Safety Measures for Reciprocating Internal Combustion Engines

Amended Rules and Guidance

Rules for the Survey and Construction of Steel Ships Part D
Rules for Automatic and Remote Control Systems
Rules for the Survey and Construction of Inland Waterway Ships
Guidance for the Survey and Construction of Steel Ships Part D
Guidance for Automatic and Remote Control Systems
Guidance for the Survey and Construction of Inland Waterway Ships

Reason for Amendment

IACS Unified Requirements (UR) M35 and M36 specify requirements for alarms, remote indication and safety measures for reciprocating internal combustion engines in unattended machinery spaces. In addition, SOLAS Reg. II-2/31 specifies requirements for pre-alarms and override systems for bridge control devices. All of these requirements have already been incorporated into the Society's Rules.

Since the Society's Rules also stipulate the Society's own independent treatment of such engines based on their service histories and past survey results, the correspondence between the Society's Rules and the URs is somewhat unclear. In addition, regarding the pre-alarms for bridge control devices, the handling of the cases in which total failure of main propulsion machinery occurs within a short period of time (such as over-speed and abrupt pressure drops of lubricating oil to main bearings) which are not covered by the override requirements is unclear.

Accordingly, relevant requirements are amended to clarify their correspondence with URs M35 and M36 as well as the applicability of requirement related to pre-alarms for bridge control devices.

Additionally, relevant requirements are amended to clarify their correspondence with UR M9 with respect to the applicable criteria for the number and location of crankcase explosion relief valves.

Outline of Amendment

The main contents of this amendment are as follows:

(1) Clarifies the requirements for pre-alarms for bridge control devices in cases in which total failure of main propulsion machinery will occur within a short period of time.
(2) Adds high temperatures of thrust bearings or thrust bearing lubricating oil to the cases in which safety devices automatically shut off the fuel supply to the main propulsion machinery.
(3) Transfers requirements related to monitoring devices for main propulsion machinery from 3.3.2-1 of the Guidance to the 3.3.2 of the Rules for Automatic and Remote Control Systems.
(4) Deletes requirements specifying that low pressure alarms for starting air engine inlets may be omitted in cases where indicators are provided to show whether intermediate valves or automatic starting valves are open or closed.
(5) Adds requirements specifying that high level alarms are required for settling tanks without overflow arrangements in addition to being required for settling tanks with automatic filling capability.

(6) Deletes requirements specifying that low level alarms be required only for service tanks having capacities insufficient for 24 hours.
(7) Adds requirements specifying that low level alarms of sump tanks for main propulsion engines be required for each tank in cases where separate lubricating oil systems and relevant tanks (e.g. camshaft, rocker arms) are installed.
(8) Amends applicable criteria for the number and location of crankcase explosion relief valves from cylinder bore sizes of “250 mm to below 300 mm” and “300 mm and over” “over 250 mm to 300 mm” and “over 300 mm”, respectively.

"Rules for the survey and construction of steel ships" has been partly amended as follows:

Part D MACHINERY INSTALLATIONS

Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES

2.4 Safety Devices

2.4.3 Protection against Crankcase Explosion*

1 Reciprocating internal combustion engines having a cylinder bore not less than 200 *mm* or a crankcase with a gross volume not less than 0.6 m^3 are to be provided with crankcase explosion relief valves of an approved type for preventing any overpressure in the event of an explosion within the crankcase. Crankcase explosion relief valves are to be in accordance with the following requirements:
((1) to (5) are omitted.)

2 The number and locations of the explosion relief valves specified in **-1** are to be in accordance with **Table D2.3**.
(-3 and -4 are omitted.)

Table D2.3 has been amended as follows.

Table D2.3 Number and Location of Explosion Relief Valves

Cylinder bore (*mm*)	Number and location of explosion relief valves
200 to ~~below~~ 250	At least one valve near each end, but, ~~over 8 crankthrows,~~ an additional valve is to be fitted near the middle of the engine in the case of more than 8 crankthrows.
over 250 to ~~below~~ 300	At least one valve in way of each alternate crankthrow, with a minimum of two valves.
over 300 ~~and over~~	At least one valve in way of each crankthrow.

Chapter 18 AUTOMATIC AND REMOTE CONTROL

18.3 Automatic and Remote Control of Main Propulsion Machinery or Controllable Pitch Propellers

Paragraph 18.3.3 has been amended as follows.

18.3.3 Bridge Control Devices*

Bridge control devices are to comply with the following **(1)** through **(4)** as well as requirements in **18.3.2**.

((1) and (2) are omitted.)

(3) Bridge control devices are to be provided with visual and audible alarms which give the officer in charge of the navigational watch enough time to assess navigational circumstances in an emergency before the safety systems of main propulsion machinery specified in **18.1.2(14)(b)** or **(c)** go into effect~~.~~,except in cases in which total failure of main propulsion machinery will occur within a short period of time.

(4) Bridge control devices are to be provided with the override arrangement specified in **18.2.6-3** for the following safety systems of main propulsion machinery:

(a) Safety systems which perform as specified in **18.1.2(14)(b)**

(b) Safety systems which perform as specified in **18.1.2(14)(c)** ~~(~~, except in cases ~~where the~~ in which total failure of main propulsion machinery will occur within a short period of time.~~)~~

"Rules for automatic and remote control systems" has been partly amended as follows:

Chapter 3 CENTRALIZED MONITORING AND CONTROL SYSTEMS FOR MACHINERY

3.3 Additional Requirements for Safety Measures

3.3.1 General

In the case of **MC**-ships, safety measures in accordance with the requirements given in this **3.3** are to be taken in addition to those requirements specified in **Chapter 18, Part D of the Rules for the Survey and Construction of Steel Ships**.

Paragraph 3.3.2 has been amended as follows.

3.3.2 Main Propulsion Machinery or Controllable Pitch Propellers

1 Main propulsion machinery in ships in which reciprocating internal combustion engines are used as main propulsion machinery (excluding electric propulsion ships)

(1) Safety devices

Safety devices are to be provided to ~~shut~~ automatically shut off the fuel suppl~~ies~~y to the main propulsion machinery under the following conditions:

(a) Over-speed
(b) Pressure drops of lubricating oil to main bearings and thrust bearings
(c) Pressure drops of lubricating oil to crosshead bearings in the case of crosshead engines which have separate lubricating oil systems
(d) Pressure drops of lubricating oil to camshafts in the case of crosshead engines which have separate lubricating oil systems
(e) High temperatures of thrust bearings or thrust bearing lubricating oil in cases where engines have thrust bearings

(2) Reductions of speeds or loads

Measures are to be taken to automatically reduce speeds or loads to main propulsion machinery under the following conditions. However, in cases where alternative measures such as activating alarms to request such reductions are taken, manual reductions of speeds or loads may be accepted.

(a) Pressure drops of lubricating oil to main bearings and thrust bearing in the case of crosshead engines
(b) Pressure drops of lubricating oil to crosshead bearings in cases where crosshead engines have separate lubricating oil systems
(c) High temperatures of thrust bearings or thrust bearing lubricating oil in cases where engines have thrust bearings
(d) Low flows of lubricating oil at each cylinder lubricator (non-flow may be accepted)
(e) Pressure drops of piston coolant at inlets in the case of crosshead engines (not required when cooling oil is provided from main lubricating oil systems of engines)
(f) High temperatures of piston coolant at cylinder outlets in the case of crosshead engines
(g) Low flows of piston coolant at cylinder outlets (alternative means may be accepted for those crosshead engines which have piston coolant flows that cannot be measured.)
(h) Pressure drops of cylinder cooling water at inlets (low flows may be accepted in the case of trunk piston engines)
(i) High temperatures of cylinder cooling water at cylinder outlets

Temperatures at cylinder common outlets may be accepted in case<u>s</u> where engines have no

individual stop valves at their cylinder outlets.

(j) High temperatures or fires in scavenge air boxes in the case of crosshead engines

(k) High temperatures of exhaust gases at cylinder outlets (not required for those trunk piston engines of maximum continuous power not exceeding 500 *kW*/cylinder)

(l) Other fault conditions considered necessary by the Society

(3) Standby pumps

Standby pumps for any pumps used as auxiliary machinery essential for main propulsion are to be arranged so as to start automatically or so as to be capable of being immediately remotely started from centralized control stations or the centralized monitoring and control stations on bridges under the following conditions:

(a) With respect to lubricating oil pumps, in cases where delivery pressures or flow rates of any pumps in operation fall below their predetermined values.

(b) With respect to cooling pumps used for cylinders, pistons, fuel valves and coolers and fuel oil supply pumps, in cases where delivery pressures or flow rates of any pumps in operation fall below their predetermined values or such pumps stop.

(4) Alarm devices

Main propulsion machinery is to be provided with alarm devices which activate in the event of any of those abnormal conditions given in **Table 3.1**.

(5) Monitoring devices

Monitoring devices for main propulsion machinery specified in **3.2.2(1)** are to be provided, and are to indicate at least the following information.

(a) Pressure of fuel oil to fuel oil burning pumps

(b) Pressure of lubricating oil to main and thrust bearings

(c) Pressure of lubricating oil to crosshead bearings in cases where crosshead engines have separate lubricating oil systems

(d) Differential pressure between inlets and outlets of lubricating oil strainers, or the pressure of lubricating oil at inlets and outlets of strainers in the case of trunk piston engines

(e) Temperature of lubricating oil to engines in the case of trunk piston engines

(f) Revolutions of turbochargers

(g) Pressure of lubricating oil to turbochargers in cases where trunk piston engines have separate lubricating oil systems

(h) Pressure of cooling seawater (including central cooling systems)

(i) Pressure at cylinder cooling water inlets

(j) Temperature of cylinder cooling water at cylinder outlets or at cylinder common outlets in cases where one common cooling space without individual stop valves is provided

(k) Pressure at starting air inlets

(l) Pressure of control air

(m) Pressure of scavenge air receivers

(n) Exhaust gas temperatures at cylinder outlets (not required for those engines with a maximum continuous power not exceeding 500 *kW*/cylinder)

(o) Exhaust gas temperatures at turbocharger inlets

(p) Exhaust gas temperatures at turbocharger outlets

(q) Pressure of low temperature cooling water in cases where central cooling systems are adopted

(r) Speed and direction of rotation of main propulsion machinery

(s) Any other information deemed necessary by the Society

(-2 to -4 are omitted.)

3.3.3 Boilers

(Omitted)

3.3.4 Generating Sets

1 Safety devices

Safety devices for electric generating sets are to comply with the following **(1)** through **(3)**:

((1) to (3) are omitted.)

2 Alarm devices

Electric generating sets are to be provided with alarm devices which activate in the event of any of those abnormal conditions given in **Table 3.4**.

3.3.5 Thermal Oil Installations

(Omitted)

3.3.6 Prime Movers Driving Auxiliary Machinery

1 Safety measures

Prime movers driving auxiliary machinery essential for main propulsion of ships are to be arranged so as to automatically stop under the following conditions:

((1) and (2) are omitted.)

2 Alarm devices

Prime movers driving auxiliary machinery essential for main propulsion of ships are to be provided with alarm devices which activate in the event of any of those abnormal conditions given in **Table 3.7**.

3.3.7 Other Machinery

(-1 and -2 are omitted.)

3 Alarm devices

Other machinery is to be provided with alarm devices which activate in the event of any of those abnormal conditions given in **Table 3.9**.

Table 3.1 has been amended as follows.

Table 3.1 Reciprocating Internal Combustion Engines used as Main Propulsion Machinery (and Gearing)

Monitored Variables		Alarms	Remarks
Temperature	Cylinder cooling water cylinder outlets	H	cylinder cooling water common outlets in ~~the~~ cases ~~of no~~ where individual stop valves are not provided for each cylinder outlet
	Piston coolant cylinder outlets	H	in the case of crosshead engines
	Fuel valve coolant outlets	H	
	L.O. inlets	H	
	L.O. camshaft inlets	H	in the case of crosshead engines with a separate L.O. system
	Thrust bearings or L.O. thrust bearing outlets	H	in the case of engines with a thrust bearing
	L.O. turbocharger bearing outlets	H	in cases where it is not possible to measure such temperature, continuous monitoring of inlet pressure and inlet temperature in combination with ~~bearing inspections conducted at specific intervals deemed appropriate by Society, etc.~~ specific intervals for bearing inspection in accordance with turbocharger manufacturer instructions may be accepted as an alternative measure.
	L.O. reduction gear inlets	H	in the case of engines with a separate L.O. system
	F.O. burning pump inlets	H L	in cases where viscosity is controlled (e.g. heavy fuel oil burning engines). Alternatively, high and low viscosity alarms may be accepted.
	Exhaust gas in cylinder outlets	H	not required for trunk piston engines of max. continuous power not exceeding 500 *kW*/cylinder
	Exhaust gas deviation for cylinder outlets	H	
	Exhaust gas in turbocharger inlets	H	
	Exhaust gas in turbocharger outlets	H	
	Air in scavenge air boxes	H	in the case of crosshead engines. Alternatively, fire alarm may be accepted.
	Air in scavenge air receivers	H	in the case of trunk piston engines
	Air in air cooler outlets	H L	in cases where temperatures are automatically controlled
Pressure	Cylinder cooling water inlets	L	
	Piston coolant inlets	L	in the case of crosshead engines
	Fuel valve coolant inlets	L	
	L.O. main bearing and thrust bearing inlets	L	
	L.O. crosshead bearing inlets	L	in the case of crosshead engines with separate L.O. systems
	L.O. camshaft inlets	L	
	L.O. strainer in/out differentials	H	
	L.O. turbocharger inlets	L	in the case of crosshead engines with separate L.O. systems
	L.O. reduction gear inlets	L	
	F.O. burning pump inlets (Engine inlet after filter)	L	
	Common accumulators fuel oil pressure	L	in the case of electronically-controlled engines (only they have common accumulators)
	Common accumulators or high pressure pipe hydraulic oil pressure	L	in the case of electronically-controlled engines
	Starting air engine inlets	L	~~not required in cases where an indicator is provided to show the intermediate valve or the automatic starting valve is open or close~~

	Cooling sea water	L	
	Low temperature cooling water	L	in cases where central cooling systems are adopted
(Omitted)			

Table 3.2 Steam Turbines used as Main Propulsion Machinery (and Gearing, Main Condenser)
(Table is omitted.)

Table 3.3 Boilers
(Table is omitted.)

Table 3.4 has been amended as follows.

Table 3.4 Electric Generating Sets

Monitored Variables		Alarms	Remarks
Reciprocating internal combustion engines driving generators			
Temperature	L.O. inlets	H	
	Cooling water or air outlets	H	
	Exhaust gas, turbo-blower inlets or cylinder outlets	H	at each cylinder outlet is required in the case of the engines with max. continuous power exceeding 500 *kW*/cylinder
	F.O. burning pump inlets	H L	in cases where viscosity is controlled (e.g. heavy fuel oil burning engines). Alternatively, high and low viscosity alarms may be accepted.
Pressure	L.O. inlets	L	
	Common accumulators fuel oil pressure	L	in the case of electronically-controlled engines (only they have common accumulators)
	Common accumulators or high pressure pipe hydraulic oil pressure	L	in the case of electronically-controlled engines
	Cooling water inlets	L	low flow may be accepted
	Starting air	L	not required when starting air piping for propulsion engines is commonly used
Others	Leakage from F.O. burning pipes, levels leakage tanks	○	
	Revolutions of turbochargers	H	applied only to the categories *B* and *C* turbochargers specified in **2.1.2, Part D of the Rules for the Survey and Construction of Steel Ships**, with novel design features or no service records
Steam turbines driving generators			
Temperature	L.O. inlets	H	
Pressure	L.O. inlets	L	
	Steam inlets	L	for ships in which steam turbines are used as main propulsion machinery (excluding electric propulsion ships), only applicable where extracted steam is used
	Exhaust	H	
(Omitted)			

Table 3.5 Thermal Oil Installations
(Table is omitted.)

Table 3.6 Controllable Pitch Propellers
(Table is omitted.)

Table 3.7 has been amended as follows.

Table 3.7 Engine Driving Auxiliary Machinery

Monitored Variables		Alarms	Remarks
Reciprocating internal combustion engines			
Temperature	L.O. inlets	H	
	Cooling water outlets	H	low pressures/flows may be accepted
	Exhaust gas, turbo charger inlets or cylinder outlets	H	
	F.O. burning pump inlets	H L	in cases where viscosity is controlled (e.g. heavy fuel oil burning engines). Alternatively, high and low viscosity alarms may be accepted.
Pressure	L.O. inlets	L	
	Common accumulators fuel oil pressure	L	in the case of electronically-controlled engines (only they have common accumulators)
	Common accumulators or high pressure pipe hydraulic oil pressure	L	in the case of electronically-controlled engines
	Cooling water outlets	L	low flows or high temperatures at cooling water outlets may be accepted
Others	Leakage from F.O. burning pipes, levels in leakage tanks	○	
	Revolutions of turbochargers	H	applied only to categories *B* and *C* turbochargers specified in **2.1.2, Part D of the Rules for the Survey and Construction of Steel Ships**, with novel design features or no service records
Steam turbines			
Temperature	L.O. inlets	H	
Pressure	L.O. inlets	L	
	Steam inlets	L	for ships in which steam turbines are used as main propulsion machinery (excluding electric propulsion ships), only applicable when extracted steam is used
	Exhaust steam	H	

Table 3.8 Electrical Equipment for Propulsion in Electrical Propulsion Ships
(Table is omitted.)

Table 3.9 has been amended as follows.

Table 3.9 Other Machinery

Monitored Variables		Alarms	Remarks	
Auxiliaries				
Distilling plants, salinity		H		
Purifiers, malfunctions		○		
F.O. or L.O. heater outlets, temperatures		H	or heater outlets, flow lows	
Cooling sea water pressures		L	in cases where central cooling systems are adopted for the main propulsion machinery	
Condensate pump outlets, pressures		L	or stoppage of driving units	for ships in which steam turbines are used as main propulsion machinery (excluding electric propulsion ships)
Condensate pump outlets, salinity		H		
Drain pump outlets, salinity		H		
External desuperheaters, steam temperatures		H L	L is required when the steam in used for auxiliary turbines relation to propulsion	
Deaerator, levels		H L		
Tanks				
F.O.	Settling tanks, levels	H L	H is required in the case of automatic filling ~~only, L is required to tanks having capacity not enough to 24 *hours*~~ tanks or tanks without overflow arrangements	
	Service tanks, levels	H L	~~continuous operation~~	
	Drain tanks levels	H		
	Sludge tanks, levels	H		
	Settling tanks, temperatures	H	applied to tanks where heating devices are provided	
	Service tanks, temperatures	H		
L.O. and control oil	Sump tanks for propulsion engines, levels	L	applied to each tank in cases where separate lubricating oil systems and relevant tanks (e.g. camshaft, rocker arms) are installed.	
	Drain tanks, levels	H		
	Sludge tanks, levels	H		
	Gravity tanks, levels	L	applied to oil bath type stern tube bearings, exhaust driven turboblowers, and reduction gear for propulsion steam turbines	
Water	Cooling water expansion (makeup) tanks, levels	L		
	Purifier water tanks, levels	L		
	Cascade tanks, levels	L	applied to ships in which reciprocating internal combustion engines are used as main propulsion machinery (excluding electric propulsion ships)	
	Atmospheric drain tanks, levels	H L	applied to ships in which steam turbines are used as main propulsion machinery (excluding electric propulsion ships)	
	Distilled water tanks, levels	L		
Air	Starting air tanks for propulsion engines, pressures	L		
	Starting air tanks for generator prime movers, pressures	L	applied to ships in which steam turbines are used as main propulsion machinery (excluding electric propulsion ships)	
(Omitted)				

"Rules for the survey and construction of inland waterway ships" has been partly amended as follows:

Part 7 MACHINERY INSTALLATIONS

Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES

2.4 Safety Devices

2.4.3 Protection against Crankcase Explosion*

1 Reciprocating internal combustion engines having a cylinder bore not less than 200 *mm* or a crankcase with a gross volume not less than 0.6 m^3 are to be provided with crankcase explosion relief valves of an approved type for preventing any overpressure in the event of an explosion within the crankcase. Crankcase explosion relief valves are to be in accordance with the following requirements:
((1) to (5) are omitted.)

2 The number and locations of the explosion relief valves specified in **-1** are to be in accordance with **Table 7.2.5**.
(-3 and -4 are omitted.)

Table 7.2.5 has been amended as follows.

Table 7.2.5 Number and Location of Explosion Relief Valves

Cylinder bore (*mm*)	Number and location of explosion relief valves
200 to ~~below~~ 250	At least one valve near each end, but, ~~over 8 crankthrows,~~ an additional valve is to be fitted near the middle of the engine in the case of more than 8 crankthrows.
over 250 to ~~below~~ 300	At least one valve in way of each alternate crankthrow, with a minimum of two valves.
over 300 ~~and over~~	At least one valve in way of each crankthrow.

Chapter 14 AUTOMATIC AND REMOTE CONTROL

14.3 Automatic and Remote Control of Main Propulsion Machinery or Controllable Pitch Propellers

Paragraph 14.3.3 has been amended as follows.

14.3.3 Bridge Control Devices*

Bridge control devices are to comply with the following **(1)** through **(4)** as well as requirements in **14.3.2**.

((1) and (2) are omitted.)

(3) Bridge control devices are to be provided with visual and audible alarms which give the officer in charge of the navigational watch enough time to assess navigational circumstances in an emergency before the safety systems of main propulsion machinery specified in **14.1.2(14)(b)** or **(c)** go into effect, except in cases in which total failure of main propulsion machinery will occur within a short period of time.

(4) Bridge control devices are to be provided with an override arrangement specified in **14.2.6-3** for the following safety systems of main propulsion machinery:

(a) Safety systems which perform as specified in **14.1.2(14)(b)**

(b) Safety systems which perform as specified in **14.1.2(14)(c)** ~~(~~, except in cases ~~where the~~in which total failure of main propulsion machinery will occur within a short period of time.~~)~~

"Guidance for the survey and construction of steel ships" has been partly amended as follows:

Part D MACHINERY INSTALLATIONS

D18 AUTOMATIC AND REMOTE CONTROL

D18.3 Automatic and Remote Control of Main Propulsion Machinery or Controllable Pitch Propellers

D18.3.3 Bridge Control Devices

Sub-paragraph -3 has been amended as follows.

3 The following may be considered as examples of those "cases ~~where the~~in which total failure of main propulsion machinery will occur within a short period of time" given in **18.3.3(3)** and **18.3.3(4)(b), Part D of the Rules**:

(1) Over-speed

(2) Abrupt pressure drops of lubricating oil to main bearings

“Guidance for automatic and remote control systems” has been partly amended as follows:

Chapter 3 has been deleted.

~~Chapter 3 CENTRALIZED MONITORING AND CONTROL SYSTEMS FOR MACHINERY~~

~~3.2 Centralized Monitoring and Control Systems for Machinery~~

~~3.2.2 Centralized Monitoring and Control Systems for Machinery~~

~~The wording “necessary monitoring devices for main propulsion machinery” specified in **3.2.2(1) of the Rules** means those monitoring devices used to indicate any of the information listed below.~~

~~(1) Pressure of fuel oil to fuel oil burning pumps~~
~~(2) Pressure of lubricating oil to main and thrust bearings~~
~~(3) Pressure of lubricating oil to crosshead bearings in cases where crosshead engines have separate lubricating oil systems~~
~~(4) Differential pressure between inlets and outlets of lubricating oil strainers or the pressure of lubricating oil at inlets and outlets of strainers in the case of trunk piston engines~~
~~(5) Temperature of lubricating oil to engines in the case of trunk piston engines~~
~~(6) Revolutions of turbochargers~~
~~(7) Pressure of lubricating oil to turbochargers in cases where trunk piston engines have separate lubricating oil systems~~
~~(8) Pressure of cooling seawater (including central cooling systems)~~
~~(9) Pressure at cylinder cooling water inlets~~
~~(10) Temperature of cylinder cooling water at cylinder outlets, or at cylinder common outlets in cases where one common cooling space without individual stop valves is employed~~
~~(11) Pressure at starting air inlets~~
~~(12) Pressure of control air~~
~~(13) Pressure of scavenge air receivers~~
~~(14) Exhaust gas temperatures at cylinder outlets (not required for those engines with a maximum continuous power not exceeding 500 *kW/cylinder*)~~
~~(15) Exhaust gas temperatures at turbocharger inlets~~
~~(16) Exhaust gas temperatures at turbocharger outlets~~
~~(17) Pressure of low temperature cooling water in cases where central cooling systems are adopted~~
~~(18) Any other information deemed necessary by the Society~~

Chapter 5 SPECIFIC AUTOMATION EQUIPMENT

5.3 Standards for Specific Automation Equipment

5.3.13 Centralized Machinery Control Systems

Sub-paragraph -2 has been amended as follows.

2 The wording "effectively controlling" specified in **5.3.13 of the Rules** means to control the following functions. However, in such cases, any functions not provided or required to be remote-controlled from navigating bridges by any requirements other than this **5.3.13** may be dispensed with.

(1) With respect to the controls of main propulsion ~~diesel~~reciprocating internal combustion engines
((a) to (j) are omitted.)

(2) With respect to the control of ~~diesel~~reciprocating internal combustion engines driving generators (except emergency generators, the same being referred to hereinafter)
((a) to (d) are omitted.)

((3) to (5) are omitted.)

Title of Table 5.3.12-1 has been amended as follows.

Table 5.3.12-1 Indications and Alarm Items of ~~Diesel~~Reciprocating Internal Combustion Engines
(Table is omitted.)

"Guidance for the survey and construction of inland waterway ships" has been partly amended as follows:

Part 7 MACHINERY INSTALLATIONS

Chapter 14 AUTOMATIC AND REMOTE CONTROL

14.3 Automatic and Remote Control of Main Propulsion Machinery or Controllable Pitch Propellers

14.3.3 Bridge Control Devices

Sub-paragraph -3 has been amended as follows.

3 The following may be considered as examples of those "cases ~~where the~~in which total failure of main propulsion machinery will occur within a short period of time" given in **14.3.3(3) and 14.3.3(4)(b), Part 7 of the Rules**:

(1) Over-speed

(2) Abrupt pressure drops of lubricating oil to main bearings