TÜRK LOYDU

Chapter 37 - Tentative Rules for the Classification of Passenger Craft

January 2020

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 IACS PR No.29 is on or after 1st of January 2020. 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.

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Tentative Rules For The Classification of Passenger Craft

Page

Section 1 – General Requirements and References

A. Scope and Application **1-**2
B. Definitions **1-**3
C. Documentation **1-**4
D. Rules And Regulations to be Considered **1-**5
E. Technical Requirements **1-**6

Section 2 – Classification and Surveys

A. Classification **2-**2
B. Surveys **2-**2

Section 3 – Hull Structures And Stability

A. Hull Structures **3-**2
B. Watertight/Weathertight Integrity **3-**5
C. Rudder **3-**11
D. Stability **3-**12
E. Particular Requirements for Multi-Hull Craft **3-**13

Section 4 – Structural Fire Protection

A. Flow Chart **4-**2
B. Further Requirements **4-**2

Section 5 – Propulsion Plants

A. Propulsion System **5-**2

Section 6 – Electrical Installations and Automation

A. General **6-**2
B. Emergency Source of Electrical Power **6-**2
C. Machinery Control System and Automation **6-**5

Section 7 – Craft Operation Installations and Auxiliary Systems

A. Pipes, Valves, Fittings and Pumps **7-**2
B. Bilge System **7-**3
C. Fuel Oil System **7-**8
D. Air, Sounding and Overflow Pipe **7-**12
E. General Water Fire-Extinguishing System **7-**14
F. Pressure Water Spraying system **7-**17
G. Ventilation **7-**17

AMENDMENTS

Revision	RCS No.	EIF Date*
Section 07	04/2022	01.07.2022
Section 07	05/2021	01.01.2022

* 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 REQUIREMENTS and REFERENCE

Page

A. SCOPE AND APPLICATION **1-**2
1. Scope
2. Application
3. Equivalence
4. Statutory rules and regulations

B. DEFINITIONS **1-**3
1. Passenger
2. Passenger Craft
3. Ro-Ro Passenger Craft
4. High Speed Passenger Craft
5. Main dimensions

C. DOCUMENTATION **1-**4
1. Documents to be submitted for approval
2. Production standard

D. RULES AND REGULATIONS TO BE CONSIDERED **1-**5
1. TL Rules
2. International Standards and National Directives

E. TECHNICAL REQUIREMENTS **1-**6
1. Ambient conditions
2. Environmental conditions
3. Workmanship
4. Corrosion protection

A. Scope and Application

1. Scope

The intention of these Rules is to facilitate the use of the Rules of **TL** by clients who want to design and build a Passenger craft/ Ro-Ro Passenger Craft within the Domestic Waters of Turkey in harbour service. The purpose of this rule is to summarise the applicable rules by using flow-charts.

This rule is applicable for Passenger craft/ Ro-Ro Passenger Craft operating in harbour service (**L1/L2**) within the domestic waters of Turkey (**TR- Domestic Service**) and the requirements given in this rule apply to craft which carries more than 12 passengers.

Classification covers the structural design, watertight integrity and standard of construction of the hull, installation and testing of the propulsion machinery, essential auxiliary machinery, essential piping and electrical systems to the extent indicated within this rule.

In the scope of this rule, HSC Terms are met when a Passenger craft/ Ro-Ro Passenger Craft complies with definition as provided in Item 4. or where Owner's request is taken for the application of entire or specific sections (e.g. Chapter 3) of HSC Rules (Chapter 7).

2. Application

2.1 This Rule is applicable to:

– hull structures for monohulls, catamarans, SWATH, hydrofoil
– materials for hull structures including steel, austenitic stainless steel, aluminium alloys, fibre reinforced plastics (FRP), wooden and polyethylene
– ship equipment
– complete propulsion plants with diesel engines, gas turbines or any other propulsion plants.
– electrical and electronic equipment
– relevant automated equipment
– relevant auxiliary systems

2.2 This Rule do not consider:

– steam propulsion
– low speed diesel engines and reversible two-stroke diesel engines
– heavy fuel operation and treatment
– outboard motors using gasoline for the propulsion of the Craft.
– auxiliary steam boilers and oil firing equipment
– diving systems and systems for breathing gases

2.3 Due to tentative nature of these Rules, where any point not clearly clarified, relevant corresponding requirement stated in Part A, Chapter 1 Hull, Part A Chapter 2 – Material, Part A Chapter 3 – Welding, Part B Chapter 4 – Machinery, or Part B Chapter 5 – Electrical Installations, as amended shall be referred to.

3. Equivalence

Passenger Craft deviating from the **TL** Rules in structure or equipment or some of their parts may be classed, provided that their structures or equipment are found to be equivalent to the requirements of relevant **TL** Rules.

4. Statutory rules and regulations

Respective flag state rules and regulations will not be affected by this rule, and to be applied. In cases where flag state gives waivers/exemptions or relaxation from a statutory requirement which also directly/indirectly effects the requirements set out in this chapter, same waivers/exemptions or relaxations can be applied by **TL**.

Passenger craft subject to International Conventions or Codes e.g. High Speed Craft Code, the relevant requirements of the Code or Convention are to be applied.

B. Definitions

1. Passenger

Passenger is every person other than:

- the master and members of the crew or other persons employed or engaged in any capacity on board a craft on the business of that craft; and
- a child under one year of age.

2. Passenger Craft

A passenger craft is a craft which carries more than twelve passengers.

3. Ro-Ro Passenger Craft

A Ro-Ro passenger craft is defined as a craft with ro-ro spaces or special category spaces designed and constructed for the carriage of more than 12 passengers, as well as the carriage of vehicles accessed by means of ramps and doors located at the bow, stern or through the side shell, or any combination thereof.

4. High Speed Passenger Craft

A High Speed Passenger Craft is a craft which does not proceed in the course of their voyage more than 4 hours at operational speed from a place of refuge and is capable of a maximum speed of at least as defined in International Code of Safety for High Speed Craft (“HSC Code”), 1.4.30:

$v_{max} = 3,7 \cdot \Delta^{0,1667}$ [m / s]

Δ = displacement volume at design water line

5. Main dimensions

The length referred in flowcharts are to be taken as the length defined in Loadline Convention (ICLL 66/88) . The principal dimensions are defined in relevant **TL** Rules referred in flow charts in following Sections.

6. **Harbour Service**:shall be divided into **L1** and **L2** notations for harbour services of up to 100 miles:

a. **Class Notation(L1);** This range of service is limited to trade in harbours which their boundaries fixed by flag state, provided that to stay in the range of **L2**.

b. **Class Notation(L2);** This range of service is limited to trade in harbours not exceeding 10 nautical miles from the nearest coastline and not exceeding 100 nautical miles from the port of departure.

7. **Cabotage service** are made between Turkish ports beyond the limits of the harbour service Class Notation (A,B,C,D type vessels)

C. Documentation

1. Documents to be submitted for approval

1.1 Submission

The documents are to be submitted in electronic plan approval system (EPAS).

All documents have to indicate the project, revision number, sistership's hull number,if applicable, and the name of the Owner and/or the name of Shipyard.

All documents are to be submitted at a sufficiently early date to ensure that they are approved and available to the Surveyor at the beginning of the construction or installation of the craft or of important components.

1.2 Language

All documents have to be submitted to **TL** in Turkish and/or English.

1.3 Calculations

Calculations shall contain all necessary information concerning reference documents (parts of the specification, relevant drawings, etc.). Literature used for the calculations has to be cited. Any non-standard symbols used are to be explained in definitions.

1.4 Computer programs

1.4.1 In order to increase the flexibility in the design of Passenger Craft, **TL** also accepts direct calculations with computer programs. The aim of such analyses should be the proof of equivalence of a design with the rule requirements.

1.4.2 Direct calculations may be used in the following areas:

– global strength

– Beams and grillages

– Local strength

For such calculations the computer model, the boundary conditions and load cases are to be agreed upon with **TL**. The calculation documents are to be submitted including input and output. During the examination it may prove necessary that **TL** perform independent comparative calculations.

1.5 List of documents

For classification of a Passenger Craft the documents defined in Table 1.3 have to be submitted, as far as applicable.

1.6 Additional documentation

TL reserve the right to request additional documentation for an assessment.

1.7 Modifications and extensions

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

1.8 Surveys

Survey of the Passenger Craft construction will be carried out on the basis of approved documents. The documentation has to contain all data necessary for final approval of the Passenger Craft. For more details see Section 2.

2. Production standard

A production standard which considers the special requirements for the manufacturing of Passenger Craft has to be defined by the Shipyard and accepted by **TL**.

D. Rules and Regulations to be Considered

1. TL Rules

The following **TL** Rules are to be considered and therefore reference is made to them in this Rule:

– Classification and Surveys

– Chapter 1, Hull

– Chapter 2, Material

– Chapter 3, Welding

– Chapter 4, Machinery

– Chapter 5, Electrical Installations

– Chapter 7, High Speed Craft

– Chapter 9, Construction and Classification of Yachts

– Chapter 19, Inland Waterway Vessels

– Tentative Rules For Polyethylene Crafts

2. International Standards and National Directives

Where reference is made to International Standards and Directives these are defined as follows, e.g.:

- **International Code of Safety for High Speed Craft ("HSC Code")** adopted by MSC.97 (73) as amended (MSC.175(79), 222(82), 260(84), 271(85), 326(90), 352(92))

- **2009/45/EC:** Safety Rules and Standards For Passenger Ships as amended (2010/36/EU)

- **Yolcu Gemilerinin Emniyetine ve Gemilerdeki Yolcuların Kayıt Altına Alınmasına İlişkin Yönetmelik** / Regulation about Safety of Passenger Ships and Recording of Passengers on Board" (based on 98/18/EC)

- **Gemilerin Teknik Yönetmeliği** /Technical Regulations for Ships

E. Technical Requirements

1. Ambient conditions

Table 1.1 Ambient conditions about inclinations (see note)

Installations, Components	**Angle of inclinations** [°] **(2)**			
	Athwartship		**Fore-and-aft**	
	static	**dynamic**	**static**	**dynamic**
Main and auxiliary machinery	15	22,5	5	7,5
Ship safety equipment, e.g. emergency power installations, emergency fire pumps and their drives	22,5	22,5	10	10
Switchgear, electrical and electronic appliances **(1)** and remote-control systems				

(1) *Up to an angle of inclination of 45° no undesired switching operations or functional changes may occur.*

(2) *Athwartships and fore-and-aft inclinations may occur simultaneously.*

Note:

***TL** may be consider deviations from these angles, talking into consideration the type, size and service condition of the craft.*

2. Environmental conditions

Table 1.2 Environmental conditions for machinery and electrical installations (see Note)

Seawater temperature +32 °C	
Charge air coolant inlet to charge air cooler +32 °C	
Ambient air temperature -25 °C to +45 °C, relative humidity (1 bar / 45 °C) 60 %	
Enclosed machinery spaces	Temperature range 0 °C to 55 °C. Relative humidity 100 %. Ability to withstand oil vapour and salt-laden air
Air conditioned control rooms	Temperature range 0 °C to 40 °C. Relative humidity 80 %
Open deck	Temperature range -25 °C to +45 °C. Ability to withstand temporary flooding with seawater and salt-laden spray
Note: *TL may approve other conditions for craft operating only in special agreed geographical areas.*	

3. Workmanship

Requirements for proper workmanship to be applied for Passenger Craft are defined in the **TL** Rules for Hull (Chapter 1), Section 1, N.

Requirements for proper workmanship for composite and wooden craft are to be applied in accordance with applicable rules defined in flowcharts provided in following sections.

4. Corrosion protection

The requirements to reduce the corrosion risk by measures in design are defined together with protection measures during construction and operation in the **TL** Rules for Hull (Chapter 1), Section 1, N.3.

Table 1.3 Documentation to be submitted for Classification of Passenger Craft/Ro-Ro Passenger Craft

No.	Description
	General
1	General arrangement plan
2	Technical specification
3	Lines plan / Offset tables
4	Tank & capacity plan
	Hull Structures and Ship Equipment
	Hull
5	Midship section
6	Other typical sections
7	Bottom structure
8	Engine room structure (including engine foundation)
9	Shell expansion plan
10	Ice strengthening, if applicable
11	Decks
12	Superstructures and deckhouses
13	Bulkheads
14	Rudder body
15	Rudder stock
16	Rudder bearing, pintles and couplings, etc.
17	Large openings
18	Foundations
19	Welded joints for steel or aluminium
20	Lamination Schedule and Structural Member Connection Details, applicable for GRP and Wooden Construction
21	Coating plan
22	NDT-plan (Non-Destructive-Testing)
23	Equipment number and anchoring equipment
24	Mooring equipment
	Supporting Calculation (Structure)
25	Design loads summarized in a load plan
26	Local stress calculations, if applicable
27	Finite element analysis, if applicable
	Safety Requirements of the Hull
28	External watertight integrity plan / Freeboard plan
29	Bulwarks and guard-rails
30	Intact stability calculations
31	Damage stability calculations
32	Damage control plan
33	Inclining test report
34	Inclining test procedure
35	Structural fire protection
36	Masts

No.	Description
37	Cargo Lashing and Securing Devices and Their Arrangement
38	Bow Door and Ramp Construction
39	Inner Door Construction
40	Stern Door and Ramp Construction
41	Side Door and Ramp Construction
	Machinery Installations
	General
42	General arrangement of machinery spaces
	Internal Combustion Engines
43	Data on main parameters for each type of internal combustion to be used
44	Detailed drawings of the complete engine, including cross/longitudinal sections
45	Documentation on provisions or additional equipment for low load operation of the engines, if applicable
	Propulsion Systems
46	General drawings of the entire shafting
47	Component parts transmitting torque (shafting, couplings, bearings, etc.)
48	Propeller shaft brackets
49	Stern tube arrangement
50	Cast resin mount
51	Shaft alignment calculation
52	Assembly and sectional drawings of gears and couplings (calculations, parts list)
53	Design drawings of propeller in main propulsion (for engine output in excess of 300 kW)
54	Design drawings of transverse thrust systems (for engine output in excess of 100 kW)
55	General drawings, sectional drawings and functional characteristic of controllable pitch propeller unit
56	Rudder propeller/Podded drives, if applicable
	Electrical Installations
	Power Plant
57	Details of the scope and type electrical plant
58	Details about the construction of electrical equipment in hazardous areas
59	General layout for electrical power generation and distribution
60	Details on generations and UPS units
61	Details on hazardous areas
62	Short circuit calculation
63	Electrical power balance
64	Details on main and emergency switchgear, main distribution boards
65	Details on lighting network
66	Details on concept to avoid radiation hazards
67	Documentation on switchgear, monitoring and controls for the refrigerating plant
68	Main cableways for different voltage systems
69	Details in electromagnetic compatibility measures
70	Bulkhead/deck penetrations
71	Cable layout/-list

No.	Description
	Manoeuvring System
72	Details on steering gear drive and control system
73	Details on rudder propeller and lateral thrust system, if applicable
74	Controllable pitch propeller system, if applicable
75	Details on dynamic positioning system, if applicable
	Lighting
76	Lighting arrangement
77	Documentation on light fittings and sockets used
	Control and Alarm System
78	Monitoring and safety systems for machinery
79	Starting arrangements for main and auxiliary engines
80	Control and regulation for essential equipment and drives
81	Documentation on general and special alarm systems
82	Documentation on position and navigation lights
83	Documentation on fire and CO_2 alarm system
84	Documentation on watertight and fire door operation and position monitoring system
85	Documentation on tank level indicators, alarms, shut-off facilities
86	Documentation on all essential intercommunication systems
	Board Computer
87	Hardware and software documentation on computers (as relevant for Classification)
	Propulsion
88	Electrical propulsion plants, if applicable
	Automation
89	General layout and arrangement
90	Description of functional relationships
91	Software documentation
92	List of sensor types and location for the monitoring system
93	Safety programmes giving details of limit values
94	Details of bridge arrangement
	Auxiliary Systems and Equipment
	Pressure vessels
95	List of pressure vessels and equipment
	Tanks and piping
96	Details on fuel and oil tanks
97	Diagrammatic plans of all piping systems
98	Details on remotely controlled valves
	Fire extinguishing systems
99	Water fire extinguishing equipment
100	CO_2 fire extinguishing system, if applicable
101	Foam extinguishing systems
102	Details of all other fire fighting systems and equipment
103	Fire control plan

No.	Description
	Equipment
104	Steering gear
105	Rudder propeller units, if applicable
106	Anchor windlasses
107	Fire door control system
108	Hydraulic systems for special devices, if safety-relevant

SECTION 2

CLASSIFICATION AND SURVEYS

Page

A. CLASSIFICATION **2-**2

1. General
2. Class Notations

B. SURVEYS **2-**2

1. Preparations for Survey
2. Accessibility to craft structure
3. Tank corrosion
4. Special Survey Requirements

A. Classification

1. General

TL Rules, Classification and Surveys, Section 1 and Section 2 are to be generally applied for classification of a Passenger/Ro-Ro Passenger Craft.

2. Class Notations

The notation **PASSENGER CRAFT/RO-RO PASSENGER CRAFT** with service range of **TR – Domestic Service L1/L2** is to be assigned to a passenger craft built to applicable requirements of this Chapter.

Additional **HSDE** Notation may be also assigned where specific sections (e.g. Section 3) of HSC Rules (Chapter 7) is applied in addition. In this case, details regarding rule application are to be specified in the Class Certificate.

Additional **FS** Notation is to be assigned for passenger craft with **L2** Notation.

B. Surveys

A Passenger/Ro-Ro Passenger Craft will be subject to survey requirements in accordance with the design requirements provided in following sections with respect to size and dimension of the craft. For cases, where there are conflicting, overlapping or missing survey requirements in referred rules, **TL** Classification and Surveys will be applicable.

In following sub-sections, additional guidance for preparations of survey, tank corrosion and amalgamated survey requirements for different material other than steel will be detailed.

1. Preparations for Survey

1.1 General

The owner's representative should be aware of the scope of the coming survey and instruct those who are responsible, such as the Master or the Superintendent, to prepare the necessary arrangements. Execution will naturally be heavily influenced by the type and scope of the survey to be carried out. If there is any doubt, **TL** should be consulted.

1.2 Conditions for survey

1.2.1 The Owner is to provide necessary facilities for a safe execution of the survey.

1.2.2 Tanks and spaces are to be safe for access, i.e. gas freed, ventilated and illuminated.

1.2.3 In preparation for survey and thickness measurements and to allow for a thorough examination, all spaces are to be cleaned including removal from surfaces of all loose accumulated corrosion scale. Spaces are to be sufficiently clean and free from water, scale, dirt, oil residues etc. to reveal corrosion, deformation, fractures, damages, or other structural deterioration. However, those areas of structure whose renewal has already been decided by the Owner need only be cleaned and descaled to the extent necessary to determine the limits of the areas to be renewed.

1.2.4 Sufficient illumination is to be provided to reveal corrosion, deformation, fractures, damages or other structural deterioration.

1.2.5 Where soft or semi-hard coatings have been applied, safe access is to be provided for the surveyor to verify the effectiveness of the coating and to carry out an assessment of the conditions of internal structures which may include spot removal of the coating. When safe access cannot be provided, the soft or semi-hard coating is to be removed.

1.3 Documentation on Board

The following documentation should be readily available when planning the survey.

- structural plans of the areas to be surveyed;
- accessibility document as detailed in 2.2 below.

Prior to survey, it is recommended that the documents on board the craft be reviewed as a basis for the current survey.

2. Accessibility to craft structure

2.1 General accessibility

The areas relevant for structural surveys depend on the design and there are large differences between different craft configurations. The structural survey of a passenger craft may involve a large variety of differing access problems due to the complexity of the structure.

Surveyable items are not specifically confined to tank examination, but will involve access to various other parts of the internal structure and the shell plating.

In any case, for survey, means are to be provided to enable the surveyor to examine the hull structure in a safe and practical way.

2.2 Access and inspection planning

It is recommended that an accessibility document is developed for each craft or class of craft containing the relevant information for accessing the structures indicated in 2.3 to 2.9 below.

The document should be retained onboard for use by owner's representatives and surveyors intending to examine the relevant spaces, structure and items.

This document should also be referred to the owners planned maintenance scheme. The accessibility document should include the following as applicable:

- discontinuities and/or openings in continuous longitudinal bulkheads
- manhole/inspection opening arrangement and location(s)
- ladders and hand-holds
- specific safety issues for the individual item where extra precaution or procedures for access is required
- damage stability subdivision zones/boundaries (if applicable)
- location of and means for inspection of ventilation duct valves and fire flaps with controls

2.3 Longitudinal bulkheads

The continuous longitudinal bulkheads are, together with the craft sides, the webs of the hull girder, carrying the shear loads created by the differences in buoyancy and weight distribution along the craft as well as those created by sea loads. The longitudinal bulkheads also contribute to resisting the longitudinal bending, particularly near the upper decks and the bottom structure.

Wherever there are discontinuities/openings in the longitudinal bulkheads the stresses from the loads above will have to flow “around” these discontinuities resulting in stress concentrations at the corners. It should be noted that fractures may be observed, particularly at the upper and lower zones of the bulkheads.

Examples of discontinuities include fire-screen door openings, cable and pipe penetrations, elevator access arrangements and ventilation duct openings. (An example of such fractures is shown in Fig.2.1).
Access to these areas may be required in connection with Class Renewal or Continuous Surveys, or more often where considered necessary.

Figure 2.1 Openings in longitudinal bulkhead – a fracture in way of a door frame

2.4 Ventilation ducts

The ventilation ducts may in general be categorized in two groups, structural and non-structural.

- **Structural** ventilation ducts are stiffened in such a way that the boundaries can withstand loads other than just the loads from air pressure and may be integrated with the craft structure or self supporting. These ducts are used in cases where a ventilation duct is crossing a watertight bulkhead, or in spaces that may be filled in case of damages according to the damage scenarios calculated for the craft.

- **Non-structural** ventilation ducts are “thin” compared to the structural ducts and are normally only designed to withstand the air pressure. They are thus only used within one vertical division and for areas above the waterline where water filling is not likely to occur in case of damages.

Access to and inspection of the structural ventilation ducts is considered particularly important as a potential transfer of water along a ventilation duct from one compartment to another may have severe consequences for the craft.

The condition of the ventilation ducts using the craft's side shell plating as one of the duct boundaries, both structural and non-structural (layout is shown in Fig. 2.2), is particularly important for both maintenance and regular inspection.

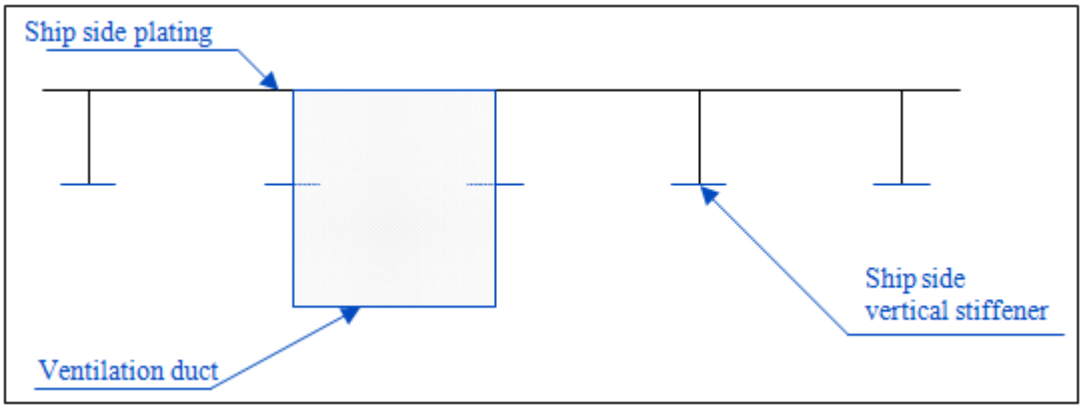


Figure 2.2 Plan view of ventilation duct using craft side shell as one of the boundaries

2.5 Air Pipes

All internal tanks will have air pipes to prevent overpressure or vacuum in case of filling or discharging. Air pipes may end in the engine room for smaller tanks, but are normally extended to higher external decks or led directly overboard above the waterline.

Where extended to higher decks or led overboard, the air pipes may be crossing other compartments and will, in service or accommodation decks, often be hidden behind panels. Some of the air pipes will be subject to a corrosive environment adversely affecting the pipe itself and also the vent heads.

2.6 Grey and black water tanks, including biological treatment system tanks

The main challenges with these tanks are the corrosive environment, the lack of access and time window for routine internal inspection and maintenance whilst the craft is in service.

If the internal structures are kept unprotected, the corrosive environment may cause leaks and water ingress/egress, giving rise to a risk of pollution or a reduced tank capacity as a result.

Surveys of these tanks are recommended to be planned well in advance to coincide with planned dockings. Some biological treatment systems may require a lead time to re-establish operational capability.

2.7 Stabiliser housings

Due to the limited access opportunities for inspection, it is recommended that during dry docking survey, the fin housings and in particular the welds in the fin/hull connection, with the fin extended, should be surveyed.

2.8 Structures adjacent to refrigerated rooms

Structures adjacent to refrigerated rooms may have an increased risk of condensation leading to deterioration of the structures. In particular, the structures below the refrigerated rooms may be subject to deterioration.

In cases where refrigerated stores are located adjacent to the side shell, there may be an increased risk of condensation leading to deterioration of the side shell structure.

As the access to the side shell structure in these areas will be restricted, it is recommended that, in addition to the deck below, the surrounding structure also be examined as far as practicable, in particular the connection to the craft side structure below the refrigerated store.

2.9 Permanent ballast

In some crafts, permanent or fixed ballast may be fitted in some of the ballast tanks. Such ballast may be of a corrosive or non-corrosive type. When corrosive ballast is used, it should be protected from the main factors causing corrosion and kept under observation.

For a type of ballast that needs to be kept under observation, a manual describing these procedures should be retained onboard.

In cases of liquid permanent ballast, a material test piece may be fitted to the access cover of the tank, hanging into the liquid for monitoring of the corrosion activities in the tank. In addition, a chemical test of the ballast fluid from mid-depth should be done to confirm that the inhibitors are still effective.

In cases of non-liquid ballast, sample areas may be required to be cleared to enable access for survey and ballast material should be visually examined for shifting or settling and excessive moisture.

3. Tank corrosion

3.1 General

In tanks with a corrosive environment, the corrosion of the structure may be accelerated where the tank is not coated or where the protective coating has not been properly maintained, and can lead to fractures of the internal structures and the tank boundaries. When corrosion occurs, it may be accelerated by factors like higher temperatures, humidity, salinity and presence of oxygen.

In water ballast tanks, wastage of the internal structure can be a major problem, in particular on older crafts.

Whilst corrosion may be found in all parts of a tank, the ullage space of tanks with a corrosive environment is known to be prone to accelerated rates of corrosion.

3.2 Tanks with constant water levels

In order to ensure a proper survey onboard, it is important to take into account operational information such as constant water levels of certain ballast tanks.

For tanks with a “typical” or stable filling level, and in particular those with a corrosive environment, e.g. water ballast tanks, high corrosion rates may normally be found in the splash zone right above the filling level. (see Fig. 2.3). At the survey planning meeting, it should be established if any of the tanks to be surveyed have a normal/stable working level of liquid content, and the surveyor is to be made aware of this level.

The surveyor is further to be made aware of any previous problems associated with the tanks to be examined.

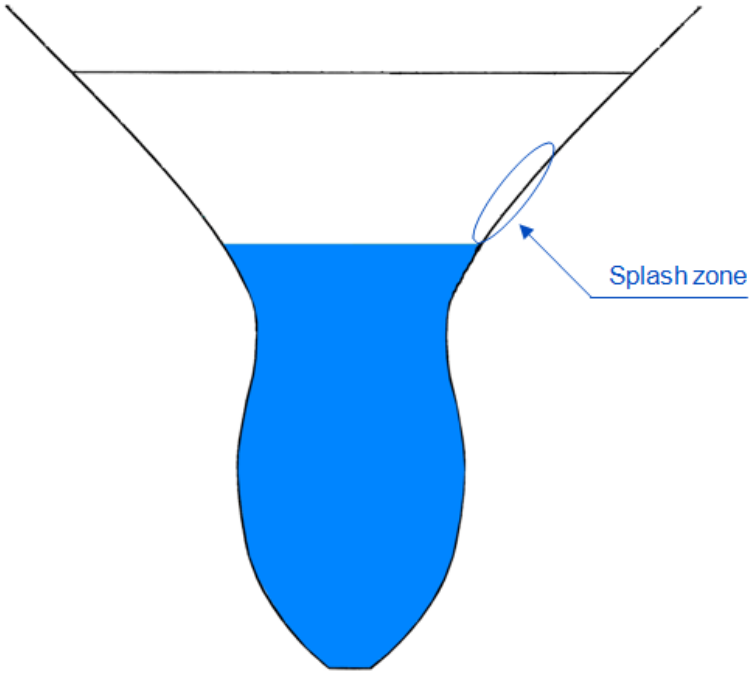


Figure 2.3 Fore peak tank with “typical” filling level

4. Special Survey Requirements

4.1 Special Requirements for Passenger Craft/Passenger Ro-Ro Craft

4.1.1 Surveys in general

For all periodical surveys, the requirements of TL Rules, Classification and Surveys, Section 3 are to be fulfilled as applicable. However, in the case of craft more than 15 years old, the frequency of the bottom survey is subject to special consideration.

For high speed craft with aluminium hull the condition of the corrosion protection systems including the coating and cathode protection system shall be examined. Any significant corrosion damage observed shall be repaired and the corrosion protection system renewed. The corrosion protection systems shall be renewed for a target useful life period of at least as long as until the next survey. Potential difference measurements, when relevant, must be carried out with the craft in the afloat condition. Earth fault detection equipment shall be checked for proper functioning.

4.1.2 Fibre Reinforced Plastic (FRP) Craft

4.1.2.1 Surveys during construction

4.1.2.1.1 With reference to lamination, special inspections are required at the following stages.

For hand lay-up lamination:

a) when the hull lamination starts with the application of gel-coat;

b) during the hull lamination at different stages;

c) before starting the arrangement of internal stiffeners;

d) when the hull is extracted from the mould;

e) when the connection of the hull to the deck starts;

f) before the installation of the dolly, if any;

g) when the core of sandwich structure is arranged.

4.1.2.1.2 For particular lamination processes in enclosed mould, such as infusion lamination, the lamination survey scope is to be agreed with the **TL** Surveyor, but in any case special inspections are required at the following stages:

a) at the application of the release agent and the gel coat prior to starting with application of the laminate;

b) when the dry reinforcements layers and cores are fitted on the mould;

c) at the vacuum application for the initial check prior to starting with the lamination and related to:

- consolidation of the bag
- vacuum application
- vacuum/leakage control

d) during the resin infusion to verify and record the following data:

- waiting time
- infusion time
- vacuum level during the infusion

e) after the bag take-off to inspect the result of the lamination

f) before starting the arrangement of internal stiffeners

g) when the hull is extracted from the mould for the final inspection;

h) when the connection of the hull to the deck starts;

i) before the installation of the dolly, if any.

4.1.2.1.3 When thermosetting resins are employed, attention is to be payed to the type and quantity of catalyst agent employed so as to be compatible with the resin and the temperature and humidity of the space where composite fabrication and the curing process take place.

4.1.2.1.4 On the basis of the internal controls of the shipyard, the **TL** Surveyor may not attend some of the above inspections, provided that satisfactory records and internal checks are be submitted.

4.1.2.1.5 In addition, during the supervision of the first hull, an inspection of the shipyard is performed in order to verify that it is provided with adequate equipment in relation to the materials used and to the type of manufacture and that the quality of the laminates is ensured.

4.1.2.2 Periodical hull surveys

4.1.2.2.1 Annual and intermediate surveys

In the case of hulls made of sandwich type structures, it is to be carefully checked that the parts are not detached from the core. The check is to be performed by hammering the shell and evaluating the differences in the sound heard or by means of checks with non-destructive methods recognised by **TL**.

The connection between hull and deck is to be carefully checked, in particular when hull and deck are made of different materials.

4.1.2.2.2 Class renewal survey (hull) and bottom survey in dry condition

In addition to the requirements for the intermediate surveys given in 4.1.2.2.1, the presence of "osmosis" phenomena in the laminates of the underwater body and/or of cracks in the gel-coat is to be verified.

To this end, the craft is to be made available for the bottom survey in dry condition before the application of any paint, so as to allow a careful visual inspection.

In-water survey in lieu of bottom survey in dry condition will be specially considered by **TL** on a case-by-case analysis.

4.1.2.3 Examination and testing – Additional items for composite craft

The bonded attachments of frames, floors, bulkheads, structural joinery, engine bearers, sterntubes, rudder tubes, and integral tank boundaries are to be examined.

The hull to deck joint together with any joints between the deck and deckhouses or superstructures are to be examined.

The structure in way of the bolted attachment of fittings including guardrail stanchions, windlass, shaft brackets, fendering, mooring bitts, mast steps, rigging chainplates, etc., is to be examined.

External hull structure are to be specially examined:

For composite hulls the gelcoat or other protective finish is to be examined for surface cracking, blistering or other damage which may impair the efficiency of the protection to the underlying laminate.

4.1.2.4 Suspect areas

Suspect areas are locations within the hull structure vulnerable to increased likelihood of structural deterioration and may include areas subject to impact damage.

4.1.2.5 Ballast Keel

In composite craft care is to be taken to prevent crushing of GRP laminates through overtightening of keel bolts.

In the case of composite structures, including steel and GRP, consideration will be given to the use of steel rivets.

4.1.3 Wooden Craft

Following requirements are to be applied for Wooden craft:

4.1.3.1 Surveys in general

For all periodical surveys, the requirements of Classification and Surveys, Section 3 are to be fulfilled as applicable, with the exception of the Bottom survey, which is to be performed one year after the previous survey of the passenger craft with wooden hull of 200 gross tonnage and upwards.

4.1.3.2 Periodical hull surveys

4.1.3.2.1 Annual surveys

4.1.3.2.1.1 The craft is to be inspected, as far as practicable at the time of the survey, in order to verify that the hull and its equipment are in a satisfactory and efficient condition and that no significant unapproved modifications or alterations have been made which could affect the class and/or the safety of the craft concerned.

Following items are to be checked:

a) the outside shell above the waterline, with particular attention to the butts of shell and sheerstrake planking;

b) weather decks, with particular attention to the butts of waterways, inner waterways and planking;

c) hatches, other deck openings (with closing appliances, ventilator coamings, etc.) and bulwarks;

d) deck fittings and appliances, such as bollards, fairleads, guard-rails, ladders, etc.;

e) masts and rigging, and sails, if any (with iron fittings, standing and running rigging, etc.), including lightning conductors;

f) wire equipment - towline, hawsers and warps, and stream-anchor wire (or chain), if required;

g) the windlass and chain-cables as far as accessible;

h) the equipment of anchors and chain-cables;

i) main and auxiliary steering arrangements, with particular attention to the rod and chain gear, if fitted;

j) freeboard marks;

k) the deck outfit, tools and gear;

l) enclosed spaces, as far as accessible at the time of the survey.

For the purpose of the above, survey operations other than those mentioned above, but deemed equivalent by the **TL** Surveyor in terms of the characteristics and general condition of the craft concerned, may also be carried out.

4.1.3.2.1.2 At alternate Annual surveys, after the second one, in addition to the provisions given in 4.1.3.2.1.1, all enclosed spaces are to be examined by the **TL** Surveyor in charge to verify their condition.

In the course of the inspection, the following hull structural members are to be examined, in particular: beams, deck girders, pillars, knees, frames (after removal of air-courses and ceiling at the discretion of the Surveyor), breasthooks, deadwoods, keelsons, inner planking (beam shelves, clamps, thick strakes of ceiling, sparring, etc.), with particular attention to the examination of the butts of all longitudinal members.

Fastenings are also to be examined to verify their general condition.

The Surveyor may require a check of the condition of the structure by means of a more extensive specific examination, such as removal of portions of the inner planking and testing of timbers by axe, chisel or other suitable tool.

4.1.3.2.2 Bottom surveys

4.1.3.2.2.1 The survey is to consist of the following checks:

a) Check of the condition of the outside planking and its caulking by means of suitable tests, as deemed necessary by the attending Surveyor, on each side of the craft, amidships and at the ends, in the vicinity of the waterline and near to the keel, with local removal of any metal sheathing, as necessary. When evidence of deterioration is found in the outside planking and its caulking, additional tests are to be made as necessary to determine the extent of renewal of planking or re-caulking required. If it is found that general re-caulking of the outside planking is necessary, the metal sheathing, if any, is to be entirely removed and the outside planking is to be thoroughly cleaned. At the discretion of the **TL** Surveyor, after re-caulking the metal sheathing is to be renewed either entirely or in the deteriorated areas.

b) Check of the condition of keel, deadwood, stem, sternpost, rudder and associated pintles and gudgeons and all sea openings.

c) Examination of sea connections, of the attachments of valves to the craft shell and of gratings; where the valves fitted to the craft shell are of cast iron, they are to be opened for examination at every Docking Survey; where they are of ductile material, they are to be opened for examination at intervals not exceeding 4 years.

d) Measurement of clearances in the rudder gudgeons and the wear down in the rudder carrier bearing and sternbush.

Moreover, in the case of a Docking Survey held concurrently with a First Classification or Class Renewal Survey, all those checks are to be performed which are required for such surveys and which can only be carried out when the craft is in drydock or on a slipway.

4.1.3.2.3 Class Renewal surveys

4.1.3.2.3.1 The survey is to include examination and checks sufficiently extensive to ensure that the structures, systems and equipment of the craft are in good order or are restored to such condition as to allow the craft to operate safely for the new period of class to be assigned.

To this end, the operations listed below, or others deemed equivalent by the **TL** Surveyor in relation to the characteristics of the craft concerned, are to be performed.

The survey is, however, to include all the operations required in connection with an Annual survey of the hull and a Bottom survey.

4.1.3.2.3.2 All ceiling and limber boards are to be removed; in addition, if considered necessary by the Surveyor, a sufficient amount of the outer shell planking and inner sparring is to be removed to enable a close examination of the frames to be carried out.

4.1.3.2.3.3 Any surfaces in contact with rust are to be well scraped and the outside surface of the shell planking, from the light waterline to the covering boards, is to be well cleaned and scraped. The whole of the internal structure and planking is to be cleaned and scraped.

4.1.3.2.3.4 The condition of fastenings is to be checked and, if considered necessary by the **TL** Surveyor, a sufficient number of fastenings is to be drawn to enable their condition and that of the adjacent timber to be thoroughly checked. In this connection, particular attention is to be given to iron fastenings, especially in way of the waterline, and fastenings made of copper or yellow metal are to be tested, as far as practicable, and renewed when found to be broken or excessively worn.

4.1.3.2.3.5 The sheerstrake planking is to be tested by drawing a sufficient number of treenails, or by boring if no treenails are fitted; the holes resulting from the latter are subsequently to be closed by treenails or bolts.

4.1.3.2.3.6 If the keel and centre keelson are connected by iron fastenings, a sufficient number of these fastenings is to be drawn to check their condition; where this is impracticable, additional fastenings, as required by the Surveyor, are to be fitted in the connection of keel with centre keelson, of stem and stern-post with aprons and inner stern-posts, and also in the connection of other main structural members.

4.1.3.2.3.7 Particular attention is to be given to the examination of breasthooks, frames, beams (particularly at their ends), knees, hawse timbers, knight heads, transoms and all fore and aft structural members.

4.1.3.2.3.8 If visual examination or testing by sounding and boring reveals rot or decay due to woodworm, the affected areas and adjacent timbers are to be closely inspected and, if necessary for the purpose, additional parts are to be removed in order to decide the extent of renewal required.

4.1.3.2.3.9 Bulwarks, bulwark stays, guard-rails and similar fittings, and superstructures in general are to be examined in order to check their condition.

4.1.3.2.3.10 Anchors and chain-cables are to be examined.

4.1.3.2.3.11 Rudder and steering arrangements are to be carefully examined and, if considered necessary for the purpose, the rudder is to be unshipped; rod and chain gears are to be examined as required for Class renewal surveys of steel craft.

4.1.3.2.3.12 Particular attention is to be given to the condition of the upper deck or weather decks; planks showing evident signs of wear are to be bored, and renewed either wholly or in part when the deterioration exceeds 20 mm.

4.1.3.2.3.13 The windlass and other items of deck machinery are to be examined and dismantled as deemed necessary by the **TL** Surveyor.

4.1.3.2.3.14 Several lengths of covering boards, waterways and inner waterways are to be removed as considered necessary by the Surveyor, in order to carefully check the condition of the timber in way of the ends of beams and frames.

4.1.3.2.3.15 Superstructures and erections are to be scraped, particularly in those positions which are liable to greater deterioration, and parts are to be removed as required for renewal and/or repair.

4.1.4 Polyethylene Craft

4.1.4.1 General

Craft constructed of Polyethylene (PE) do not require coating or painting, and are low maintenance as the PE is inert and therefore has no porosity ensuring that marine growth can not penetrate the polymer. Although marine organisms like to grow on polymer they can not effectively attach or penetrate making them easy to remove and therefore anti foul is not required.

4.1.4.2 Routine Inspection

During a routine inspection following steps should be followed:

- Surveyor should not begin the survey without OSHA (Occupational Safety & Health Administration) approved guidelines
- Checking each inlet and outlet connection with structure for possible seepage or leaks
- Ensuring that all flexible expansion joints are in good working condition
- Ensuring by log book that tanks are flushing once in a year
- Ensuring by log book that when clearing tank fill lines applied pressure is max. 0.5 bar.
- If the craft has been in service three years or longer, the inside and outside surface of the craft should be checked for crazing, cracking or unusual discoloration.

4.1.4.3 Ultra-Violet Exposure

Quality polyethylene resins are compounded with Ultra-violet stabilizer prior to being distributed to the craft manufacturer's facility. Craft that have extreme amounts of UV exposure should be sheltered from the environment,

insulated or colored for additional protection. Manufacturers reduce wall thickness by using less resin. This application extends the life of PE.

A common test method to see if the craft has undergone Ultra-violet attack is to use water based stain or marker and color in a small area that has been exposed to sunlight. This will fill any voids in the PE material making cracks visible.

4.1.4.4 Craft Failure

Improper plumbing attachments, Chemical and UV attacks are the most common causes for failure. Craft can also fail due to age. Typically cracks will develop near the craft base. Stress cracks normally develop at or near tank sidewall connections. A Crosslink tank will typically develop a stress crack prior to complete tank failure.

4.1.4.5 Non-Structural Repair

4.1.4.5.1 Abrasion

Abrasion is basically due to wear and tear and if often localized. Common locations are on the stems or ends of the craft. Much of polyethylene's durability comes from its elasticity and capability to flex and absorb impact and contact. Abrasion often takes the form of a series of scrapes and shallow gouges and in most cases doesn't need to be attended to unless over time damage continues to accumulate to the point where gouges become deeper. This type of damage will transition from non-structural to structural when there is a difference in the flexibility between the abraded section and neighboring hull sections.

Easiest way to test this is to press on the hull with palms and compare the resistance. A sharp knife can be used to cut away any raised edges along sides of abrasion. Rasp can also be used effectively to smooth out the hull surface. Unfortunately, painting is not an option as paint will not adhere to polyethylene.

4.1.4.5.2 Slits & Cuts

Compared to sharp edged rocks and ledges and even coarse grained sand, polyethylene is a soft material. Abrasion is one result and a second consequence can be superficial cuts or slits in the hull. These are primarily noticeable by the raised edges on either side of the cut. Again isolated cuts are not a structural concern. A sharp knife or rasp can be used to remove the raised material regarding to non-structural impact. A rotary tool can also be used effectively to remove the feathered edges.

4.1.4.5.3 Gouges

Gouge seems that it could easily be filled and smoothed but polyethylene doesn't provided a good bonding surface for new material and the inherent flexibility of the material poses a challenge to the bond between original material and filler or new material. Other than smoothing the edges of the gouges as slits and cuts, it's the best way to accept it.

4.1.4.5.4 Dents

Dents can result from impact from paddling or a weight left resting on the boat. Long term storage in one position can also produce hull distortions. Prolonged or continual exposure to sunlight can distort or stress the hull and create depressed sections of the hull. Tying craft tightly, particularly on sunny hot days can result in dents and deformations. Generally, prevention is the best solution to this type of damage. Periodically ropes or straps should be untied. Craft should be suspended in web straps or resting on rigid sections of hull.

4.1.4.6 Structural Repair

4.1.4.6.1 Cracks

The most common structural damage “poly” craft suffer are cracks or linear breaks. In many cases, these are repairable but the process is challenging. Following tools and materials can be used to repair this type of damage:

- hot air gun with reducing nozzle or propane torch
- wire cutters
- drill
- drill bits
- file or rasp
- sharp knife
- fine edged metal putty knives
- vise grips
- coarse grit sandpaper
- polyethylene welding rod
- denatured alcohol
- gloves

Area around the crack should be cleaned and ensuring that area is very dry. Heat gun or torch can be used to dry area. Lightly sand area allow each side of crack, sufficient to raise small fibers on surface of hull. Surface can be wiped down with alcohol and allow to dry. Drill hole should be opened at either end of crack with drill bit. If drill is not available, end of drill bit can be heated with torch, holding bit with vise grips, and hole at each end of crack can be melted. Function of the hole is to prevent the crack from “walking” or extending after the repair.

4.1.4.6.2 Small Holes

Repair of small punctures is similar to filling the end-holes on cracks. For tiny holes, it may be necessary to slightly enlarge the hole first to allow the melted poly to enter and seal the hole. The hole can be enlarged by drilling with small bit or by heating drill bit and melting hole slightly. For best results, area around the hole can be heated and the melted poly from the weld rod can be applied to surface while hull is hot. This allows repair poly to bond with hull material as repair cures. Melted end of poly rod can be pressed against hole and rod can be rotated in hole to spread adequate repair material in place. Unmelted part of poly rod should be cut off. Trying to pull rod away is prohibited as this could pull melted poly from hole.

4.1.4.6.3 Large Holes

It is possible to weld a patch to hull. As its necessary to melt existing hull surface at point of repair, the possibility of inadvertently further damaging hull does exist. If possible, the process can be repeated on a couple of scrap pieces of PE before attempting on the craft. For best results, a patch of adequate size from craft’s manufacturer can be obtained.

SECTION 3

HULL STRUCTURES AND STABILITY

Page

A. HULL STRUCTURES **3-**2
1. Flow chart
2. Double Bottom Requirements for L1/L2 Passenger/Ro-Ro Passenger Craft

B. WATERTIGHT/WEATHERTIGHT INTEGRITY **3-**5
1. Flow Chart
2. Further Requirements
3. Hatches and Doors On Exposed Decks
4. Portlights, Windows and Viewing Ports, Skylights
5. Bulwarks And Guard Rails
6. Air Pipes

C. RUDDER **3-**11
1. Flow Chart

D. STABILITY **3-**12
1. Flow Chart

E. PARTICULAR REQUIREMENTS FOR MULTI-HULL CRAFT **3-**13
1. General

A. Hull Structures

1. Flow chart

Following flow-chart is to be applied for hull structures of passenger craft with **L1** and **L2** Notations (Figure 3.1).

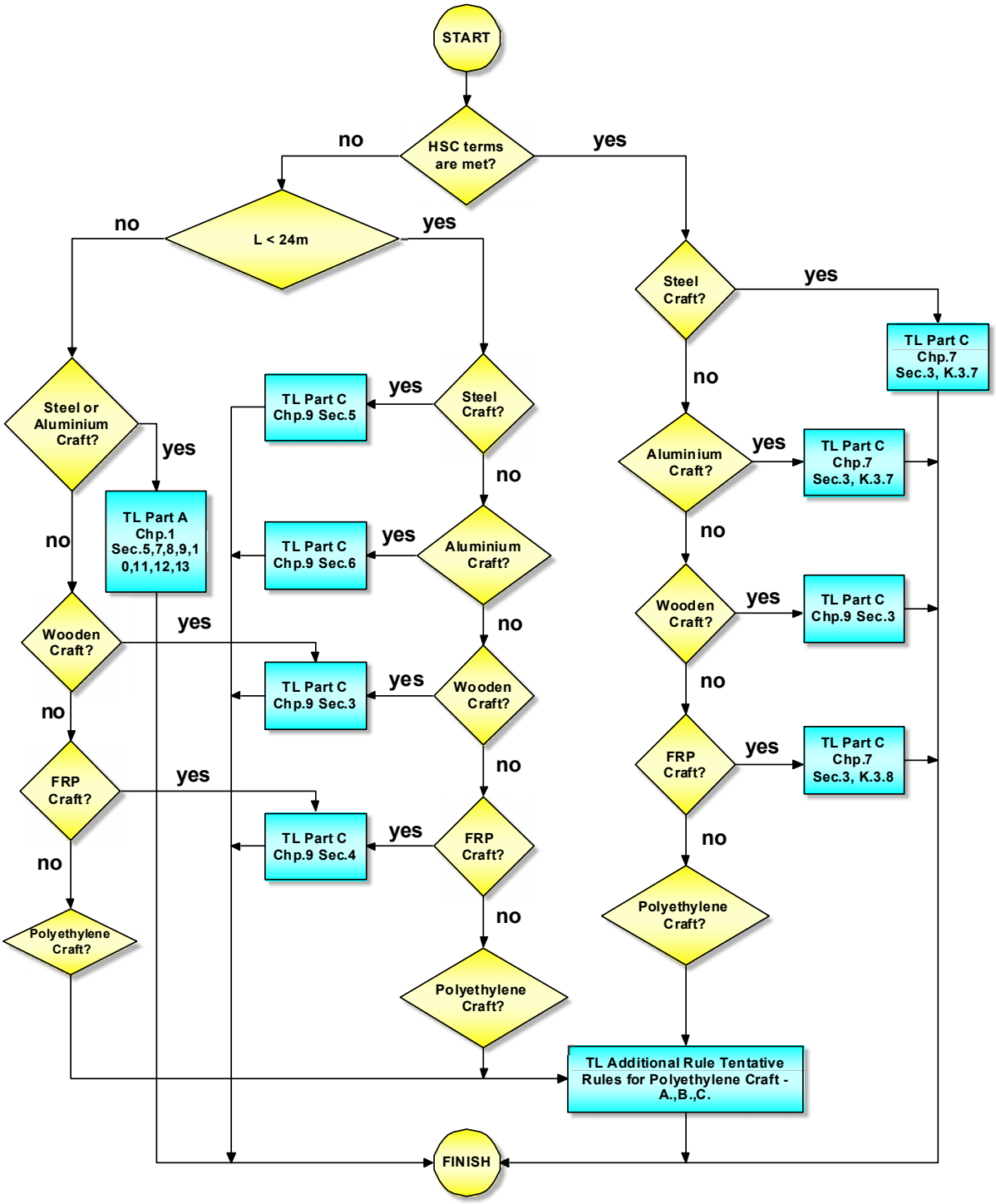


Figure 3.1 Selection of rules and regulations for the design of hull structures

2. Double Bottom Requirements for L1/L2 Passenger/Ro-Ro Passenger Craft (See also Table 3.1)

2.1. **L1/L2** passenger craft/Ro-Ro Passenger Craft with a length of 24 metres and above, a double bottom shall be fitted extending from the forepeak bulkhead to the afterpeak bulkhead as far as this is practicable and compatible with the design and proper working of the ship.

a. In ships of 50 metres and upwards but less than 61 metres in length, a double bottom shall be fitted at least from the machinery space to the forepeak bulkhead, or as near thereto as practicable.

b. In ships of 61 metres and upwards but less than 76 metres in length, a double bottom shall be fitted at least outside the machinery space and shall extend to the fore and after peak bulkheads or as near thereto as practicable.

c. In ships of 76 metres in length and upwards, a double bottom shall be fitted amidships and shall extend to the fore and after peak bulkhead or as near as practicable.

2.2. Where a double bottom is required to be fitted its depth shall comply with Chapter 1, Hull, Section 30, D 2. and the inner bottom shall be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge. Such protection will be deemed satisfactory if the line of intersection of the outer edge of the margin plate with the bilge plating is not 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 at 25 ° to the base line and cutting it at a point one half of the ship's moulded breadth from the middle line. (See Figure 3.2)

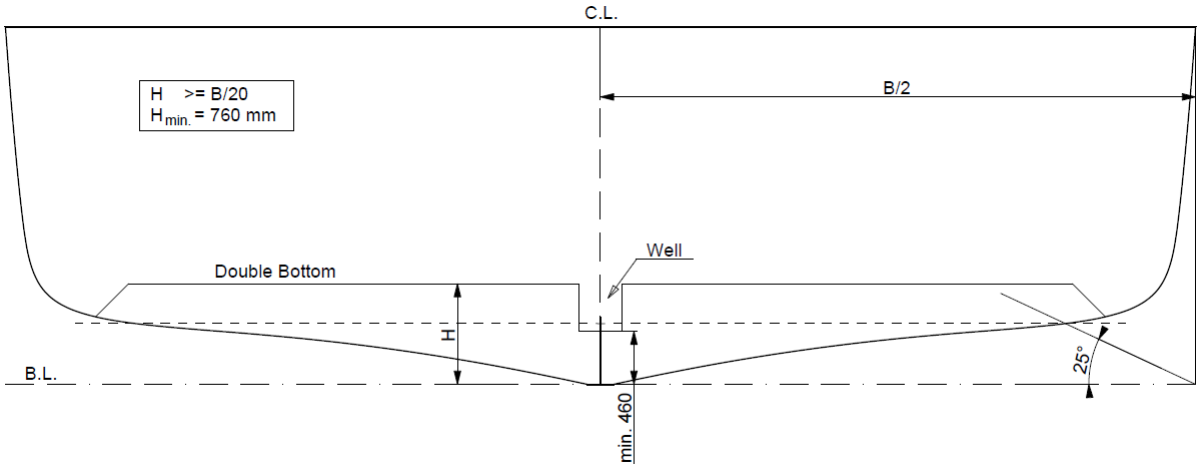


Figure 3.2 Double Bottom Arrangement

2.3. Small wells constructed in the double bottom in connection with drainage arrangements of holds, etc., shall not extend downwards more than necessary. The depth of the well shall in no case be more than the depth less 460 mm of the double bottom at the centreline, nor shall the well extend below the horizontal plane referred to in paragraph 2.2. A well extending to the outer bottom is, however, permitted at the after end of the shaft tunnel. Other wells (e.g. for lubricating oil under main engines) may be permitted by the Administration of the flag State if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation.

2.4. A double bottom need not be fitted in way of watertight compartments of moderate size used exclusively for the carriage of liquids, provided the safety of the ship, in the event of bottom or side damage, is not, in the opinion of the Administration of the flag State, thereby impaired.

2.5. Notwithstanding paragraph 2.1,

- For **L1/L2** Passenger Craft/Ro-Ro Passenger Craft, **TL** may permit a double bottom to be dispensed with in any part of the ship which is subdivided by a factor not exceeding 0.5, if satisfied that the fitting of a double bottom in that part would not be compatible with the design and proper working of the ship.

- For **L1** Passenger Craft/Ro-Ro Passenger Craft of 24 metres and upwards in length, **TL** may permit a double bottom to be dispensed with in any part of the ship which is subdivided by a factor 1.0, if satisfied that the fitting of a double bottom in that part would not be compatible with the design and proper working of the ship.

Table 3.1. Damage Stability Requirements for L1/L2 Passenger Craft

Notation	Number of passengers	Sbd. factor
L1	>12	1.0
L2	<400	1.0
	>=400	0.5

B. Watertight/Weathertight Integrity

1. Flow Chart

Following flow-chart is to be applied for watertight/weathertight integrity of passenger craft with **L1** and **L2** Notations (Figure 3.3).

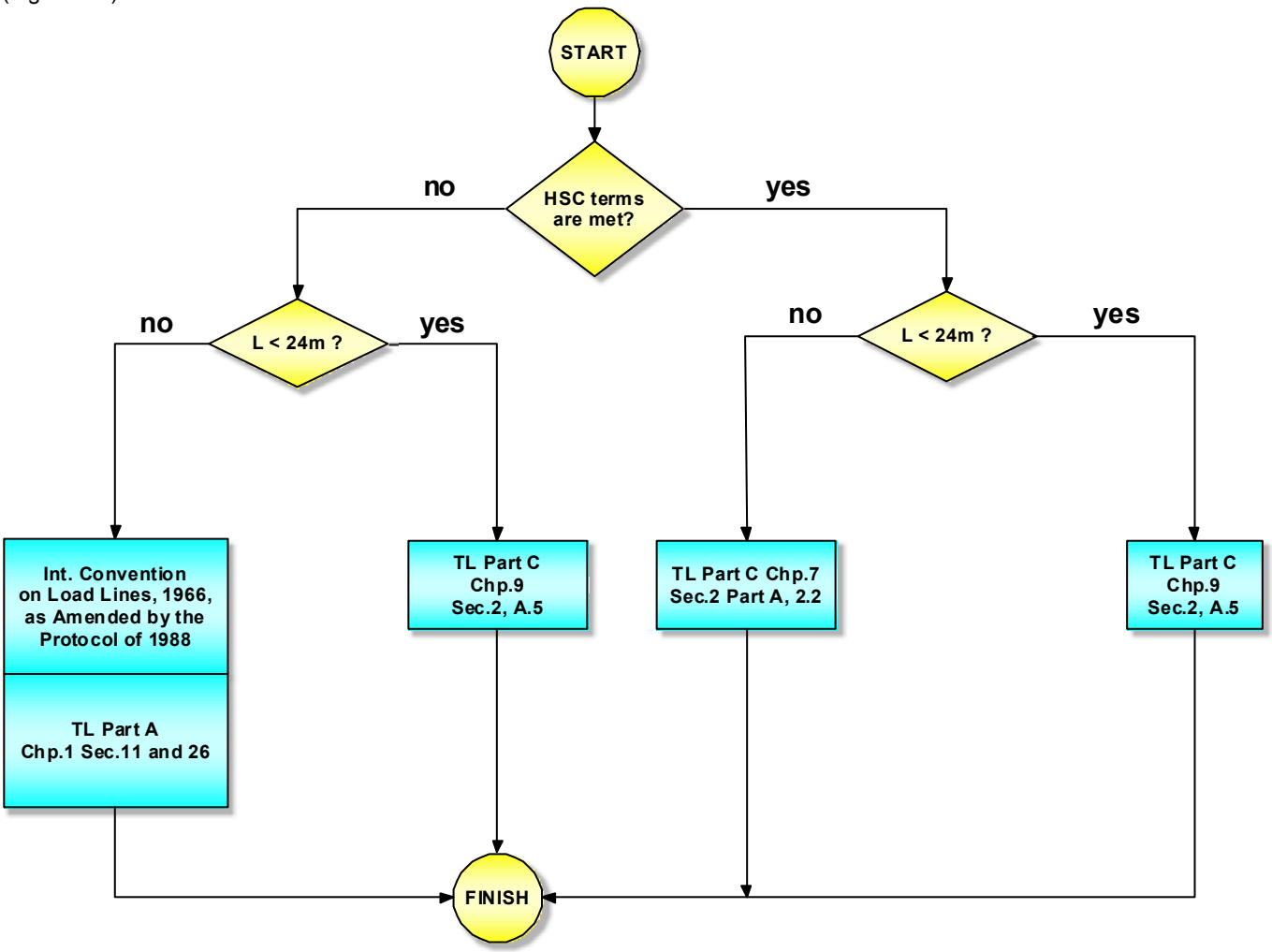


Figure 3.3 Selection of rules and regulations for watertight/weathertight integrity

2. Further Requirements

2.1 General

TL Rules, Part A, Chapter 2 and Chapter 3 are to be applied regarding to material and welding.

3. Hatches and Doors On Exposed Decks

3.1. General

3.1.1 This subsection applies to small hatchways or door openings in the positions indicated in Figure 3.4.

3.1.2 The number and size of hatchways and other access openings are to be kept to the minimum consistent with the satisfactory operation of the craft.

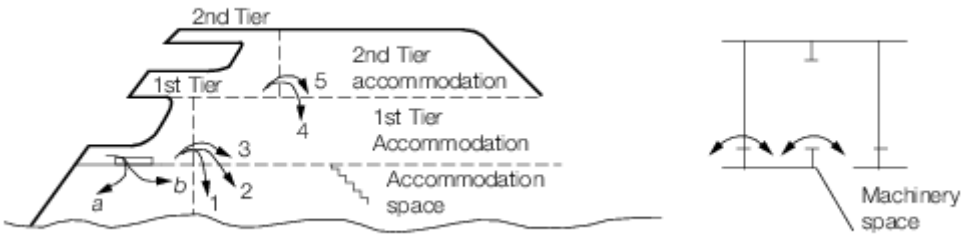


Figure 3.4 Arrangement of doors, sills and hatch coamings

3.2 Hatches

3.2.1 Hatch covers are to be weathertight when closed, of substantial construction and generally hinged. The means of securing are to be such that weathertightness can be maintained in any sea condition. Details are to be submitted for approval.

3.2.2 Hatch covers may be of steel, steel equivalent construction. Where toggles are fitted, their diameter and spacing are to be in accordance with an ISO Standard or equivalent.

3.2.3 Hatches on the weatherdeck in the forward 0,25$\mathbf{L}_R$ or to machinery spaces are to be hinged on the forward side.

3.2.4 Hatch coamings height above the deck surface shall not be less than specified below. (ref. to the Technical Regulation for Ships.

3.2.5 Flush hatches will be specially considered. Flush hatches are to be kept closed at sea.

Table 3.2. Coaming Heights for L1/L2 Passenger Craft

Position/access	**Coaming Height (mm) L1**	**Coaming Height (mm) L2**
(a) Weather deck/lower machinery compartment	100	380
(b) Weather deck/lower accommodation	100	380

3.2.6 Rope hatches may be accepted with reduced coamings, but generally not less than 380 mm, provided they are well secured and opened only at the Master's discretion. A suitable notice is to be displayed at the hatch.

3.2.7. Closing devices

3.2.7.1 Hinges are not to be used as securing devices unless specially considered.

3.2.7.2 Overhead hatches fitted along the escape routes to be acceptable provided that;

a. Escape hatches and their securing devices can be opened from both sides;

b. The maximum force needed to open the hatch cover is not to exceed 150 N; and (The use of a spring counterbalance, equalising or any other suitable device on the hinge side to reduce the force needed for opening is acceptable.)

3.2.8 Engine removal hatches

Where portable plates are required in decks for unshipping machinery, or for other similar reasons, they may be accepted provided they are of equivalent strength to the unpierced deck and are secured by gaskets and closely spaced bolts. The pitch spacing of the bolts will be specially considered depending on the hatch stiffening and support arrangements but should not exceed ten diameters. Large deck openings suitable stiffened considering longitudinal strength of vessel. The calculation of torsional stresses and/or deflections may be required when considering ships with large deck openings.

3.2.9 Testing upon completion

Weathertight hatch covers and closing appliances are to be hose tested to the satisfaction of the Surveyor.

3.2.10. Standard designs

3.2.10.1 Standard designs of hatches may be accepted, provided they are designed and manufactured in accordance with the requirements of a recognised National or International Standard which gives reasonable equivalence to the requirements of this Section.

3.2.10.2 Type Approved standard flush hatches, not exceeding 650 mm x 650 mm clear opening, may be accepted. Where the hatch type is not type approved, full details, including the material specification, are to be submitted to **TL** for approval in each case.

3.2.10.3 Hatchways of novel or unusual design will be specially considered.

3.3. External doors

3.3.1 Door sills are to have a height above the deck surface in accordance with table below (ref. to the Technical Regulation for Ships.

Table 3.3. Sill Heights for L1/L2 Passenger Craft

Position/Access	Sill Height (mm) L1	Sill Height(mm) L2
(1) Weather deck/ lower machinery compartment	100	380
(2) Weather deck / lower accommodation	100	380
(3) Weather deck / 1st tier accommodation	100	100
(4) 1st tier/1st tier accommodation	50	50
(5) 1st tier/2nd tier accommodation	50	50

Where the sill heights do not comply with the requirements listed above, interior deck openings are to be treated as if they were exposed on the weather deck.

Doors are to be steel or steel equivalent material, permanently and strongly attached to the bulkhead and framed, stiffened and fitted so that the whole structure is of equivalent strength to the unpierced bulkhead, and weathertight when closed.

The doors are to be gasketed and secured weathertight by means of clamping devices or equivalent arrangements, permanently attached to the bulkhead or to the door.

Doors are generally to open outwards and are to be capable of being operated and secured from both sides.

Double doors are to be equivalent in strength to the unpierced bulkhead.

Companionways on exposed decks are to be of equivalent construction, weathertightness and strength to a deckhouse in the same position and effectively secured to the deck.

Where there is no requirements regarding the structural fire protection, elsewhere doors may be of hardwood or equivalent material and are to be of equivalent strength to the unpierced bulkhead

Portlights or windows in doors are to comply with the requirements given in Item B, 4. “Portlights, windows and viewing ports, skylights and glass walls”. Administration may accept external deadlights or storm covers.

3.3.2 Doors on the weather deck (first tier) protecting direct access to machinery spaces are to be of substantial construction in accordance with approved plans or a recognised National or International Standard. They are to be permanently attached to the casing, outward opening and gasketed weathertight with a minimum of six clips and have a sill height in accordance with Table 3.1.

3.3.3 Doors on the weather deck to accommodation or spaces protecting access below are to be with a minimum of four clips.

3.3.4 Where wood doors are proposed on the weather deck they are to be strongly constructed of hardwood not less than 45 mm thick and double gasketed.

3.3.5 FRP doors are not to be fitted in access openings where `A', `B' or `C' class fire integrity is required, or in engine room casings.

3.3.6 Doors in the second tier are to be of equivalent construction, weathertightness and strength to a deckhouse in the same position.

3.4. Manholes

Manholes to be closed by substantial covers capable of being made watertight by closely spaced bolts.

3.5. Hatchways within enclosed superstructures

3.5.1 The requirements of B.2 Hatches on exposed decks are to be complied with where applicable.

3.5.2 Access hatches within a superstructure or deckhouse need not be provided with means for closing if all openings in the surrounding bulkheads have weathertight closing appliances.

4. Portlights, Windows and Viewing Ports, Skylights

4.1 General Requirements:

4.1.1 Side scuttles are not to be fitted in such a position that their sills are below a line drawn parallel to the freeboard deck at side and having its lowest point 2,5% of the breadth (B), or 500 mm, whichever is the greatest distance, above the Summer Load Line. Side scuttles are defined as being round or oval openings with an area not exceeding 0.16 m^2 . Thickness of side scuttles is to be at least 6mm. Round or oval openings having areas exceeding 0.16 m^2 shall be treated as windows. Windows are not to be fitted below freeboard deck.

4.1.2 Glass panes have to be made of thermally toughened safety glass (TSG), or laminated safety glass made of TSG and to be shatterproof in order not to endanger passengers or crew when broken.

4.1.3 Side scuttles below freeboard deck is to be fitted with deadlights capable of being closed and secured watertight. If the required damage stability calculations indicate that the side scuttles would become immersed at any intermediate stage of flooding or the final equilibrium waterline, they shall be of the non-opening type.

4.1.4 Windows above freeboard deck are to be secured weathertight. Glass panes of windows can be glued to the framing or hull. However, this is not allowed for side scuttles. Windows and sidescuttles are to be certified according to relevant ISO Standard.

4.1.5 Storm covers are to be provided and be ready for use in bad weather conditions for windows fitted on fronts of superstructure.

4.2 Thickness requirements

4.2.1 For passenger craft with L <24 m.

4.2.1.1 For number of passengers <= 36, the requirements of ISO 12216 are to be applied considered as Design Category C

4.2.1.2 For number of passengers > 36, requirements given of ISO 12216 are to be applied. considered as Design category B

4.2.2 For passenger craft with L>=24m

4.2.2.1 For number of passengers <= 36, requirements given in Ch.9-Yacht Rules, Sec.2 A 5.7.2 to 5.7.6 are to be applied.

4.2.2.2 For number of passengers > 36, Chapter 1, Hull, Section 16 is to be applied.

5. Bulwarks And Guard Rails

5.1 Bulwarks or guard rails are to be provided at the boundaries of exposed freeboard and superstructure decks and first tier deckhouses. Fixed, removable or hinged stanchions shall be fitted about 1.5 m apart. Where stanchions are fitted, every third stanchion is to be supported by a bracket or stay. Bulwarks or guard rails height are to be not less than as follows;

L (m)	Bulwark /Guardrail Height (mm)
<15	800
15-24	850
>24	1000

For the maximum clearance of course of the guardline Refer to TL Yacht Rules section 2 A 5.13.1

5.2 The freeing arrangements in bulwarks are to be in accordance with;

- ILCC if L ≥24m
- TL Ch.9 Yacht rules if L< 24m

5.3 Special consideration will be given to the provision of guard-wires in lieu of bulwarks or guard rails.

5.4 Chains are only permitted in short lengths in way of access openings.

6. Air Pipes

6.1 Air and sounding pipes are to comply with the requirements of Sec.7 D, Air, Sounding and Overflow Pipe.

6.2 Air pipes to double bottom tanks, deep tanks extending to the shell plating, or tanks which can be run up from the sea are to be led to above the watertight deck.

6.3 Air pipes are generally to be led to an exposed deck. Alternatively, air pipes from cofferdams or void spaces may terminate in the enclosed 'tween deck space on main vehicle decks, provided the space is adequately ventilated and the air pipes are provided with weathertight closing appliances.

6.4 Where air pipes are led through the side of superstructures, the opening is to be at least 2,3 m above the summer load waterline.

6.5 All openings of air and sounding pipes are to be provided with permanently attached, satisfactory means of closing to prevent the free entry of water.

6.6 In the case of air pipe closing devices of the float type, suitable guides are to be provided to ensure unobstructed operation under all working conditions of heel and trim.

C. Rudder

1. Flow Chart

Following Chart is to be used for rudder arrangements (Figure 3.5).

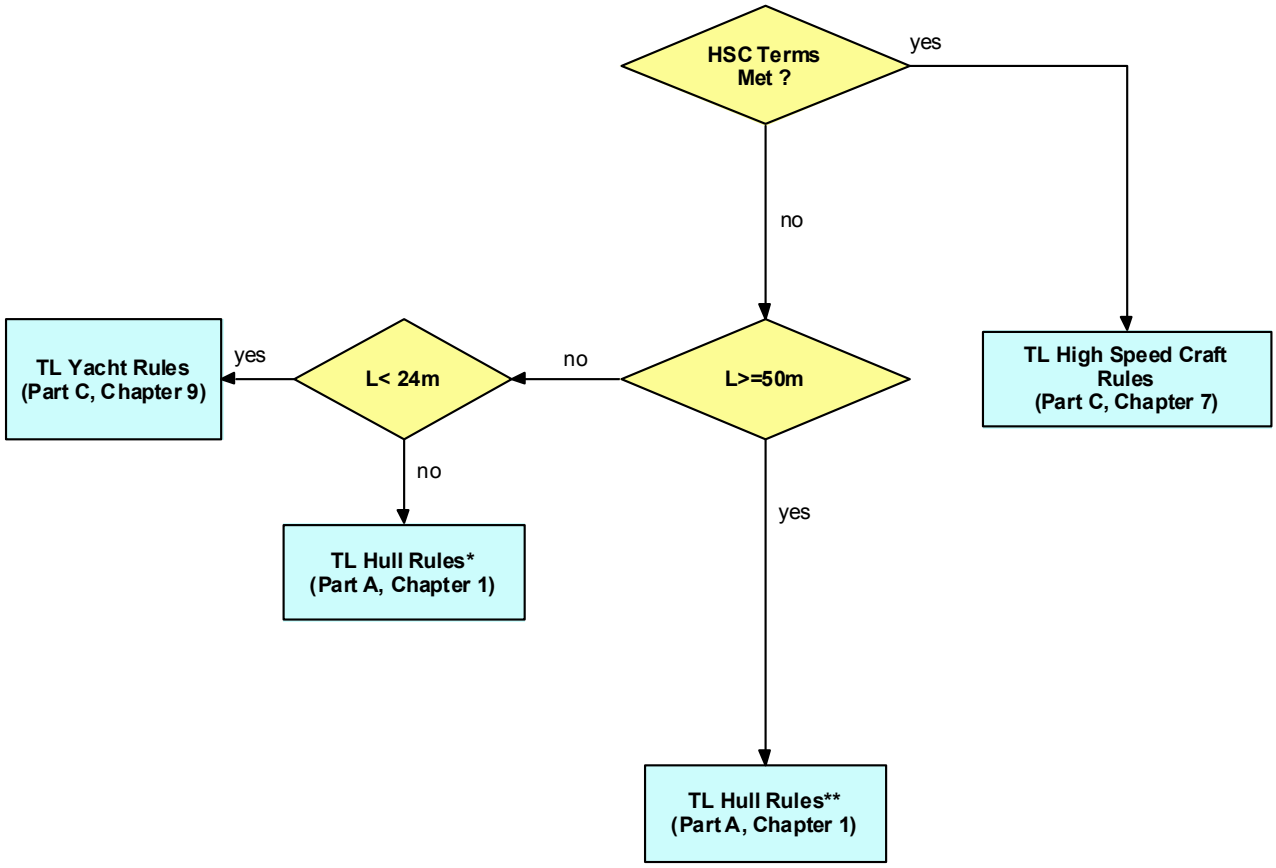


Figure 3.5 Selection of rules and regulations for rudders

Notes:

**use navigation coefficient n_c=0.75 to calculate rudder force, CR = 132 $n_c AV^2k_1k_2k_3$*

*** use navigation coefficient n_c=0.85 to calculate rudder force, CR = 132 $n_c AV^2k_1k_2k_3$*

D. Stability

1. Flow Chart

Following flow-chart is to be applied for determintation of stability requirements of passenger craft with **L1** and **L2** Notations (Figure 3.6).

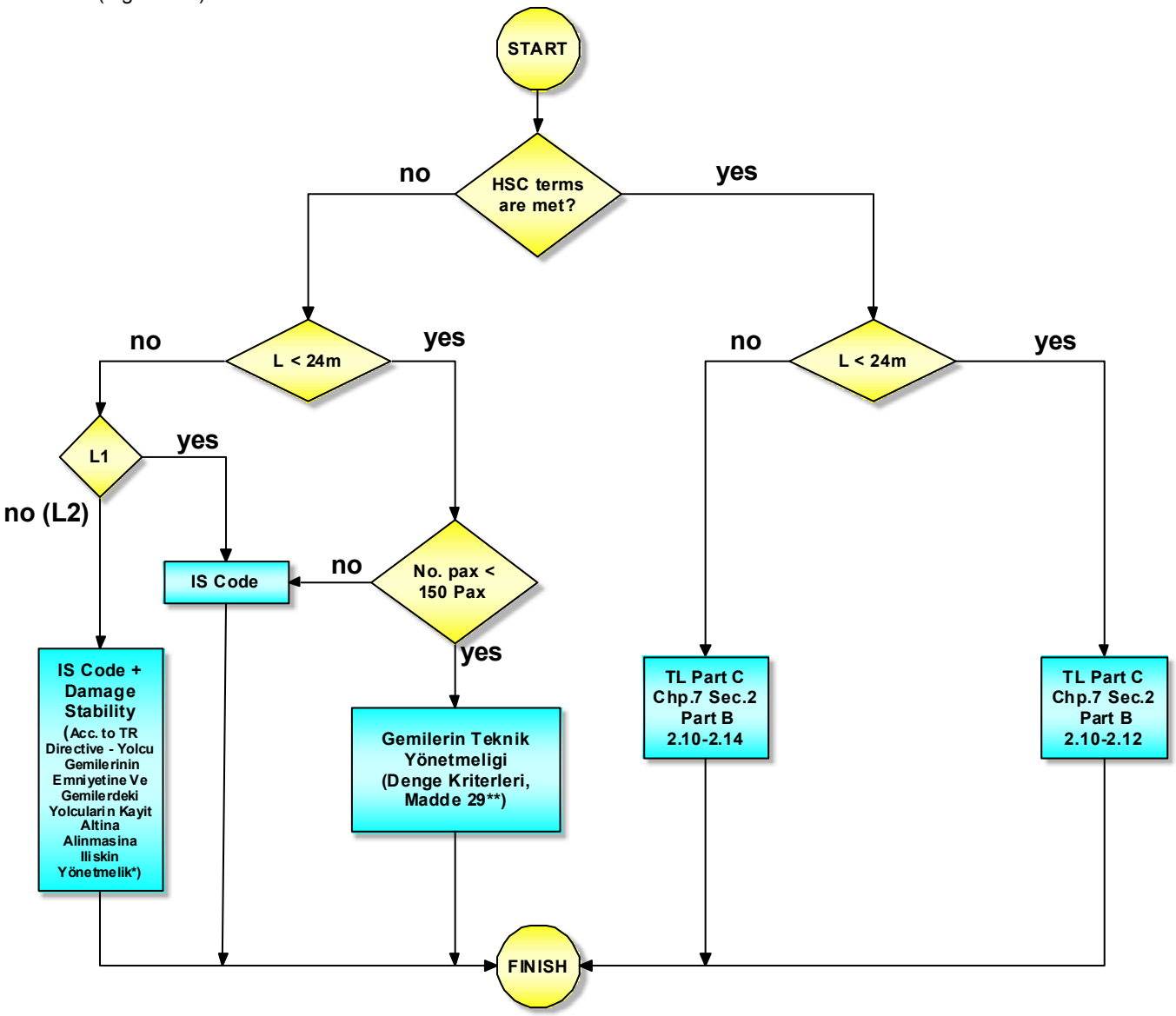


Figure 3.6 Selection of rules and regulations for stability

Notes:

** Yolcu Gemilerinin Emniyetine ve Gemilerdeki Yolcularin Kayıt Altına Alınmasına İlişkin Yönetmelik / Regulation about Safety of Passenger Ships and Recording of Passengers on Board based on 98/18/EC.*

*** Gemilerin Teknik Yönetmeliği (Technical Regulation for Ships)*

E. Particular Requirements For Multi-Hull Craft

1. General

1.1 In addition to the general requirements given in this Chapter, this subsection gives particular requirements for multi-hull craft.

1.2 Multi-hull craft escape hatches

1.2.1 Multi-hull craft are to be provided with a suitable means of escape from each accommodation compartment between watertight bulkheads in the event of inversion of the craft.

1.3 Portlights

Where it is proposed to fit portlights in the hulls of multi-hull craft, the arrangements will be specially considered.

SECTION 4

STRUCTURAL FIRE PROTECTION

Page

A. FLOW CHART **4-**2

B. FURTHER REQUIREMENTS **4-**2

A. Flow Chart

1. Following flow-chart is to be applied structural fire protection and means of escape for passenger craft.

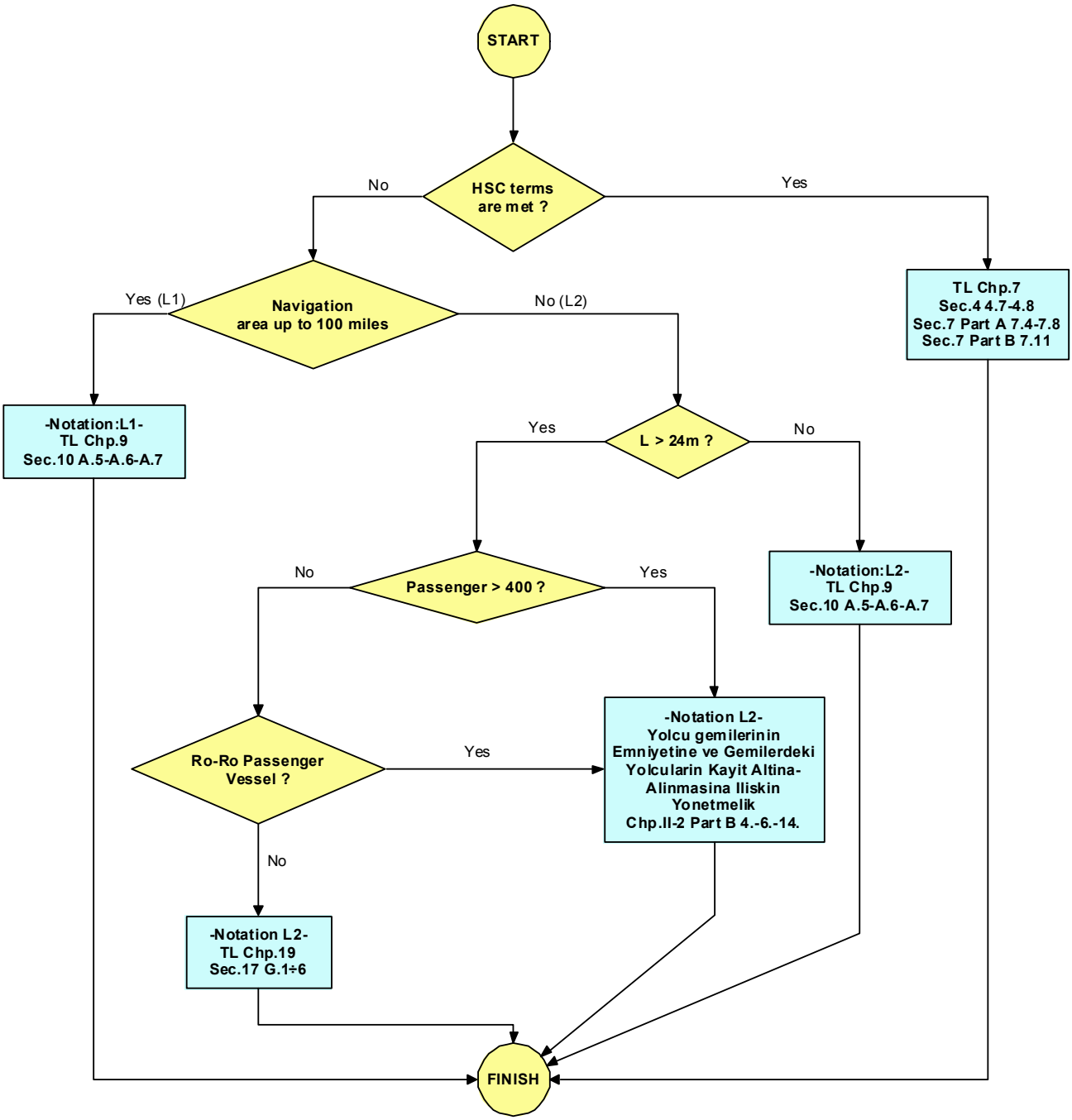


Figure 4.1 Selection of rules and regulations for structural fire protection and means of escape

B. Further Requirements

1. Requirements of **TL** Chp.19 and Yolcu Gemilerinin Emniyetine ve Gemilerdeki Yolcuların Kayıt Altına Alınmasına İlişkin Yönetmelik / Regulation about Safety of Passenger Ships and Recording of Passengers on Board" (based on 98/18/EC) shall be applied for materials other than steel or equivalent for vessels notation with **L2** and not less than 24 m.

SECTION 5

PROPULSION PLANTS

Page

A. PROPULSION SYSTEM **5-**2

1. General
2. Internal Combustion Engines, Steering Gears, Thrusters, and Gearings
3. Main Shafting and Propellers

A. Propulsion System

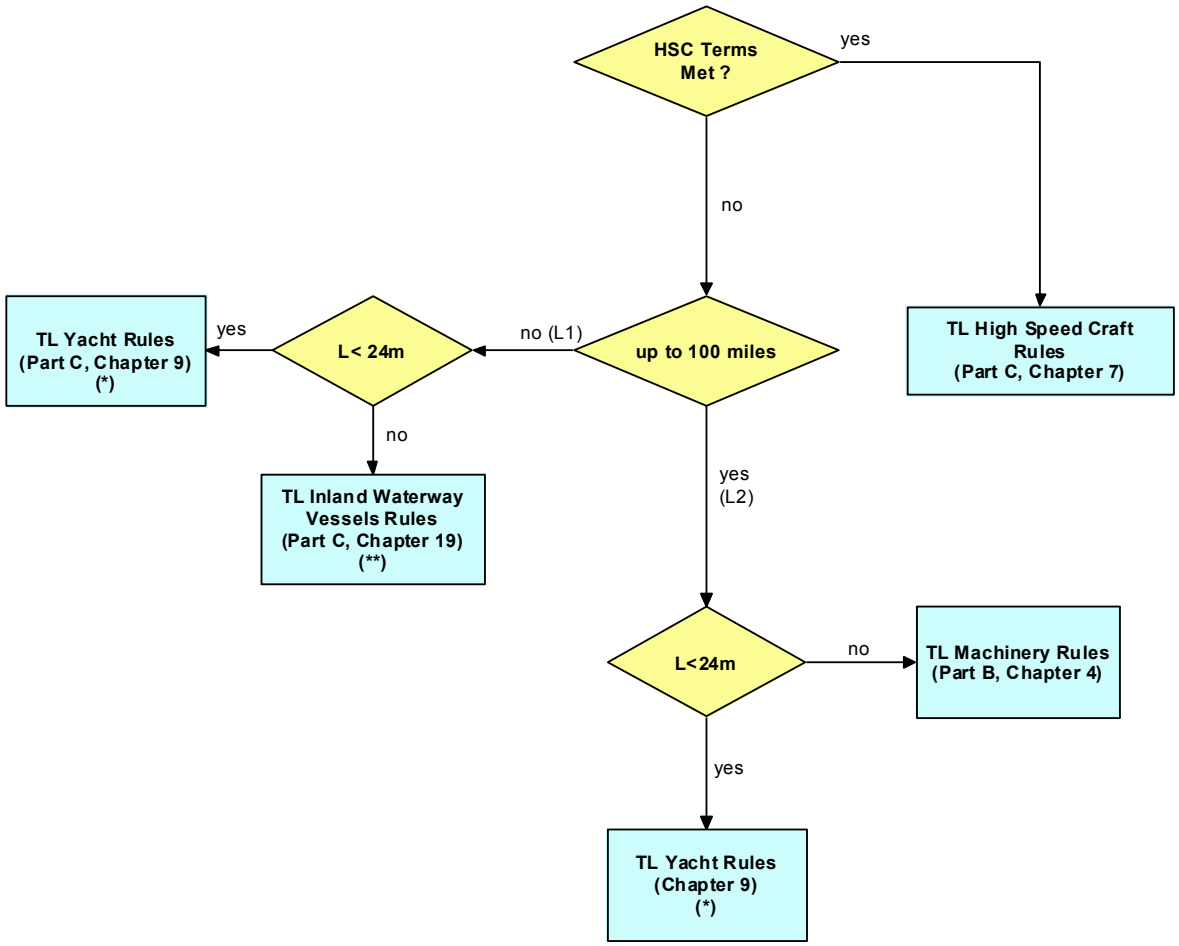
1. General

As a general rule, all materials, machinery, boilers, auxiliary installations, equipment, items, etc. which are covered by the class and used or fitted on board vessels surveyed by the Society during construction shall be new and, tested by the Society.

The requirements for the selection of materials to be used in the construction of the various parts of a vessel, the characteristics of products to be used for such parts and the checks required for their acceptance shall be as stated in other parts of the rules or as specified on approved plans. In particular, the testing of products manufactured according to quality assurance procedures approved by the **TL** or judged equivalent by the **TL** and the approval of such procedures are governed by the requirements of the **TL**.

2. Internal Combustion Engines, Steering Gears and Thrusters, and Gearings

Following flowchart is to be applied for Internal Combustion Engines, Steering Gears, Thrusters, and Gearings.



(*) *Main steering gears shall, with the rudder fully immersed in calm water, be capable of putting the rudder from 35° port to 35° starboard and vice versa and the vessel travelling at full speed. The time required to put the rudder over shall not exceed 20 seconds.*

(**) *For the steering gear alarm see Chapter 9, Section 7 F*

Figure 5.1 Selection of rules and regulations for the Internal Combustion Engines, Steering Gears, Thrusters, and Gearings

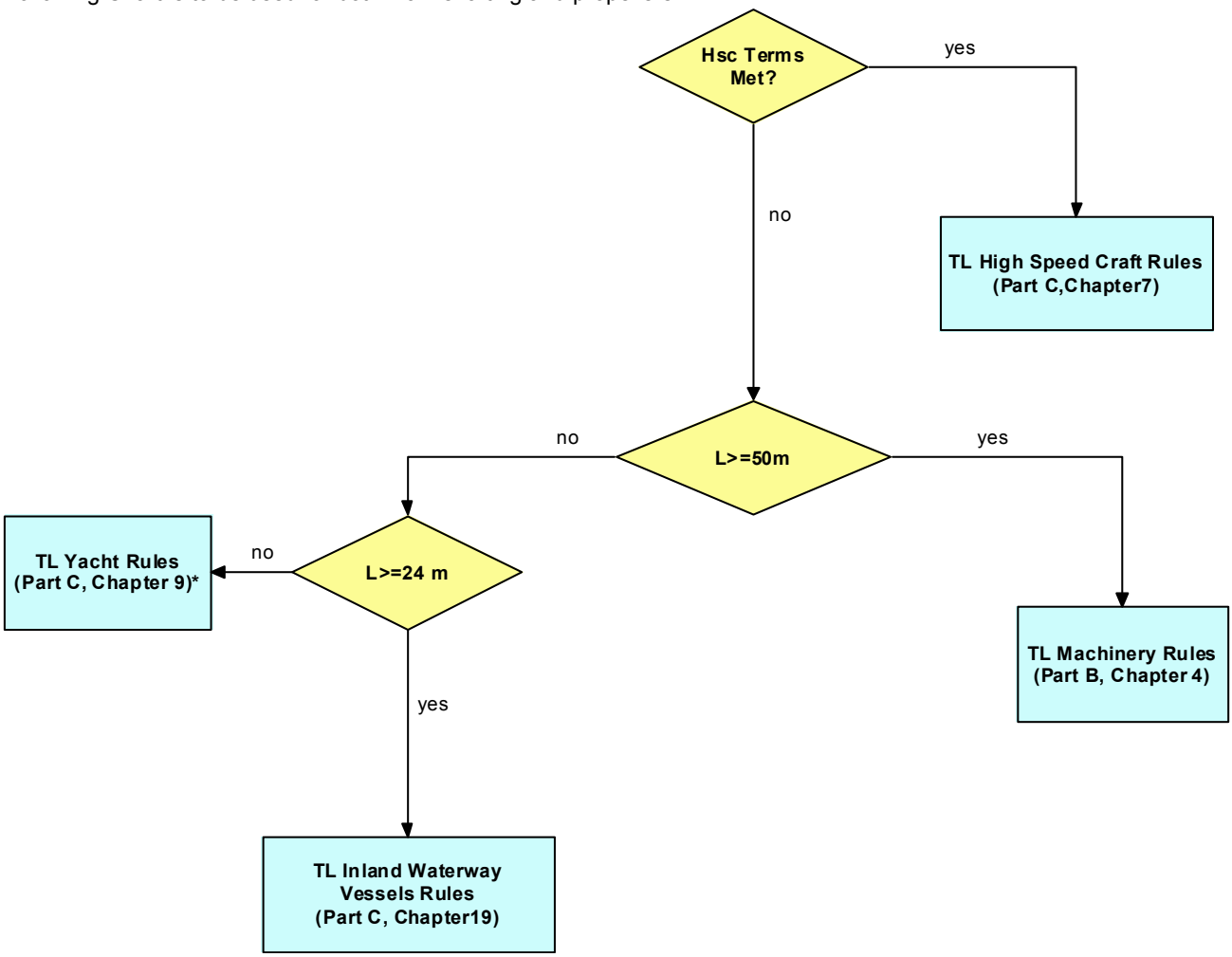
Note :

Certification requirements are outlined below for reference

- *For Internal Combustion Engines up to 110 kW manifacturer'certificate,and for more than 110kW **TL** certificate will be requested.*
- *For Steering gear and thrusters **TL** certificate*
- *For Gearings up to 220 kW manufacturers'certificate,and for more than 220kW **TL** certificate*

3. Main Shafting and Propellers

Following Chart is to be used for both main shafting and propellers.



(*) Section 7, C Article 2.2.3 is excluded.

Figure 5.2 Selection of rules and regulations for Main Shafting and Propellers

SECTION 6

ELECTRICAL INSTALLATIONS AND AUTOMATION

Page

A. GENERAL **6-**2

B. EMERGENCY SOURCE OF ELECTRICAL POWER **6-**2

C. MACHINERY CONTROL SYSTEM AND AUTOMATION **6-**5

A. General

1. The following rules shall be applied to passenger craft with **"L1"** or **"L2"** Notations.

B. Emergency Source of Electrical Power

1. An independent emergency source of electrical power shall be provided.

2. Vessels shall have an emergency source of electrical power (generator or battery) located above the uppermost continuous deck and readily accessible from open deck that outside the space containing main source of electrical power.

3. The emergency source of electrical power for passenger ships may be either a generator set with a transitional source of emergency electrical power or a storage battery.

4. The installation of the batteries is to be accordance with Part C, Ch. 9, Sec.9, C.3 (Rules for Construction and Classification of Yacht)

5. Where the emergency and/or transitional emergency loads are supplied from a battery via an electronic converter or inverter the maximum permitted d.c voltage variations are to be taken as those on the load side of the converter or inverter.

Where the d.c. is converted into a.c. the maximum variations are not exceed those given in Table 6.1 – 6.2.

Table 6.1 Voltage and frequency variations for a.c. distribution systems

Quantity in operation	Variations	
	permanent	transient
Frequency	±5%	±10%(5 sec)
Voltage	+6%,-10%	±20%(1.5 sec)

Table 6.2 Voltage variations for battery systems

Systems	Variations
Components connected to the battery during charging (see Note)	+30%,-25%
Components not connected to the battery during charging	+20%,-25%
Note: *Different voltage variations as determined by the charging / discharging characteristics, including ripple voltage from the charging device, may be considered.*	

6. Emergency generators and their prime movers shall be installed above the uppermost continuous deck and behind of the collision bulkhead. Exceptions require **TL** approval. The location in which the emergency generator is installed shall be accessible from the open deck; it shall be so located that a fire or another incident

a. In a room containing the main generators and/or the main switchboard, or in

b. A Category A machinery space

will not impair the operating ability of the emergency source of electrical power.

7. As far as is practicable, the room containing the emergency source of electrical power, the associated transformers, converters, the transitional emergency source of electrical power and the emergency switchboard shall not adjoin the boundaries of Category A machinery spaces or of those spaces which contain the main source of electrical power, the associated transformers, converters or the main switchboard.

8. Emergency generating sets are to be so designed that they can be started up readily even at a temperature of 0°C.

9. If the set can be started only at higher temperatures, or where there is a possibility that lower ambient temperatures may occur, heating equipment is to be fitted to ensure ready reliable starting.

10. The operational readiness of the set must be guaranteed under all weather and seaway conditions. Fire flaps required in air inlet and outlet openings may only be closed in case of fire and are to be kept open at other times. Warning signs to this effect are to be applied. No alarm is required in the case of automatic fire flap actuation dependent on the operation of the set. Air inlet and outlet openings must not be fitted with weatherproof covers.

11. Each emergency generating set required to be capable of automatic starting is to be equipped with an automatic starting system approved by **TL**, the capacity of which is sufficient for at least three successive starts see **TL** Rules for Electrical Installations, Part B, Chapter 5, Section 7, D.6.

The emergency switchboard shall be installed close to the emergency generator and/or the emergency battery. The requirements of subsection C. shall be observed. The place of installation shall satisfy the same conditions as apply to the installation of the emergency generator.

12. Where the emergency source of electrical power is an accumulator battery it shall not be installed in the same space as the emergency switchboard.

13. The emergency source of power shall be operating according to classification of the ships in periods(min) of:

- For class L1;

1 hour for communication and emergency light --- (L<=24m)
3 hours --- (L>24m)

- For class L2;

3 hours --- (L<=24m)
6 hours --- (L>24m)

14. In particular, be capable to operate simultaneously the consumers as identified within the following services as required for the class of ships for the times indicated above;

a. the ship's emergency bilge pump and one of the fire pumps;

b. Emergency Lighting;

i. At every assembly or embarkation station and over the sides;

ii. *In all alleyways, stairways and exits giving access to the assembly or embarkation station;*

iii. *In the machinery spaces, and in the place where the emergency generator is situated;*

iv. *In the control stations where radio and main navigating equipment are situated;*

v. *at all stowage positions for fighter's outfits;*

vi. *at the emergency bilge pump and one of the fire pumps;*

c. the ship's navigation lights,

d. all communication equipment,

all general alarm system, the fire detection and alarm system,

all signal which may be required in an emergency, if they are electrically operated from the ship's main generating sets,

e. the ship's sprinkler pump, if any and if it is electrically operated,

f. the ship's daylight signalling lamp, searchlight if it is operated by the ship's main source of electric power,

15. In addition to the emergency lighting required, on every ship with Ro-Ro cargo spaces or special category spaces:

a. all passenger public spaces and alleyways shall be provided with supplementary electric lighting that can operate for at least three hours when all other sources of electrical power have failed and under any condition of heel. The illumination provided shall be such that the approach to the means of escape can be readily seen. The source of power for the supplementary lighting shall consist of accumulator batteries located within the lighting units that are continuously charged, where practicable, from the emergency switchboard. Alternatively, any other means of lighting which is at least as effective may be accepted by the Administration of the flag State. The supplementary lighting shall be such that any failure of the lamp will be immediately apparent. Any accumulator battery provided shall be replaced at intervals having regards to the specific service life in the ambient conditions that they are subject to in service; and

b. a portable rechargeable battery operated lamp shall be provided in every crew space alleyway, recreational space and every working space which is normally occupied unless supplementary emergency lighting, as required by paragraph a is provided.

16. A LLL system shall be provided for passenger ships and Ro-Ro passenger ships.

17. The additional emergency luminaires required acc. to 15. may be fully or partly integral part of the LLL-system (16) provided the additional requirements acc. to item 15. are to be complied with.

C. Machinery Control System and Automation

1. For unmanned machinery installations (**AUT** notation), Part C, Chapter 9, Sec.8 - Automation System is to be observed in addition to the following requirements.

2. For the requirements of the control, monitoring, alarm and safety systems necessary to operate equipment for vessel's propulsion, steering and safety, please see also Part C, Ch. 19, Sec.13.M (Inland Waterway Vessel)

3. For the requirements of engine control systems of passenger craft with **L1** and **L2** notations, please refer to Part C, Ch. 19 Sec. 12, B (Inland Vessel).

SECTION 7

CRAFT OPERATION INSTALLATIONS AND AUXILIARY SYSTEMS

Page

A. PIPES, VALVES, FITTINGS AND PUMPS **7-**2
1. Flowchart
2. Definitions
3. General
4. Materials, Quality Assurance, Pressure Tests
5. Pipe Wall Thickness
6. Principles for the Construction of Pipes, Valves, Fittings and Pumps

B. BILGE SYSTEM **7-**3
1. Layout of bilge lines
2. Prevention of communication between spaces - Independence of the lines

C. FUEL OIL SYSTEM **7-**8
1. Limitations in the use of oil as fuel
2. Pipe layout
3. Distribution and location of fuel tanks
4. Fuel tank fittings and mountings
5. Attachment of mountings and fittings to fuel tanks
6. Design of fuel oil filling and transfer systems
7. Tank filling and suction systems
8. Filters
9. Sampling points

D. AIR, SOUNDING AND OVERFLOW PIPE **7-**12
1. General
2. Air Pipes
3. Sounding Pipes
4. Overflow pipes

E. GENERAL WATER FIRE-EXTINGUISHING SYSTEM **7-**14
1. Fire main and Fire pumps:
2. Fire hoses and Hydrants
3. Nozzles

F. PRESSURE WATER SPRAYİNG SYSTEM **7-**17
1. Drencher system for Ro Ro Passenger craft
2. Sprinkler system for accomodation and service spaces

G. VENTILATION **7-**17
1. Flowchart
2. General
3. Closing Appliances
4. Ventilation in Machinery Spaces
5. Ro-Ro Space
6. Additional Fire Safety Arrangement

A. Pipes, Valves, Fittings and Pumps

1. Flowchart

Following flow-chart is to be applied for pipes, valves, fittings and pumps of passenger craft with **L1** and **L2** Notations.

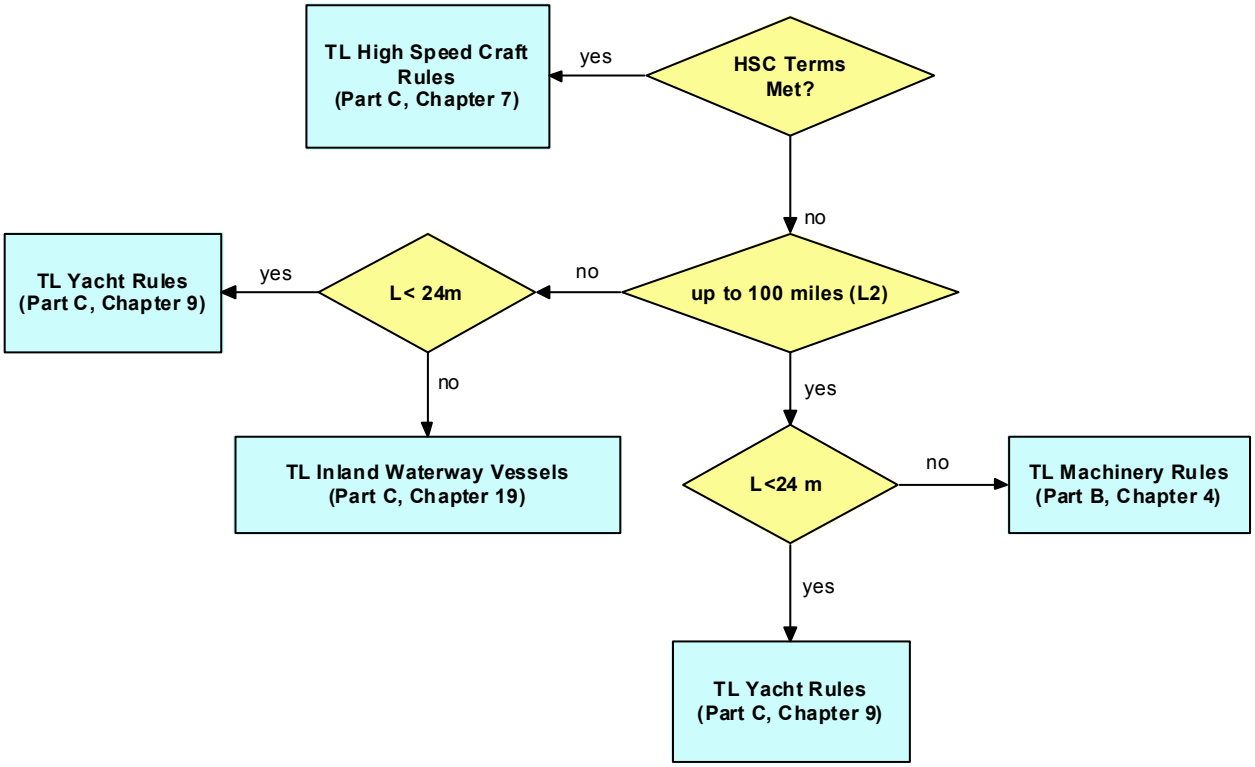


Figure 7.1 Selection of rules and regulations for pipes, valves, fittings and pumps

Note: *In case of absence of any necessary requirements regarding piping systems in "Yacht Rules" and "Inland Vessel Rules", "Chp.4 Machinery Rules" or "Cabotage voyages C,D" shall be applied.*

2. Definitions

- **Vehicle spaces** are cargo spaces intended for carriage of motor vehicles with fuel in their tanks for their own propulsion

- **Special category spaces** are those enclosed vehicle spaces above and below the bulkhead deck, into and from which vehicles can be driven and to which passengers have access. Special category spaces may be accommodated on more than one deck provided that the total overall clear height for vehicles does not exceed 10 m.

- **Ro-Ro spaces** are spaces not normally subdivided in any way and normally extending to either a substantial length or the entire length of the ship in which motor vehicles with fuel in their tanks for their own propulsion and/or goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction.

3. General

3.1 Documents for review / approval

Diagrammatic plans of the following piping systems shall be submitted to **TL**

- Fuel systems (bunkering, transfer and supply systems)
- Lubricating oil systems
- Cooling water systems
- Compressed air systems
- Bilge systems
- Oily Bilge systems
- Air, sounding and overflow systems
- Drinking water and sewage systems
- Systems for remotely controlled valves and quick closing valves.
- Hose assemblies and compensators
- General water fire-extinguishing system

4. Materials, Quality Assurance, Pressure Tests

See Figure 7.1.

5. Pipe Wall Thickness

See Figure 7.1.

6. Principles for the Construction of Pipes, Valves, Fittings and Pumps

See Figure 7.1.

B. Bilge System

1. Layout of bilge lines

Bilge lines and bilge suctions are to be so arranged that the bilges can be completely pumped even under all disadvantageous trim conditions.

Bilge suctions are normally to be located on both sides of the vessel. For compartments located fore and aft in the vessel, one bilge suction may be considered sufficient provided that it is capable of completely draining the relevant compartment.

Spaces located forward of the collision bulkhead and aft of the sterntube bulkhead and not connected to the general bilge system are to be drained by other suitable means of adequate capacity.

The collision bulkhead may be pierced by one pipe for filling and draining of the fore peak, provided that a screw-down valve capable of being remote operated from above the open deck if it is fitted at the collision bulkhead within the fore peak.

Where the fore peak is directly adjacent to a permanently accessible room which is separated from the any spaces, this shut-off valve may be fitted directly at the collision bulkhead inside this room without provision for remote control.

2. Prevention of communication between spaces - Independence of the lines

Bilge lines are to be so arranged as to avoid inadvertent flooding of any dry compartment.

The arrangement of the bilge pumping system shall be such as to prevent the possibility of water passing from the sea

2.1 Pipes led through tanks

Bilge pipes may not be led through tanks for lubricating oil, drinking water or feedwater.

2.2 Bilge suctions

Bilge suctions shall be so arranged as not to impede the cleaning of bilges and bilge wells. They shall be fitted with easily detachable, corrosion-resistant strum.

2.2.1 Mud Boxes In machinery spaces, termination pipes of bilge suctions are to be straight and vertical and are to be led to mud boxes so arranged as to be easily inspected and cleaned.The lower end of the termination pipe is not to be fitted with a strum box.

2.2.2 Strum boxes

In compartments other than machinery spaces, the open ends of bilge suction pipes are to be fitted with strum boxes or strainers having holes not more than 10 mm in diameter. The total area of such holes is to be not less than twice the required cross-sectional area of the suction pipe.

Strum boxes are to be so designed that they can be cleaned without having to remove any joint of the suction pipe.

For L<24m vessels,all fixed bilge suctions shall be fitted with readily accessible strainers so that they may be regularly checked and cleaned.

2.3 Bilge valves

Valves in connecting pipes between the bilge and the sea water and ballast water system, as well as between the bilge

connections of different compartments, shall be so arranged that even in the event of faulty operation or intermediate positions of the valves, penetration of sea water through the bilge system will be safely prevented.

Bilge discharge pipes shall be fitted with shut-off valves at the vessel's side.

Bilge valves shall be arranged so as to be always accessible irrespective of the ballast and loading condition of the vessel.

2.4 Bilge pump and piping systems

2.4.1. Pumps and piping

It is to be possible to pump out each watertight compartment separately. However, that requirement is not to apply to watertight compartments that are normally sealed hermetically during operation.

Sanitary, ballast and general service pumps may be accepted as independent power bilge pumps if fitted with the necessary connections to the bilge pumping system.

Where centrifugal pumps are used for bilge pumping, they are to be of self-priming type.

If rudder stock glands are located above the deepest water line, drainage of steering gear room bilge to the engine room bilge well by means of an easily accessible, self-closing valve is acceptable.
Branch pipes of single compartments are to be connected to the main drainage pipe by means of a lockable non-return valve.

A direct suction from the engine room shall be connected to the largest of the specified bilge pumps. Its diameter shall not be less than that of the main bilge pipe.

However, the direct suction in the engine room shall be fitted only with one screw-down non-return valve.

Where the direct suction is connected to a centrifugal pump which can also be used for cooling water, balast water or fire-extinguishing, a screw-down non-return valve shall be fitted in the discharge pipe of the pump.

For L<24m vessels in bilge pumping arrangements where a bilge main is not provided, then, with the exception of fore peak compartment fixed submersible pump shall be provided for each space. In addition, at least one portable pump shall be provided for use on individual spaces.

2.4.2 Pipe material

All bilge pipes used in fuel storage tanks or machinery spaces, including spaces in which fuel oil settling tanks or fuel oil pumping units are situated, are to be of steel or other suitable material non-sensitive to heat.

2.5 Bilge pumping for various spaces

2.5.1 Machinery spaces

The bilges of every main machinery space shall be capable of being pumped as follows:

a) Through the bilge suctions connected to the main bilge system and

b) Through one direct suction connected to the largest independent bilge pump,

c) Through an emergency bilge suction connected to the sea cooling water pump of the main propulsion plant or through another suitable pump other than the bilge pumps. An emergency bilge suction is to be provided for only L≥40m vessels

2.5.2 Fore and after peaks

Connection of the fore and after peaks to the general bilge system is not permitted. Where the peak tanks are not connected to the ballast system, separate means of pumping shall be provided. Where the after peak terminates at the engine room, it may be drained to the engine room bilge through a pipe fitted with a shutoff valve. Similar emptying of the fore peak into an adjoining space is not permitted.

2.5.3 Spaces above peak tanks

These spaces may either be connected to the bilge system or be pumped by means of hand-operated bilge pumps. Spaces above the after peak may be drained to the machinery space, provided that the drain line is fitted with a self-closing shut-off valve at a clearly visible and easily accessible position. The drain pipes shall have an inside diameter of at least 40 mm.

2.5.4 Cofferdams and void spaces

Bilge pumping arrangements shall be provided for cofferdams and void spaces.

2.5.5 Chain lockers

Chain lockers may be connected to the main bilge system or drained by a hand pump. Draining to the forepeak tank is not permitted.

2.6 Calculation of pipe diameters and Pump Capacity

2.6.1 Calculation of pipe diameters and Pump Capacity for a craft with L<24 m:

Table 7.1 Bilge pump capacity and pipe diameters for L<24 m

Length L (m)	Hand pump flow rate (m^3/h)	Power pump flow rate (m^3/h)	Bilge pipe (mm) Main pipe / Branch pipe	
L<12	3	6	32	
L<20	5	9	40	32
L<24	5	10	50	32

2.6.2 Calculation of pipe diameters and Pump Capacity for a craft with L ≥24 m :

2.6.2.1 Pump Capacity

$Q = 5{,}75 \cdot 10^{-3} \cdot d^2$ m³/h

Q = Minimum capacity [m^3/h].

2.6.2.2 Main bilge pipes

$d = 25 + 1.5\sqrt{L(B+D)}$,

$d = 25 + 1.68\sqrt{L(B+D)}$, (for more than 400 passengers)

d = Inside diameter of main bilge pipe [mm]

B = Moulded breadth of ship

D = Depth of ship to the bulkhead deck, [m]

L = Length of ship between perpendiculars, [m]

2.6.2.3 Branch bilge pipes

$d1 = 25 + 2.\sqrt{L_1(B+D)}$

L1= Length of the compartment [m].
d1 = Inside diameter of the branch, [m].

2.7 Number and type of bilge pumps

For L<24 m vessels: At least two pumps(one main engine pump or power driven pump and other pump hand pump).Hand pump has to be located outside engine room. (See Table 7.1)

For **L ≥24 m vessels:**

up to 250 passengers,one main engine pump and one independent power pump, located and powered outside the engine room,

over 250 passengers: one main engine pump and two independent power pumps, one of which has to be located and powered outside the engine room.

The main engine pump may be replaced by one independent power pump.

The drainage of very small compartments may be dealt with movable hand pumps

2.8 Additional rules for damage stability requirements

Following items shall be taken into account:

Distribution boxes, cocks and valves in connection with the bilge pumping system shall be so arranged that, in the event of flooding, one of the bilge pumps may be operative on any compartment; in addition, damage to a pump or its pipe connecting to the bilge main outboard of a line drawn at one fifth of the breadth of the ship shall not put the bilge system out of action.

If there is only one system of pipes common to all the pumps, the necessary valves for controlling the bilge suctions must be capable of being operated from above the bulkheads deck.

Where in addition to the main bilge pumping system an emergency bilge pumping system is provided, it shall be independent of the main system and so arranged that a pump is capable of operating on any compartment under flooding condition; in the case only the valves necessary for the operation of the emergency system need be capable of being operated from above the bulkhead deck.

2.9 Additional Rules For Ro-Ro Passenger Vessels

The drainage from ro-ro decks and/or car decks shall be of sufficient capacity that the scuppers, wash ports on the starboard and the port side shall be sufficient to drain with a quantity of water originating from drencher and fire pumps, taking into account the ship's conditions of heel and trim.

When provided with sprinkler installations and hydrants, passenger and crew lounges shall have an adequate number and capacity of scuppers, sufficient to drain with the quantity of water originating from fire extinguishing by the room's sprinkler heads and from two fire hoses with jets. The scuppers shall be located in the most effective positions.

The drain capacity for Ro-Ro space scuppers are to be according to TL Part B, Chapter 4 –Machinery, Section 16.N.

C. Fuel Oil System

1. Limitations in the use of oil as fuel

The flash point of liquid fuels for the operation of machinery and boiler installations shall be above 55 °C

In emergency generators, oil fuel with a flashpoint of not less than 43 °C may be used.

2. Pipe layout

2.1 Oil fuel pipes

Fuel lines should be run in rigid, metal pipework unless permitted otherwise

Oil fuel pipes shall have their valves and fittings (including filters) constructed of steel or other approved material. This is to provide at least a 30 minutes fire protection.

Oil fuel pipes shall not be located immediately above or near units of high temperature, including boilers, exhaust manifolds, silencers. As far as practicable, oil fuel lines shall be arranged far apart from hot surfaces, electrical installations or other sources of ignition and shall be screened or otherwise suitably protected to avoid oil spray or oil leakage onto the sources of ignition. The number of joints in such piping systems shall be kept to a minimum. Heated surfaces, particularly the exhaust systems and exposed indicator cocks of main and auxiliary diesel engines, must be effectively insulated, so that the surface temperature is below 220^{o}C

2.2 Flexible fuel pipes

2.2.1 Fuel lines shall be run in rigid, metal pipework unless permitted otherwise. Minimum lengths of flexible hoses may be used where necessary to allow for relative movements and vibration between machinery and fixed piping systems. The hoses and any couplings shall be suitable for the intended purpose.

2.2.2 Flexible pipes and end attachments shall be of approved fire resisting materials of adequate strength which provide at least A30 fire protection. Flexible pipework shall at least comply with ISO 7840.

2.3 High pressure fuel pipes

Flexible pipes are not acceptable for use in high pressure fuel injection systems.

All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors of engines with a power equal to or more than 130 kW shall be protected with a jacketed piping system capable of containing fuel from a high pressure line failure. A jacketed pipe incorporates an outer pipe into which the high-pressure fuel pipe is placed forming a permanent assembly. The jacketed piping system shall include a means for collection of leakages and arrangements shall be provided for an alarm to be given of a fuel line failure.

In multi-engine installations which are supplied from the same fuel source, means of isolating the fuel supply and spill piping to individual engines, shall be provided. The means of isolation shall not affect the operation of the other engines and shall be operable from a position not rendered inaccessible by a fire on any of the engines.

If an engine under 130 kW is designed and installed so that there are no surfaces having a temperature exceeding 220°C, and this can be verified by acceptable evidence/inspection, then an enclosure to prevent spray from a damaged high-pressure fuel line is not necessarily required. When approving such an installation, care should also be taken to ensure that there is no other equipment in the machinery space that may be a source of ignition if impinged by a fuel spray, e.g. electric motors, switches, etc.

Components of a diesel engine fuel system shall be designed considering the maximum peak pressure which will be experienced in service, including any high-pressure pulses which are generated and transmitted back into the fuel supply and spill lines by the action of fuel line injection pumps. Connections within the fuel supply and spill lines shall be constructed having regard to their ability to prevent pressurised oil fuel leaks while in service and after maintenance.

3. Distribution and location of fuel tanks

The fuel supply is to be stored in several tanks so that, even in event of damage to one tank, the fuel supply will not be entirely lost.

At least 1 storage tank and 1 service/settling tank is to be provided for L1 additional notation

Two fuel oil service tanks is to be provided for L2 additional notation with a capacity of at least 4 hours at maximum continuous rating of the propulsion plant and normal operating load at sea of the generator plant. One service may be accepted, provided that **TL** is satisfied with fuel service system

Fuel oil tanks are to be separated from tanks for lubricating oil, hydraulic oil, thermal oil, vegetable oil, feedwater, condensate water and potable water by cofferdams

4. Fuel tank fittings and mountings

Service tanks are to be so arranged that water and residues can settle out despite the movement of the vessel.
Free discharge and drainage lines shall be fitted with self-closing shut-off valves.

4.1 Tank gauges

Oil gauges with flat glasses and self-closing shut-off valves at the connections to the tank are to be installed and protected against external damage

For fuel storage tanks, the provision of sounding pipes is sufficient. Such sounding pipes need not be fitted to tanks equipped with oil level indicating devices which have been type-tested by **TL**.

Glass and plastic components are not permitted in fuel systems.

Sight glasses and oil gauges fitted directly on the side of the tank and round glass oil gauges are not permitted.

Sounding pipes of fuel tanks may not terminate in accommodation or passenger spaces, nor shall they terminate in spaces where the risk of ignition of spillage from the sounding pipes might arise.

5. Attachment of mountings and fittings to fuel tanks

Only appliances, mountings and fittings forming part of the fuel tank equipment may generally be fitted to tank surfaces.

Valves and pipe connections are to be attached to strengthening flanges welded to the tank surfaces. Holes for attachment bolts shall not be drilled in the tank surfaces. Instead of strengthening flanges, short, thick pipe flange connections may be welded into the tank surfaces.

6. Design of fuel oil filling and transfer systems

The filling of fuels is to be effected from the open through permanently installed lines.

Arrangements are to be made to avoid overpressure in the filling lines which are served by pumps on board. In this case, safety valves are to be provided.

The fuel oil transfer piping system is to be completely separate from the other piping systems of the ship.

6.1 Transfer, booster pumps

At least two means of transfer is to be provided. Second transfer pump is to be hand pump

Second transfer pump may not be required if the dimensions of the vessel are small

Where a feed or booster pump is required to supply fuel to main or auxiliary engines, standby pumps are to be provided.

Where, the pumps are attached to the engines, complete spare feed or booster pumps stored on board may be accepted instead of stand-by pumps provided that the feed or booster pumps are so arranged that they can be replaced with the means available on board.In this case, stand-by pumps may not be needed for auxiliary engines.

7. Tank filling and suction systems

Fuel pumps are to be equipped with emergency stops.

All suction pipes from fuel oil tanks, including those in the double bottom, are to be provided with valves. For storage tanks, filling pipes may also be used for suction purposes.

Where the filling pipes to fuel oil tanks are not led to the upper part of the such tanks, they are to be provided with non-return valves at their ends,

Filling and suction lines terminating below the oil level in tanks shall be fitted with remote controlled shut-off valves. The shut-off valves shall be directly at the tanks.

Such a cock or valve is also required if there is a risk of tank contents syphoning out of the tank through pipes connected at the top of the tank.

The emergency stops and the remote-controlled shutoff valves must be capable of being operated from a permanently accessible open deck and protected from unauthorized use

Air and sounding pipes shall not be used to fill fuel tanks.

Fuel lines may not pass through tanks containing feedwater, drinking water or lubricating oil.

Shut-off valves in fuel lines shall be operable from above the floor plates in machinery spaces.

8. Filters

Fuel supply lines to continuously operating main engines are to be fitted with duplex filters with a changeover cock By-pass arrangements are not permitted.

Dublex filters may not be needed for auxiliary engines

Fuel transfer units are to be fitted with a simplex filter on the suction side.

9. Sampling points

The fuel oil pipelines should be provided with sampling points.

The sampling points should meet the requirements of MEPC.1/Circ.864/Rev.1 "Guidelines for on board sampling and verification of the sulphur content of the fuel oil used on board ships' and should be located as follows:

- after the transfer pump discharge,
- before and after the fuel cleaning equipment,
- after the fuel oil service tank, before any fuel change over valve,
- before fuel enters the oil fuelled machinery

D. Air, Sounding and Overflow Pipe

1. General

For items not covered in Section 3, B.6 and D.2 following is to be applied.

For ships have a length ≥ 24 m, see Chp.4 Sect. 16.

For ships have a length < 24 m, see Chp.9 Sect. 7.

2. Air Pipes

Each tank is to be fitted with air pipes, overflow pipes and sounding pipes.

The air pipes are to be led to above the exposed deck.

Air pipes are to be made of steel or other approved material.

Aluminium and aluminium alloys are not to be used on the sounding and air pipes of fuel oil tanks.

In case of using plastic pipes, requirement in **TL** Machinery Rules Chapter 4 Section 16 B Table 16.2 are to be met.

Air pipes to fuel oil tanks serving emergency generators may not be led through Category 'A' machinery spaces.

Air pipes from storage tanks containing lubricating or hydraulic oil may terminate in the machinery space, provided that the open ends are so situated that issuing oil cannot come into contact with electrical equipment or heated surfaces.

The location and arrangement of air pipes for fuel oil service, settling and lubricating oil tanks are to be such that in the event of a broken vent pipe, this does not directly lead to the risk of ingress of sea-water or rainwater.

The open ends of air pipes to fuel oil tanks are to be fitted with a wire gauze diaphragm of non-corrodible material which can be readily removed for cleaning or renewal.

Where wire gauze diaphragms are fitted at air pipe openings, the area of the opening through the gauze is to be not less than the cross-sectional area required for the pipe.

Air pipes are to be generally not less than 38 mm bore. In the case of small gravity filled tanks smaller bore pipes may be accepted but in no case is the bore to be less than 25mm

In all cases, whether a tank is filled by on-board pumps or other means, the total cross-sectional area of the pipes is to be not less than 25 per cent greater than the effective area of the respective filling pipe.

The height of air pipes from the upper surface of decks exposed to the weather, to the point where water may have access below is normally to be not less than:

For L≥ 24m (L1 and L2 notation) and L<24m (L2 notation):

- 450 on the freeboard deck;
- 380 on the superstructure deck;

For L<24m (L1 notation only):

- 380 mm on the freeboard deck;
- 230 mm on the superstructure deck;

these heights being measured above deck sheathing, where fitted.

Exposed air pipes are to be provided with approved closing appliances

Air pipe closing devices shall be constructed to **TL-R P3.**

3. Sounding Pipes

Sounding pipes are to be provided for tanks, cofferdams and void spaces and bilge wells in spaces which are not accessible at all times.

As far as possible,sounding pipes are to be laid straight and are to extend as near as possible to the bottom of the tank close to the pump suction.

Sounding pipes may not be used as filling pipes.

Where tanks are fitted with remote level indicators approved by **TL**, provision of sounding pipes may be dispensed with.

Sounding pipes which terminate below the bulkhead deck are to be fitted with self-closing shutoff devices.

Such sounding pipes are permissible only in spaces whichare accessible at all times. All other sounding pipes are to be extended to the open deck.

The openings of sounding pipes are to be located at a sufficient distance from boilers, electrical equipment and hot components.

Sounding pipes are not to terminate in accommodation or service spaces.

Sounding pipe openings are always to be accessible and fitted with watertight closing devices.

The internal diameter of sounding pipes is not to be less than 32 mm. Where sounding pipes pass through refrigerated spaces, or through the insulation of refrigerated spaces in which the temperature may be below 0°C, their internal diameter is to be at least 60 mm.

Doubling plates are to be placed under the lower ends of sounding pipes in order to prevent damage to the hull. When sounding pipes with closed lower ends are used, the closing plate is to have reinforced scantlings

4. Overflow pipes

For every tank which can be filled by on-board pumps, the total cross-sectional area of the air pipes and the air pipe closing devices is to be such that when the tank is overflowing at the maximum pumping capacity available for the tank, it will not be subjected to a pressure greater than that for which it is designed.

E. General water fire-extinguishing system

1. Fire main and Fire pumps:

For the capacity and number of fire pumps see Table 7.2

L<24m and **L2** notation vessels carrying over 250 passengers are to be provided with an additional fire pump which shall be permanently connected to the fire main. Such pump shall be operated by power. Pump capacity is to be min.8m3/h. Such pump and its source of power shall not be situated in the same compartment as the fire pump and shall be provided with a permanent sea connection situated outside the machinery space

Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps

The delivery valve of each fire pump shall be fitted with a non-return valve

Every centrifugal pump which is connected to the fire main shall be fitted with a non-return discharge valve.

All the mechanical/electrical pumps are to be of the self-priming type

If the fire pump is located in the engine room, a second power-driven fire pump shall be provided outside the engine room. Second fire pump is to be suply from emergency electrical source unless supplied by mechanical power. The arrangement of sea connections, fire pumps and their sources of power shall be such as to ensure that in ship certified to carry more than 250 passengers, in the event of a fire in any one compartment all the fire pumps will not be put out of action.

Fire pumps are to be located aft of the forward collision bulkhead.

The fire main shall have no connections other than those necessary for fire-fighting and washing down

Fire pumps are to be located as deep as possible.

Pump suction are to be safeguarded even in lightship condition

In ships with a periodically unattended machinery space or when only one person is required on watch, there shall be immediate water delivery from the fire main system at a suitable pressure, either by remote starting of one of the main fire pumps with remote starting from the navigating bridge and fire control station, if any, or permanent pressurisation of the fire main system by one of the main fire pumps.

Relief valves are to be provided in connection with all power-driven fire pumps unless it can be shown that the arrangements are such as to prevent excessive pressure in any part of the fire main system

1.1 Hand pump

Each hand pump is to be equipped with suction and discharge hoses suitable for use in fire-fighting.Hand pums are to be installated outside engine room

1.2 Shore connection

The vessels L=40m and over are to be provided with at least one connector through which water can be pumped from the shore into the ships fire main. The dimensions of the shore connection flange see:TL Rules Machinery Chapter 4 Section18 E, Fig.18.1.

Table. 7.2 Number of hydrants, the capacity and number of fire pumps

Length L (m)	Number of hydrants		Hand pump		Power driven pump	
	A category machinery room	Other spaces	Number	Pump Capacity (m^3/h)	Number	Each Pump Capacity (m^3/h)
L≤12	-	1	1	2	1	5
12<L≤24	-	2	1	3.5	1	8
24<L≤40	-	3	-	-	2	12
40<L≤50	1	5	-	-	2	20
L>50	1	5	-	-	3	25
Passenger on board>500	1	min.5	-	-	3	25

2. Fire hoses and Hydrants

L<24m, The fire main and hydrants shall be so positioned to ensure at least one jet of water can be delivered to any part of the ship accessible to the crew using hoses of maximum length 10m. Vessels of over 12m length shall have at least two hydrants.

L≥24m, The fire main and hydrants shall be so positioned that it shall be possible at least two jet of water simultaneously on any part of the vessel from two different hydrants using for each a single length of hose not more than 20 m long. The length of throw shall be at least 12 m with a nozzle diameter of 12mm.

In ro-ro spaces or vehicle spaces it must be possible to reach any part with water from two nozzles simultaneously, each from a single length of hose.

The length of a fire hose should be restricted to not more than 20 metres on deck and in superstructures and to 15 metres in machinery spaces and on smaller ships respectively to 15 metres and 10 metres.

The fire hydrants shall be so placed that the fire hoses may be easily coupled to them.

At least one hose must be provided for every hydrant fitted.Vessels carrying more than 36 passengers, fire hoses are to be permanently connected to the hydrants

Fire hydrants are to be fitted with valves that allow a fire hose to be isolated and removed when a fire pump is operating

The arrangements of pipes and hydrants shall be such as to avoid the possibility of freezing.

Materials readily rendered ineffective by heat shall not be used for fire mains and hydrants unless adequately protected

3. Nozzles

Standard nozzle sizes are to be 12 mm ,16 mm and 19 mm, or as near thereto as possible.

All nozzles shall be of an approved dual-purpose type (spray/jet type), and shall have a shutoff facility.
For accommodation and service spaces, a nozzle size greater than 12 mm need not be used,

For machinery spaces and exterior locations, the nozzle size is to be such as to obtain the maximum discharge possible from two jets at the pressure 0,4 N/mm^2,for more than 500 passengers and 0,3 N/mm^2 up to 500 passengers from the smallest pump. However, a nozzle size greater than 19 mm need not be used.

L<24 m vessels, pressure at each nozzles is to be 0.2 N/mm^2

L<24 m and L2 notation vessels carrying over 250 passengers are to be provided with an additional fire pump .Such pump shall be capable of delivering at least one jet of water from any fire hydrants provided in the ship maintaining a pressure of at least 0,3 N/mm^2 .

F. Pressure Water Spraying System

1. Drencher system for Ro Ro Passenger craft

Drencher system is to be complied with the requirements of Chapter 4, Machinery Rules Sec.18.L for vessels with L2 notation

2. Sprinkler system for accomodation and service spaces

If passenger craft is provided with an effective fire dedection and alarm system at accomodation and service spaces, sprinkler system may be dispensed with.

G. Ventilation

1. Flowchart

Following flow-chart is to be applied for ventilation requirements of passenger craft with **L1** and **L2** Notations.

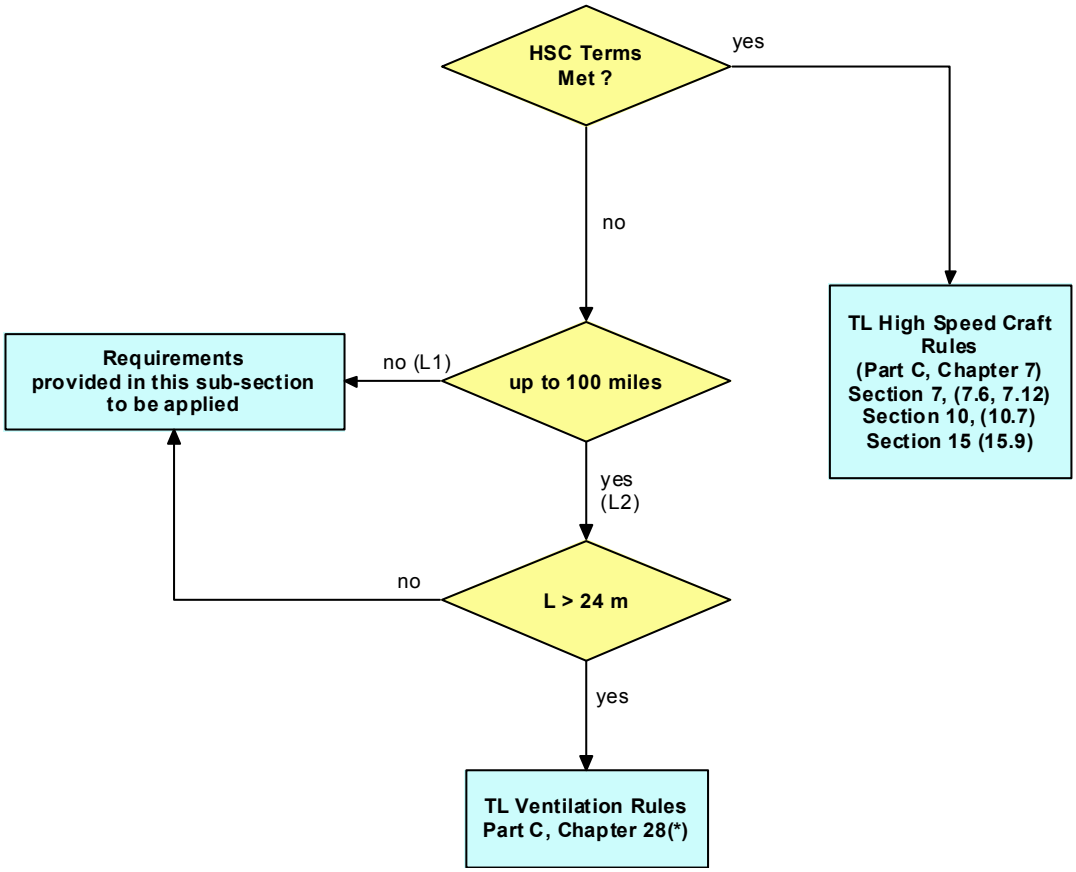


Figure 7.2 Selection of rules and regulations for ventilation

(*) Where due to ship size and arrangement, **4.3** may be applied to the ships assigned with L2 and having a length more than 24 m. by TL with regard to their special suitability for the case in question.

2. General

2.1 The ventilation system shall keep the air in cabins and dining halls at required conditions and shall provide adequate airflow in all types of weather and climatic conditions.

2.2 Radiators and other heating appliances shall be installed so as to prevent the risk of fire and not to be a source of danger or discomfort.

2.3 The heating system shall be adjusted in the normal weather and climate conditions encountered during the course of the ship's voyage to keep the temperature in places accommodating crew and passengers at an adequate level.

2.4 Accommodation spaces are to be protected from gas or vapour fumes from machinery, exhaust and fuel systems. Ships are to be adequately ventilated throughout all spaces.

Ventilating openings are to be designed and positioned with care, above all in exposed zones or those subject to high stress. The deck plating in way of the coamings is to be adequately stiffened.

The scantlings of ventilators exposed to the weather are to be equivalent to those of the adjacent deck or bulkhead. Ventilators are to be adequately stayed.

3. Closing Appliances

All ventilator openings are to be provided with efficient weathertight closing appliances with coaming heights provided in Table 7.3.

Table 7.3. Ventilator Coaming Heights

	Pos1	Pos2
L<24 m	450	350
L>=24m	600	450

As a general rule, closing appliances are to be permanently attached to the ventilator coamings.

Ventilators are to be fitted with a suitable means of preventing ingress of water and spray when open and to have suitable drainage arrangements leading overboard.

4. Ventilation in Machinery Spaces

4.1 The machinery spaces are to be adequately ventilated so as to ensure that, when machinery therein is operating at full power in all weather conditions, an adequate supply of air is maintained in the spaces for the safety and the operation of the machinery, according to the Manufacturer's specification.

Special attention is to be paid both to air delivery and extraction and to air distribution in the various spaces. The quantity and distribution of air are to be such as to satisfy machinery requirements for developing maximum continuous power. The requirements of the engine Manufacturer are to be followed.

4.2 The ventilation is to be so arranged as to prevent any accumulation of flammable gases or vapours.

4.3 Ventilators necessary to continuously supply the machinery space may have coamings of extended to the deck next above the bulkhead deck and these ventilation openings are to be considered as downflooding points in the stability calculations. In cases where the minimum stability criteria is not complied with, these ventilation openings can be closed with weathertight closing appliances and additionally, alternative means of ventilation is to be provided.

5. Ro-Ro Space

5.1 A ducted mechanical continuous supply of air ventilation is to be provided, capable of ensuring at least six changes of air per hour in the protected space. An indication is to be provided in the event of a reduction of the rate of ventilation.

The indication is to be fitted on the bridge deck or in the continuously manned position. Means are to be provided in order to shut down the ventilation in the event of fire.

6. Additional Fire Safety Arrangement

6.1 Ventilation fans for machinery spaces and enclosed galleys are to be capable of being stopped and main inlets and outlets of the ventilation system closed from outside the spaces being served. This position is not to be readily cut off in the event of a fire in the spaces served.

6.2 Ventilation ducts serving category A machinery spaces, galleys, special category space or lockers containing fuel tanks are not to cross accommodation spaces, service spaces or control stations unless the trunking is constructed of steel (minimum thickness 4 mm) also is to be complied with structural fire protection.

6.3 Where the trunking passes from the machinery space or galley into the accommodation, automatic fire dampers are to be provided in the deck or bulkhead within the accommodation. The automatic fire dampers are also to be manually operable from outside the machinery space or galley.

6.4 The requirements in 6.2 and 6.3 also apply to ventilation ducts for accommodation spaces passing within category A machinery spaces.

6.5 Enclosed spaces in which generating sets and freestanding fuel tanks are installed are to be ventilated independently of systems serving other spaces, in order to avoid the accumulation of vapours, to allow discharge into the open air and to supply the air necessary for the service of the installed engine according to the Manufacturer's specifications.

The inlet and outlets of ventilators are to be positioned so that they do not draw from or vent into an area which would cause undue hazard, and are to be fitted with spark arresters.

6.6 Ventilation systems serving machinery spaces are to be independent of systems serving other spaces.

6.7 Ventilation exhaust systems serving galleys are to be independent of systems serving other spaces. The galley ventilation exhaust systems need not be completely separated, but may be served by separate ducts from a ventilation unit serving other spaces if an automatic fire damper is fitted in the galley ventilation duct near the ventilation unit.

6.8 Adequate means of ventilation are to be provided to prevent the accumulation of dangerous concentrations of flammable gas which may be emitted from batteries.