# M35 Alarms, remote indications and safeguards for main reciprocating I.C. engines installed in unattended machinery spaces

M35
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(Rev.1
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(Rev.2
1996)
(Rev.3
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Rev.4
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Mar 2016)
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Jan 2019)
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Note:

1. The requirements of M35 Rev.5 are to be uniformly implemented by IACS Societies for engines:
   i) when an application for certification of an engine is dated on or after 1 January 2010; or
   ii) which are installed in new ships for which the date of contract for construction is on or after 1 January 2010.

2. The requirements of M35 Rev.6 are to be uniformly implemented by IACS Societies for engines:
   i) when an application for certification of an engine is dated on or after 1 January 2015; or
   ii) which are installed in new ships for which the date of contract for construction is on or after 1 January 2015.

3. The requirements of M35 Rev.7 are to be uniformly implemented by IACS Societies for engines:
   i) when an application for certification of an engine is dated on or after 1 July 2017; or
   ii) which are installed in new ships for which the date of contract for construction is on or after 1 July 2017.

4. The “contracted for construction” date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No. 29.

5. The requirements of M35 Rev.8 are to be uniformly implemented by IACS Societies for engines:
   i) when an application for certification of an engine is dated on or after 1 January 2020; or
   ii) which are installed in new ships for which the date of contract for construction is on or after 1 January 2020.

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### 35.1 General

Alarms, remote indications and safeguards listed in Table 1 and 2 are respectively referred to cross-head and trunk-piston reciprocating I.C. engines.

### 35.2 Alarms

A system of alarm displays and controls is to be provided which readily ensures identification of faults in the machinery and satisfactory supervision of related equipment. This may be provided at a main control station or, alternatively, at subsidiary control stations. In the latter case, a master alarm display is to be provided at the main control station showing which of the subsidiary control stations is indicating a fault condition.

The detailed requirements covering communications of alarms from machinery spaces to the bridge area and accommodation for engineering personnel, are contained in M29.

### 35.3 Remote indications

Remote indications are required only for ships which are operated with machinery space unattended but under a continuous supervision from a position where control and monitoring devices are centralized, without the traditional watch service being done by personnel in machinery space.

### 35.4 Safeguards

#### 35.4.1 Automatic start of standby pumps – slow down

A suitable alarm is to be activated at the starting of those pumps for which the automatic starting is required.

#### 35.4.2 Automatic reduction of power

If overriding devices of the required automatic reduction of power are provided, they are to be so arranged as to preclude their inadvertent operation, and a suitable alarm is to be activated by their operation.

#### 35.4.3 Automatic stop – shut down

If overriding devices of the required automatic stops are provided, they are to be so arranged as to preclude their inadvertent operation, and a suitable alarm is to be operated by their activation. When the engine is stopped automatically, restarting after restoration of normal operating conditions is to be possible only after manual reset, e.g. by-passing the control lever through the 'stop' position.
Automatic restarting is not permissible (see M30.2.8).

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## Table 1 Cross-head diesel engines

| | Gr 1 | | | Gr 2 | Gr 3 |
|---|---|---|---|---|---|
| **Monitored parameters for cross-head diesel engines** | **Remote Indication** | **Alarm activation** | **Slow down with alarm** | **Automatic start of standby pump with alarm** | **Shut down with alarm** |
| **1.0 Fuel oil system** | | | | | |
| Fuel oil pressure after filter (engine inlet) | x | low | | x | |
| Fuel oil viscosity before injection pumps or<br>Fuel oil temp before injection pumps | | high<br>low | | | |
| Leakage from high pressure pipes | | x | | | |
| Level of fuel oil in daily service tank[1] | | low | | | |
| Common rail fuel oil pressure | | low | | | |
| | | | | | |
| **2.0 Lubricating oil system** | | | | | |
| Lub oil to main bearing and thrust bearing, pressure | x | low | x | x | x |
| Lub oil to crosshead bearing pressure[2] | x | low | x | x | x |
| Lub oil to camshaft pressure[2] | | low | | x | x |
| Lub oil to camshaft temp[2] | | high | | | |
| Lub oil inlet temp | | high | | | |
| Thrust bearing pads temp or bearing outlet temp | | high | x | | x |
| Activation of oil mist detection arrangements (or activation of the temperature monitoring systems or equivalent devices of:<br>- the engine main, crank and crosshead bearing oil outlet; or<br>- the engine main, crank and crosshead bearing) [3] | | x | x | | |
| Flow rate cylinder lubricator. Each apparatus | | low | x | | |
| Level in lubricating oil tanks[4] | | low | | | |
| Common rail servo oil pressure | | low | | | |
| | | | | | |
| **3.0 Turbocharger system** | | | | | |
| Turbocharger lub oil inlet pressure[9] | | low | | | |
| Turbocharger lub oil outlet temp each bearing[10] | | high | | | |
| Speed of turbocharger[11] | x | high | | | |
| | | | | | |
| **4.0 Piston cooling system** | | | | | |
| Piston coolant inlet pressure[5] | | low | x | x | |
| Piston coolant outlet temp each cylinder | | high | x | | |
| Piston coolant outlet flow each cylinder[8] | | low | x | | |
| Level of piston coolant in expansion tank | | low | | | |
| | | | | | |
| **5.0 Sea water cooling system** | | | | | |
| Sea water pressure | | low | | x | |

**Gr 1** **Common sensor for indication, alarm, slow down**
**Gr 2** **Sensor for automatic start of standby pump with alarm**
**Gr 3** **Sensor for shut down**

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**Table 1 (continued)**

| Monitored parameters for cross-head diesel engines | Gr 1 Remote Indication | Gr 1 Alarm activation | Gr 1 Slow down with alarm | Gr 2 Automatic start of standby pump with alarm | Gr 3 Shut down with alarm |
|---|---|---|---|---|---|
| **6.0 Cylinder fresh cooling water system** | | | | | |
| Cylinder water inlet pressure | | low | x | x | |
| Cylinder water outlet temp (from each cylinder) or Cylinder water outlet temp (general)[6] | | high | x | | |
| Oily contamination of engine cooling water system[7] | | x | | | |
| Level of cylinder cooling water in expansion tank | | low | | | |
| | | | | | |
| **7.0 Starting and control air systems** | | | | | |
| Starting air pressure before main shut-off valve | x | low | | | |
| Control air pressure | | low | | | |
| Safety air pressure | | low | | | |
| | | | | | |
| **8.0 Scavenge air system** | | | | | |
| Scavenge air receiver pressure | x | | | | |
| Scavenge air box temp (fire) | | high | x | | |
| Scavenge air receiver water level | | high | | | |
| | | | | | |
| **9.0 Exhaust gas system** | | | | | |
| Exhaust gas temp after each cylinder | x | high | x | | |
| Exhaust gas temp after each cylinder. Deviation from average. | | high | | | |
| Exhaust gas temp before each T/C | x | high | | | |
| Exhaust gas temp after each T/C | x | high | | | |
| | | | | | |
| **10.0 Fuel valve coolant** | | | | | |
| Pressure of fuel valve coolant | | low | | x | |
| Temperature of fuel valve coolant | | high | | | |
| Level of fuel valve coolant in expansion tank | | low | | | |
| | | | | | |
| **11.0 Engine speed/direction of rotation.** | x | | | | |
| **Wrong way** | | x | | | |
| | | | | | |
| **12.0 Engine overspeed** | | | | | x |
| | | | | | |
| **13.0 Control-Safety-Alarm system power supply failure** | | x | | | |

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1 High-level alarm is also required if no suitable overflow arrangement is provided.

2 If separate lub oil systems are installed.

3 When required by UR M10.8 or by SOLAS Reg. II-1/47.2.

4 Where separate lubricating oil systems are installed (e.g. camshaft, rocker arms, etc.), individual level alarms are required for the tanks.

5 The slow down is not required if the coolant is oil taken from the main cooling system of the engine.

6 Where one common cooling space without individual stop valves is employed for all cylinder jackets.

7 Where main engine cooling water is used in fuel and lubricating oil heat exchangers.

8 Where outlet flow cannot be monitored due to engine design, alternative arrangement may be accepted.

9 Unless provided with a self-contained lubricating oil system integrated with the turbocharger.

10 Where outlet temperature from each bearing cannot be monitored due to the engine/turbocharger design alternative arrangements may be accepted. Continuous monitoring of inlet pressure and inlet temperature in combination with specific intervals for bearing inspection in accordance with the turbocharger manufacturer’s instructions may be accepted as an alternative.

11 Only required for turbochargers of Categories B and C. (see M73.5)

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## Table 2 Trunk-piston diesel engines

| | Gr 1 | | | Gr 2 | Gr 3 |
|---|---|---|---|---|---|
| **Monitored parameters for trunk-piston diesel engines** | **Remote Indication** | **Alarm activation** | **Slow down with alarm** | **Automatic start of standby pump with alarm** | **Shut down with alarm** |
| **1.0 Fuel oil system** | | | | | |
| Fuel oil pressure after filter (engine inlet) | x | low | | x | |
| Fuel oil viscosity before injection pumps or<br>Fuel oil temp before injection pumps[1] | | high<br>low | | | |
| Leakage from high pressure pipes | | x | | | |
| Level of fuel oil in daily service tank[2] | | low | | | |
| Common rail fuel oil pressure | | low | | | |
| | | | | | |
| **2.0 Lubrication oil system** | | | | | |
| Lub oil to main bearing and thrust bearing, pressure | x | low | | x | x |
| Lub oil filter differential pressure | x | high | | | |
| Lub oil inlet temp | x | high | | | |
| Activation of oil mist detection arrangements (or activation of the temperature monitoring systems or equivalent devices of:<br>- the engine main and crank bearing oil outlet; or<br>- the engine main and crank bearing)[3] | | x | | | x |
| Flow rate cylinder lubricator. Each apparatus | | low | x | | |
| Common rail servo oil pressure | | low | | | |
| | | | | | |
| **3.0 Turbocharger system** | | | | | |
| Turbocharger lub oil inlet pressure[4] | x | low | | | |
| Turbocharger lub oil temperature each bearing[7] | | high | | | |
| Speed of turbocharger[8] | x | high | | | |
| | | | | | |
| **4.0 Sea Water cooling system** | | | | | |
| Sea Water pressure | x | low | | x | |
| | | | | | |
| **5.0 Cylinder fresh cooling water system** | | | | | |
| Cylinder water inlet pressure or flow | x | low | x | x | |
| Cylinder water outlet temp (general)[5] | x | high | x | | |
| Level of cylinder cooling water in expansion tank | | low | | | |
| | | | | | |
| **6.0 Starting and control air systems** | | | | | |
| Starting air pressure before main shut-off valve | x | low | | | |
| Control air pressure | x | low | | | |

**Gr 1 Common sensor for indication, alarm, slow down**
**Gr 2 Sensor for automatic start of standby pump with alarm**
**Gr 3 Sensor for shut down**

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**Table 2 (continued)**

| Monitored parameters for trunk-piston diesel engines | Gr 1 | | | Gr 2 | Gr 3 |
|---|---|---|---|---|---|
| | Remote Indication | Alarm activation | Slow down with alarm | Automatic start of standby pump with alarm | Shut down with alarm |
| **7.0 Scavenge air system** | | | | | |
| Scavenge air receiver temp | | high | | | |
| | | | | | |
| **8.0 Exhaust Gas system** | | | | | |
| Exhaust gas temp after each cylinder[6] | x | high | x | | |
| Exhaust gas temp after each cylinder. Deviation from average[6] | | high | | | |
| | | | | | |
| **9.0 Engine speed** | x | | | | |
| | | | | | |
| **10.0 Engine overspeed** | | | | | x |
| | | | | | |
| **11.0 Control-Safety-Alarm system power supply failure** | | x | | | |

1 For heavy fuel oil burning engines only.

2 High-level alarm is also required if no suitable overflow arrangement is provided.

3 When required by UR M10.8 or by SOLAS Reg. II-1/47.2: for each engine, one oil mist detector (or engine bearing temperature monitoring system or equivalent device) having two independent outputs for initiating the alarm and shut-down would satisfy the requirement for independence between alarm and shut-down systems.

4 Unless provided with a self-contained lubricating oil system integrated with the turbocharger.

5 Two separate sensors are required for alarm and slow down.

6 For engine power > 500 kW/cyl.

7 Where outlet temperature from each bearing cannot be monitored due to the engine/ turbocharger design alternative arrangements may be accepted. Continuous monitoring of inlet pressure and inlet temperature in combination with specific intervals for bearing inspection in accordance with the turbocharger manufacturer's instructions may be accepted as an alternative.

8 Only required for turbochargers of Categories B and C. (see M73.5)

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