Protection of Reciprocating Internal Combustion Engines against Explosions

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part D
Guidance for the Survey and Construction of Steel Ships Part D
Rules for High Speed Craft
Rules / Guidance for the Survey and Construction of Inland Waterway Ships

Reason for Amendment

IACS Unified Requirement (UR) M10 specifies safety requirements for protection against the crankcase explosions of reciprocating internal combustion engines, and it has already been incorporated into the NK Rules.

In principle, IACS UR M10 prohibits crankcase ventilation and the intake of external air, except for dual-fuel engines. However, for gas-fueled engines and engines using low-flashpoint fuels, ventilation may be necessary to maintain the gas concentration in the crankcase below its lower explosive limit. In light of this, IACS reviewed the safety requirements applicable to reciprocating internal combustion engines using gas or low-flashpoint fuels and amended them as needed.

In addition to the above, revisions and clarifications were made to safety requirements for crankcases, including requirements for verifying the installation location of oil mist detectors and submitting related documentation.

The above-mentioned amendments were all adopted as IACS UR M10(Rev.5) in November 2024.

Accordingly, relevant requirements are amended based on IACS UR M10 (Rev.5), and the correspondence between the NK Rules and the UR is clarified.

Outline of Amendment

The main details of this amendment are as follows:

(1) Specifies requirements related to the gas concentration in the crankcase for reciprocating internal combustion engines using gas or low-flashpoint fuels.
(2) Amends requirements related to the forced extraction of the crankcase atmosphere.
(3) Amends requirements related to the installation location and documentation of oil mist detectors.

Effective Date and Application

This amendment applies to reciprocating internal combustion engines that fall under the following:

(1) those for which the application for approval is submitted to the Society on or after 1 January 2026; or
(2) those installed in ships for which the date of contract for construction is on or after 1 January 2026.

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

ID:DD25-11

Amended-Original Requirements Comparison Table
(Protection of Reciprocating Internal Combustion Engines against Explosions)

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part D MACHINERY INSTALLATIONS

Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES

2.1 General

2.1.3 Drawings and Data*

Table D2.1(b) Drawings and Data for Reference

	Items	For inspection and testing
	(Omitted)	
(35)	The following drawings and data for measures to prevent crankcase explosions: (a) Documentation containing evidence of studies justifying the selected location of sample points and the sample extraction rate specified in **2.4.5-2(6)** (may be omitted in cases where replaced by the test specified in **2.4.5-2(7)**) (b) Documentation of alternative methods to prevent the build-up of oil mist within the crankcase specified in **2.4.5-3** (if applicable) (c) Documentation of the introduction of inert gas into the crankcase specified in **2.4.6-1** (if applicable)	○
(3~~5~~6)	Other drawings and data deemed necessary by the Society	○

Notes:
(1) Operation and service manuals are to contain maintenance requirements (servicing and repair) including details of any special tools and gauges that are to be used with their fitting/settings together with any test requirements on completion of maintenance.
(2) Drawings and data modified for a specific application are to be submitted to the Society for reference or approval, as applicable.

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RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part D MACHINERY INSTALLATIONS

Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES

2.1 General

2.1.3 Drawings and Data*

</td><td>Adding items to the “Drawings and Data” specified in 2.4.5-2(6), 2.4.5-3 and 2.4.6-1, Part D of the Rules for the Survey and Construction of Steel Ships.</td></tr>
</table>

Amended-Original Requirements Comparison Table
(Protection of Reciprocating Internal Combustion Engines against Explosions)

Amended	Original	Remarks
2.2 Materials, Construction and Strength	**2.2 Materials, Construction and Strength**	
2.2.2 Construction, Installation and General*	**2.2.2 Construction, Installation and General***	
6 Ventilation of crankcase, and any arrangement which could produce a flow of external air into the crankcase, is not permitted except in cases **(1)** to **(3)** below.	**6** Ventilation of crankcase, and any arrangement which could produce a flow of external air into the crankcase, is not permitted except in cases **(1)** to **(3)** below.	
(1) Ventilation pipes, where provided, are to be as small as practicable to minimise the inrush of air after a crankcase explosion. In addition, ventilation pipes for each engine are to be independent of any other engine. Ventilation pipes from the crankcase of main propulsion engine are to lead to a safe position on deck or to some other approved position.	(1) Ventilation pipes, where provided, are to be as small as practicable to minimise the inrush of air after a crankcase explosion. In addition, ventilation pipes for each engine are to be independent of any other engine. Ventilation pipes from the crankcase of main propulsion engine are to lead to a safe position on deck or to some other approved position.	
(2) When forced extraction of crankcase atmosphere is provided, the crankcase pressure level is not to influence the reliable function of measurement and safety devices (such as oil mist detection) in the crankcase.	(2) If provision is made for the extraction of gases from the crankcase (*e.g.* for oil mist detection purposes), the vacuum in the crankcase is not to exceed 2.5×10^{-4} *MPa*.	(2) Incorporating UR M10.5.2.
(3) In engines fuelled with gas or low-flashpoint fuel, where such arrangement is necessary to maintain the gas concentration in the crankcase below lower explosive limit. In such cases, the following **(a)** to **(c)** are to be satisfied: (a) It is demonstrated that the risk connected with a crankcase explosion is not increased by the ventilation system. (b) The operation of the ventilation system is monitored. (c) The automatic safety actions to be activated and/or the risk mitigation measures to be implemented in case of detection of a ventilation	(3) In cases where gas-fuelled engines are provided with crankcase ventilation for preventing the accumulation of leaked gas.	(3) Incorporating UR M10.5.

Amended	Original	Remarks
failure are specified by the engine manufacturer and justified in the safety concept of the engine.		
2.4 Safety Devices	**2.4 Safety Devices**	
2.4.3 Protection against Crankcase Explosion*	**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** 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.)	((1) to (5) are omitted.)	
3 Additional explosion relief valves corresponding to **-1** above are to be fitted on separate spaces of crankcase such as gear or chain cases for camshaft or similar drives, when the gross volume of such spaces is not less than 0.6 m^3.	**3** Additional explosion relief valves corresponding to **-1** above are to be fitted on separate spaces of crankcase such as gear or chain cases for camshaft or similar drives, when the gross volume of such spaces is not less than 0.6 m^3.	Although no revision will be made to this requirement in this amendment, it will be noted for reference (see 2.4.5-2(6)). -1 above is treated similarly.
2.4.5 Crankcase Oil Mist Detection Arrangements*	**2.4.5 Crankcase Oil Mist Detection Arrangements***	
1 Crankcase oil mist detection arrangements are required for reciprocating internal combustion engines of 2,250 *kW* maximum continuous power and above or having cylinders of more than 300 *mm* bore, and in cases of engine failure, the following means are to automatically be employed. However, in cases where alternative devices deemed appropriate by the Society are provided, such devices may be used instead of crankcase oil mist detection	**1** Crankcase oil mist detection arrangements are required for reciprocating internal combustion engines of 2,250 *kW* maximum continuous power and above or having cylinders of more than 300 *mm* bore, and in cases of engine failure, the following means are to automatically be employed. However, in cases where alternative devices deemed appropriate by the Society are provided, such devices may be used instead of crankcase oil mist detection	

Amended	Original	Remarks
arrangements. In this case, the following means are also to be automatically employed. (1) In the case of low speed engines (a rated speed of less than 300 *rpm*), alarms are to activate and speeds be reduced. (However, in cases where alternative measures such as activating alarms to request such speed reductions are taken, the manual reduction of speeds may be accepted). (2) In the case of medium speed engines (a rated speed of 300 *rpm* and above, but less than 1,400 *rpm*) and high speed engines (a rated speed of 1,400 *rpm* and above), alarms are to activate and engines are to be stopped or have their fuel supply shut off. **2** The crankcase oil mist detection arrangements required in **-1** above are to be of an approved type and in accordance with the following requirements: (1) Oil mist detection arrangements are to provide an alarm indication in the event of a foreseeable functional failure in the equipment and installation arrangements. (2) Oil mist detection arrangements are to provide an indication that any lenses fitted in the equipment and used in determination of the oil mist level have been partially obscured to a degree that will affect the reliability of the information and alarm indication. (3) Oil mist detection arrangements are to be capable of being tested on the test bed and board under engine standstill and engine running at normal operating conditions. (4) Each engine is to be provided with independent oil mist detection and monitoring and a dedicated alarm. Oil mist detection and alarm information is to be	arrangements. In this case, the following means are also to be automatically employed. (1) In the case of low speed engines (a rated speed of less than 300 *rpm*), alarms are to activate and speeds be reduced. (However, in cases where alternative measures such as activating alarms to request such speed reductions are taken, the manual reduction of speeds may be accepted). (2) In the case of medium speed engines (a rated speed of 300 *rpm* and above, but less than 1,400 *rpm*) and high speed engines (a rated speed of 1,400 *rpm* and above), alarms are to activate and engines are to be stopped or have their fuel supply shut off. **2** The crankcase oil mist detection arrangements required in **-1** above are to be of an approved type and in accordance with the following requirements: (1) Oil mist detection arrangements are to provide an alarm indication in the event of a foreseeable functional failure in the equipment and installation arrangements. (2) Oil mist detection arrangements are to provide an indication that any lenses fitted in the equipment and used in determination of the oil mist level have been partially obscured to a degree that will affect the reliability of the information and alarm indication. (3) Oil mist detection arrangements are to be capable of being tested on the test bed and board under engine standstill and engine running at normal operating conditions. (4) Each engine is to be provided with independent oil mist detection and monitoring and a dedicated alarm. Oil mist detection and alarm information is to be	

Amended-Original Requirements Comparison Table
(Protection of Reciprocating Internal Combustion Engines against Explosions)

Amended	Original	Remarks
able to be confirmed from a safe location away from the engine. In addition, in the case of ships which apply the **Rules for Automatic and Remote Control Systems**, the concentration of crankcase oil mist is also to be capable of being read by a monitoring panel.	able to be confirmed from a safe location away from the engine. In addition, in the case of ships which apply the **Rules for Automatic and Remote Control Systems**, the concentration of crankcase oil mist is also to be capable of being read by a monitoring panel.	
(5) The oil mist detection system and arrangements are to be installed in accordance with the engine designer's and oil mist detection system manufacturer's instructions. The following particulars are to be included in the instructions: (a) Schematic layout of engine oil mist detection and alarm system showing location of engine crankcase sample points and piping or cable arrangements together with pipe dimensions to detector. (b) The manufacturer's maintenance and test manual. (c) Information relating to type or in-service testing of the engine with engine protection system test arrangements having approved types of oil mist detection equipment.	(5) The layout of the arrangements, pipes and cables, pipe dimensions, the location of engine crankcase sample points, sample extraction rate and the way of maintenance and test are to be in accordance with the engine designer's and oil mist manufacturer's instructions.	(5) Incorporating UR M10.10.
(6) Plans showing details and arrangements of oil mist detection and alarm arrangements are to be submitted for approval in accordance with **(16)** of **Table D2.1(1)**. Additionally, documentation containing evidence of studies justifying the selected location of sample points, supported by a confirmation from the oil mist detection system manufacturer, from the crankcase and the spaces mentioned in **2.4.3-3**, is to be submitted to the Society for reference purposes only. When the	(Newly added)	(6) Incorporating paragraph 1 and 2 of UR M10.19.

Amended	Original	Remarks
systems use a suction method, information regarding the sample extraction rate is to be included.		
(7) As an alternative to the evidence of studies in **(6)** above, an oil mist inlet test may be performed on a running engine. In such cases, test conditions such as setup, records or engine loads are to be agreed upon between the engine designer, oil mist detector manufacturer and the Society. The test engine is to be chosen to demonstrate oil mist detector arrangement suitability to cover a specified range of engine types and configurations. To allow a repeatable and comparable test, an oil mist is to be generated by a procedure deemed appropriate by the Society.	(Newly added)	(7) Incorporating paragraph 3 of UR M10.19.
(8) Where sequential oil mist detection arrangements are provided the sampling frequency and sampling time is to be as short as reasonably practicable.	(6) Where sequential oil mist detection arrangements are provided the sampling frequency and sampling time is to be as short as reasonably practicable.	
(9) A copy of the maintenance and test manual is to be provided on board ship.	(7) A copy of the maintenance and test manual is to be provided on board ship.	
(10) In addition to the requirements in this Chapter, safety systems and alarm systems of oil mist detection systems are to satisfy the requirements in **Chapter 18**.	(Newly added)	(10) Incorporating UR M10.15.
3 In cases where alternative methods are provided for the prevention of the build-up of oil mist that may lead to a potentially explosive condition in the crankcase in accordance with **-1** above, details (including the following **(1)** to **(4)**) are to be submitted to the Society.	(Newly added)	-3 Incorporating UR M10.22.
(1) Engine particulars - type, power, speed, stroke, bore and crankcase volume.		
(2) Details of arrangements prevent the build-up of potentially explosive conditions within the		

Amended	Original	Remarks
crankcase, e.g. bearing temperature monitoring, oil splash temperature, crankcase pressure monitoring, recirculation arrangements. (3) Evidence to demonstrate that the arrangements are effective in preventing the build-up of potentially explosive conditions together with details of in-service experience. (4) Operating instructions and the maintenance and test instructions.		
2.4.6 Safety Measures against Crankcase Explosions	**(Newly added)**	
1 In cases where it is proposed to use the introduction of inert gas into the crankcase to minimise a potential crankcase explosion, details of the arrangements are to be submitted to the Society.	(Newly added)	-1 Incorporating UR M10.23.
2 For engines fuelled with gas or low-flashpoint fuel a detailed evaluation regarding the safety of crankcase is to be carried out to confirm the following **(1)** or **(2)**: (1) The gas concentration in the crankcase remains below the lower explosive limit without specific measures. (2) The risk of a crankcase explosion is reduced through specific measures (*See* **2.2.2-6(3)** and **-1** above).	(Newly added)	-2 Incorporating UR M10.6.
2.5 Associated Installations	**2.5 Associated Installations**	
2.5.5 Lubricating Oil Arrangements	**2.5.5 Lubricating Oil Arrangements**	
4 Lubricating oil drain pipes from the engine crankcase sump to the sump tank are to be continuously submerged at their outlet ends.	**4** Lubricating oil drain pipes from the engine crankcase sump to the sump tank are to be submerged at their outlet ends.	-4 Incorporating UR M10.7.

Amended-Original Requirements Comparison Table
(Protection of Reciprocating Internal Combustion Engines against Explosions)

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RULES FOR HIGH SPEED CRAFT

Part 9 MACHINERY INSTALLATIONS

Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES

2.1 General

2.1.3 Drawings and Data*

Table 9.2.1(b) Drawings and Data for Reference

	Items	For inspection and testing
(Omitted)		
(35)	Documentation of the introduction of inert gas into the crankcase (if applicable)	○
(3~~5~~6)	Other drawings and data deemed necessary by the Society	○

Notes:

(1) Operation and service manuals are to contain maintenance requirements (servicing and repair) including details of any special tools and gauges that are to be used with their fitting/settings together with any test requirements on completion of maintenance.

(2) Drawings and data modified for a specific application are to be submitted to the Society for information or approval, as applicable.

2.2 Safety Devices

2.2.2 Protection against Crankcase Explosion

Engines are to comply with the following requirements to protect from crankcase explosion:

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RULES FOR HIGH SPEED CRAFT

Part 9 MACHINERY INSTALLATIONS

Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES

2.1 General

2.1.3 Drawings and Data*

2.2 Safety Devices

2.2.2 Protection against Crankcase Explosion

Engines are to comply with the following requirements to protect from crankcase explosion:

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Adding items to the “Drawings and Data”.

Amending the requirements to apply the safety measures against

</td></tr>
</table>

Amended-Original Requirements Comparison Table
(Protection of Reciprocating Internal Combustion Engines against Explosions)

Amended	Original	Remarks
(1) **2.2.2-4, -5 and -6, Part D of the Rules for the Survey and Construction of Steel Ships** (2) **2.4.3, Part D of the Rules for the Survey and Construction of Steel Ships** (3) **2.4.6, Part D of the Rules for the Survey and Construction of Steel Ships**	(1) **2.2.2-4, -5 and -6, Part D of the Rules for the Survey and Construction of Steel Ships** (2) **2.4.3, Part D of the Rules for the Survey and Construction of Steel Ships** (Newly added)	crankcase explosions to the high speed craft as specified in 2.4.6, Part D of the Rules for the Survey and Construction of Steel Ships.
2.3 Associated Installations	**2.3 Associated Installations**	
2.3.4 Lubricating Oil Arrangements **4** Lubricating oil drain pipes from the engine crankcase sump to the sump tank are to be continuously submerged at their outlet ends. These drain pipes of two or more engine units are not to be inter-connected.	**2.3.4 Lubricating Oil Arrangements** **4** Lubricating oil drain pipes from the engine crankcase sump to the sump tank are to be submerged at their outlet ends. These drain pipes of two or more engine units are not to be inter-connected.	-4 Incorporating UR M10.7.

Amended-Original Requirements Comparison Table
(Protection of Reciprocating Internal Combustion Engines against Explosions)

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RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS

Part 7 MACHINERY INSTALLATIONS

Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES

2.1 General

2.1.3 Drawings and Data*

Table 7.2.1(b) Drawings and Data for Reference

<table>
<tr><th></th><th>Items</th><th>For inspection and testing</th></tr>
<tr><td colspan="3">(Omitted)</td></tr>
<tr><td>(35)</td><td>The following drawings and data for measures to prevent crankcase explosions:
(a) Documentation containing evidence of studies justifying the selected location of sample points and the sample extraction rate specified in 2.4.5-2(6) (may be omitted in cases where replaced by the test specified in 2.4.5-2(7))
(b) Documentation of alternative methods to prevent the build-up of oil mist within the crankcase specified in 2.4.5-3 (if applicable)
(c) Documentation of the introduction of inert gas into the crankcase specified in 2.4.6-1 (if applicable)</td><td>○</td></tr>
<tr><td>(3~~5~~6)</td><td>Other drawings and data deemed necessary by the Society</td><td>○</td></tr>
</table>

Notes:
(1) Operation and service manuals are to contain maintenance requirements (servicing and repair) including details of any special tools and gauges that are to be used with their fitting/settings together with any test requirements on completion of maintenance.
(2) Drawings and data modified for a specific application are to be submitted to the Society for reference or approval, as applicable.

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RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS

Part 7 MACHINERY INSTALLATIONS

Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES

2.1 General

2.1.3 Drawings and Data*

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Adding items to the “Drawings and Data” specified in 2.4.5-2(6), 2.4.5-3 and 2.4.6-1, Part 7 of the Rules for the Survey and Construction of Inland Waterway Ships.

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Amended-Original Requirements Comparison Table
(Protection of Reciprocating Internal Combustion Engines against Explosions)

Amended	Original	Remarks
2.2 Materials, Construction and Strength	**2.2 Materials, Construction and Strength**	
2.2.2 Construction, Installation and General*	**2.2.2 Construction, Installation and General***	
6 Ventilation of crankcase, and any arrangement which could produce a flow of external air into the crankcase, is not permitted except in cases **(1)** to **(3)** below.	**6** Ventilation of crankcase, and any arrangement which could produce a flow of external air into the crankcase, is not permitted except in cases **(1)** to **(3)** below.	
(1) Ventilation pipes, where provided, are to be as small as practicable to minimise the inrush of air after a crankcase explosion. In addition, ventilation pipes for each engine are to be independent of any other engine. Ventilation pipes from the crankcase of main propulsion engine are to lead to a safe position on deck or to some other approved position.	(1) Ventilation pipes, where provided, are to be as small as practicable to minimise the inrush of air after a crankcase explosion. In addition, ventilation pipes for each engine are to be independent of any other engine. Ventilation pipes from the crankcase of main propulsion engine are to lead to a safe position on deck or to some other approved position.	
(2) When forced extraction of crankcase atmosphere is provided, the crankcase pressure level is not to influence the reliable function of measurement and safety devices (such as oil mist detection) in the crankcase.	(2) If provision is made for the extraction of gases from the crankcase (*e.g.* for oil mist detection purposes), the vacuum in the crankcase is not to exceed 2.5 × 10-4 *MPa*.	(2) Incorporating UR M10.5.2.
(3) In engines fuelled with gas or low-flashpoint fuel, where such arrangement is necessary to maintain the gas concentration in the crankcase below lower explosive limit. In such cases, the following **(a)** to **(c)** are to be satisfied: (a) It is demonstrated that the risk connected with a crankcase explosion is not increased by the ventilation system. (b) The operation of the ventilation system is monitored. (c) The automatic safety actions to be activated and/or the risk mitigation measures to be implemented in case of detection of a ventilation	(3) In cases where dual fuel engines are provided with crankcase ventilation for preventing the accumulation of leaked gas.	(3) Incorporating UR M10.5.

Amended	Original	Remarks
failure are specified by the engine manufacturer and justified in the safety concept of the engine.		
2.4 Safety Devices	**2.4 Safety Devices**	
2.4.3 Protection against Crankcase Explosion*	**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** 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) The valves are to be provided with lightweight spring-loaded valve discs or other quick-acting and self closing devices to relieve a crankcase of pressure in the event of an internal explosion and to prevent the inrush of air thereafter.	(1) The valves are to be provided with lightweight spring-loaded valve discs or other quick-acting and self closing devices to relieve a crankcase of pressure in the event of an internal explosion and to prevent the inrush of air thereafter.	
(2) The valve discs are to be made of ductile material capable of withstanding the shock of contact with stoppers at the full open position.	(2) The valve discs are to be made of ductile material capable of withstanding the shock of contact with stoppers at the full open position.	
(3) The valves are to be designed and constructed to open quickly and be fully open at a pressure not greater than 0.02 *MPa*.	(3) The valves are to be designed and constructed to open quickly and be fully open at a pressure not greater than 0.02 *MPa*.	
(4) The valves are to be provided with a flame arrester that permits flow for crankcase pressure relief and prevents passage of flame following a crankcase explosion.	(4) The valves are to be provided with a flame arrester that permits flow for crankcase pressure relief and prevents passage of flame following a crankcase explosion.	
(5) The valves are to be provided with a copy of the manufacturer's installation and maintenance manual. This copy is to be provided on board ship.	(5) The valves are to be provided with a copy of the manufacturer's installation and maintenance manual. This copy is to be provided on board ship.	

Amended-Original Requirements Comparison Table
(Protection of Reciprocating Internal Combustion Engines against Explosions)

Amended	Original	Remarks
3 Additional explosion relief valves corresponding to **-1** above are to be fitted on separate spaces of crankcase such as gear or chain cases for camshaft or similar drives, when the gross volume of such spaces is not less than 0.6 m^3.	**3** Additional explosion relief valves corresponding to **-1** above are to be fitted on separate spaces of crankcase such as gear or chain cases for camshaft or similar drives, when the gross volume of such spaces is not less than 0.6 m^3.	Although no revision will be made to this requirement in this amendment, it will be noted for reference (see 2.4.5-2(6)). -1 above is treated similarly.
2.4.5 Crankcase Oil Mist Detection Arrangements*	**2.4.5 Crankcase Oil Mist Detection Arrangements***	
1 Crankcase oil mist detection arrangements are required for reciprocating internal combustion engines of 2,250 *kW* maximum continuous power and above or having cylinders of more than 300 *mm* bore, and in cases of engine failure, the following means are to automatically be employed. However, in cases where alternative devices deemed appropriate by the Society are provided, such devices may be used instead of crankcase oil mist detection arrangements. In this case, the following means are also to be automatically employed. (1) In the case of low speed engines (a rated speed of less than 300 *rpm*), alarms are to activate and speeds be reduced. (However, in cases where alternative measures such as activating alarms to request such speed reductions are taken, the manual reduction of speeds may be accepted). (2) In the case of medium speed engines (a rated speed of 300 *rpm* and above, but less than 1,400 *rpm*) and high speed engines (a rated speed of 1,400 *rpm* and above), alarms are to activate and diesel engines are to be stopped or have their fuel supply shut off.	**1** Crankcase oil mist detection arrangements are required for reciprocating internal combustion engines of 2,250 *kW* maximum continuous power and above or having cylinders of more than 300 *mm* bore, and in cases of engine failure, the following means are to automatically be employed. However, in cases where alternative devices deemed appropriate by the Society are provided, such devices may be used instead of crankcase oil mist detection arrangements. In this case, the following means are also to be automatically employed. (1) In the case of low speed engines (a rated speed of less than 300 *rpm*), alarms are to activate and speeds be reduced. (However, in cases where alternative measures such as activating alarms to request such speed reductions are taken, the manual reduction of speeds may be accepted). (2) In the case of medium speed engines (a rated speed of 300 *rpm* and above, but less than 1,400 *rpm*) and high speed engines (a rated speed of 1,400 *rpm* and above), alarms are to activate and diesel engines are to be stopped or have their fuel supply shut off.	
2 The crankcase oil mist detection arrangements required in **-1** above are to be of an approved type and in	**2** The crankcase oil mist detection arrangements required in **-1** above are to be of an approved type and in	

Amended	Original	Remarks
accordance with the following requirements: (1) Oil mist detection arrangements are to provide an alarm indication in the event of a foreseeable functional failure in the equipment and installation arrangements. (2) Oil mist detection arrangements are to provide an indication that any lenses fitted in the equipment and used in determination of the oil mist level have been partially obscured to a degree that will affect the reliability of the information and alarm indication. (3) Oil mist detection arrangements are to be capable of being tested on the test bed and board under engine standstill and engine running at normal operating conditions. (4) Each engine is to be provided with independent oil mist detection and monitoring and a dedicated alarm. Oil mist detection and alarm information is to be able to be confirmed from a safe location away from the engine. In addition, in the case of ships which apply the **Rules for Automatic and Remote Control Systems**, the concentration of crankcase oil mist is also to be capable of being read by a monitoring panel. (5) The oil mist detection system and arrangements are to be installed in accordance with the engine designer's and oil mist detection system manufacturer's instructions. The following particulars are to be included in the instructions: (a) Schematic layout of engine oil mist detection and alarm system showing location of engine crankcase sample points and piping or cable arrangements together with pipe dimensions to	accordance with the following requirements: (1) Oil mist detection arrangements are to provide an alarm indication in the event of a foreseeable functional failure in the equipment and installation arrangements. (2) Oil mist detection arrangements are to provide an indication that any lenses fitted in the equipment and used in determination of the oil mist level have been partially obscured to a degree that will affect the reliability of the information and alarm indication. (3) Oil mist detection arrangements are to be capable of being tested on the test bed and board under engine standstill and engine running at normal operating conditions. (4) Each engine is to be provided with independent oil mist detection and monitoring and a dedicated alarm. Oil mist detection and alarm information is to be able to be confirmed from a safe location away from the engine. In addition, in the case of ships which apply the **Rules for Automatic and Remote Control Systems**, the concentration of crankcase oil mist is also to be capable of being read by a monitoring panel. (5) The layout of the arrangements, pipes and cables, pipe dimensions, the location of engine crankcase sample points, sample extraction rate and the way of maintenance and test are to be in accordance with the engine designer's and oil mist manufacturer's instructions.	(5) Incorporating UR M10.10.

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detector. (b) The manufacturer's maintenance and test manual. (c) Information relating to type or in-service testing of the engine with engine protection system test arrangements having approved types of oil mist detection equipment.		(6) Incorporating paragraph 1 and 2 of UR M10.19.
(6) Plans showing details and arrangements of oil mist detection and alarm arrangements are to be submitted for approval in accordance with **(16)** of **Table 7.2.1(a)**. Documentation containing evidence of studies justifying the selected location of sample points and the sample extraction rate (if applicable), supported by a confirmation from the oil mist detection system manufacturer, from the crankcase and the spaces mentioned in **2.4.3-3**, is to be submitted to the Society for reference purposes only.	(Newly added)	(7) Incorporating paragraph 3 of UR M10.19.
(7) As an alternative to the evidence of studies in **(6)** above, an oil mist inlet test may be performed on a running engine. In such cases, test conditions such as setup, records or engine loads are to be agreed upon between the engine designer, oil mist detector manufacturer and the Society. The test engine is to be chosen to demonstrate oil mist detector arrangement suitability to cover a specified range of engine types and configurations. To allow a repeatable and comparable test, an oil mist is to be generated by a procedure deemed appropriate by the Society.	(Newly added)	
(8) Where sequential oil mist detection arrangements are provided the sampling frequency and sampling time is to be as short as reasonably practicable.	(6) Where sequential oil mist detection arrangements are provided the sampling frequency and sampling time is to be as short as reasonably practicable.	(10) Incorporating UR

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Amended	Original	Remarks
(9) A copy of the maintenance and test manual is to be provided on board ship.	(7) A copy of the maintenance and test manual is to be provided on board ship.	M10.15.
(10) In addition to the requirements in this Chapter, safety systems and alarm systems of oil mist detection systems are to satisfy the requirements in **Chapter 14**.	(Newly added)	
3 In cases where alternative methods are provided for the prevention of the build-up of oil mist that may lead to a potentially explosive condition in the crankcase in accordance with **-1** above, details (including the following **(1)** to **(4)**) are to be submitted to the Society.	(Newly added)	-3 Incorporating UR M10.22.
(1) Engine particulars - type, power, speed, stroke, bore and crankcase volume.		
(2) Details of arrangements prevent the build-up of potentially explosive conditions within the crankcase, e.g. bearing temperature monitoring, oil splash temperature, crankcase pressure monitoring, recirculation arrangements.		
(3) Evidence to demonstrate that the arrangements are effective in preventing the build-up of potentially explosive conditions together with details of in-service experience.		
(4) Operating instructions and the maintenance and test instructions.		
2.4.6 Safety Measures against Crankcase Explosions	**(Newly added)**	
1 In cases where it is proposed to use the introduction of inert gas into the crankcase to minimise a potential crankcase explosion, details of the arrangements are to be submitted to the Society.	(Newly added)	-1 Incorporating UR M10.23.
2 For engines fuelled with gas or low-flashpoint fuel a detailed evaluation regarding the safety of crankcase is to be	(Newly added)	-2 Incorporating UR M10.6.

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carried out to confirm the following **(1)** or **(2)**: (1) The gas concentration in the crankcase remains below the lower explosive limit without specific measures. (2) The risk of a crankcase explosion is reduced through specific measures (*See* **2.2.2-6(3)** and **-1** above).		
2.5 Associated Installations	**2.5 Associated Installations**	
2.5.5 Lubricating Oil Arrangements **2** Lubricating oil drain pipes from the engine crankcase sump to the sump tank are to be continuously submerged at their outlet ends.	**2.5.5 Lubricating Oil Arrangements** **2** Lubricating oil drain pipes from the engine crankcase sump to the sump tank are to be submerged at their outlet ends.	-4 Incorporating UR M10.7.

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Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part D MACHINERY INSTALLATIONS** **D2 RECIPROCATING INTERNAL CONBUSTION ENGINES**	**GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part D MACHINERY INSTALLATIONS** **D2 RECIPROCATING INTERNAL CONBUSTION ENGINES**	
D2.2 Materials, Construction and Strength	**(Newly added)**	
D2.2.2 Construction, Installation and General The wording "lower explosive limit" in **2.2.2-6(3), Part D of the Rules** means as defined in 3.6.12 of *IEC* 60079-10-1:2021. The lowest applicable lower explosive limit of all possible gas or low-flashpoint fuels, fuel vapours or mixtures is to be considered.	**(Newly added)** (Newly added)	Incorporating Note of UR M10.5.
D2.4 Safety Devices	**D2.4 Safety Devices**	
D2.4.5 Crankcase Oil Mist Detection Arrangements **1** The wording "devices as deemed appropriate by the Society" specified in **2.4.5-1, Part D of the Rules** means to the types of temperature monitoring devices for bearings or equivalent devices approved by the Society.	**D2.4.5 Crankcase Oil Mist Detection Arrangements** **1** The wording "devices as deemed appropriate by the Society" specified in **2.4.5-1, Part D of the Rules** means to the types of temperature monitoring devices for main bearings, crankpin bearings and crosshead bearings approved by the Society or equivalent devices.	
2 The wording "temperature monitoring devices for	(Newly added)	-2 Incorporating Note of

Amended	Original	Remarks
bearings or equivalent devices" in **-1** above means as follows: (1) For crosshead engines The wording "bearings" includes at least journal and connecting rod bearings and the crosshead bearings. (2) For trunk piston engines The wording "temperature monitoring devices for bearings" may be accepted as an alternative to the oil mist detector only when the temperature of bearings, including the piston pin bearings, is monitored. (3) The wording "equivalent devices" includes measures applied to engines where specific design features to preclude the risk of crankcase explosion are incorporated, subject to satisfactory justification. (4) Examples of acceptable "temperature monitoring devices for bearings or equivalent devices" are as follows: (a) Temperature monitoring devices for bearings that fall under **(1)** or **(2)** above. (b) Bearing oil outlet temperature monitoring systems. (c) Splash oil temperature monitoring systems. (d) Measures applied to engines where specific design features to preclude the risk of crankcase explosions are incorporated, subject to satisfactory justification.		UR M10.9.
3 The wording "crankcase oil mist detection arrangements required to be fitted to engines are to be approved type" stipulated in **2.4.5-2, Part D of the Rules** refers to crankcase oil mist detection arrangement approved in accordance with **Chapter 6, Part 7 of the Guidance for the Approval of Materials and Equipment for Marine**	**2** The wording "crankcase oil mist detection arrangements required to be fitted to engines are to be approved type" stipulated in **2.4.5-2, Part D of the Rules** refers to crankcase oil mist detection arrangement approved in accordance with **Chapter 6, Part 7 of the Guidance for the Approval and Type Approval of Materials and**	

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Amended	Original	Remarks
Use. **4** The wording "a procedure deemed appropriate by the Society" in **2.4.5-2(7), Part D of the Rules** means the procedure specified in **6.3.3-3, Part 7 of the Guidance for the Approval of Materials and Equipment for Marine Use**.	**Equipment for Marine Use**. (Newly added)	Clarifying the procedure of oil mist generation as specified in 2.4.5-2(7), Part D of the Rules, in accordance with UR M10.19.

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Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS **Part 7 MACHINERY INSTALLATIONS** **Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES** **2.2 Materials, Construction and Strength** **2.2.2 Construction, Installation and General** **1** The wording "lower explosive limit" in **2.2.2-6(3), Part 7 of the Rules** means as defined in 3.6.12 of *IEC* 60079-10-1:2021. The lowest applicable lower explosive limit of all possible gas or low-flashpoint fuels, fuel vapours or mixtures is to be considered. **2** With respect to the ambient reference conditions specified in **2.2.2-7, Part 7 of the Rules**, expected component lifespan of the turbochargers with novel design features or no service records is to be based upon an air inlet temperature of 45°C.	**RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS** **Part 7 MACHINERY INSTALLATIONS** **Chapter 2 RECIPROCATING INTERNAL COMBUSTION ENGINES** **2.2 Materials, Construction and Strength** **2.2.2 Construction, Installation and General** (Newly added) With respect to the ambient reference conditions specified in **2.2.2-7, Part 7 of the Rules**, expected component lifespan of the turbochargers with novel design features or no service records is to be based upon an air inlet temperature of 45°C.	Incorporating Note of UR M10.5.

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Amended	Original	Remarks
2.4 Safety Devices	**2.4 Safety Devices**	
2.4.5 Crankcase Oil Mist Detection Arrangements **1** The wording "devices as deemed appropriate by the Society" specified in **2.4.5-1, Part 7 of the Rules** means to the types of temperature monitoring devices for bearings or equivalent devices approved by the Society.	**2.4.5 Crankcase Oil Mist Detection Arrangements** **1** The wording "devices as deemed appropriate by the Society" specified in **2.4.5-1, Part 7 of the Rules** means to the types of temperature monitoring devices for main bearings, crankpin bearings and crosshead bearings approved by the Society or equivalent devices.	
2 The wording "temperature monitoring devices for bearings or equivalent devices" in **-1** above means as follows: (1) For crosshead engines The wording "bearings" includes at least journal and connecting rod bearings and the crosshead bearings. (2) For trunk piston engines The wording "temperature monitoring devices for bearings" may be accepted as an alternative to the oil mist detector only when the temperature of bearings, including the piston pin bearings, is monitored. (3) The wording "equivalent devices" includes measures applied to engines where specific design features to preclude the risk of crankcase explosion are incorporated, subject to satisfactory justification. (4) Examples of acceptable "temperature monitoring devices for bearings or equivalent devices" are as follows: (a) Temperature monitoring devices for bearings that fall under **(1)** or **(2)** above. (b) Bearing oil outlet temperature monitoring systems. (c) Splash oil temperature monitoring systems.	(Newly added)	-2 Incorporating Note of UR M10.9.

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Amended	Original	Remarks
(d) Measures applied to engines where specific design features to preclude the risk of crankcase explosions are incorporated, subject to satisfactory justification. **3** The wording "crankcase oil mist detection arrangements required to be fitted to engines are to be approved type" stipulated in **2.4.5-2, Part 7 of the Rules** refers to crankcase oil mist detection arrangement approved in accordance with **Chapter 6, Part 7 of the Guidance for the Approval of Materials and Equipment for Marine Use**. **4** The wording "a procedure deemed appropriate by the Society" in **2.4.5-2(7), Part D of the Rules** means the procedure specified in **6.3.3-3, Part 7 of the Guidance for the Approval of Materials and Equipment for Marine Use.**	**2** The wording "crankcase oil mist detection arrangements required to be fitted to engines are to be approved type" stipulated in **2.4.5-2, Part 7 of the Rules** refers to crankcase oil mist detection arrangement approved in accordance with **Chapter 6, Part 7 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**. (Newly added)	Clarifying the procedure of oil mist generation as specified in 2.4.5-2(7), Part 7 of the Rules, in accordance with UR M10.19.
EFFECTIVE DATE AND APPLICATION **1.** The effective date of the amendments is 1 January 2026. **2.** Notwithstanding the amendments, the current requirements apply to reciprocating internal combustion engines other than those which fall under the following: (1) reciprocating internal combustion engines for which the application for approval is submitted to the Society on or after the effective date; or (2) reciprocating internal combustion engines installed in ships for which the date of contract for construction is on or after the effective date. * "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29. IACS PR No.29 (Rev.0, July 2009) 1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding. 2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.		

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For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided: (1) such alterations do not affect matters related to classification, or (2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval. The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed. **3.** If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply. **4.** If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder. Note: This Procedural Requirement applies from 1 July 2009.		