

CHAPTER 6

STEERING GEAR SYSTEM

6-1 GENERAL REQUIREMENTS

6-1.1 Vessels shall be ~~equipped~~ **fitted** with a **reliable steering gear system** which ~~ensures~~ **provides** at least the manoeuvrability ~~prescribed~~ **required by** in chapter 5.

6-1.2 ~~The steering gear~~ **Powered steering systems** shall be so constituted that the rudder position cannot change ~~position unexpectedly~~ **unintentionally**.

6-1.3 The entire steering gear **system** shall be designed for a permanent list up to 15°, an angle of trim up to 5° and ambient temperatures from - 20°C to + ~~40~~ **50**°C.

6-1.4 The component parts of the steering gear **system** shall be rugged enough **to** always ~~to~~ be able to withstand the stresses to which they may be subjected during normal operation. No external forces applied to the rudder shall impair the operating capacity of the steering ~~equipment~~ **apparatus** and its ~~controls~~ **drive units**.

6-1.5 The steering gear **system** shall comprise a ~~powered-driven~~ **powered-driven** unit if the forces required to ~~activate~~ **actuate** the rudder require so.

6-1.6 The ~~power-driven~~ **power-driven** unit of the steering gear **apparatus** shall be protected against overload **by means of a system that restricts the torque applied by the drive unit**.

6-1.7 The penetrations for the rudder stocks shall be so designed as to prevent the spread of water-polluting lubricants.

6-2 STEERING APPARATUS ~~CONTROL~~ DRIVE UNIT

6-2.1 If the steering gear **apparatus** has a ~~powered~~ **powered** ~~driven~~ **driven** unit, **a second independent drive unit or an additional manual drive shall be present**. ~~In case of the failure or breakdown~~ **malfunctioning** of the steering ~~apparatus control~~ **drive** unit, it shall be possible to bring ~~a~~ **the** second **independent drive** unit or ~~a~~ **the** manual drive into ~~service~~ **operation** within five seconds.

6-2.2 If the second ~~steering apparatus control~~ **drive** unit or manual drive is not automatically brought into service, it shall be possible for the helmsman to bring it into service simply and rapidly by means of a single manipulation.

6-2.3 The second drive unit or manual drive shall ensure the manoeuvrability prescribed in chapter 5.

6-3 HYDRAULIC DRIVE UNIT

6-3.1 No **other power** consumers ~~appliance~~ may be connected to the hydraulic **steering apparatus** drive unit ~~of the steering gear~~.

6-3.2 If there are two hydraulic drive units, a hydraulic tank is required for each of ~~them; double tanks, however, are permitted~~. ~~The~~ **Hydraulic tanks** shall be equipped with ~~an~~ **oil low level indicator with alarm** ~~a warning system that monitors a dropping of the oil level below the lowest content level needed for safe operation~~.

6-3.3 The dimensions, ~~design construction~~ **design** and arrangement of the **pipeworking** shall ~~ensure~~, as far as possible, **exclude** mechanical damage ~~ore~~ damage resulting from fire ~~that they will not be damaged by mechanical effects or fire~~.

6-3.4 **Hydraulic Hoses** are: ~~only permitted when their use is indispensable to absorb vibrations and permit the freedom of movement of the constituent parts. They shall be rated at least according to the maximum working pressure.~~

(i) **only permissible, if vibration absorption or freedom of movement of components makes their use inevitable;**

(ii) **to be designed for at least the maximum service pressure;**

(iii) **to be renewed at the latest every eight years.**

6-3.5. **Hydraulic cylinders, hydraulic pumps and hydraulic motors as well as electric motors shall be examined at the latest every eight years by a specialised firm and repaired if required.**

6-4 POWER SOURCE

6-4.1 ~~If the Steering gear systems~~ is equipped with two powered -driven units, it shall have **at least** two power sources.

6-4.2 If the second power source for the power-driven unit is not permanently available while the vessel is under way, a buffer device is required. Its capacity shall be sufficient to provide power during the period needed for bringing the second power source into operation.

6-4.3 In the case of electrical power sources, no other consumers may be powered by the network supplying the steering ~~gear system~~.

6-5 MANUAL DRIVE

6-5.1 The hand wheel shall not be ~~actuated~~ **driven** by ~~the a~~ powered driven unit.

6-5.2 Regardless of rudder position, ~~a hand wheel kickback of the wheel~~ must be prevented when the manually-operated wheel **drive** is engaged automatically.

6-6 RUDDER-PROPELLER, WATER-JET, CYCLOIDAL-PROPELLER, AND ~~ACTIVE BOW-RUDDER THRUSTER SYSTEMS~~

6-6.1. ~~Where the thrust vectoring of~~ In the case of rudder-propeller, water-jet, cycloidal-propeller or ~~active bow-thruster rudder~~ installations **is remotely actuated by** ~~where the remote control of the modification of the direction of the drive is~~ electric, hydraulic or pneumatic **means**, there shall be two **actuating systems**, ~~steering apparatus control units~~ **each** independent of ~~each~~ **the** other, between the wheelhouse and the **propeller- or thruster - installation which, mutatis mutandis, and on analogy,** meet the requirements of paragraphs 6-1 to 6-5. Such systems are not subject to this section, if they are not necessary in order to achieve the manoeuvrability required by chapter 5 or if they are only needed for the stopping test.

6-6.2 Where there are several rudder-propeller, water-jet, cycloidal-propeller or bowrudder systems **installations** that are independent of each other, the second **actuating system** ~~steering apparatus control unit~~ is not necessary if the vessel retains the manoeuvrability required by chapter 5 if one of the units fails.

6-7 INDICATORS AND MONITORING DEVICES

6-7.1 The rudder position shall be clearly displayed at the steering position. If the rudder position indicator is electrical, it shall have its own power supply.

6-7.2 There shall be at least the following **optical and acoustic alarm indicators or monitoring** devices at the steering position:

- (i) oil level in the hydraulic tanks in accordance with paragraph 6-3.2, and working pressure of the hydraulic system;
- (ii) failure of the electrical supply for the steering control;
- (iii) failure of the electrical supply for the drive units;
- (iv) failure of the rate-of-turn regulator;
- (v) failure of the required buffer devices.

6-8 RATE-OF-TURN REGULATORS

6-8.1 The rate-of-turn regulators and their components shall meet the requirements laid down in paragraph 9-2.18.

6-8.2 The proper functioning of the rate-of-turn regulator shall be displayed at the steering position by means of a green warning light. Any lack of or unacceptable variations in the supply voltage and an unacceptable fall in the speed of rotation of the gyroscope shall be monitored.

6-8.3 Where, in addition to the rate-of-turn regulator, there are other steering control systems, it shall be possible to distinguish clearly at the steering position which of these systems has been activated. It shall be possible to shift from one system to another immediately. The rate-of-turn regulator shall not ~~cause any kickback in the~~ **have any influence on these other steering control** systems.

6-8.4 The electrical supply to the rate-of-turn regulator shall be independent of that for the other power consumers.

6-8.5 The gyroscopes, detectors and rate-of-turn indicators used in the rate-of-turn regulators shall meet the minimum requirements and test conditions concerning rate-of-turn indicators for inland waterways as set by the competent authority.

6-9 ~~APPROVAL~~ ACCEPTANCE AND PERIODICAL INSPECTIONS

6-9.1 The ~~compliance~~ **correct installation** of the ~~installed~~ steering system shall be checked by a competent authority ~~on the inspection of vessels~~. It may, for this purpose, request the following documents:

- (i) description of the steering ~~gear~~ **system**;
- (ii) drawings and information on the steering apparatus ~~control~~ **drive** units;
- (iii) information concerning the steering apparatus;
- (iv) electrical wiring diagram;
- (v) description of the rate-of-turn regulator;
- (vi) ~~system use~~ **operating and maintenance** instructions for the steering system.

6-9.2 Operation of the entire steering gear shall be checked by means of a navigation test. **If a rate-of-turn regulator is installed** it shall be checked that a predetermined course

can be reliably maintained ~~by the rate-of-turn regulators~~ and that bends can be negotiated safely.

6-9.3. Power-driven steering systems shall be inspected by an expert:

- (i) before being put into service;**
- (ii) after a failure;**
- (iii) after any modification or repair;**
- (iv) regularly at least every three years.**

6-9.4. The inspection has to cover at least:

- (i) a check of conformity with the approved drawings and at periodical inspections whether alterations in the steering system were made;**
- (ii) a functional test of the steering system for all operational possibilities;**
- (iii) a visual check and a tightness check of the hydraulic components, in particular valves, pipelines, hydraulic hoses, hydraulic cylinders, hydraulic pumps, and hydraulic strainers;**
- (iv) a visual check of the electrical components, in particular relays, electric motors and safety devices;**
- (v) a check of the optical and acoustic control devices.**

6-9.5. An inspection certificate, signed by the inspector, shall be issued, showing the date of inspection.
