

## SECTION 1

## GENERAL REQUIREMENTS AND APPLICATION

### 1 General

#### 1.1 Application

**1.1.1** Chapter 1 applies to the design, construction, installation, tests and trials of main propulsion and essential auxiliary machinery systems and associated equipment, pressure vessels, piping systems, and steering and manoeuvring systems installed on board classed yachts, as indicated in each Section of this Chapter and as far as class is concerned only.

Where the word yachts is used in the subsequent chapter, it means yachts and charter yachts.

**1.1.2** In the present Chapter, length reference to 24 m means:

- for yacht: Hull length,  $L_{hr}$ , as defined in EC Directive (EN ISO standard 8666:2002) reminded in Pt A, Ch 2, Sec 1, [2.2.1]
- for charter yacht: Length according to International Rules,  $L_{LL}$ , as defined in Pt A, Ch 2, Sec 1, [2.2.1].

#### 1.2 Statutory requirements

**1.2.1** Attention is to be paid to any relevant statutory requirements of the National Authority of the country in which the yacht is to be registered, as stated in Part A.

In particular, no specific requirements related to prevention of marine pollution are included in the present Rules.

#### 1.3 Documentation to be submitted

**1.3.1** Before the actual construction is commenced, the Manufacturer, Designer or yacht builder is to submit to the Society the documents (plans, diagrams, specifications and calculations) requested in the relevant Sections of this Chapter.

#### 1.4 Definitions

##### 1.4.1 Engine space

On yachts of less than 24m in length, the engine space is the space or compartment of the yacht containing main or auxiliary engine(s).

##### 1.4.2 Machinery spaces

On yachts of 24 m in length and over, machinery spaces are machinery spaces of category A and other spaces containing propulsion machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.

##### 1.4.3 Machinery spaces of category A

On yachts of 24 m in length and over, machinery spaces of category A are those spaces and trunks to such spaces which contain either:

- a) internal combustion machinery used for main propulsion, or
- b) internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW, or
- c) any oil-fired boiler or oil fuel unit, or any oil-fired equipment other than boilers, such as inert gas generators, incinerators, etc.

##### 1.4.4 Fuel oil unit

Fuel oil unit is the equipment used for the preparation of fuel oil for delivery to an oil fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure of more than 0,18 N/mm<sup>2</sup>.

##### 1.4.5 Continuity of service

The Shipyard is to give special consideration to the reliability of single essential propulsion components. This may require a separate source of propulsion power sufficient to give the yacht a navigable speed, especially in the case of unconventional arrangements.

## 2 Design and construction

### 2.1 General

**2.1.1** The machinery, pressure vessels, associated piping systems and fittings are to be of a design and construction adequate for the service for which they are intended and are to be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards.

The design is to have regard to materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

### 2.2 Materials, welding and testing

#### 2.2.1 General

Materials, welding and testing procedures are to be in accordance with the requirements of the Rule Note NR216 Materials and Welding and those given in the other Sections of this Chapter. In addition, for machinery components fabricated by welding the requirements given in [2.2.2] apply.

Table 1 : Inclination of yacht

Installations, components	Angle of inclination (degrees) (1)			
	Athwartship		Fore and aft	
	static	dynamic	static	dynamic
Main and auxiliary machinery	15	22,5	5	7,5
Safety equipment, e.g. emergency power installations, emergency fire pumps and their devices Switch gear, electrical and electronic appliances (4) and remote control systems	22,5 (2) (3)	22,5 (2) (3)	10	10
<p>(1) Athwartship and fore-and-aft inclinations may occur simultaneously.</p> <p>(2) In sailing yachts, auxiliary engines must operate satisfactorily after being heeled to a larger angle of 30° a long time.</p> <p>(3) In sailing yachts, where main and/or auxiliary engines are intended to supply energy to a yacht sailing heeled a long time, the subject engines must operate satisfactorily to an angle of 30°.</p> <p>(4) Up to an angle of inclination of 45° no undesired switching operations or operational changes may occur.</p>				

2.2.2 Welded machinery components

Welding processes and welders are to be approved by the Society in accordance with the Rule Note NR216 Materials and Welding, Chapter 5.

References to welding procedures adopted are to be clearly indicated on the plans submitted for approval.

Joints transmitting loads are to be either:

- full penetration butt-joints welded on both sides, except when an equivalent procedure is approved
- full penetration T- or cruciform joints.

For joints between plates having a difference in thickness greater than 3 mm, a taper having a length of not less than 4 times the difference in thickness is required. Depending on the type of stress to which the joint is subjected, a taper equal to three times the difference in thickness may be accepted.

T-joints on scalloped edges are not permitted.

Lap-joints and T-joints subjected to tensile stresses are to have a throat size of fillet welds equal to 0,7 times the thickness of the thinner plate on both sides.

In the case of welded structures including cast pieces, the latter are to be cast with appropriate extensions to permit connection, through butt-welded joints, to the surrounding structures, and to allow any radiographic and ultrasonic examinations to be easily carried out.

Where required, preheating and stress relieving treatments are to be performed according to the welding procedure specification.

2.3 Vibrations

2.3.1 Shipyards and manufacturers are to give special consideration to the design, construction and installation of propulsion machinery systems and auxiliary machinery so that any mode of their vibrations shall not cause undue stresses in this machinery in the normal operating ranges.

2.4 Operation in inclined position

2.4.1 Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the yacht

are, as fitted in the yacht, be designed to operate when the yacht is upright and when inclined at any angle of list either way and trim by bow or stern as stated in Tab 1.

The Society may permit deviations from angles given in Tab 1, taking into consideration the type, size and service conditions of the yacht.

Machinery with a horizontal rotation axis is generally to be fitted on board with such axis arranged alongships. If this is not possible, the Manufacturer is to be informed at the time the machinery is ordered.

2.5 Ambient conditions

2.5.1 Machinery and systems covered by the Rules are to be designed to operate properly under the ambient conditions specified in Tab 2, unless otherwise specified in each Section of this Chapter.

Table 2 : Ambient conditions

AIR TEMPERATURE	
Location, arrangement	Temperature range (°C)
In enclosed spaces	between 0 and +45 (2)
On machinery components, boilers In spaces subject to higher or lower temperatures	According to specific local conditions
On exposed decks	between –25 and +45 (1)

  

WATER TEMPERATURE	
Coolant	Temperature (°C)
Sea water or, if applicable, sea water at charge air coolant inlet	up to +32
<p>(1) Electronic appliances are to be designed for an air temperature up to 55°C (for electronic appliances see also Part C, Chapter 2).</p> <p>(2) Different temperatures may be accepted by the Society in the case of yachts intended for restricted service.</p>	

## 2.6 Power of machinery

**2.6.1** Unless otherwise stated in each Section of this Chapter, where scantlings of components are based on power, the values to be used are determined as follows:

- for main propulsion machinery, the power/rotational speed for which classification is requested
- for auxiliary machinery, the power/rotational speed which is available in service.

## 2.7 Astern power

**2.7.1** Where power exceeds 5 kW, means for going astern is to be provided to secure proper control of the yacht in all normal circumstances.

The main propulsion machinery is to be capable of maintaining in free route astern at least 70% of the maximum ahead revolutions for a period of at least 30 min.

For main propulsion systems with reversing gears, controllable pitch propellers or electrical propeller drive, running astern is not to lead to an overload of propulsion machinery.

During the sea trials, the ability of the main propulsion machinery to reverse the direction of thrust of the propeller is to be demonstrated and recorded (see also Ch 1, Sec 10).

## 2.8 Safety devices

**2.8.1** Where risk from overspeeding of machinery exists, means are to be provided to ensure that the safe speed is not exceeded.

**2.8.2** Where main or auxiliary machinery including pressure vessels or any parts of such machinery are subject to internal pressure and may be subject to dangerous overpressure, means are to be provided, where practicable, to protect against such excessive pressure.

**2.8.3** Where applicable, main internal combustion propulsion machinery and auxiliary machinery are to be provided with automatic shut-off arrangements in the case of failures, such as lubricating oil supply failure, which could lead rapidly to complete breakdown, serious damage or explosion.

The Society may permit provisions for overriding automatic shut-off devices.

See also the specific requirements given in the other Sections of this Chapter.

## 2.9 Fuels

**2.9.1** Fuel oils employed for engines and boilers are, in general, to have a flash point (determined using the closed cup test) of not less than 60°C. However, for engines driving emergency generators, fuel oils having a flash point of less than 60°C but not less than 43°C are acceptable.

For yachts assigned with a restricted navigation notation, or whenever special precautions are taken to the Society's satisfaction, fuel oils having a flash point of less than 60°C but not less than 43°C may be used for engines and boilers,

provided that, from previously effected checks, it is evident that the temperature of spaces where fuel oil is stored or employed will be at least 10°C below the fuel oil flash point at all times.

Fuel oil having flash points of less than 43°C may be employed on board provided that it is stored outside machinery spaces and the arrangements adopted are specially approved by the Society (see also Ch 4, Sec 9).

## 3 Arrangement and installation on board

### 3.1 General

**3.1.1** Provision is to be made to facilitate cleaning, inspection and maintenance of main propulsion and auxiliary machinery, including boilers and pressure vessels.

Easy access to the various parts of the propulsion machinery is to be provided by means of metallic ladders and gratings fitted with strong and safe handrails.

Spaces containing main and auxiliary machinery are to be provided with adequate lighting and ventilation.

### 3.2 Gratings

**3.2.1** Gratings in engine rooms, if any, are to be metallic, divided into easily removable panels.

### 3.3 Bolting down

**3.3.1** Bedplates of machinery are to be securely fixed to the supporting structures by means of foundation bolts which are to be distributed as evenly as practicable and of a sufficient number and size so as to ensure proper fitting.

Where the bedplates bear directly on the inner bottom plating, the bolts are to be fitted with suitable gaskets so as to ensure a tight fit and are to be arranged with their heads within the double bottom.

Continuous contact between bedplates and foundations along the bolting line is to be achieved by means of chocks of suitable thickness, carefully arranged to ensure a complete contact.

The same requirements apply to thrust block and shaft line bearing foundations.

Particular care is to be taken to obtain levelling and general alignment between the propulsion engines and their shafting (see also Ch 1, Sec 2, [7]).

**3.3.2** Chocking resins are to be type approved.

**3.3.3** Where stays are provided for fixing the upper part of engines to the yacht's structure in order, for example, to reduce the amplitude of engine vibrations, such stays are to be so designed as to prevent damage to these engines further to deformation of the shell plating in way of the said stays. The stays are to be connected to the hull in such a way as to avoid abnormal local loads on the structure of the yacht.

### 3.4 Safety devices on moving parts

**3.4.1** Suitable protective devices on access restrictions are to be provided in way of moving parts (flywheels, couplings, etc.) in order to avoid accidental contact of personnel with moving parts.

### 3.5 Gauges

**3.5.1** All gauges are to be grouped, as far as possible, near each manoeuvring position; in any event, they are to be clearly visible.

### 3.6 Ventilation in engine or machinery spaces

**3.6.1** Engine or machinery spaces are to be sufficiently ventilated so as to ensure that when machinery or boilers therein are operating at full power in all weather conditions, including heavy weather, a sufficient supply of air is maintained to the spaces for the operation of the machinery.

This sufficient amount of air is to be supplied through suitably protected openings arranged in such a way that they can be used in all weather conditions, taking into account Regulation 19 of the 1966 Load Line Convention.

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

### 3.7 Hot surfaces and fire protection

**3.7.1** Surfaces, having temperature exceeding 60°C, with which the crew are likely to come into contact during operation are to be suitably protected or insulated.

Surfaces of machinery with temperatures above 220°C, e.g. steam, thermal oil and exhaust gas lines, silencers, exhaust gas boilers and turbochargers, are to be effectively insulated with non-combustible material or equivalently protected to prevent the ignition of combustible materials coming into

contact with them. Where the insulation used for this purpose is oil absorbent or may permit the penetration of oil, the insulation is to be encased in steel sheathing or equivalent material.

Fire protection, detection and extinction are to comply with the requirements of Part C, Chapter 4.

### 3.8 Machinery remote control, alarms

**3.8.1** For remote control systems of main propulsion machinery and essential auxiliary machinery and relevant alarms and safety systems, the requirements of Ch 3, Sec 2 apply.

## 4 Tests and trials

### 4.1 Works tests

**4.1.1** Equipment and its components are subjected to works tests which are detailed in the relevant Sections of this Chapter. The Surveyor is to be informed in advance of these tests.

Where such tests cannot be performed in the workshop, the Society may allow them to be carried out on board, provided this is not judged to be in contrast either with the general characteristics of the machinery being tested or with particular features of the shipboard installation. In such cases, the Surveyor is to be informed in advance and the tests are to be carried out in accordance with the provisions of the Rule Note NR216 Materials and Welding relative to incomplete tests.

All boilers, all parts of machinery, all steam, hydraulic, pneumatic and other systems and their associated fittings which are under internal pressure are to be subjected to appropriate tests including a pressure test before being put into service for the first time as detailed in the other Sections of this Chapter.

### 4.2 Trials on board

**4.2.1** Trials on board of machinery are detailed in Ch 1, Sec 10.