

## Safety Precautions and Engine Data

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## Safety Precautions

### General

Correct operation and maintenance, which is the aim of this book, are crucial points for obtaining optimum safety in the engine room. The general measures mentioned here should therefore be routine practice for the entire engine room staff.

### Special Dangers: Warning

*Keep clear of space below crane with load.*

*The opening of cocks may cause discharge of hot liquids or gases.*

*Think out beforehand which way liquids, gases or flames will move, and keep clear.*

*The dismantling of parts may cause the release of springs.*

*The removal of fuel valves (or other valves in the cylinder cover) may cause oil to run down onto the piston crown. If the piston is hot, an explosion might blow out the valve.*

*When testing fuel valves, do not touch the spray holes, as the jets may pierce the skin.*

### Cleanliness

The engine room should be kept clean both above and below the floor plates.

If there is a risk of grit or sand blowing into the engine room, when the ship is in port, the ventilation should be stopped and ventilating ducts, skylights and engine room doors closed.

Welding, or other work which causes spreading of grit and/or swarf, must not be carried out near the engine unless it is closed or protected, and the turbocharger air intake filters covered.

The exterior of the engine should be kept clean, and the paintwork maintained, so that leakages can be easily detected.

<b>Warning !</b>
<p>Keep the areas around the relief valves free of oil, grease, etc. to prevent the risk of fire caused by the emitted hot air/gas in the event that the relief valves open.</p>

### Fire

*Do not weld or use naked lights in the engine room, until it has been ascertained that no explosive gases, vapour or liquids are present.*

If the crankcase is opened before the engine is cold, welding and the use of naked flames will involve the risk of explosions and fire. The same applies to inspection of oil tanks and of the spaces below the floor.

Attention is furthermore drawn to the danger of fire when using paint and solvents having a low flash point.

Porous insulating material, soaked with oil from leakages, is easily inflammable and should be renewed.

See also: 'Fire in scavenge air box' and 'Ignition in Crankcase', Chapter 704, and 'Sealing Materials' in this Chapter.

### Order/Tidiness

Hand tools should be placed on easily accessible tool panels. Special tools should be fastened in the engine room, close to the area of application.

No major objects must be left unfastened, and the floor and passages should be kept clear.

### Spares

Large spare parts should, as far as possible, be placed near the area of application, well secured, and accessible by crane.

All spares should be protected against corrosion and mechanical damage. The stock should be checked at intervals and replenished in good time.

### Lighting

Ample working light should be permanently installed at appropriate places in the engine room, and portable working light should be obtainable everywhere.

Special lamps should be available for insertion through the scavenge ports.

### Low Temperatures - freezing

If there is a risk of freezing, then all engines, pumps, coolers, and pipe systems should be emptied of cooling water.

### Check and Maintain

Measuring equipment, filter elements, and lubricating oil condition.

### Entering the Crankcase or Cylinder

Always ensure that the turning gear is engaged; even at the quay, the wake from other ships may turn the propeller and thus the engine.

*Check beforehand that the starting air supply to the engine and the starting air distributor, is shut off.*

*In case of oil mist alarm, precautions must be taken before opening to crankcase (see Chapter 704 'Ignition in Crankcase')*

### Turning Gear

*Before engaging the turning gear, check that the starting air supply is shut off, and that the indicator cocks are open.*

When the turning gear is engaged, check that the indicator lamp "Turning gear in" has switched on.

### Slow-turning

If the engine has been stopped for more than 30 minutes, slow-turning should always be effected, just before starting in order to safeguard free rotation of the engine, see Chapter 703.

### Feeling over

Whenever repairs or alterations have been made to moving parts, bearings, etc., apply the "Feel-over sequence" (see Chapter 703, Item 3.2, 'Check 9') until satisfied that there is no undue heating (friction, oil-mist formation, blow-by, failure of cooling water or lubricating oil systems, etc.).

Feel over after 10-15 minutes' running, again after 1 hour's running, and finally shortly after the engine has reached full load. See Chapter 703, Item 3.2, 'Check 9'.

### Sealing Materials

Use gloves when removing O-rings and other rubber/plastic-based sealing materials, which have been subjected to **abnormally high temperatures**.

These materials may have a **caustic effect** when being touched directly.

The gloves should be made of neoprene or PVC.

Used gloves must be discarded.

### Safety Cap in Starting Air Line

If the bursting disc of the safety cap is damaged due to excessive pressure in the starting air line, overhaul or replace the starting valve which caused the burst, and mount a new disc.

If a new disc is not available immediately, turn the cover in relation to the cylinder, in order to reduce the leakage of starting air.

**Note:** Mount a new bursting disc and return the cover to the open position at the first opportunity.

		TEMPERATURE (°C) <sup>*7</sup>				PRESSURE (bar) <sup>*8</sup>						
		NORMAL <sup>*0</sup>	ALARM		SLOW DOWN	SHUT DOWN	NORMAL <sup>*0</sup>	LOWER ALARM	SLOW DOWN	SHUT DOWN	OTHERS	NOTES H <sup>*1</sup>
UPPER	LOWER											
FRESH WATER	INLET	65 - 70		57			3.5 - 4.5	2.0 <del>3.0</del>	1.5 <del>2.5</del>	1.4 <del>2.0</del>	△0.4 PDS8403 ON (ALARM)	H1=5000
	OUTLET	80 - 85	90		95							
MAIN BEARING LUB. OIL	INLET	40 - 47	55		60		2.1 - 2.4	1.7	1.5	1.3		H1=1800
PISTON COOL. OIL	INLET	40 - 47										
	OUTLET	50 - 65	70		75							
TURBOCHARGER LUB. OIL (NA57/TO9)	INLET						1.5 - 2.2	1.2				H1=6000
	OUTLET	55 - 70	75									
FRESH WATER OF AIR COOLER	INLET	10 - 36	40				2.0 - 4.5	1.0				
STARTING AIR							25 - 30	15				
SCAVENGING BOX FIRE DETECTOR			80		120 <del>80</del>							
SCAVENGING AIR RECEIVER		25 - 51	55								0.7/0.55 <sup>*2</sup> 0.45 <sup>*9</sup>	
CONTROL AIR (FOR MANEUVERING)							6.5 - 7.5	5.5				

	TEMPERATURE (°C) <sup>*7</sup>					PRESSURE (bar) <sup>*8</sup>					
	NORMAL <sup>*0</sup>	ALARM		SLOW DOWN	SHUT DOWN	NORMAL <sup>*0</sup>	LOWER ALARM	SLOW DOWN	SHUT DOWN	OTHERS	NOTES H <sup>*1</sup>
		UPPER	LOWER								
SAFETY AIR						6.5 - 7.5	5.5				
SPRING AIR FOR EXH. VALVE						6.5 - 7.5	5.5				
FUEL OIL AFTER FILTER	According to oil Viscosity 10 - 15cst.	150				7.0 - 8.0	6.5				H1=6000
		Vis. 20cst	Vis. 7cst								
EXH. GAS CYLINDER OUTLET	320 - 390 <sup>*3</sup>	430 Dev. ±40		450 Dev. ±50							
EXH. GAS T/C INLET	380 - 430 <sup>*3</sup>	480									
EXH. GAS T/C OUTLET	220 - 300 <sup>*3</sup>	350				Back press. at M.C.O. <3.5KPa					
THRUST BEARING SEGMENT	55 - 70	75		80	90						
AXIAL VIBRATION AMPLITUDE PEAK-PEAK (mm)	0-2.42	3.23		4.03							
ENG. REVOLUTION (r/min)	<108				114						
Remarks	<sup>*0</sup> : The "NORMAL" values are approximate and valid for 85-100% load if they are load dependent. <sup>*1</sup> : H is height from crank shaft center. H1 : Press. gauge, H2 : Press. switch <sup>*2</sup> : For aux. blowers automatic start/stop <sup>*3</sup> : Condition Ambient temp. in engine room is 25°C. Scavenge air temp. in receiver 35°C.					<sup>*7</sup> : All settings are to be ±2°C. <sup>*8</sup> : All settings are to be ±0.1bar <sup>*9</sup> : For aux. blower Failure					

	TEMPERATURE (°C) <sup>*7</sup>					PRESSURE (bar) <sup>*8</sup>					NOTES H <sup>*1</sup>
	NORMAL <sup>*0</sup>	ALARM		SLOW DOWN	SHUT DOWN	NORMAL <sup>*0</sup>	LOWER ALARM	UPPER ALARM	SLOW DOWN	SHUT DOWN	
		UPPER	LOWER								
ALPHA LUB. SYSTEM CYL. LUB. OIL	30-60	70				40 – 50	35				
Remarks 1.ALARM SYSTEM FOR ALPHA LUB. SYSTEM COMMON ALARM : In case of the MCU system detects a fault, the alarm will be released. Information about the cause of the alarm can be read of the number in the HMI panel. MCU POWER FAILURE :In case of the power to MCU system is interrupted, the alarm will be released. BCU POWER FAILURE : In case of the power to BCU system is interrupted, the alarm will be released. MCU FAILURE :The BCU system detects that the MCU system program execution has halted. BCU FAILURE :The BCU system detects a fault in the BCU system. 2.SLOW DOWN FOR ALPHA LUB. SYSTEM The slow down command is released if the MCU and BCU systems fail to lubricate one or more cylinders.											

SETTING OF PRESSURE SWITCH				
NO.	ITEM	SET. PRESS. bar	Q'T Y	REMARKS
PS 8109	MAIN LUB. OIL INLET, LOW PRESS.	↓ 1.3 <del>0.8</del>	1	FOR SHUT DOWN
PS 8402	COOL. FRESH WATER INLET	↓ 1.4 <del>1.2</del>	1	FOR SHUT DOWN
PS 8603	SCAV. AIR AUX. BLOWER CONTROL	↑ 0.7	1	FOR CONTROL
PS 8604	SCAV. AIR AUX. BLOWER, FAILURE	↓ 0.45	1	FOR ALARM (L)
PDS 8403	COOL. FRESH WATER ACROSS ENGINE	△ 0.4	1	FOR ALARM
PS 8505	AIR INLET TO AIR CYLINDER FOR EXH. VALVE	↓ 5.5	1	FOR ALARM (L)
PS 1118	MANEUVRING SYSTEM IN EMERGENCY CONTROL	↓ 2.0	1	
PS 1133	CANSEL OF TACHO ALARM FROM SAFETY SYSTEM,	↓ 4.0	1	
PS 1134	GIVES SIGNAL WHEN ON BRIDGE CONTROL	↓ 2.0	1	
TS 8107	THRUST BEARING SEGMENT	↑ 90	1	FOR SHUT DOWN
TS 415	SCAVENGING BOX OF EACH CYL. FIRE	↑ 120 <del>80</del>	7	FOR SLOW DOWN
<b>REMARKS</b>				
↓ : To be set at falling pressure ±0.1bar				
↑ : To be set at rising pressure ±0.1bar comment follow				