stowage of each chain locker in addition a free depth of

h = 1500 [mm]

is to be provided, if the local arrangement enables this.

2. The chain locker boundaries and their access openings are to be watertight to prevent flooding of adjacent spaces, where essential installations or equipment are arranged in order to not affect the proper operation of the vessel after accidental flooding of the chain locker.

3. Adequate drainage facilities of the chain locker are to be provided.

4. Where chain locker boundaries are also tank boundaries their scantlings of stiffeners and plating are to be determined as for tanks in accordance with Section 3.

Where this is not the case, plate thickness is to be determined as for t_2 and the section modulus as for W_2 in accordance with Chapter 1, Hull, Section 12, B.1, B.2 and B.4. respectively. The distance from the load centre to the top of chain locker pipe is to be taken for calculating the load.

A corrosion allowance of 1,5 mm has to be applied. The minimum thickness of plating is 5,0 mm.

G. Windlasses

1. Basic rules

The design and construction of windlasses for fishing vessels shall be based on the Chapter 4, Machinery, Section 11, A. unless they are superseded by the special requirements defined in this Section.

2. Design principles

2.1 Fishing vessels provided with anchors of or above 150 kg shall be fitted with a windlass. The windlass shall be fitted with a messenger wheel and/or drum for each anchor and means for release of each messenger wheel or drum. If for anchors with a weight of less than 150 kg no windlass is provided, other arrangements for dropping and hoisting the anchor are to be considered.

2.2 It shall not be possible to carry the chains forward to the hawsepipe, skid or similar arrangement without the chain passing the messenger wheels. When anchor wire is used it shall pass a roller adjacent to the hawsepipe to avoid chafing.

2.3 The windlass, its support and its brakes shall be capable of absorbing a static tension of at least 45 % of the breaking strength of the anchor chain or anchor wire without the occurrence of any permanent deformations and without the brake losing its hold.

Furthermore, a chain stopper or wire nipper should be fitted between the windlass and the hawsepipe or similar for each anchor chain or anchor wire capable of holding the vessel while at anchor.

If chain stoppers or wire nippers are not fitted, the windlass, its support and its brake shall be capable of absorbing a static tension of at least 80 % of the breaking strength of the anchor chain or anchor wire.

The chain stopper or wire nipper and their supports shall be capable of absorbing a static tension of at least 80 % of the breaking strength of the anchor chain/wire without the occurrence of any permanent deformations and without the chain stopper or wire nipper losing its hold.

2.4 If the trawl winch is fitted with Messenger wheels, etc. and meets the requirements set out in 2.1 to 2.3 such a winch may be used as a windlass.

2.5 Fishing vessels which have been authorized to use trawl warp as anchor wire may use their trawl winch as a windlass provided the trawl warp can be wound on a drum with a braking device that is independent of the actual trawl warps in use for fishing. Lead blocks and guide rollers shall be suitably fitted and arranged to prevent the warps from chafing at the deckhouses, superstructures, deck plating and equipment on deck.

H. Mooring Equipment

1. Ropes

1.1 The mooring ropes specified in Tables 5.1 and 5.2 and the content of 1.2 and 1.3 are recommendations only, a compliance with which is not a condition of Class.

1.2 Breaking load

For mooring lines steel wire ropes as well as fibre ropes made of natural or synthetic fibres or wire ropes consisting of steel wire and fibre cores may be used.

Nominal breaking loads specified in Table 5.1 are valid for wire ropes only. Where ropes of synthetic fibre are used, the breaking load is to be increased above the table values. The extent of increase depends on material quality.

The required diameters of synthetic fibre ropes used in lieu of steel wire ropes may be taken from Table 5.3.

Regardless of the breaking load, recommended in Table 5.1, the diameter of fibre ropes should not be less than 20 mm.

1.3 Type of wire ropes

Wire ropes shall be of the following type:

– 6 × 24 wires with 7 fibre cores for breaking loads of up to 500 kN type: standard

– 6 × 36 wires with 1 fibre core for breaking loads of more than 500 kN type: standard

Where wire ropes are stored on mooring winch drums, steel cored wire ropes may be used e.g.:

– 6 × 19 wires with 1 steel core type: seal

– 6 × 36 wires with 1 steel core type: Warrington-seale

1.4 Length

The length of the individual mooring ropes may be up to 7 per cent less than that given in Table 5.1 and Table 5.2 provided that the total length of all the wires and ropes is not less than the sum of the individual lengths.

2. Mooring winches, bollards, hawses

2.1 Mooring winches are to be designed according to the basic Rules defined in G.1. taking into account the actual mooring lines and 80 % of their nominal breaking loads. Substructures are to be dimensioned according to Section 3.

2.2 Hawses, bollards and cleats shall be so designed as to protect the ropes against excessive wear. They are to be of proved construction and shall comply with relevant standards.

Note

Attention is drawn to relevant National Standards.

2.3 Hawses, bollards, cleates and their substructures are to be strengthened, if they are intended to be belayed by multiple lines. In this case 80 % of the nominal breaking load of the individual lines has to be used as pulling forces.

Table 5.3 Equivalent diameters of synthetic wire and fibre ropes related to steel wire ropes

Steel wire ropes **(1)**	Synthetic wire ropes	Fibre ropes		
	Polyamide **(2)**	Polyamide	Polyester	Polypropylene
Diameter [mm]	Diameter [mm]	Diameter [mm]	Diameter [mm]	Diameter [mm]
12	30	30	30	30
13	30	32	32	32
14	32	36	36	36
16	32	40	40	40
18	36	44	44	44
20	40	48	48	48
22	44	48	48	52
24	48	52	52	56
26	56	60	60	64

(1) *According to DIN 3068 or equivalent*

(2) *Regular laid ropes of refined polyamide monofilaments and filament fibres*

SECTION 6

FISHING GEAR and LIFTING APPLIANCES

Page

A. General

1. Scope of application

1.1 Equipment which is used for fishing, catch handling, loading and/or discharging is subject to these Rules.

1.2 Equipment according to 1.1 is not part of a fishing vessel's Classification even in case the Class Notation **CFG** (Certified Fishing Gear) has been assigned to the vessel.

1.3 In a fishing vessel's Classification all foundations and their substructures for cranes, masts, gantries, gallows, winches, fairleads, etc. are included.

1.4 If the Class Notation **CFG** shall be assigned to a vessel, the requirements according to F.2. and F.3. are to be met.

1.5 In these Rules the requirements for fishing gear and lifting appliances as well as ropes and accessories will be defined.

2. Definitions

2.1 Fishing gear

2.1.1 Masts, gantries, gallows, outriggers, jumper stays/tackles and other gear used for fishing and/or catch handling at sea are defined as fishing gear.

2.1.2 Deck equipment like winches, fairleads, rollers, pad eyes, etc. used for fishing is also part of the fishing gear.

2.2 Lifting appliances

2.2.1 All cranes, derricks, hoists, tackles and other gear used for loading and/or discharging of, e.g. processed catch, fish meal, supplies, equipment, etc. in a harbour (for exceptions see C.3.2), are defined as lifting appliances.

2.2.2 Some gear/appliance or parts of it may be regarded as fishing gear and lifting appliance alike.

2.3 Ropes and accessories

2.3.1 Running and standing wire ropes used for fishing, catch handling, loading and/or discharging are defined as ropes.

2.3.2 Chains, rings, hooks, shackles, swivels, blocks, etc. are defined as accessories.

2.3.3 Ropes and accessories are usually part of a fishing gear or lifting appliance. They may, however, be fixed or used individually on the deck of a fishing vessel as well.

2.4 Loads

2.4.1 Design load DL_n

The design load DL_n is the static load a fishing gear is dimensioned for and will be distinguished as follows:

- DL_1 is the design load for catch handling at sea
- DL_2 is the nominal winch pull when there is only one rope layer on the drum.
- DL_3 is the minimum breaking load of a trawl warp

For dimensioning, DL_1 and DL_2 are to be multiplied by the operating factor f_o , see C.2.1.2.

2.4.2 Operation load

- L_1 is the operation load for catch handling gear
- L_2 is the operation load for pelagic trawling gear

2.5 Safe working load SWL

The safe working load SWL is the maximum static load a lifting appliance is allowed to handle with its hook or any other load attaching device. For dimensioning the SWL is to be multiplied by a dynamic factor ψ as described in the Lifting Appliance Guidelines, see 3.3.1.

2.6 Certification

Following plan approval as well as initial tests and examination fishing gear and lifting appliances will get the TL documentation as described in F.4.1. This combined approval system is called "Certification".

2.7 Class Notation

On the basis of "Certification" and in case TL is entrusted to conduct annual/5-yearly surveys and the supervision of load testing every five years the vessel will get the "Class Notation" **CFG** (Certified Fishing Gear). For documentation see F.4.2.

3. Applicable regulations, rules and standards

3.1 International regulations

For international regulations see Section 1, A.3.3.

3.2 Flag state regulations

Flag State regulations for the stability of the vessel, accident prevention, dimensioning, etc., if existing, are generally to be observed.

3.3 TL Rules and Guidelines

3.3.1 TL Rules, Chapter 50, Rules for the Construction and Survey of Lifting Appliances (Lifting Appliance Rules). These Rules are dealing in detail with design and dimensioning requirements, plan approval, supervision during construction, Certification of components, examination and testing, accident prevention and with the Certification system for lifting appliances, ropes and accessories.

3.3.2 TL Rules Chapters 1 - 5 must be applied accordingly.

3.4 Standards

In general international and national standards for ropes and accessories are accepted. Other standards may be accepted after verification.

B. Plan Approval

1. General

Depending on the contractual and legal situation the following applies:

1.1 Classification

For the Classification of the vessel it is conditional that the documents, as listed in 2.1, undergo approval and/or verification.

1.2 Certification

For the Certification of fishing gear and lifting appliances the documents as described in 2.2 shall undergo approval and/or verification.

1.3 Class Notation

For assigning a Class Notation to a vessel no additional plan approval and/or verification in excess of those addressed in 1.1 and 1.2 is required.

2. Documents for approval

The approval documents shall contain all dimensions, details of materials and welding as well as accident prevention measures. If necessary parts lists are to be added.

2.1 Documents for Classification

For plan approval the following documents shall be submitted in electronic plan approval system (EPAS):

- General arrangement drawings showing the fishing gear, lifting appliances and deck equipment together with their rope reeving/leading systems.
- Drawings showing all foundations with their substructures for fishing gear, lifting appliances and deck equipment.

- Information about the forces which may act on the foundations and their substructures, at least the following:
  - for fishing gear the respective DL_n values and, if necessary, height and angles of rope attack, see also C.2.
  - for lifting appliances the SWL value and associated load radii, see also C.3.
- Stability sheets covering the fishing gear and/or lifting appliances as may be necessary.

2.2 Documents for Certification

These documents are only required in case of national regulations asking for plan approval/Certification and if this is agreed with the shipyard and/or owners.

2.2.1 Documents for fishing gear

For plan approval the following documents are to be submitted in electronic plan approval system (EPAS):

- Strength calculations and/or force diagrams
- Detailed rope reeving / leading plans of fishing gear
- Drawings of masts and booms, gantries, gallows, outriggers, pedestals etc. together with their fittings, connection pins, bearings, and weld details
- Information about the machinery such as hoisting, slewing and luffing mechanisms plus general drawings of slewing-ring and gear, pulleys, shafts, the winches including their design data and assembly drawings, and detail drawings of base plate and drums
- Hydraulic circuit diagrams of all machinery

2.2.2 Documents for lifting appliances

For plan approval the documents prescribed by the Lifting Appliance Rules are to be submitted in electronic plan approval system (EPAS).

2.2.3 Documents for ropes and accessories

2.2.3.1 Information about all ropes as defined in A.2.3.1 are to be provided, e.g. rope standard, construction, diameter and strength of material. (The minimum breaking load is specified in the applicable standard).

2.2.3.2 Information about location and nominal sizes of all accessories which are used for fishing gear and lifting appliances are to be provided. In addition drawings of all accessories are required which are not series manufactured according to standards, e.g. rollers, blocks, esp. trawl warp blocks, swivels, etc.

C. Dimensioning

1. General

1.1 While fishing gear is to be dimensioned for a defined design load DL_n, lifting appliances must be assessed for a defined safe working load SWL. These loads shall be specified in the drawings and calculations submitted. Allowance is to be made for possible oblique loading and simultaneous loading of a supporting structure by more than one fishing gear and/or lifting appliance.

1.2 Shipyard, design office, manufacturers and/or owners, as the case may be, have to decide on the operating conditions and to specify the angles of trawl warp attack and there possible combinations, the design loads DL_n of fishing gear and the SWL of lifting appliances to provide the basis for dimensioning and approval.

2. Fishing gear

2.1 General

2.1.1 For dimensioning it has to be considered that the forces acting on fishing gear cannot be determined

exactly. This is especially valid for loads acting on e.g. net tails, jumper stay tackles or trawling gear.

2.1.2 Consequently the operating factor f_o = 1,5 as applied in the following makes up for these uncertain loads.

2.1.3 Fish pumps and power blocks for hauling of nets will be dealt with individually, if necessary.

2.2 Catch handling gear

2.2.1 The dimensioning of catch handling gear is to be based on the following:

- $L_1 = DL_1 \times f_o$
- 15° angle of rope attack in all directions in case of freely suspended loads, e.g. jumper stay tackles
- Allowable stresses according to load condition B in the Lifting Appliance Rules

2.2.2 For dimensioning of jumper stays it has to be assumed that the minimum breaking load of the jumper stays is not to be less than the product of the maximum rope tension (due to SWL and pretensioning) and a factor of utilization K equal to 4.

The slag span f of the unloaded rope shall be limited by:

l / f = Length between suspension/slag span < 50 values between 10 and 30 are recommended

2.2.3 In case there are several tackles suspended from a jumper stay it will be assumed that only one at a time is in operation if not otherwise described in the approval documentation.

2.3 Trawling gear

The dimensioning of trawling gear is to be based on the nominal winch pull (pelagic trawl) or, in case the net may be caught, on the minimum breaking load of a trawl warp (ground trawl).

2.3.1 Pelagic trawl

The dimensioning of pelagic trawling gear is to be based on the following:

- $L2 = DL2 \times f_o$
- trawl warp angles of egression from the vessel's hull as specified but within the following limits:
  - 15° up to -45° in the vertical plane against horizontal level
  - 0° up to ± 45° in the horizontal plane against vertical level
- allowable stresses according to load condition B in the Lifting Appliance Rules.

2.3.2 Ground trawl

The dimensioning of ground trawling gear is to be based on the following:

- DL_3
- trawl warp angle of egression as described in 2.3.1
- allowable normal or von Mises stress equal to R_{eH} in case of normal strength materials
- a safety factor of 1,1 against R_{eH} or $R_{p0,2}$ if being decisive
- In case of breakage of a trawl warp, gantries, masts, derricks, gallows, etc., shall not fail and remain in place

2.3.3 The angles of trawl warp of egression as specified consider dynamic vessel inclinations as prescribed in the Lifting Appliance Rules.

2.3.4 If higher strength materials are used their R_{eH} or $R_{p0,2}$ shall be reduced in accordance with the Lifting Appliance Rules. R_{eH} respectively $R_{p0,2}$ is to be taken from the applicable material standards.

2.3.5 In the North and Baltic Sea, or in other shallow waters with similar conditions, it is recommended that trawl booms and their forward stays should be dimensioned with an additional safety margin of 10 %.

3. Lifting appliances

3.1 The dimensioning of lifting appliances is to be based on SWL, load radius, dynamic influences, etc. for a Type A lifting appliance as described in the Lifting Appliance Rules. This system is based on allowed stresses, proof against R_{eH} or $R_{p0,2}$ and fatigue, as may be necessary.

For dimensioning a minimum static vessel inclination is prescribed in the Lifting Appliance Rules. Depending on the actual stability of a given vessel a bigger inclination may have to be taken into consideration.

3.2 A dimensioning of lifting appliances for load handling at sea may be considered individually on the basis of the Lifting Appliance Rules, if this may be necessary. In such cases a larger vessel inclination and additional dynamic influences are to be taken into consideration.

4. Ropes and accessories

4.1 Ropes

Construction and diameter of the various wire ropes used on a fishing vessel are to be chosen by shipyard, design office, manufacturers and/or owners as the case may be, however, the following is to be observed:

4.1.1 The minimum breaking load of ropes for catch handling gear and lifting appliances is to be calculated by multiplying their static rope forces with the utility factor as given in the Lifting Appliances Rules. Static rope forces are to be calculated without dynamic influences but by taking into consideration the friction and bending resistance in the rope sheaves.

4.1.2 The minimum breaking load of trawl warps shall be at least 2,5 times the design load DL_2, see A.2.4.

4.2 Accessories

4.2.1 In case of accessories for catch handling gear and lifting appliances their nominal sizes shall be equal to the static forces acting on them, e.g. DL_1 or SWL. This system is described in the Lifting Appliance Rules.

4.2.2 In case of accessories for trawling gear their nominal sizes shall be equal to the design load DL_2.

4.2.3 Accessories which have to take the trawl warp pull and go over board for fishing, shall have nominal sizes at least equal to half the design load DL_2.

4.2.4 Accessories which have to take the pull of jumper stays shall have nominal sizes at least equal to half the minimum breaking load of the jumper stays.

4.2.5 The nominal sizes of accessories are to be finally determined by interpolation between the nominal sizes as shown e.g. in the relevant Tables in the Lifting Appliance Rules. If a design value is 25 % higher than the difference towards the following nominal size, this higher nominal size shall be chosen.

D. Construction

1. General

Constructional requirements for lifting appliances are defined in the Lifting Appliance Rules. For fishing gear the following applies additionally:

1.1 Fishing in arctic waters requires a special design to prevent undue accumulation of ice as far as possible, e.g. mast stays should be avoided.

1.2 Materials and welding procedures as well as the construction measures of hydraulic components shall be in line with the relevant principles of the TL Rules, see A.3.3.2.

2. Fishing gear

2.1 Stern gantries

2.1.1 Stern gantries shall be dimensioned for angles of rope attack in accordance with C.2.3.1 as need may be. All locations where rope blocks are fixed shall be sufficiently strengthened, e.g. by inside frames and outside brackets.

2.1.2 End operating/rest positions of hinged gantries shall be able to be sufficiently locked or secured by mechanical or hydraulic means.

2.1.3 The movement of hinged gantries shall be controlled from a local control stand inaccessible to unauthorized persons or from a central control stand, e.g. at the rear of the bridge. As soon as the controls, such as push-buttons, levers and similar are released, movement of the gantry shall stop immediately.

If central control is realized, emergency stop buttons have to be provided in the rear working deck area. The gantry has to be fully visible from the control station.

2.1.4 Fixed stern gantries shall have safe access to their top and to platforms, if any. Top and platforms shall have sufficient handrails and foot bars, compare Section 4, E.3.

2.2 Side gallows

2.2.1 Side gallows (fish davits) typically arranged on starboard side need to have sufficient additional strength because they may get heavy blows when the trawl boards are hauled in at bad seaway conditions.

2.2.2 Means are to be provided in front of side gallows for a secure stowage of trawl boards and trawl doors, if any.

2.3 Jumper stays

2.3.1 Sheaves rolling onto the jumper stay shall have at least a minimum diameter of 14 times the rope diameter.

2.3.2 To reduce the effect of corrosion, jumper stay ropes shall be galvanized and shall have wire cores.

2.3.3 Wire rope clips and other detachable clamps are not permitted for rope end attachments. For shackle connections only type C shackles as shown in the Lifting Appliance Rules shall be employed.

2.4 Trawl booms

If trawl booms are also employed for loading and discharging, they have to be designed as fishing gear and lifting appliances alike.

3. Deck equipment

3.1 Winches

3.1.1 Winches shall be designed in accordance with the Chapter 4, Machinery and be of reversible type. Also the rope paying out shall be motor controlled.

3.1.2 Winches for ground trawling shall be dimensioned to withstand the design load DL_3, i.e. the breaking of a trawl warp. Winches for pelagic trawling shall be designed to withstand the nominal winch pull DL_2 multiplied by the operating factor f_o. (see A.2.4 and C.2.1.2).

3.1.3 Satisfactory spooling of ropes onto the drums shall be ensured. Winch drums of trawl warps shall have a diameter ratio (d / D) between ropes and drums of 1:14. The direction in which the rope reels onto the drum shall be clearly indicated on the winch.

3.1.4 The way in which the first layer of rope is wound onto the drum shall be chosen depending on the lay of the rope so that the rope does not unlay.

3.1.5 Trawl winches and their leading rollers shall be arranged such that the rope fleet angles to either side of the drum centre are symmetrical.

3.1.6 The number of safety turns of rope left on a drum shall be such that the maximum rope tension, which is in case of winches for ground trawling the minimum rope breaking load, can be taken jointly by the remaining turns and the end fastenings.

3.1.7 Rope end fastenings shall be designed such that they

- Do not pull the rope over sharp edges

- Cannot be released unintentionally

- Are easy to inspect

3.2 Fairleads and rollers

3.2.1 Centre fairleads on side trawlers shall be provided with a protective guard extending at the sides at least 0,30 m beyond the outer periphery of the fairleads.

3.2.2 The groove of rollers passed over by shackles, swivels, chain links, etc. shall be specially designed to prevent undue stressing of these parts.

3.2.3 Rope sheaves are to be fitted with a protective device which prevents the ropes from jumping out of the sheave.

3.2.4 The sheave for the trawl warp messenger rope shall be fixed in the bulwark. Fixing on top of the bulwark is not allowed.

3.2.5 The fleet angle of wire ropes running over metallic rope sheaves shall not exceed 4°.

3.2.6 Rope sheaves made of plastic may only be employed with the consent of **TL** and owners.

3.2.7 The groove diameter of rope sheaves shall be at least 14 times the rope diameter in case of running ropes under load.

4. Ropes and accessories

4.1 Ropes, especially trawl warps, which are spooled in several layers, shall have a steel wire core.

4.2 Portable guide rollers shall not be used unless fitted with an efficient and adequately designed rope restraining device.

4.3 Shackles, swivels, chain links, etc. which are to pass over rollers shall be specially designed in order to prevent overstressing.

4.4 Bows and pad eyes for attaching of moveable blocks shall be aligned in such a way that they may not be undue stressed rectangular to their main load plane.

4.5 Chains used for fishing or load handling shall meet the requirements in the relevant **TL** Rules, see A.3.3.2.

E. Accident Prevention

1. Deck areas

1.1 After the net has been hauled in or out, the stern ramp shall be properly secured by suitable equipment.

1.2 Provision shall be made for the stowage of bulky netting to allow drainage and to prevent shifting. The stowage area shall be of adequate dimensions to hold down the centre of gravity of the stowed net as far as possible and to allow for the crew to work not endangered when handling the nets.

1.3 In the range of fishing winches and net drums, a passageway at least 0,60 m wide shall be maintained.

1.4 Fixed and removable fish pounds for holding the catch on and below deck shall be of adequate size. Fish pounds on deck shall be constructed in such a way that water can drain without hindrance.

1.5 For further protective measures see Section 4, E.

2. Fishing gear

2.1 Fishing gear shall be designed to avoid working accidents and damage to the gear if the operating instructions to be provided are consequently followed. Possible danger scenarios during operations have to be clearly addressed in these instructions.

2.2 Where practicable, provision shall be made to stop trawl boards from swinging inboard, such as the fitting of a portable prevention bar at the gallows aperture, or other equally effective means.

2.3 If no fishing activities are under way, the complete fishing gear has to be stowed in a safe way. Adequate devices for lashing have to be provided.

2.4 Where manually operated gear is installed it should be capable of being disengaged when the warps are paying out. The operating wheels shall be without spokes or protrusions which could cause injury to the operator.

3. Lifting appliances

The relevant requirements in the Lifting Appliance Rules apply.

4. Winches and controls

4.1 The controls and monitoring instruments of winches shall be clearly arranged on the control platform. They shall be placed to give the winch driver ample room for unimpeded operation and an unobstructed view of the working area.

4.2 Controls and monitoring instruments have to be permanently, clearly and intelligible marked with the direction or the function of the movement they control. The arrangement and direction of movement of controls and monitoring instruments must match the direction of the movement which they control. In the case of pushbutton controls there shall be a separate button for each direction of movement.

4.3 Where a fishing winch is controlled from the bridge, the arrangements shall be such that the operator has a clear view of the winch and the adjacent area. In addition to an emergency button at the winch, an emergency button on the bridge shall be provided.

4.4 Where necessary, emergency buttons for winches shall be provided remote from the winch to protect fishermen working in places which are dangerous for operating trawl warps and boards.

F. Tests, Examinations, Certification and Class Notation

1. General

1.1 The following statements outline the test, survey and Certification system applied by TL in case this is required by Flag State Regulations or agreed upon with owners. The Class Notation system will be applied in case the vessel shall get the Class Notation **CFG.**

1.2 Lifting appliances with a SWL below one tonne will be treated in the same way as those with one tonne and more, except national regulations stipulate otherwise.

2. Certification

Certification of fishing gear and lifting appliances is mainly intended to confirm adequate strength of load bearing structural members and requires individual Certificates for ropes and accessories. For Certification plan approval as well as initial tests and examination of fishing gear and lifting appliances shall be conducted before putting the gear/appliances into operation, but no periodical surveys are required.

2.1 Supervision of construction

2.1.1 Supervision of construction at the premises of subcontractors is not prescribed. Subcontractors shall deliver fishing gear and lifting appliances with their works Certificates for being presented to a TL Surveyor by the shipyard.

2.1.2 In case of components being constructed at the shipyard, i.e. hinged stern gantries, etc., a TL Surveyor shall conduct supervision and certify the construction. Fixed stern gantries are subject to Classification of the vessel and generally undergo supervision of construction.

2.2 Certificates for ropes and accessories

2.2.1 Works Certificates for wire ropes and accessories will be accepted, if tensile testing to

destruction in case of ropes, respectively static load testing in case of accessories as prescribed in the Lifting Appliance Rules is confirmed in the Certificates.

2.2.2 The Certificates for wire ropes and accessories are to be ordered by the manufacturers of fishing gear and lifting appliances at subcontractors and shall be delivered to the shipyard together with the fabricated gear/appliances for being handed over to a **TL** Surveyor by the shipyard.

2.3 Initial Tests and Examination

2.3.1 Before being taken into operation, fishing gear shall be presented to a TL Surveyor and function tested in his presence as far as possible by the shipyard. Following this the TL Surveyor will examine the gear.

2.3.2 Before being taken into operation lifting appliances shall be load and function tested on the vessel, usually by the shipyard, supervised by a **TL** Surveyor who will examine the appliances after the test.

2.3.3 Following supervision of load and/or function testing and after examination, the acting **TL** Surveyor will issue a **TL** load test Certificate for the lifting appliances, confirm the examinations conducted by him for both fishing gear and lifting appliances into a **TL** Register Book and release the complete documentation as described under 4.

3. Class Notation

For the Class Notation **CFG,** in addition to Certification, annual and 5-yearly examinations of fishing gear and lifting appliances are to be conducted by a **TL** Surveyor who will also supervise the 5 yearly load testing of lifting appliances.

The Class Notation will automatically become invalid and will be withdrawn by **TL** Head Office if fishing gear and lifting appliances are no more presented for surveys and/or load testing within the time windows according to 3.1.4. The following tests and examinations are to be performed:

3.1 Periodical Tests and Examinations

3.1.1 Once a year in conjunction with Annual Class Surveys fishing gear and lifting appliances will be surveyed by the acting **TL** Surveyor. Following this, the **TL** Surveyor will confirm the surveys conducted by him in the Register Book

3.1.2 Every five years, in conjunction with the Class Renewal Survey of the vessel, a new function/load testing of fishing gear/lifting appliances, as far as possible, supervised by a **TL** Surveyor is required.

3.1.3 Following function/load testing in according with 3.1.2 the acting **TL** Surveyor will examine all gear/appliances, issue a new load test Certificate for the lifting appliances, confirm all examinations conducted by him in the Register Book and add the load test Certificate to it.

3.1.4 All time windows for tests and surveys are the same as for the Class Surveys of the vessel.

3.2 Tests and examinations after repair

3.2.1 After repair of load bearing parts of fishing gear an examination is required.

3.2.2 After repair of load bearing parts of lifting appliances a new load testing/examination and a new load test Certificate is required.

3.2.3 Replacement of axles, shafts, rope sheaves, ropes, accessories, etc. due to wear and tear does not necessitate load testing and subsequent examination.

3.2.4 Newly issued Certificates have to be included into the Register Book and the examinations have to be confirmed in this book.

4. Documentation

4.1 Certification

4.1.1 Following successful tests and examinations as described in the foregoing, the acting **TL** Surveyor

will issue a **TL** Register Book for all fishing gear and lifting appliances on the vessel which shall remain on board for at least 5 years after the last 5 yearly survey/ load testing.

4.1.2 In the Register Book all Certificates for load testing of lifting appliances as well as for testing of ropes and attachments will be collected as evidence towards all parties concerned. In addition the **TL** Surveyor will add rope reeving plans for lifting appliances and fishing gear to the Register Book, as far as available.

4.2 Class Notation

The Class Notation **CFG** is subject to a contractual agreement. No special Certificate will be issued to this regard. The Class Notation will be stated in the Class Certificate of the vessel by **TL** Head Office after successful initial tests and examinations as well as Certification.

SECTION 7

STRUCTURAL FIRE PROTECTION

A. General

1. Application

The requirements in this Section are generally valid for unrestricted service of fishing vessels as defined in Section 1, B.3. Exceptions may be granted by **TL** for restricted service ranges according to the Class Notations **Y** (Restricted International Service), **K50,K20, K6** (Coastal Service), **L1, L2** (Harbour Service).

For fishing vessels complying with fire safety requirements provided in the Torremolinos International Convention for the Safety of Fishing Vessels, 1977 amended by Protocol of 1993 or equivalent national standards such as Regulation for Safety of Fishing Vessels as amended Official Gazette No:26089 dated 23.02.2006 (In Turkish), the requirements given in this section may be dispensed with.

2. Documents to be Submitted

The following drawings and documents are to be submitted in electronic plan approval system (EPAS). **TL** reserve the right to ask for supplementary copies, if deemed necessary.

- Fire division plan
- Insulation plan (may be part of the fire division plan)
- Ventilation and air condition scheme
- Deck covering plan
- Door plan
- Fire control plan
- List of approved materials and equipment

3. TL approval

3.1 The term "approved" relates to a material or construction, for which **TL** has issued an Approval Certificate. A type approval can be issued on the basis of a successful standard fire test, which has been carried out by neutral and recognized fire test institutes.

3.2 The type "A", "B" and "C" class partitions, fire dampers, duct penetrations as well as the insulation materials, linings, ceilings, surface materials and not readily ignitable deck coverings shall be of approved type, refer to 2010 FTP Code as amended.

4. Equivalence

Where this Section requires that a particular fitting, material, appliance or apparatus, or type thereof, shall be fitted or carried in a fishing vessel, or that any particular provision shall be made, **TL** may allow any other fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other provision to be made in the vessel, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance or apparatus or type thereof, or provision, is at least as effective as that required by this Section.

Where compliance with any of the requirements of this Section would be impracticable for the particular design of the vessel, **TL** may substitute those with alternative requirements, provided that equivalent safety is achieved.

5. References

For the rules for fire protection and fire fighting see Section 8. For electrical installations for fire detection see **TL** Rules, , Chapter 5, Electrical Installations, Section 9 and **TL** Rules, Chapter 4-1, Automation, Section 4, G as applicable.

B. Requirements for Fire Protection for Fishing Vessels with 12 m ≤ L < 45 m

1. Material

1.1 The hull, decks, structural bulkheads, superstructures and deckhouses are to be of steel except where in special cases the use of other suitable material may be approved, having in mind the risk of fire.

1.2 Bulkheads and decks enclosing machinery spaces, cargo spaces, emergency generator rooms, galleys, pantries containing cooking appliances, store rooms containing flammable liquids and workshops other than those forming part of the machinery spaces are to be of steel or equivalent material.

1.3 All stairways shall be of steel frame construction or equivalent material.

2. Exemptions

For fishing vessels with **L** < 24 m **TL** may accept deviations from material requirements of 1.1 and 1.2.

3. Structural fire protection

3.1 The requirements given in Torremolinos International Convention (See Section 1, A, 3.3) are to be applied for fishing vessels with L ≥ 24 m.

3.2 For fishing vessels with L < 24 m, **TL** may accept deviations.

4. Restricted use of combustible materials

4.1 Paints, varnishes and other finishes used on exposed interior surfaces shall not offer an undue fire hazard and shall not be capable of producing excessive quantities of smoke.

4.2 Primary deck coverings, if applied, in accommodation and service spaces and control stations, which are located above machinery spaces, shall be of an approved material which will not readily ignite.

4.3 Combustible insulation materials are accepted in compartments for stowage of fish provided low ignitability and low flame spread properties are documented.

4.4 Combustible insulation as accepted by 4.3 shall be protected by close-fitting cladding. Acceptable cladding is steel sheet and marine plywood. Surface coatings shall have low flame spread properties.

5. Ventilation systems

5.1 The main inlet and outlets of all ventilation systems shall be capable of being closed from outside the respective spaces in the event of a fire.

5.2 Where they pass through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges shall be appropriately isolated.

6. Means of escape

6.1 Stairways and ladders shall be so arranged as to provide, from all accommodation spaces and from spaces in which the crew is normally employed, other than machinery spaces, ready means of escape to the open deck and from there to the lifeboats and liferafts.

6.2 At all levels of accommodation there shall be provided at least two widely separated means of escape from each restricted space or group of spaces.

6.3 Below the weather deck, the means of escape shall be a stairway and the second escape may be a trunk or a stairway. Above the weather deck, the means of escape shall be stairways or doors to an open deck or a combination thereof. Where it is not practicable to fit stairways or doors, one of these means of escape may be by means of adequately sized portholes or hatches protected where necessary against ice accretion.

6.4 Dispense may be given with one of the means of escape, due regard being paid to the nature and location of spaces and to the numbers of persons who normally might be quartered or employed there.

6.5 No dead-end corridors having a length of more than 5 m shall be accepted and it shall not preferably not exceed 2.5 in length. A dead-end corridor is a corridor or part of a corridor from which there is only one escape route.

6.6 Two means of escape shall be provided from machinery space of category A by two sets of steel ladders as widely separated as possible leading to doors in the upper part of the space similarly separated and from which access is provided to the open deck.

6.7 For a vessel of a gross tonnage less than 1000, dispense may be given with one of the means of escape due regard being paid to the dimension and disposition of the upper part of the space.

6.8 Lifts shall not be considered as forming one of the required means of escape.

C. Requirements for Fire Protection for Fishing Vessels with L ≥ 45 m

1. Materials

1.1 The hull, decks, structural bulkheads, superstructures and deckhouses are to be of steel except where in special cases the use of other suitable material may be approved, having in mind the risk of fire.

1.2 Components made from aluminium alloys require special treatment, with regard to the mechanical properties of the material in case of temperature increase. In principle, the following is to be observed:

1.2.1 The insulation of "A" or "B" class divisions shall be such that the temperature of the structural core does not rise more than 200 °C above the ambient temperature at any time during the applicable fire exposure to the standard fire test.

1.2.2 Special attention shall be given to the insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and liferaft stowage, launching and embarkation areas, and "A" and "B" class divisions to ensure:

- that for such members supporting lifeboat and liferaft areas and "A" class divisions, the temperature rise limitation specified in 1.2.1 shall apply at the end of one hour; and

- that for such members required to support "B" class divisions, the temperature rise limitation specified in 1.2.1 shall apply at the end of half an hour.

1.2.3 Crowns and casings of machinery spaces of category A shall be of steel construction and be insulated as required by 2 as appropriate.

2. Fire integrity of bulkheads and decks

2.1 Structural fire protection is to comply with the requirements in SOLAS Ch. II-2 Reg. 9.2 as applicable for cargo ships. Method of protection as defined in Reg.9.2.3.1 should be IC.

2.2 Materials are to comply with the requirements in SOLAS Ch. II-2 Reg. 5.3 and 6 as applicable for cargo ships.

2.3 Combustible insulation materials are accepted in compartments for stowage of fish provided low ignitability and low flame spread properties are documented.

2.4 Combustible insulation as accepted by 2.3 shall be protected by close-fitting cladding. Acceptable cladding is steel sheet and marine plywood. Surface coatings shall have low flame spread properties.

3. Openings in fire resisting divisions

3.1 For the protection of openings in fire-resisting divisions SOLAS Ch. II-2 Reg. 9.4 and 9.5 Cargo ship requirements are to be applied.

4. Ventilation systems

4.1 For the ventilation systems, SOLAS Ch. II-2 Reg. 9.7 Requirements for cargo ships are to be applied.

5. Means of escape

5.1 For the means of escape, SOLAS Ch. II-2 Reg. 13 Requirements for cargo ships are to be applied.

6. Protection of Cargo Spaces

6.1 Fire-extinguishing arrangements according to Section 8 are to be provided for cargo spaces.

SECTION 8

FIRE PROTECTION and FIRE FIGHTING

A. General

1. Scope

The Rules in this Section apply to fire protection in machinery spaces and to systems and equipment to be provided for fire fighting purposes in machinery spaces and throughout the fishing vessel.

2. Application

2.1 General

In general the **TL** Rules defined in the following are valid for all types of fishing vessels. Some of the detailed requirements are to be applied in dependence of the length of the vessel, using the characteristic values **L** = 24 m and **L** = 45 m.

2.2 International Torremolinos Convention

Fishing vessels of flag states which have already ratified the Torremolinos International Convention for fishing vessels with a length **L** ≥ 45 m, see Section 1, A.3., have to follow directly the requirements defined therein.

2.3 National regulations

Where national regulations are existing, these regulations have to be met in addition. It will be decided case by case if **TL** will supervise also the compliance with such regulations.

3. Documents for approval

Diagrammatic plans, drawings and documents are to be submitted in electronic plan approval system (EPAS) for approval.

All necessary details of the systems to be installed shall be given and in particular as follows:

3.1 Water fire extinguishing system (Fire and deckwash system)

- Position, type and capacity of pumps and position of associated power sources
- Arrangement of pipes, valves and hydrants including material, pipe diameters and wall thicknesses
- Sizes and numbers of fire hoses and nozzles

3.2 Fire extinguishers

- types, sizes and position

3.3 Fixed gas fire extinguishing system

- Arrangement of pipes, nozzles, gas cylinders, controls and alarms
- Schematic diagram and details of the release system, alarm system and the means of monitoring as applicable
- Calculation of the required quantity of extinguishing medium
- Hydraulic calculation

3.4 High-expansion foam system

- Arrangement drawing
- Details on foam generator, pumps, power supply and supply of foam concentrate

3.5 Pressure water-spraying system (sprinkler and deluge system)

- Arrangement drawing
- Details on materials, nozzle characteristics, pumps and power supply
- Calculation of pump capacity and hydraulic calculation

3.6 Fixed water-based local application firefighting system (FWBLAFFS) in category A machinery spaces, if applicable

- Arrangement drawing

- Details on piping, nozzle characteristics, supply pump and water supply

- Details of the release and alarm system

- Calculation of pump capacity and hydraulic calculation

3.7 Fire extinguishing system for galley range exhaust ducts, if applicable

- Arrangement drawing

- Details of the release station

3.8 Fire extinguishing system for deep-fat cooking equipment

- Arrangement drawing

- Details on piping and nozzle characteristics

- Details of the release station

3.9 Fire extinguishing systems for cargo spaces and paint stores

- Arrangement drawing

- Details on piping and nozzle characteristics

- Details of the release station

B. Fire Protection in Machinery Spaces

1. Machinery space arrangement

1.1 The arrangement of machinery spaces shall be so that safe storage and handling of flammable liquids is ensured.

1.2 All spaces in which internal combustion engines, oil burners or fuel settling or service tanks are located shall be easily accessible and sufficiently ventilated.

1.3 Where leakages of flammable liquids may occur during operation or routine maintenance work, special precautions are to be taken to prevent these liquids from coming into contact with sources of ignition.

1.4 Materials used in machinery spaces shall normally not have properties increasing the fire potential of these rooms.

1.5 Materials used as flooring, bulkhead lining, ceiling or deck in control rooms, machinery spaces or rooms with oil tanks shall be non-combustible. This requirement, however, does not apply to vessels the hull of which is constructed of combustible materials.

1.6 Where there is a danger that oil may penetrate insulating materials, these shall be protected against the penetration of oil or oil vapours.

2. Installation of boilers

2.1 Boilers are to be located at a sufficient distance from fuel and lubricating oil tanks and from cargo space bulkheads in order to prevent undue heating of the tank contents or the cargo. Alternatively, the tank sides or bulkheads are to be insulated.

2.2 Oiltight coamings are to be provided between boiler and engine rooms not separated by watertight bulkheads.

2.3 Where boilers are located in machinery spaces on 'tween-decks and the boiler rooms are not separated from the machinery spaces by watertight bulkheads, the 'tween-decks are to be provided with oiltight coamings at least 200 mm high. Drains from this area may be led to the bilges. In case of thermal oil boilers, however, the drains are to be led to a leakage oil tank.

3. Insulation of lines and appliances

3.1 All parts with surface temperatures above 220°, e.g. steam, thermal oil and exhaust gas lines, exhaust gas boilers and silencers, turbochargers etc., are to be effectively insulated with non-combustible materials. The insulation shall be such that oil or fuel

cannot penetrate into the insulating material. Metal cladding or approved hard jacketing of the insulation is considered to afford effective protection against such penetration.

3.2 Boilers are to be provided with non-combustible insulation which is to be clad with steel sheet or equivalent.

3.3 Insulation shall be such that it will not crack or deteriorate when subject to vibration.

4. Fuel and lubricating oil tanks

The Rules in **TL** Rules Chapter 4, Machinery, Section 16, V are to be observed.

5. Protection against fuel and oil leakage

5.1 Suitable means of collection are to be fitted below potential leakage points.

Where oil leakage is liable to be frequent, e.g. with oil burners, separators, drains and valves of service tanks, the collectors are to be drained to an oil drain tank.

Leakage oil drains may not be part of an overflow system.

5.2 The arrangement of piping systems and their components intended for combustible liquids, shall be such that leakage of these liquids cannot come into contact with heated surfaces or other sources of ignition. Where this cannot be precluded by structural design, suitable precautionary measures are to be taken.

5.3 Tanks, pipelines, filters, preheaters, etc. containing combustible liquids may not be placed directly above heat sources such as boilers, steam lines, exhaust gas manifolds and silencers or items of equipment which have to be insulated in accordance with 3.1 and may also not be placed above electrical switchgear.

5.4 Where tanks with flammable liquids are replenished automatically or remote controlled, means are to be provided to prevent overflow spillage.

5.5 In periodically unattended machinery spaces fuel injection high pressure lines of diesel engines are to be shielded or installed in such a way, that, should leakage occur, the leaking fuel can be safely collected in a suitable drain tank with high level alarm.

6. Bulkhead penetrations

Pipe penetrations through class A or B divisions shall be able to withstand the temperature for which the divisions were designed.

Where steam, exhaust gas and thermal oil lines pass through bulkheads, the bulkhead shall be suitably insulated to protect it against excessive heating.

7. Means for emergency closing of openings, stopping of machinery and fuel shutoffs

7.1 Any opening in machinery spaces and boiler rooms shall be capable of being effectively sealed from outside the space.

7.2 Means are to be provided for stopping ventilating fans serving machinery spaces or boiler rooms from outside such spaces.

7.3 Any forced - or induced - draft fans, oil fuel unit pump, oil fuel transfer pump shall be capable of being stopped from outside the space concerned.

7.4 Except for small independent tanks every oil fuel suction pipe from storage, settling or service tanks situated above the double bottom is to be fitted with a cock or valve capable of being closed from outside the space concerned. This regulation applies also to lubricating oil tanks.

7.5 The controls required by 7.2, 7.3 and 7.4 should be arranged in as few locations as possible, be readily accessible, not likely to be cut-off in the event of a fire in the space concerned and bear clear denominations.

C. Fire Detection

1. Periodically unattended machinery spaces are to be equipped with an approved fire detection and alarm system.

2. The design and arrangement are to comply with **TL** Rules Chapter 5, Electrical Installations, Section 9 and Chapter 4-1, Automation Section 4, G as applicable.

D. Water Fire Extinguishing System (Fire and Deckwash System)

Every fishing vessel shall be provided with a water fire extinguishing system according to the requirements defined in the following.

1. Fire pumps

1.1 Fishing vessels with **L** ≥ 24 m shall be fitted with at least two (2) fire pumps one of which is to be independent from the main engine.

1.2 Fishing vessels with **L** < 24 m shall be fitted with at least one fire pump which may be coupled to the main engine provided that the propeller shaft can be readily declutched or that a variable pitch propeller is fitted.

1.3 The fire pumps shall be capable of supplying a total quantity of water for fire fighting of not less than two-thirds of the total capacity of the required bilge pumps.

1.4 The minimum capacity of any fire pump shall not be less than 25 m3/h for fishing vessels with **L** ≥ 45 m and 15 m3/h for fishing vessels with **L** < 45 m.

1.5 With the fire pumps supplying water for the number of jets specified in 4.1, through nozzles specified in 4.9, a pressure of at least 0,25 N/mm^2 is to be maintained at any hydrant.

1.6 Where two pumps are required one of them may be reduced to 40 % of the capacity specified in 1.3, but not less than the capacity specified in 1.4, provided that the prescribed total capacity is maintained by increasing the capacity of the second pump accordingly.

1.7 Bilge, ballast or other seawater pumps of sufficient capacity and head may be used as fire pumps provided that at least one pump is immediately available for fire fighting purposes.

1.8 Where more than one pump is connected to the fire main a screw-down non-return valve or a combination of shut-off and check valve is to be fitted at the outlet of each pump.

1.9 Provisions are to be made as to safeguard the supply of water for fire fighting under all conditions of list, trim, roll and pitch likely to be encountered by the vessel.

1.10 For vessels with unattended machinery spaces remote start for at least one fire pump is to be provided.

2. Emergency fire pump

2.1 For vessels of 1000 GT and above an emergency fire pump shall be provided, if a fire in one compartment can put all the main fire pumps out of service. The emergency fire pump shall be capable of delivering at least 40 % of the capacity specified in 1.3, but in any case not less than the capacity specified in 1.4.

2.2 Emergency fire pumps shall meet the requirements specified in 1.5, 1.8 and 1.9 and including their source of power and fuel supply be independent from the space containing the main fire pumps and be capable of supplying water to the fire main for at least 18 hours.

2.3 A shut-off valve shall be provided such as to be capable of isolating the fire main within the space where the main fire pumps are installed from the rest of the fire main. The shut-off valve shall be arranged in a suitable location outside of such space.

2.4 Any diesel driven power source for the pump shall be capable of being readily started in cold condition down to a temperature of 0 °C. If lower temperatures are likely to be encountered proper means are to be provided to the satisfaction of **TL** so that ready

starting will be safeguarded.

3. Fire piping

3.1 The piping system for the distribution of water for fire fighting shall be designed for the total capacity of the fire pumps required.

3.2 Materials readily rendered ineffective by heat shall not be used unless adequately protected. Ordinary cast iron shall not be used.

3.3 The pipes and their accessories are to be adequately protected against corrosion, shock and freezing. Drain cocks are to be provided in suitable locations in order to drain all parts of the system which may be subjected to freezing.

4. Fire hydrants, hoses and nozzles

4.1 The number and position of hydrants shall be such that any part of the vessel normally accessible while at sea can be reached with:

- one jet of water from a single length of hose in a vessel with **L** < 24 m
- two jets of water not emanating from the same hydrant in a vessel with **L** ≥ 24 m, one of the jets shall be from a single length of hose.

4.2 Fire hydrants shall be fitted with a shut-off such that any fire hose can be disconnected while the system is pressurized.

4.3 One hydrant is to be arranged near the entrance to any space containing internal combustion machinery or oil fired boilers.

4.4 The hydrants are to be so located as to be readily accessible at any time.

4.5 Fire hoses shall be of appropriate materials. Their length should be chosen in view of easy handling considering the vessel's dimensions, however, the length shall not exceed 20 m on deck and 15 m in machinery spaces.

4.6 The number of fire hoses provided shall be

- at least two in vessels with **L** < 24 m
- at least three in vessels with **L** ≥ 24 m
- in vessels of 1000 GT and above one hose for each 30 m of vessel's length but at least five. Hoses for machinery spaces and boiler rooms shall be provided in addition to this figure.

4.7 Fire hoses with nozzles attached are to be located near the fire hydrants, the position to be marked conspicuously.

4.8 Only appropriate quick-acting couplings shall be used for the connection of hoses to hydrants and nozzles.

4.9 Nozzle size shall be 12 mm in vessels with **L** ≥ 24 m and 10 mm in vessels with **L** < 24 m.

4.10 Nozzles for use in machinery spaces and boiler rooms shall be of dual purpose type (full jet/spray with shut-off). However, it is recommended to use this type of nozzle throughout the vessel.

E. Arrangement of Portable Fire Extinguishers

Portable fire extinguishers are to be provided in accordance with the requirements in TL Rules, Chapter 4, Machinery, Sec.18 F as applicable for cargo ships.

1. Portable fire extinguishers shall be provided in accommodation and service spaces.

The number of extinguishers provided shall not be less than:

- five in vessels with **L** ≥ 45 m
- three in vessels with **L** < 45 m

2. Portable fire extinguishers shall be provided in machinery spaces.

In ships with L < 24 m, a portable fire extinguisher can be used in spaces containing oil-fired boilers or internal combustion machinery instead of a wheeled fire extinguisher with 45 l foam or 50 kg dry powder.

In spaces containing only domestic boilers with a capacity of less than 175 kW one portable extinguisher can be used instead of a wheeled fire extinguisher with 45 lt foam or 50 kg dry powder.

This may also be applied where internal combustion machinery is installed in the same space if 175 kW are not exceeded when adding up the output of internal combustion machinery and the capacity of the boiler.

F. Fixed Fire Extinguishing Systems İn Machinery Spaces

A fixed fire extinguishing system as specified in G. shall be provided for:

1 All vessels in machinery spaces containing internal combustion machinery of total power output of 375 kW or above.

2 Vessels of 500 GT and above in machinery spaces containing internal combustion machinery used for the main propulsion and for spaces containing oilfired boilers or oil-fuel units. For fishing vessels with Class Notation **AUT** the **TL** Rules according to Chapter 4, Machinery, Section 18 apply.

3 Vessels constructed mainly of wood or GRP in machinery spaces decked with such material and which contain internal combustion machinery or oil fired boilers.

G. Types of Fixed Fire Extinguishing Systems in Machinery Spaces

The fixed fire extinguishing system required by F. shall be any one of the following:

1 A gas system complying with **TL** Rules according to Chapter 4, Machinery, Section 18, G. or I.

2 A high expansion foam system complying with **TL** Rules according to Chapter 4, Machinery, Section 18, K.3.

3 A pressure water-spraying system complying with **TL** Rules according to Chapter 4, Machinery, Section 18, L.2.1.

4. In fishing vessels of 2000 GT and above, fire hazard areas in category A machinery spaces above 500 m^3 in gross volume shall be protected with a fixed water based local application fire fighting system (FWBLAFFS). The design of the system and the protected areas shall be in compliance with the **TL** Rules according to Chapter 4, Machinery, Section 18, L.3.

H. Fire Extinguishing Arrangements in Spaces other than Machinery Spaces

1. Galley range exhaust duct

Where the galley range exhaust duct passes through accommodation spaces or spaces containing combustible materials, a fixed fire extinguishing system shall be provided complying with the **TL** Rules according to Chapter 4, Machinery, Section 18, M.2.

2. Deep-fat cooking equipment

Deep-fat cooking equipment is to be fitted with arrangements as specified in the **TL** Rules according to Chapter 4, Machinery, Section 18, M.3.

3. Paint stores and flammable liquid lockers

Paint stores and flammable liquid lockers are to be protected with a fixed fire extinguishing system complying with the **TL** Rules according to Chapter 4, Machinery, Section 18, M.1.

4. Cargo spaces

Cargo spaces on fishing vessels of 2000 GT and above are to be provided with a fixed CO_2 system complying with **TL** Rules according to Chapter 4, Machinery, Section 18, G.

SECTION 9

MACHINERY

A. General

1. Applicable Rules and Regulations for Machinery Installations

1.1 Machinery systems fitted on board ships having the notation fishing vessel are to comply with the relevant sections of **TL** Rules, Part B, Chapter 4.

1.2 Fishing vessels having machinery plants built, equipped, surveyed and tested in compliance with the requirements of the **TL** Rules, Part B, Chapter 4-1, Automation may be assigned the Class Notation **AUT**. This is only possible for vessels with L ≥ 24 m.

1.3 The requirements for machinery equipment of fishing vessels with a length L < 24 m are mainly defined in this section (mainly sub-section C). For the machinery equipment of decked fishing vessels with a length L ≥ 24, rules as defined in 1.1 and 1.2 are to be applied unless otherwise stated in this section.

1.4. In addition to the Rules and requirements set out in this section, **TL** reserve the right to impose further requirements in respect of all types of machinery or **TL** may permit deviations from the Rules where these are specially warranted.

1.5 International and National rules or regulations outside **TL**'s Rules remain unaffected. See also Section 1, A 3.2 and 3.3.

2. Documents for Approval

The general conditions for submission of documents are defined in Section 1, E. Refer also to TL Rules, Part B, Chapter 4, Machinery and 4-1 Automation for documents to be submitted. Documents are to be submitted for examination at a sufficiently early date to ensure that they are approved and available to the Surveyor at the beginning of the manufacture or installation of the machinery equipments.

B. General Rules for Machinery Installations

1. Operating conditions, general

1.1 The general ambient conditions for the operations of the machinery installations are defined in Section 1, C.

1.2 Account is to be taken of the effects on the machinery installation of distortions of the vessel's hull.

2. Vibrations

2.1 Machinery, equipment and hull structures are normally subjected to vibration stresses. Design, construction and installation must in every case take account of these stresses.

The faultless long-term service of individual components shall not be endangered by vibration stresses.

2.2 Assessment, proof and measurement of vibrations shall follow the **TL** Rules according to Chapter 4 - Machinery.

C. Propulsion System

1. Main Shafting

1.1 Approved materials

For fishing vessels with L < 24 m Inspection Certificates 3.1B according to EN 10204 can be accepted.

1.2 Minimum shaft diameter

For fishing vessels with L < 24 m and fishing along the coast line at a distance not exceeding 20 nautical miles from main land or off-shore islands the minimum shaft diameter is to be determined by the following formula:

$$d_a \geq d \geq k \cdot C \sqrt[3]{\frac{P_W}{n}} \quad [mm]$$

da = Actual outer shaft diameter [mm]

d = Required outside diameter of shaft [mm]

P_W = Rated power of propulsion motor [kW]

n = Shaft speed [min-1]

k = 90 for shafts of corrosion-resistant steel, wrought copper alloys, nickel alloys or non-corrosion resistant steel if the shaft is protected against contact with seawater

= 75 for shafts of high tensile wrought nickel alloys (e.g. "Monal alloy K-500", tensile strength > 800 N/mm^2)

C = 1,06 for vessels with one propulsion line

= 1,0 for vessels with two propulsion lines

2. Gears, Couplings

2.1 Approved materials

For fishing vessels with L < 24 m Inspection Certificates 3.1B according to EN 10204 can be accepted.

2.2 Minimum shaft diameter

For fishing vessels with L < 24 m, the following minimum safety margins for flank and root bending stress may be used:

SH = 1,3 SF = 1,8 for vessels with one propulsion line

SH = 1,2 SF = 1,55 for vessels with two propulsion lines

3. Steering Gear

Steering gears comprise all the equipment used to operate the rudder from the rudder actuator to the steering station including the transmission elements See:**TL**.Rules Part B Chapter 4 Section 9.

The requirements set out in SOLAS Chapter II-1, Regulation 29 and 30 in their most actual version are to be satisfied as far as an application for fishing vessels is senseful.

4. Torsional Vibrations

For fishing vessels with a length L < 24 m measurements of torsional vibrations are in general not required.

D. Storage of Liquids, Piping Systems, Valves and Pumps

1. Application

1.1 This Section does not cover the design and performances of the fishing equipment. However, the piping systems and pressure vessels serving the fishing equipment are required to comply with the relevant Sections of Part B, Chapter 4, Machinery and Chapter 4-1, Automation, if applicable .

SECTION 10

REFRIGERATION INSTALLATIONS

A. General

1. Scope

1.1 Class Notation BST

The complete requirements of this Section apply to refrigeration installations intended for use on board of fishing vessels with Class Notation **BST, [BST] or QUICK FREEZING,** see also **TL** Rules, Classification and Surveys, Section 2, D.3.2.4.

1.2 Safety requirements

The safety requirements of this Section also apply to fishing vessel cargo refrigerating installations for which Class Notation **BST** is not requested as well as for refrigerating installations used for cooling of provisions and air conditioning.

For these refrigerating installations the following requirements have to be considered:

- C. Refrigerants
- D. Refrigerating Machinery Spaces
- F. Pressure Vessels and Apparatus
- J.1. Safety Equipment
- M.1.5 Escape from refrigerated or air-cooler spaces, etc.

2. Definitions

Within the scope of this Section refrigerating installations on board fishing vessels are:

- Cargo refrigerating installations for the refrigeration of insulated cargo holds
- Cargo refrigerating installations for the refrigeration of insulated brine/seawater tanks (RSW)
- Quick-freezing installations for fish and other catch

The provisions assume that the refrigerating installations are permanently installed and belong to the vessel.

3. Classification and survey of refrigeration installations

3.1 For the Classification and Characters of Classification of refrigeration installations see **TL** Rules, Classification and Surveys, Section 2,D.3.2.4.

3.2 For surveys of refrigeration installations see **TL** Rules, Classification and Surveys, Section 3.

4. Documents for approval

4.1 Cargo refrigeration installations

For refrigerating installations which are built under the supervision and in accordance with the **TL** Rules, each of the following documents is to be submitted to **TL** in electronic plan approval system (EPAS) in due time:

a) A description of the refrigerating installations to provide the information necessary for the Classification of refrigerating installations.

b) A calculation of the cooling load as evidence of the adequate capacity of the installation.

c) A general arrangement plan of the refrigerating installation with details of the ventilation of the refrigerating machinery spaces.

d) Drawings of the compressors, such as longitudinal and transverse sections, and a workshop drawing of the crankshaft or rotors.

e) Performance data of the compressors.

f) Drawings of all vessels and equipment under refrigerant pressure, e.g. condensers, evaporators, oil separators, receivers as well as brine/RSW coolers together with details of the materials used.

g) Diagrams showing the layout of refrigerant, brine / CO_2, RSW and cooling water pipelines with details of the wall thickness and materials of the pipes.

h) Drawings showing the arrangement and equipment of the refrigerated spaces with details of air ventilation including airducts and temperature-measuring equipment.

i) Drawings showing the type and design of the defrosting system.

j) Drawings showing the type and execution of the insulation used for the refrigerated spaces and tanks, with details of the insulation of hatches, doors, covers for scuppers and bilges, thermal bridges and refrigerant and brine piping.

k) Drawings of the bilge pumping and drainage facilities for refrigerated spaces and tanks.

l) Drawings and descriptions of electrical temperature-monitoring systems with details covering extent of the system, the arrangement, number and coordination of the measuring the points and instruments, measuring ranges, accuracy, wiring etc..

m) Description of automatic control systems.

5. Testing of materials and components

5.1 The selecting and testing of materials is subject to the **TL** Rules, Chapter 2, Material.

5.2 Components under refrigerant pressure are required to undergo material testing as a matter of principle. Specific requirements are stated individually within this Section.

5.3 Material tests are to be performed on the crankshafts of reciprocating compressors and the rotors of screw compressors with a calculated journal diameter of more than 50 mm. Works Certificates are sufficient in case of journal diameters ≤ 50 mm.

5.4 **T**L reserve the right to extend material testing to other important plant components.

B. Installation, Design and Rating

1. Design principles

1.1 Refrigeration systems shall be so designed, constructed, tested and installed as to take account of the safety of the system and also emission of chlorofluorocarbons (CFCs) or any other ozone-depleting substances from the refrigerant held in quantities or concentrations which are hazardous to human health or to the environment and shall be also to the satisfaction of the Administration of the country of registration.

1.2 Refrigeration systems shall be adequately protected against vibration, shock, expansion, shrinkage, etc. and shall be provided with an automatic safety control device to prevent a dangerous rise in temperature and pressure.

2. Electrical power supply

At least two generating sets have to be available for supplying power to refrigerating installations. The capacity of the generators is to be such that, in addition to other requirements:

- when all generators are in operation the total power requirements of the refrigerating installation can be satisfied, the "total power requirements" being the installed electrical load of the refrigerating installation

- in the event of the failure or shutdown of any one generator, all refrigerating machinery, with the exception of the stand-by sets can be operated at full load. For vessels with Class Notation **K50/20** this requirement may be dispensed with.

3. Number of refrigerating units

3.1 At least two complete refrigerating units

including compressors, condensers, receivers (if applicable) and prime mover are to be provided.

3.2 Where several compressors operate in a closed circuit with one condenser and, where installed, one brine cooling evaporator, this also counts as one refrigerating unit.

3.3 Where only two refrigerating units are installed, each compressor shall be capable of working with each condenser and, where applicable, with each brine cooling evaporator.

3.4 In case of vessels with Class Notation **K50/20** and with refrigerated spaces less than 400 m^3, consideration will be given to the installation of only one condensing unit.

4. Refrigerating capacity

4.1 The refrigerating capacity of the installation is to be rated in such a way that the required temperature (s) in holds or tanks can be maintained when any of the refrigerating units are out of operation. Fully loaded condition is to be assumed.

The required temperature is the temperature on which the refrigerating capacity calculation is based and which is certified in the Refrigerating Installation Certificate.

4.2 Where additional plants, such as quick freezers, icemakers, etc. are connected to the refrigerating installation, the reserve refrigerating unit may be taken into account when the conditions are most unfavourable.

5. Factors affecting plant rating

5.1 The calculation of the required refrigerating capacity is to be based on a seawater temperature of at least 32 °C and an ambient air temperature of at least 40 °C with 55 % relative humidity unless other values are agreed with **TL** in consideration of special operation.

5.2 The calculation shall likewise be based on the area enveloping the refrigerated spaces/tanks on the inside of the insulation, where such spaces are adjacent to non-cooled spaces, cooled spaces at higher temperatures, the ambient air or seawater.

6. Automation, instrumentation and alarms

6.1 Automated refrigerating installations are to be so equipped that they can also be operated with manual control.

6.2 Input units and actuating devices are to be type-tested.

6.3 Measures shall be taken to prevent freezing of refrigerated seawater.

6.4 Defrosting arrangements for air coolers are to be controlled by a defrosting program.

6.5 Fault alarms

An alarm system is to be installed which actuates an alarm at a position which is constantly manned. An alarm shall be generated for the cases defined in Table 10.1.

7. Plant of novel design

Refrigerating installations differing in design from those which have already been proved suitable in service on board fishing vessels are subject to special **TL** approval. For such installations, **TL** may impose special requirements as to the extent of the documentation to be submitted for approval and the scope of the testing, see also TL Rules, Classification and Surveys, Section 2, D.3.5.4.

C. Refrigerants

1. Classification

Refrigerants used in refrigeration systems shall be to the satisfaction of the Administration of the country of registration. Methylchloride or CFCs whose ozone-depleting potential is higher than 5 % of CFC-11 shall not be used as refrigerants. Refrigerants are classified as follows:

Table 10.1 Instrumentation and alarms

Item		Display	Alarm	Reaction
Compressor	Automatic stop		Activated	
	Lubricating oil	Pressure **(1)**	Low	Automatic stop
	Driving motors	Running	Stop	
	Discharge line: - pressure	Pressure **(1)**	High	Automatic stop
	- temperature	Temperature **(1)**	High/Low	Automatic stop
	Suction line: - pressure	Pressure **(1)**	Low	Automatic stop
	- temperature	Temperature **(1)**	High	
	Intermediate stage (if fitted)	Pressure **(1)**	High	Automatic stop
Secondary circuit Brine/CO_2	Circulation pumps	Running	Stop	
	Available pumps	Running	Start	For auto start
	Brine/CO_2 cooler - inlet/outlet	Temperature **(1)**	High (outlet)	
	Pressure line	Pressure **(1)**	Low	
	Header tank	Level **(1)**	Low	
Condenser	Cooling water pumps	Running	Stop	
	Available cooling water pump	Running	Start	
	Cooling water - inlet	Temperature **(1)**	-	
	Cooling water - outlet	Temperature **(1)**	High	
Refrigerating machinery space	Lock-in alarm		Manually activated	
Refrigerant leakage	Concentration in refrigerating machinery space, pump rooms, production areas		Leakage NH_3 = 50 ppm CO_2 = 5000 ppm	Automatic stop of refrigerating machinery if NH_3 > 500 ppm
	Concentration in refrigerated spaces		Leakage CO_2 = 10000 ppm	
	Detection system		Failure	
Refrigerated spaces	Temperature measuring	Temperature	High	
	Left/right hand cooler delivery air/return air	Temperature	High	
	Lock-in alarm		Manually activated	
	Ventilation fan (full/half speed)	Stop/running	Failure	
Defrost	Time duration		Disabled	

(1) *These devices are to be provided at or in the proximity to the refrigeration machinery*

1.1 Approved refrigerants, Group 1

Incombustible refrigerants without significant hazard to human health, e.g.:

R134a Tetrafluorethane $CH_2F\text{-}CF_3$

R404A R125/143a/134a(44/52/4%)

R407A R32/125/134a(20/40/40%)

R407B R32/125/134a(10/70/20%)

R407C R32/125/134a(23/25/52%)

R410A R32/125(50/50%)

R507 R125/143a(50/50%)

With these refrigerants the danger of asphyxiation is, however, to be borne in mind.

1.2 Approved refrigerants, Group 2

Toxic or caustic refrigerants and those which, when mixed with air, have a lower explosion limit of at least 3,5 % by volume.

R717 Ammonia NH_3

NH_3 may generally be used as refrigerant with indirect systems only. In case of quick freezing installations and in cooling coils fitted in brine / RSW tanks these refrigerants may be directly expanded. In addition, the regulations imposed by the competent authorities of the country of registration are to be observed.

1.3 Refrigerants which are not approved, Group 3

Refrigerants which, when mixed with air, have a lower explosion limit of less than 3,5 % by volume, e.g. ethane, ethylene.

2. Working pressures

2.1 For the common refrigerants, the allowable working pressures PB (design pressures PR) are laid down in Table 10.2.

For other refrigerants, the design pressures PR are determined by the pressure at the bubble point at a temperature of 55 °C on the high pressure side and at a temperature of 45 °C on the low pressure side.

Table 10.2 Allowable working pressures for refrigerants

Refrigerant	Working pressure PB [bar]	
	High-pressure side (HP)	Low-pressure side (LP)
R22	22,5	17,0
R134a	13,9	10,6
R404A	25,0	19,7
R407A	25,2	19,8
R407B	26,5	20,9
R407C	23,9	18,8
R410A	33,6	26,4
R507	25,6	20,2
R717 (NH3)	24,0	17,5
R744 (CO2	**(1)**	**(1)**

(1) *Design pressure to be determined by the plant designer taking into account the proposed operating pressure and the maximum pressure at rest condition. Where the maximum design pressure at rest conditions is maintained by the fitting of a supplementary refrigeration unit, condensing the vapour in a holding vessel, supporting calculation require to be provided to show that this can be undertaken with a local ambient temperature of 45 °C.*

The holding vessel is to be thermally insulated to prevent the operation of the relief devices within a 24 hour period after de-energising the supplementary refrigeration unit at an ambient temperature of 45 °C and an initial pressure equal to the starting pressure of the refrigerating unit.

2.2 Within the meaning of these Rules, the lowpressure side of the plant includes all parts exposed to the evaporation pressure of the refrigerant. However, these parts are also subject to the design pressure PR for the high-pressure side if, e.g. for hot gas defrosting, a switch-over of the system can subject them to high pressure.

Medium-pressure vessels of two-stage plants form part of the high pressure side.

3. Storage of reserve supplies of refrigerants

3.1 Reserve supplies of refrigerants may be stored only in steel bottles approved for this purpose by the competent authorities of the country of registration.

3.2 The filling level of these bottles shall be suitable for tropical conditions, unless operating range of the fishing vessel is restricted to cold climate zones.

3.3 Bottles containing refrigerant are to be securely anchored in an upright position and protected against overheating.

3.4 Bottles containing refrigerant may be stored only in well ventilated spaces specially prepared for this purpose or in refrigerating machinery spaces.

3.5 On fishing vessels where, with due regard for the provisions of D., there is no refrigerating machinery space and the refrigerating machinery is installed in the main or auxiliary engine room, **TL** may permit exceptions to 3.4 in the case of refrigerants belonging to Group 1. In this case storage bottles up to a maximum of 20 % of the total refrigerant charge for immediate replenishing of the system may be kept in the main or auxiliary engine room.

D. Refrigerating Machinery Spaces

1. Definition

Refrigerating machinery spaces are spaces separated by bulkheads from other service spaces and housing refrigerating machinery and associated equipment.

2. Installation of refrigerating machinery

2.1 Any space containing refrigerating machinery including condensers and gas tanks utilizing toxic refrigerants shall be separated from any adjacent space by gastight bulkheads.

2.2 When the containment according to 2.1 is not practicable, due to the size of the vessel, the refrigerating system may be installed in the machinery space provided that the quantity of refrigerant used will not cause danger to persons in the machinery space, should all the gas escape and provided that an alarm is fitted to give warning of dangerous concentration of gas should any leakage occur in the compartment.
This arrangement may be considered for a total refrigerant charge of less than 25 kg.

2.3 Refrigerating machinery is to be installed in such a way that sufficient space is left for operation, servicing and repair.

3. Equipment and accessories

3.1 Refrigeration systems using ammonia in charges exceeding 25 kg are to be installed in refrigerating machinery spaces separated by gas tight divisions from other ship spaces and service rooms.

3.2 Regardless of the type of refrigerant used, the doors of refrigerating machinery spaces shall not give access to living quarters or corridors in the accommodation area. The doors must open outwards and be self-closing.

3.3 Where refrigeration systems operate with ammonia spaces accommodating the refrigerating machinery are to be equipped as follows:

a) Spaces shall be provided with at least two access doors as far as possible from each other. The doors are to open outwards and be of selfclosing type.

b) Type-tested gas detectors are to be fitted. Visual and audible signals must be provided outside and inside the room. The alarm is to be linked to the general machinery alarm system

and is to trip an individual alarm on the bridge as well as in the engine control room.

c) Equipment for producing water screens is to be fitted above the access doors to refrigerating machinery spaces. Provision shall be made for actuating this equipment from outside the refrigerating machinery space. The actuating device shall not be located in the immediate vicinity of the entrances.

Where water sprinklers are additionally mounted in the refrigerating machinery spaces themselves, these are to be permanently installed and shall be capable of being actuated from outside.

The spray nozzles of sprinkler systems are to be suitably distributed in the refrigerating machinery space.
Due attention is to be paid to electrical machinery and equipment. The spray nozzles shall be capable of covering as large an area as possible with fine water droplets.

d) The electrical consumers in the refrigerating machinery spaces shall be capable of being switched off, independently of the forced ventilation system, by a central switch located outside the room.

3.4 Provision shall be made for the bilge pumping or drainage of refrigerating machinery spaces. Where installations are operated with ammonia, the refrigerating machinery spaces shall be provided with drainage devices leading to a place where refrigerant presents no danger to the vessel or to the persons on board.

3.5 The electrical equipment of refrigerating machinery spaces is subject to the provisions of Chapter 5, Electrical Installation.

3.6 In the case of refrigeration systems which use ammonia, suitable protective clothing, as well as goggles and breathing apparatus for at least two people must be provided outside the refrigerating machinery space close to the access door. Additional national requirements, e.g. self-contained air breathing apparatus and protective clothes are to be observed.

4. Leak detection and alarm

4.1 Refrigerant leak detectors need to be fitted in case of NH_3 and/or CO_2 in any area where leakage may occur, e.g. refrigerating machinery spaces, fish processing area, valve stations, refrigerating cargo holds. Welded pipelines passing through passageways or access ducts are not considered possible leakage areas.

4.2 Leak detection systems are to be type tested. Set points for alarms shall be adjusted as given in Table 10.1.

4.3 Leak detectors are to activate audible and visual alarms located both inside and outside the affected space. The alarm is to be linked to the general machinery alarm system and is to trip an alarm on the bridge as well as in the engine control room.

5. Ventilation

5.1 Refrigerating machinery spaces shall have a suitably arranged, mechanical ventilation system. The ventilation system shall be activated either manually or automatically by the detector system. Where Group 1 refrigerants are used, at least the exhaust air shall be conveyed into the open air separately from the ducts serving other spaces. The air intake duct shall not be connected to the ventilation system serving the accommodation.

5.2 Where ammonia is used, the ventilation system shall not be connected to systems serving other spaces of the vessel.

5.3 The rating of mechanical fans is subject to the following criteria:

a) Refrigerating machinery spaces where Group 1 refrigerants are used are to be equipped with mechanical means of ventilation enabling the air to be changed at least 30 times/hour.

b) Where the refrigerant used is ammonia, the minimum flow rate of the mechanical fans serving the refrigerating machinery spaces is to be calculated by applying the formula:

$V = 60 \cdot m^{2/3}$ [m^3/h]

V = Flow rate [m^3/h]

m = Weight of the refrigerant charge [kg]

In any case, the number of air changes per hour may not be less than 40.

Where installations operated on ammonia are equipped with an effective water sprinkler system arranged in the refrigerating machinery space, the minimum flow rate of the fans specified above may be reduced by 20 %.

5.4 Where the refrigerant used is CO_2, the minimum flow rate of the mechanical fans shall be designed for 30 air changes/hour.

5.5 Fans serving refrigerating machinery spaces shall also be capable of being switched on and off from outside the space in question. The switches are to be clearly marked.

5.6 Exhaust air ducts of fans serving refrigerating machinery spaces are to be gastight inside the vessel. The exhaust air has to be conveyed in such a way as to prevent leakage of gas into other vessel's spaces.

E. Refrigerant Compressors

1. General

1.1 Where the compressors are electrically driven, the motors and other items of electrical plant shall comply with Chapter 5, Electrical Installation.

1.2 Other compressor drives, like diesel engines, turbines, etc. shall comply with Section 09 and the relevant Sections of Chapter 4, Machinery.

1.3 Air-cooled compressors are to be designed for an air temperature of at least 45 °C.

1.4 Seawater-cooled compressors are to be designed for a minimum inlet temperature of 32 °C. The cooling water spaces of compressors are to be protected against excessive overpressure by safety valves or rupture safety devices, unless provided with a free outlet.

2. Design and construction of refrigerant compressors

For the design and construction of refrigerant compressors, see **TL** Rules defined in Chapter 15 - Refrigerating Installations,

3. Material testing

Refrigerant compressors and compressor parts are to be subjected to material testing in accordance with the **TL** Rules defined in A.5.

4. Equipment

4.1 Compressors are to be equipped with devices such as pressure relief valves, rupture discs, etc. which, if the maximum allowable working pressure is exceeded, will equalize the pressures on the discharge and suction sides. Semi-hermetic compressors in automatic installations may be exempted from this requirement, provided that they are protected by overpressure safety switches and can be operated with permanently open shutoff valves in such a way that the safety valves fitted to the installation remain effective.

4.2 Pressure gauges and thermometers are to be fitted in accordance with J.2.1 and J.2.2.

4.3 A manufacturer's plate with the following information is to be fixed to each refrigerant compressor:

- Manufacturer
- Year of construction
- Refrigerant
- Maximum allowable working pressure PB [bar]

5. Testing

After completion, refrigerant compressors are to be subjected to a trial run without refrigerant at the manufacturer's works and to the pressure and tightness tests specified in K.

F. Pressure Vessels and Apparatus

1. Pressure vessels and apparatus under refrigerant pressure

1.1 General

Pressure vessels and apparatus under refrigerant pressure shall comply with the **TL** Rules in Chapter 4, Machinery, Section 14

1.2 Material testing

The materials of components under refrigerant pressure must be tested in accordance with the **TL** Rules defined in Chapter 4, Machinery, Section 14, B.

1.3 Safety devices

1.3.1 Pressure vessels and apparatus which contain liquid refrigerant and which can be shut off are to be fitted with a safety valve, see J.1.

1.3.2 Where more than one pressure vessel are provided with one common safety valve, any closing device fitted between the pressure vessels is to be equipped as to secure in the open position. A warning sign with the following wording is to be fitted in the vicinity of each closing device:

"Valve is to be secured in open position and may be closed for repairs only".

1.3.3 Filters and dryers need not be fitted with safety valves.

1.4 Pressure and tightness tests

After completion, pressure vessels and apparatus under refrigerant pressure are to be subjected to the pressure and tightness tests specified in K.

2. Brine tanks

2.1 General

2.1.1 The term "brine" as a cooling medium means a solution of industrial salts. The use of other media with a low freezing point requires the special approval of **TL**.

2.1.2 In this context, brine tanks do not include brine cooling evaporators. The latter shall comply with the requirements for pressure vessels and apparatus under refrigerant pressure, as set out in 1.

2.1.3 Brine tanks shall not be galvanized internally.

2.1.4 Brine systems have to be equipped with air pipes which cannot be closed off and with brine compensating tanks.

2.1.5 Brine tanks which can be shut off shall be protected against excessive pressure rises due to the thermal expansion of the brine by the provision of safety valves or by mechanism for interlocking the shutoff devices in the open position.

2.2 Testing

Brine tanks are to be subjected in the manufacturer's works to the hydraulic pressure and tightness tests specified in K. Material tests and pneumatic tightness tests may in general be dispensed with.

3. Refrigerated seawater tanks (RSW)

3.1 Each RSW tank is to be provided with appropriate venting and sounding arrangements. The arrangements to assess the liquid levels in the tanks may be permanently installed or be a temporary arrangement.

3.2 Where a RSW tank is intended to carry dry fish in bulk, the following arrangements are to be provided:

- The tank is to be provided with a bilge well and a permanent connection to the bilge system, unless the tanks are provided with independent bilge systems

- Arrangements are to be made for blanking off sea water piping

4. Air coolers

4.1 General

4.1.1 Air coolers for direct evaporation **(1)** count as apparatus under refrigerant pressure and are therefore subject to the requirements in 1. Notwithstanding this, safety devices are required only for flooded evaporators.

4.1.2 Air coolers operated by indirect evaporation, insofar as brine is used as the cooling medium, shall not be galvanized internally.

4.1.3 Air coolers are to be provided with drip trays and adequate drains.

4.1.4 Air coolers are to be provided with defrosting equipment according to M.2.

4.1.5 Air coolers shall be made of corrosion resistant material or be externally protected against corrosion by galvanizing.

4.1.6 Where finned-tube or multi-plate type air coolers are used, the distance between the fins or plates shall be not less than 10 mm, at least on the air inlet side. In this context, the air inlet side is taken to mean ¼ of the length of the cooler measured in direction of air flow.

4.1.7 Depending on the type of air circulation system employed, the air coolers are to be subdivided by shut offs in such a way that, even after breakdown of one air cooler section, the cooling of the refrigerated space can be maintained.

This requirement need however, not be applied in case of very small spaces.

(1) *Refrigerating installations with direct evaporation are those where the refrigerant evaporator is located in the refrigerated space itself. In such plants no brine or similar cooling medium is used.*

4.2 Material testing

Materials for air coolers using direct evaporation are to be subjected to the tests specified in the **TL** Rules, Chapter 2, Section 3, E. and Section 4, D.

In the case of air coolers for indirect evaporation, the testing of materials may be dispensed with if the cooling medium employed is brine.

G. Pipes, Valves and Fittings

1. Refrigerant pipes, valves and fittings

1.1 General

1.1.1 Refrigerant pipes, valves and fittings are to be designed in accordance with Chapter 4, Section 16.

Where ammonia is employed for refrigerant, copper, bronze, brass and other copper alloys are not to be used.

1.1.2 Refrigerant pipes shall be insulated in accordance with L.1. Steel pipes shall be galvanized externally, unless other adequate corrosion protection has been demonstrated to **TL**.

1.1.3 At points where pipes are supported or pass through decks or bulkheads, a metallic contact with steel members of the vessel's structure has to be avoided.

1.1.4 Where necessary, refrigerant pipes between compressors and condensers are to be protected against being inadvertently touched.

1.1.5 Automatic control valves are to be arranged or fitted with by-passes so that the installation can be operated by hand.

1.1.6 Flexible refrigerant hoses of non-metallic materials shall comply with the requirements of the **TL** Rules defined in Chapter 4, Machinery, Section 16, U. Approved hose assemblies and bellows expansion joints are to be used only.

1.1.7 Shut-off valves are to be provided to allow the replacement of hose assemblies without loss of refrigerant.

1.1.8 Pipe sections of CO_2 piping systems which can be isolated are to be protected by a pressure relief valve. At least one pressure relief valve is to be fitted at the CO_2 piping system which ensures safe blow-off of CO_2-vapour directly to a safe location above deck.

1.2 Material testing

1.2.1 Materials for refrigerant pipes are to be tested in accordance with the TL Rules defined in Chapter 4, Machinery, Section 16, B.

1.2.2 Refrigerant valves and fittings are subject to material testing if their housings are made of cast steel or nodular graphite cast iron and the product of the maximum allowable working pressure PB [bar] multiplied by the nominal diameter DN [mm] is > 2500. Valves and fittings with nominal diameter DN ≤ 50 are exempted from this requirement.

1.2.3 Where the housings of valves and fittings are made of grey iron, **TL** reserve the right to check the quality of the material. EN-GJL-200 grade material is to be used as a minimum.

1.2.4 Where the housings of valves and fittings are manufactured by die-forging or are made of copper alloys, material testing is not required.

1.3 Pressure and tightness test

1.3.1 Refrigerant valves and fittings are to be subjected in the manufacturer’s works to the pressure and tightness tests specified in K.

1.3.2 Automatic control valves can be exempted from this requirement where sensitive internal components may be damaged by the pressure testing. Where the design permits, the housings are to be tested without internal components in these cases.

1.3.3 After installation, refrigerant pipes are to be subjected to the tightness test specified in K.2.1.3.

2. Brine pipes, valves and fittings

2.1 General

2.1.1 Brine pipes, valves and fittings have to comply with the requirements set out in Chapter 4, Section 16. They are not to be galvanized internally, but shall be protected against corrosion externally.

2.1.2 In general thick-walled pipes in accordance with Chapter 4, Section 16, group M are to be used.

2.1.3 At points where brine pipes are supported or pass through decks or bulkheads, a metallic contact with steel members of the vessel's structure has to be avoided.

2.2 Testing

After being installed but prior to the application of the insulation, brine piping systems are to be subjected to the hydraulic pressure tests specified in K. Material tests may generally be dispensed with.

H. Fans and Pumps

1. Fans

After being installed, the fans are to be tested in accordance with Q.1.5.

Provision shall be made for replacing fan impellers and fan motors even when the refrigerated holds are fully loaded. On fishing vessels with Class Notation **K50/20** this requirement may be dispensed with.

2. Refrigerant circulating pumps

2.1 At least two mutually independent pumps are to be installed, one of which is to act as a stand-by.

On fishing vessels with Class Notation **K50/20** the stand-by pump may be dispensed with.

2.2 Evidence of the quality of the materials used is to be supplied in respect of all parts subject to refrigerant pressure. Where housings are made of grey

cast iron, EN-GJL-200 grade material is to be used as a minimum requirement.

2.3 Refrigerant circulating pumps are to be subjected in the manufacturer's works to a performance test in presence of a **TL** Surveyor and to the pressure and tightness tests specified in K.

3. Brine pumps

3.1 At least two mutually independent pumps are to be installed, one of which is to act as a stand-by.

On fishing vessels with Class Notation **K50/20** the stand-by pump may be dispensed with.

3.2 Brine pumps are to be subjected in the manufacturer's works to a performance test in presence of a **TL** Surveyor and to the hydraulic pressure and tightness tests specified in K. A pneumatic tightness test is not required.

4. Cooling water pumps

The requirements set out in 3. are applicable in analogous manner. Regarding the stand-by pumps see I.2.

I. Cooling Water Supply

1. General

Pipes, valves and fittings have to comply with Chapter 4, Section 16, I.

2. Reserve cooling water supply

Where the reserve cooling water supply system of the refrigerating installation is connected to the cooling water system of the main propulsion plant, the standby cooling water pump specified in H.4. may be dispensed with provided that the stand-by cooling water pump of the main propulsion plant is capable of the adequate supply of cooling water to the refrigerating installation without adversely affecting the operation of the main propulsion plant.

3. Suction lines

Each cooling water pump has to be equipped with its own suction line and shall be able to draw from at least two sea chests. Seawater filters are to be fitted and so arranged that they can be cleaned without interrupting the cooling water supply.

4. Dock operation

By suitable connection of the cooling water lines to ballast water tanks or by hose connections to the deckwashing line or fire main, measures shall be taken to ensure that, where necessary, the refrigerating installation can also be operated while the vessel is docked.

This requirement is not applicable for fishing vessels with Class Notation **K**.

5. Cooling water pipes in cargo holds

Where cooling water pipes have to be laid through cargo holds or refrigerated cargo holds to the refrigerating machinery spaces, they are to be installed in pipe tunnels. In exceptional cases, cooling water pipes may be installed above deck or in the double bottom tank.

6. Testing

After being installed, cooling water pipes, valves and fittings are to be subjected to a pressure test specified in K.

J. Safety and Monitoring Equipment

1. Safety equipment

1.1 General

1.1.1 Provisions are to be made to ensure that the compressor switches off automatically if the limits are exceeded, see Table 10.1.

1.1.2 Pressure vessels and apparatus which can be isolated and which contain liquefied refrigerants have to

be equipped with a safety valve, see also F.1.3.

1.1.3 Provision has to be made for the safe blowoff of refrigerants directly into the open air.

1.2 Safety valves and rupture discs

1.2.1 Safety valves exposed to refrigerant pressure are subject to the requirements set out in G.1. The provisions of G.2. are applicable in analogous manner to safety valves under brine pressure.

1.2.2 Safety valves are to be set to the maximum allowable working pressure and secured to prevent the setting being altered inadvertently.

1.2.3 Where a rupture disk is fitted upstream of a safety valve, the space between the rupture disc and the safety valve is to be monitored by an alarm pressure gauge or an equivalent device.

A screen is to be fitted downstream the rupture disc to ensure the function of the safety valve.

The bursting pressure of the rupture disc shall not exceed the maximum allowable working pressure. A margin of 10 % is permitted.

2. Monitoring equipment

An overview of the monitoring equipment is contained in Table 10.1.

2.1 Pressure gauges

The suction and discharge pipes of refrigerant compressors, intermediate stage pressure vessels and pressurized brine pipes are to be fitted with pressure gauges. Refrigerant pressure gauges are required to have pressure and temperature scales for the refrigerant concerned. The maximum allowable working pressure is to be indicated by a red mark.

2.2 Thermometers

Brine delivery and return pipes, condenser cooling water inlet and outlet pipes and pressure and suction pipes of compressors are to be equipped with thermometers.

For the number and disposition of thermometers in refrigerated cargo holds see N.

2.3 Liquid level indicators

Direct indicators such as sight glasses for liquid refrigerants are to be fitted with shut off valves. The use of tubular glasses is not permitted.

K. Pressure and Tightness Tests

1. General

1.1 All pressure and tightness tests are to be performed in presence of a **TL** Surveyor. They are to be carried out initially during supervision of construction at the manufacturer’s works or on board of the vessel as specified in the relevant parts of this Section.

1.2 As a rule, pneumatic tightness tests are to be performed after the hydraulic pressure tests.

1.3 Exceptionally, **TL** may, on application, waive the hydraulic pressure test provided that a pneumatic pressure test is performed at a test pressure approved by **TL**. In addition regulations for accident prevention of national authorities are to be observed.

1.4 In refrigerating installations which have already been charged with refrigerant, pneumatic pressure tests may be performed only with nitrogen or carbon dioxide if Group 1 refrigerants are used or only with nitrogen if the refrigerant is ammonia.

The use of other gases requires the agreement of **TL**.

2. Test pressures

2.1 Components under refrigerant pressure

2.1.1 The hydraulic test pressure is to be 1,5 × the maximum allowable working pressure PB according to Table 10.2.

2.1.2 Where the low-pressure side of the installation can be subjected by operational switching to the pressure of the high pressure side, e.g. for defrosting

with hot gas, the vessels and equipment involved are to be designed and tested at the pressures prescribed for the high pressure side.

2.1.3 The pneumatic tightness test pressure is to be equal to the maximum allowable working pressure PB.

2.2 Components under cooling water or brine pressure.

The hydraulic test pressure is to be 1,5 × the maximum allowable working pressure PB, but not less than 4 bar.

L. Insulation of Pressure Vessels, Apparatus, Pipes, Valves and Fittings

1. Cold insulation

1.1 Pressure vessels, apparatus, pipes, valves and fittings whose operating temperatures may drop below the ambient temperatures are to be provided with cold insulation. Components of plants which are accommodated in specially insulated refrigerating machinery spaces are exempted from this requirement.

1.2 Refrigerant and brine pipes which traverse uncooled spaces are to be insulated with special care and are to be installed so that they are protected from damage.

1.3 Air-, sounding-, thermometer- and drain pipes in refrigerated and air-cooler spaces are to be adequately insulated.

1.4 Before being insulated, the items concerned are to be protected against corrosion.

1.5 Cold insulation is to be designed as to prevent the formation of condensation water on its surface at a maximum relative humidity of 90 %.

1.6 The insulation is to be free from discontinuities and its final layer shall be given a vapourtight coating.

1.7 Insulation is to be protected at points where there is a danger of damage.

2. Heat insulation

2.1 To avoid premature refrigerant condensation, hot gas defrosting pipes are to be insulated over their entire length.

2.2 If insulation is provided to prevent accidental touching see also G.1.1.4.

2.3 Components requiring insulation are to be protected against corrosion.

M. Equipment and Insulation of Refrigerated Spaces

1. Equipment

1.1 The external boundary walls of refrigerated spaces are to be watertight and made of steel. If the use of other materials is envisaged, the agreement of **TL** is required.

1.2 Manholes in the double bottom or in oil tank tops are to be surrounded with an oiltight coaming 100 mm in height.

1.3 Brine or refrigerant pipe penetrations through watertight bulkheads and decks shall be of approved design. The pipes may not come into direct contact with bulkheads, vessel's structure or other metal structural members. The fire resistance of the bulkheads and decks shall not be impaired.

1.4 The clear openings of access trunkways and companion hatches leading to cargo or air-cooler spaces shall not be less than 600 × 600 mm. Hinged hatch covers are to be protected against closing accidentally and shall be capable of being reopened by hand from inside.

1.5 Refrigerated or air-cooler spaces are to be equipped with an escape leading out to the open deck. For this purpose, each space is to be provided with at least one door which can also be opened from inside. In addition an alarm for operation from within the space shall be connected to the bridge or permanently manned machinery control centre (MCC) to prevent persons being trapped.

1.6 The supporting structures of refrigerated spaces and inspection passageways are to be designed to withstand the load expected by the cargo.

1.7 Refrigerated spaces are to be provided with drains and/or bilge pumping facilities. In this connection see, Chapter 4, Section 16.

1.8 For scuppers in the bulkhead deck, see Section 2.

1.9 Circulating fans and air-coolers installed in refrigerated or air-cooler spaces have to be accessible at all times. It shall be possible to change fan impellers and drive motors even when the cargo spaces are fully loaded, see also H.1.

If spaces are served by two or more fans having a capacity that the minimum required temperature can be maintained under most unfavourable conditions with anyone fan out of action, this requirement need not be applied.

2. Defrosting

2.1 Means are to be provided for defrosting aircoolers. Efficient defrosting is to be ensured even when refrigerated compartments are loaded to their maximum.

2.2 Drip trays and drains are to be protected from freezing by adequate heating arrangements.

2.3 Means are to be provided to protect air coolers from overheating.

3. Insulation

3.1 The inside surfaces of refrigerated spaces are to be adequately insulated. Thermal bridges are to be avoided. Structural members of the vessel which may act as thermal bridges, e.g. decks, partitions and pillars, are to be fully insulated over a length of at least 1 m into the refrigerated space.

3.2 Divisions, bulkheads and decks separating refrigerated spaces at the same temperature need not be insulated. However, the requirement in 3.1 is to be complied with. Cladding is to be fitted to protect the cargo.

3.3 Insulation materials shall be odourless and non-hygroscopic as possible. Combined with their cladding material, it shall be not readily ignitable.

3.4 If timber is used in refrigerated cargo spaces, this is to be impregnated with, if possible, odourless media to prevent rotting and fire.

3.5 Insulation is to be permanently secured. Where insulation in the form of slabs is used, the edges of the slabs are to abut tightly against each other.

3.6 The insulation at manhole covers, bilge suctions and wells shall be removable.

3.7 For the insulation of piping in refrigerated spaces see L.

3.8 The edges of insulated hatches and hatch covers, doors, bilge covers, etc. are to be protected against damage.

3.9 At hatches and for about 500 mm beyond, the deck insulation in lower holds is to be provided with a special protective covering. The same applies also to shaft tunnels.

3.10 Unless suitable deck material or aluminium gratings are provided as top covering, the insulation of the decks of refrigerated spaces is to be protected by battens measuring at least 50 mm by 50 mm in cross section. The battens may take the form of removable gratings.

3.11 The insulation of the bulkheads of refrigerated spaces and of air ducts is to be suitably protected against damage. This protection is to be so designed that the cooling air is able to circulate freely.

3.12 Refrigerated spaces should not lie adjacent to fuel or lubricating oil tanks. Where this cannot be avoided, a sufficiently wide gap is to be left between the vertical surfaces of such tanks and the insulation. This gap is to be provided with a drain leading to the bilge and with a vent pipe leading to the open air. The back of

the insulation is to be protected against the penetration of moisture, e.g. by metal cladding.

3.13 The requirements set out in 3.12 apply in analogous manner to the tops of lubricating oil and fuel tanks. In the case of welded tank tops, the specified isolating gap may be dispensed with, provided that the top is covered with a well established oilproof coating without joints and of sufficient thickness.

N. Temperature Monitoring Equipment for Refrigerated Spaces

1. General

1.1 Suitably distributed and easily accessible thermometers are to be placed in each refrigerated space. At least one thermometer each is required before and after each air-cooler.

1.2 Based on spaces of normal geometry and on the useful volume shown, the following number of thermometers is to be fitted as a minimum:

- for spaces up to approximately 300 m^3:
  2 thermometers

- for spaces up to approximately 800 m^3:
  3 thermometers

- for spaces over 800 m^3:
  4 thermometers

In determining the number of thermometers required, each individual refrigerated space is to be considered separately, even where several spaces are served by a single air-cooler and the tween decks are not insulated.

1.3 In case of RSW-tanks two thermometers shall be installed as a minimum.

2. Electrical temperature monitoring equipment

2.1 Where temperatures are not monitored locally, electrical devices are to be fitted which comply both with the following requirements and with Chapter 5.

2.2 In design and degree of protection, all appliances and other system components shall be compatible with the mechanical and climatic conditions attaching to their particular operating environments. If mobile temperature sensors are provided for refrigerated holds they are then to be fitted with connecting leads of sufficient length and the sensors are to be protected against mechanical damage.

2.3 Means are to be provided to enable temperature measuring of cargo holds in case of failure of the temperature monitoring system. The number of measuring points (sensors) in refrigerated spaces depends on the configuration and size of each space. The requirements set out in 1.1 and 1.2 are to be complied with as a minimum.

2.4 The measuring range of the system has to cover the entire anticipated temperature range plus an additional ± 5 K. Temperatures above and below the measuring range shall not have any harmful effect on the systems.

2.5 For the accuracy of the temperature measurements and reading the following values are to be applied:

- Maximum total error: 0,5 K

- Scale calibration for analogous measurements:
  2,5 mm/K

- Exceptions subject to **TL** approval

2.6 Wires and their installation has to comply with Chapter 5. Waterproof distribution and junction boxes shall be used.

2.7 Each temperature measuring system has to be provided with its own power supply. The power supply system shall be duplicated.

2.8 Where temperature measuring systems are supplied by their own power sources or via converters from the vessel's supply system provision shall be made for easy switching to a stand-by power source.

2.9 Instruments and appliances shall be marked with their type and number.

2.10 The system and its individual components are to be subjected to a test in the manufacturer's Works under the supervision of **TL**.

O. Quick Freezing Installations

1. For pressurized parts of quick freezing installations, such as plate elements or freezing coils, the requirements in F. shall be complied with.

2. Spaces for quick freezing installations shall be in line with the requirements set out in D.3., D.4. and D.2.1.

P. Spare Parts and Protective Equipment

1. Spare parts

1.1 The extent of spare parts to be carried on board is indicated in Chapter 15, O.1. In the case of recording instruments, the supply of spare parts is to be agreed with **TL**.

1.2 For fishing vessels with Class Notation **K** the availability of spare parts for refrigerating installations should be specially considered and decided upon by the owner.

2. Protective equipment

2.1 Breathing apparatus

Where any refrigerant harmful to persons is used in the refrigerating system, at least two sets of breathing apparatus shall be provided, one of which shall be placed in a position not likely to become inaccessible in the event of leakage of refrigerant. Breathing apparatus provided as part of the vessel’s fire-fighting equipment may be considered as meeting all part of this provision provided its location meets both purposes. Where self-contained breathing apparatus are used, spare cylinders shall be provided.

2.2 The provision of gas masks, respirators, protective clothing, etc. is also subject to national accident prevention regulations.

2.3 Operating and emergency advice

Adequate guidance for the safe operation and emergency procedures of the refrigeration system shall be provided by suitable notices displayed on board of the vessel.

Q. Shipboard Testing

1. Operational tests

The refrigerating installation is to be subjected to the following tests.

1.1 All compressors, pumps, fans, etc. are to be operated individually and simultaneously in all anticipated speed ranges.

The operation of the compressors has to be demonstrated at different evaporating temperatures.

During the test, the compressors are to be connected to the condensers and evaporators in all combinations possible in service.

1.2 In case of automatic refrigerating installations the proper working of the automatic and manual modes of operation are to be demonstrated.

1.3 The condensers are to be operated with the main cooling water pump and with the stand-by pump. The operation of the cooling water supply when the fishing vessel is in dock, is to be demonstrated in accordance with I.4.

1.4 Brine pumps are to be tested.

1.5 It is to be demonstrated that the specified air changes and a uniform air distribution in cargo holds are achieved.

1.6 The efficient working of the defrosting system is to be demonstrated.

2. Refrigeration test

2.1 A refrigeration test (balance test) is to be performed to demonstrate to **TL** the degree of thermal insulation of the refrigerated spaces/tanks and that the available refrigerating capacity of the installation complies with the requirements set out in B.3. and B.5. The required proof of performance is deemed to have been supplied if the evaluation of the test by **TL** shows that the heat transfer coefficient, on which the calculation is based, has not been exceeded.

2.2 The temperature in the refrigerating holds/tanks is to be lowered to the level corresponding to the refrigerated space/tank temperature specified for the installation. For this purpose, the temperature difference between the ambient air and the refrigerated spaces/tanks shall not be less than 15 K.

Where the test is performed during cold season the test conditions will be given special consideration by **TL**.

2.3 Before commencement of the balance test the agreed refrigerated hold/tank temperature is to be kept constant for at least 10 hours in order to achieve a uniform cooling of all parts. At the end of this cooling period, the refrigerating machinery must be in steady operating condition.

2.4 The temperature measurements for the balance test are to be performed for a period of at least six hours. During this time the outside temperature shall be constant as possible. Periods of strong solar radiation are to be avoided.

2.5 During the balance test all machinery and equipment in use is to be maintained in a steady operating condition and to be operated manually.

2.6 The number of compressors needed to achieve the condition of balance is to be fixed so as to achieve continuous operation. If the capacity of even a single compressor is too high, the plant has to be operated intermittently while recording the "on" time. The switching off of individual cylinders or rows of cylinder is not allowed.

2.7 Measurements

The following measurements are to be carried out:

2.7.1 Refrigerated spaces/tanks

The temperatures in refrigerated spaces/tanks and at the air-coolers are to be measured. In addition, the temperature curve is to be plotted by means of a temperature recorder.

2.7.2 Ambient conditions and adjacent spaces

The temperatures of the ambient air and of the water are to be measured as are also the temperatures of other vessel's spaces adjoining the refrigerated holds/ tanks.

2.7.3 Compressors

Pressure and temperature of the refrigerant on the suction and pressure sides, speed of the compressors and the power consumption of the drive motors are to be measured. In case of semi-hermetic motor compressors, measurement of the speed may be dispensed with.

2.7.4 Condensers

Outlet temperatures of the refrigerant are to be measured.

2.7.5 Brine

The temperature of the brine before and after the brine coolers, the pressure at the brine pump outlets and the power consumption of the brine pumps are to be measured.

2.7.6 Circulating fans for the refrigerated spaces

The power consumption of the fan motors is to be measured.

2.7.7 Measuring intervals

During the balance time recordings are to be made hourly, otherwise every two hours.

The ambient temperatures outside the refrigerated holds/tanks, which are required for the evaluation, shall be measured every hour over a period of 4 to 6 hours prior to the balancing time, depending on the insulation.

2.8 Reports

After the balance test, the following documents are to be submitted to **TL** Head Office:

2.8.1 A diagrammatic drawing of the vessel and the refrigerated holds/tanks showing the temperature measuring points.

2.8.2 A test report including all the measured data and copies of the recorded temperatures as well as those from the thermograph.

2.8.3 The vessel's draught, for and aft.

SECTION 11

ELECTRIC INSTALLATIONS

A. General

1. Scope

1.1 The requirements of these rules apply to the electrical equipment of decked fishing vessels with a length L ≥ 24 m. For fishing vessels with a length L < 24 m reduced requirements may be defined in different parts of the following Sections.

1.2 For other types of ships engaged in the fishery business, like fish processing vessels, whale factory ships or fish transport and flotilla mother ships as well as for fishing vessels with a length L ≥ 45 m, the electrical installations have to follow the requirements of Chapter 5 - Electric.

1.3 For DC or AC main installations with a voltage not exceeding 50 volts and/or a power not exceeding 5 kW, the requirements of these rules are not wholly applicable. Such installations may be given special consideration by **TL** Head Office.

1.4 Fishing vessels having machinery plants built, equipped, surveyed and tested in compliance with the requirements of the **TL** Rules in Chapter 4-1, Automation may be assigned the Class Notation **AUT -** Automation. This is only possible for vessels with **L** ≥ 24 m.

1.5 For ships provided with a system for remote control of the main propulsion plant from the bridge in compliance with the requirements of Ch.4-1, Sec.5 may be assigned the Class Notation R - Remote Control.

1.6 **TL** reserve the right to specify additional requirements to the Construction Rules where these are related to new systems or installations or where they are necessary because of new knowledge or operating experience.

2. Application

2.1 Fishing vessels of flag states which have already ratified the Torremolinos International Convention for fishing vessels with a length L ≥ 45 m, see Section 1, have to follow directly the requirements defined therein.

3. References to other rules and regulations

3.1 Where the requirements for electrical equipment and facilities are not laid down in these Rules, decision shall be made, wherever necessary, regarding the use of other regulations and standards. These include e.g. IEC publications, especially all IEC 60092 publications.

Table 11.1- Documents to be submitted

Electric one line diagram	**A**
Electrical main switchboard and panel boards	**A**
Electric load analysis (main and emergency supply)	**A**
Electrical power and lighting systems	**A**
Emergency electrical systems	**A**
Short-circuit calculation where total generator output > 500 kVA	**A**
Internal communication systems	**A**
Alarm systems	**A**
Main and emergency lighting arrangement	**A**
Navigation lights	**A**
Propulsion control system	**A**
Steering gear power and control systems	**A**
A: to be submitted for approval I: to be submitted for information.	

3.2 If necessary, besides of the **TL**'s Construction Rules for fishing vessels national regulations are to be observed as well.

B. Documents for Approval

1. The drawings and documents listed in the following Table 11.1 are to be submitted to **TL** Head Office in electronic plan approval system (EPAS) for examination at a sufficiently early date to ensure that they are approved and available to the Surveyor at the beginning of the manufacture or installation of the electrical equipment.

2. **TL** reserve the right to demand additional documentation if that submitted is insufficient for an assessment of the installation.

C. Type Approval

1. The following equipment and assemblies are subject to mandatory type approval, see Ch. 5, Sec. 21

- Cables and accessories
- Switchgear
- Circuit breakers, load-switches, disconnect switches and fuses for direct connection to the main bus bars and to non-fused, multi-terminal bus bars of main, emergency and control switchboards
- Generator protection devices
- Steering gear and lateral thrust propeller system
- Machinery control system
- Vessel’s control and safety system
- Fire detection and alarm system

2. Type tested installations, apparatuses and assemblies shall be used within the scope of valid Construction Rules only. The suitability for the subject application shall be ensured.

D. General Requirements and Instructions of Design, Control and Installation

1. Design

1.1 Electric installation;

1.1.1 the services necessary to maintain the vessel in normal operational and habitable conditions without having recourse to an emergency source of power;

1.1.2 the services essential to safety when failure of the main source of electrical power occurs; and

1.1.3 Protection of the crew and vessel from electrical hazards.

2. Main Source of Electric Power

2.1 Where electrical power constitutes the only means of maintaining auxiliary services essential for propulsion, manoeuvring and the safety of the vessel, a main source of electrical power shall be provided which shall include at least two generating sets, one of which may be driven by the main engine (shaft generator). TL Head Office may accept other arrangements having equivalent electrical capability.

2.2 The power of these sets shall be such as to ensure the functioning of the services referred to Chapter 5, Section 3, B excluding the power required in fishing activities, processing, and preservation of the catch, in the event of any one of the generating sets being stopped. In the event of any one of the generating sets being stopped, on ships less than 45m, the remaining power shall only ensure the operation of the necessary equipment for propulsion and ship safety.

2.3 The arrangement of the vessel's main source of electrical power shall be such that the services referred to in Chapter 5, Section 3, B. can be maintained in all seas and under all navigating and manoeuvring conditions, even when the vessel is stopped.

2.4 Where transformers constitute an essential part of the supply system required herein, the system shall be so arranged as to ensure continuity of the supply.

2.5 In vessels for unrestricted service and provided with periodically unattended machinery space the main source of electrical power shall be supplied as follows:

2.5.1 Where the electrical power can normally be supplied by one generator, there shall be provided suitable load shedding arrangements to ensure the integrity of supplies to services required for propulsion and steering. To cover the case of loss of the generator in operation, there shall be adequate provisions for automatic starting and connecting to the main switchboard of a stand-by generator of sufficient capacity to permit propulsion and steering and with automatic restarting of the essential auxiliaries including, where necessary, sequential operations.

Means may be approved in the wheelhouse for remote (manual) starting and connection of the standby generator to the main switchboard as well as means of repeated remote starting of essential auxiliaries.

2.5.2 If the electrical power is normally supplied by more than one generating set simultaneously, there shall, be provisions, e.g. by load shedding, to ensure that in case of loss of one of these generating sets, the remaining ones are kept in operation without overload to permit propulsion and steering.

2.6 Where required to be duplicated, other auxiliary machinery essential to propulsion shall be fitted with automatic change-over devices allowing transfer to a stand-by machine. An alarm shall be given on automatic change-over. Stand-by circuits are to be provided to enable sets of the same type to operate alternatively.

3. Emergency Source of Power

3.1 A self-contained emergency source of electrical power is to be provided capable of serving the consumers defined under 3.12 on fishing vessels. The emergency source of electrical power is to be located outside the machinery spaces and is to be so arranged as to ensure its functioning in the event of fire or other causes of failure of the main electrical installations.

3.2 The emergency source of electrical power may be either a generator or an accumulator battery.

3.3 The emergency switchboard shall be installed close to the emergency generator and/or the emergency battery.

3.4 Where the emergency source of electrical power, it shall be provided with an independent fuel supply and with an automatic starting and switch-over system.

Unless a second independent means of starting the emergency generator is provided, the single source of stored energy shall be protected to preclude its complete depletion by the automatic starting system.

3.5 Where the emergency source of electrical power is an accumulator battery it shall be capable of carrying the emergency load without recharging whilst maintaining the voltage of the battery throughout the discharge period within plus or minus 12 % of its nominal voltage. In the event of failure of the main power supply this accumulator battery shall be automatically connected to the emergency switchboard and shall immediately supply at least those services specified in 3.12.

3.6 The emergency switchboard shall be provided with an auxiliary switch allowing the battery to be connected manually in case of failure of the automatic connection system.

3.7 An indication of inadmissible battery discharge (emergency source of electrical power) shall be provided at the main switchboard or in the machinery control room.

3.8 The emergency source of electrical power and automatic starting equipment shall be so constructed and arranged as to enable adequate testing to be carried out by the crew while the vessel is in operating condition.

3.9 The emergency source of electrical power may be used for starting up the main propulsion plant from the dead ship condition provided that its capacity is sufficient to supply the emergency services at the same time.

3.10 Provided that suitable measures are taken for safeguarding independent emergency operation under all circumstances, the emergency generator may be used exceptionally and for short periods to supply non-emergency circuits.

3.11 The emergency generator may be used during lay time in the harbour for the main power supply considering the requirements of Chapter 5, Electric, Section 3, D.

3.12 The emergency source of electrical power shall be capable, having regard to starting current and transitory nature of certain loads, of serving simultaneously the following consumers:

3.12.1 The VHF radio station and if applicable;

– MF radio

– Ship earth station

– MF/HF radio

3.12.2 Internal communication equipment, fire detecting systems, general emergency system, fire extinguishing system and signals which may be required in an emergency.

3.12.3 The navigation lights if solely electrical.

3.12.4 The following emergency lightings;

– Of lifeboat/liferaft launching stations and over the side of the vessel

– in all alleyways, stairways and exits

– in spaces containing machinery or the emergency source of power

– in control stations and wheelhouse

– in fish handling and fish processing spaces

3.12.5 The operation of the emergency fire pump, if any

4. Precautions against shock, fire and other hazard of electrical origin

4.1 Exposed permanently fixed metal parts of electrical machines or equipment which are not intended to be “live”, but which are liable under fault conditions to become “live” shall be earthed (grounded) unless:

4.1.1 they are supplied at a voltage not exceeding 55 V direct current or 55 V, root mean square, between conductors; autotransformers shall not be used for the purpose of achieving this alternative current voltage; or

4.1.2 they are supplied at a voltage not exceeding 250 V by safety isolating transformers supplying one consuming device only; or

4.1.3 they are constructed in accordance with the principle of double insulation.

4.2 Portable electrical equipment shall operate at a safe voltage, exposed metal parts of such equipment which are not intended to have a voltage but which may have such under fault conditions, shall be earthed. The Administration may require additional precautions for portable electric lamps, tools or similar apparatus for use in confined or exceptionally damp spaces where particular risks due to conductivity may exist.

4.3 Electrical apparatus shall be so constructed and so installed that it shall not cause injury when handled or touched in the normal manner.

4.4 The hull return system of distribution shall not be used for power, heating or lighting in vessels of 75 m in length and over.

4.5 The requirement of 4.4 does not preclude, under conditions approved by **TL**, the use of:

4.5.1 impressed current catholic protective system;

4.5.2 limited and locally earthed system; or

4.5.3 insulation level monitoring devices provided the circulation current does not exceed 30mA under the most unfavourable condition.

4.6 Where the hull return system is used, all final sub-circuits (all circuits fitted after the last protective device) shall be two wire and special precautions shall be taken to the satisfaction of the Society.

4.7 Where a distribution system, whether primary or secondary, for power, heating or lighting, with no connection to earth is used, a device capable of monitoring the insulation level to earth shall be provided.

4.8 When a distribution system is in accordance with [4.7] and a voltage exceeding 50 V direct current or 50 V, root mean square, between conductors, is used, a device capable of continuously monitoring the insulation level to earth and of giving an audible or visual indication of abnormally low insulation values is to be provided.

4.9 Distribution systems which are supplied at a voltage not exceeding 250 V direct current or 250 V, root mean square, between conductors, and which are limited in extent, may comply with [4.7], subject to the satisfaction of the Society.

4.10 Except as permitted by the Society in exceptional circumstances, all metal sheaths and armour of cables are to be electrically continuous and to be earthed.

4.11 All electrical cables are to be at least of a flame-retardant type and are to be so installed as not to impair their original flame-retarding properties. The Society may permit the use of special types of cables where necessary for specific applications, such as radio frequency cables, which do not comply with the foregoing.

4.12 Cables and wiring serving essential or emergency power, lighting, internal communications or signals shall as far as practicable be routed clear of galleys, machinery spaces or category A and other high-risk areas and laundries, fish handling and fish processing spaces and other spaces where there is a high moisture content. Cables connecting fire pumps to the emergency switchboard shall be of a fire-resistant type where they pass through high-risk areas. Where practicable all such cables should be run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space.

4.13 Where cables which are installed in spaces where the risk of fire or explosion exists in the event of an electrical fault, special precautions against such risks shall be taken to the satisfaction of the Society.

4.14 Wiring shall be supported in such a manner as to avoid chafing or other damage.

4.15 Terminations and joints in all conductors shall be made such that they retain the original electrical, mechanical, flame-retarding and, where necessary, fire-resisting properties of the cable.

4.16 Cables installed in refrigerated compartments shall be suitable for low temperatures and high humidity.

4.17 Circuits are to be protected against short-circuit. Circuits are also to be protected against overload, unless otherwise specified in these Rules or where the Society may exceptionally otherwise permit.

4.18 The rating or appropriate setting of the overload protective device for each circuit shall be permanently indicated at the location of the protective device.

4.19 Lighting fittings shall be arranged to prevent temperature rises which could damage the wiring and to prevent surrounding material from becoming excessively hot.

4.20 Lighting or power circuits terminating in a space where the risk of fire or explosion exists shall be provided with isolating switches outside the space.

4.21 The housing of an accumulator battery shall be constructed and ventilated to the satisfaction of the Society.

4.22 Electrical or other equipment which may constitute a source of ignition of flammable vapours is not permitted in these compartments except as provided for in [4.24].

4.23 An accumulator battery shall not be located in accommodation spaces unless installed in a hermetically sealed container.

4.24 In spaces where flammable mixtures are liable to collect and in any compartment assigned principally to the containment of an accumulator battery, no electrical equipment shall be installed unless the Administration is satisfied that it is:

4.24.1 essential for operational purpose;

4.24.2 of a type which will not ignite the mixture concerned

4.24.3 appropriate to the space concerned; and

4.24.4 Appropriately certified for safe usage in the dust, vapours or gases likely to be encountered.

E. Vessel's Safety System

1. Engineers 'Alarms

1.1 On vessels for unrestricted service an engineers' alarm shall be provided to be operated from the engine control room or at the manoeuvring platform as appropriate and shall be clearly audible in the engineers' accommodation. The system is to be supplied by the emergency source of electrical power.

2. General Emergency Alarm System

2.1 Vessels for unrestricted service are to be provided with an alarm system enabling the crew to be alerted or called to the boat stations in case of danger. It shall be possible to initiate the alarm from the wheelhouse.

2.2 A sufficient number of alarm facilities is to be provided to ensure that all persons on board can be alerted without fail. Additional flashing lights may be used where necessary (with high ambient noise). See also IMO Resolution A.830 (19)/1995.

2.3 The general emergency alarm shall be powered from the vessel's main supply and the emergency source of electrical power.

2.4 A loudspeaker system may be accepted as alarm facility.

3. Fire Extinguishing System

3.1 Unattended machinery spaces shall be provided with an approved automatic fire detection and alarm system.

3.2 For the general design, construction and detection of Fire Extinguishing Systems, see Chapter 4, Section 18.

4. Fire Detection System

4.1 A fire detection system shall be provided for all length L ≥ 24 m. vessels.

4.2 Fishing vessels that are a length L ≥ 24 m have to meet the requirements of the Torremolinos Convention, Chapter V.