<table>
<thead>
<tr>
<th>Option</th>
<th>Execution</th>
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<tbody>
<tr>
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<td>Executions</td>
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<td>Fuel pump lubrication</td>
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<td>X X X X X X</td>
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<tr>
<td>EXTERNAL</td>
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<table>
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<table>
<thead>
<tr>
<th>Options</th>
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<th>MOO only with ≤ 0.1 % sulphur</th>
<th>Foundation arrangement</th>
<th>Turbocharger lubrication</th>
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</thead>
<tbody>
<tr>
<td>Fuel type</td>
<td></td>
<td></td>
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<td>STANDARD</td>
<td>INTERNAL</td>
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<td>NARROW</td>
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| Executions              | X               | X               | X                           | X                      | X                       |
|                        | X               | X               | X                           | X                      | X                       |
|                        | X               | X               | X                           | X                      | X                       |
|                        | X               | X               | X                           | X                      | X                       |

| Net Weight              | 1               | 1               | 1                           | 1                      | 1                       |
|                        | 1               | 1               | 1                           | 1                      | 1                       |
|                        | 1               | 1               | 1                           | 1                      | 1                       |
|                        | 1               | 1               | 1                           | 1                      | 1                       |

| Lubricating Oil System  | RAAD127042      |               |                | A032959F                 |                         |
|                        |                 |               |                | A032959F                 |                         |
|                        |                 |               |                | A032959F                 |                         |
|                        |                 |               |                | A032959F                 |                         |
|                        |                 |               |                | A032959F                 |                         |
|                        |                 |               |                | A032959F                 |                         |
|                        |                 |               |                | A032959F                 |                         |
|                        |                 |               |                | A032959F                 |                         |
SPECIFICATION WHICH MUST BE MET

**INLET** - High BN cylinder lubricating oil
- Cylinder lubricating oil temperature: 60°C ± 5°C
- Trace heating to be applied on the cylinder LO feed line on system side.
- Cylinder lubricating oil static pressure, min. 0.4 bar

**INLET** - Low BN cylinder lubricating oil
- Cylinder lubricating oil temperature: 60°C ± 5°C
- Trace heating to be applied on the cylinder LO feed line on system side.
- Cylinder lubricating oil static pressure, min. 0.4 bar

**OUTLET** - Oil drain servo system, oil return from engine free end
- Just needed in case a two-piece rail unit is installed.
- Free flow to lubricating oil drain tank

**OUTLET** - Oil drain supply unit
- Free flow to lubricating oil drain tank

**OUTLET** - Oil drain servo system, oil return from engine free end
- Just needed in case a two-piece rail unit is installed.
- Free flow to lubricating oil drain tank

**OUTLET** - Lubricating oil system
- Lubricating oil temperature
  - Controller set-point: 45°C (controller type: P0)
  - Tolerance steady state condition: 45 ± 2°C
  - Tolerance transient condition: 45 ± 4°C
- Lubricating oil pressure: 4 – 5 bar
- *An active pressure control device is needed, which could be either a bypass via pressure control valve or frequency controlled pumps, working with a closed loop control circle.
- Lubricating oil volume flow: according to C10
- Lubricating oil cleanliness:
  - Full flow filtered by 35 micron filter (absolute, sphere passing mesh)
  - Bypass cleaning of lubricating oil in drain tank by self-cleaning centrifugal separator

**INLET** - Crosshead lubricating oil
- Lubricating oil temperature
  - Controller set-point: 45°C (controller type: P0)
  - Tolerance steady state condition: 45 ± 2°C
  - Tolerance transient condition: 45 ± 4°C
- Lubricating oil pressure: 10 – 13 bar
- *An active pressure control device is needed, which could be either a bypass via pressure control valve or frequency controlled pumps, working with a closed loop control circle.
- Lubricating oil volume flow: according to C10
- Lubricating oil cleanliness:
  - Full flow filtered by 35 micron filter (absolute, sphere passing mesh)
  - Bypass cleaning of lubricating oil in drain tank by self-cleaning centrifugal separator

**OUTLET** - Oil drain servo system, oil return from engine free end
- Just needed in case a single-piece rail unit respectively 1-part crankshaft execution is installed.
- Free flow to lubricating oil drain tank.

**OUTLET** - Lubricating oil from bedplate vertical oil drain
- Drain to lubricating oil drain tank.
- Drain pipe position must within the permissible range as specified on the LO drain tank drawing final position to be informed by the shipyard to the engine manufacturer.
SYSTEM PROPOSAL - LO treatment system

AX02F: Number of cylinders

<table>
<thead>
<tr>
<th>Cylinder type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean LO tank volume</td>
<td>1/3</td>
</tr>
<tr>
<td>Dirty LO tank volume</td>
<td>1/5</td>
</tr>
<tr>
<td>LO separator min. capacity</td>
<td>1/4</td>
</tr>
<tr>
<td>Residue oil tank volume</td>
<td>1/5</td>
</tr>
</tbody>
</table>

Baselining:

- Air vent and drain valves where necessary.

- Air vent and drain pipes must be fully functional at all locations where the engine is to be operational.

- Specifications to be designed according to shipyard practice and component supplier's recommendations.

Main separating piping
Transfer / dirty LO pipes
Overflow / drain pipes
Air vent pipes
SPECIFICATION which must be met

OUTLET - Oil drain servo system, all return from engine driving end
  - Free flow to lubricating oil drain tank

OUTLET - Oil drain servo system, all return from engine free end
  - Free flow to lubricating oil drain tank

OUTLET - Oil drain supply unit
  - Free flow to lubricating oil drain tank

OUTLET - Oil drain servo system, all return from engine free end
  - Just needed in case a single piece rail unit respectively 1 part crankshaft execution is installed.
  - Free flow to lubricating oil drain tank

OUTLET - Lubricating oil from bedplate vertical oil drain
  - Drain to lubricating oil drain tank
  - Drain pipe must within the permissible range as specified on the LO drain tank drawing
  - Final position to be informed by the shipyard to the engine manufacturer.

INLET - Lubricating oil
  - Lubricating oil temperature
    - Controller set-point: 45 °C (controller type: PI)
    - Steady state condition: 45 ± 2 °C
    - Transient condition: 45 ± 4 °C
  - Lubricating oil pressure: 8 ~ 5 bar (*)
    - (*) An active pressure control device is needed, which could be either a bypass via pressure control valve or frequency controlled pumps, working with a closed loop control circuit.
  - Lubricating oil volume flow according to GTO
  - Lubricating oil cleanliness
    - Full flow filtered by 35 micron filter (absolute, sphere passing mesh)
    - Bypass cleaning of lubricating oil in drain tank by self-cleaning centrifugal separator.

OUTLET - Lubricating oil turbocharger
  - Must not be connected to other oil return lines.
  - Pipe outlet above the oil level in the LO drain tank or a drain pipe with venting holes above the truck oil level to be installed.
  - Connected to the lubricating oil drain tank, opposite to the main lubricating oil pump, i.e.
    - on tanks forward end if main lubricating oil pump suction is on tanks aft end,
    - on tanks aft end if main lubricating oil pump suction is on tanks forward end,
    - on tanks forward or aft end if main lubricating oil pump suction is in middle of tank.

INLET - Cross connection Lubricating oil
  - Lubricating oil temperature
    - Controller set-point: 45 °C (controller type: PI)
    - Steady state condition: 45 ± 2 °C
    - Transient condition: 45 ± 4 °C
  - Lubricating oil pressure: 8 ~ 13 bar (*)
    - (*) An active pressure control device is needed, which could be either a bypass via pressure control valve or frequency controlled pumps, working with a closed loop control circuit.
  - Lubricating oil volume flow according to GTO
  - Lubricating oil cleanliness
    - Full flow filtered by 35 micron filter (absolute, sphere passing mesh)
    - Bypass cleaning of lubricating oil in drain tank by self-cleaning centrifugal separator.

INLET - Cylinder lubricating oil
  - Cylinder lubricating oil temperature: 40°~70 °C
  - Tracer heating to be applied on the cylinder LO feed line on system side
  - Cylinder lubricating oil static pressure: min 0.4 bar

HEATING ELEMENT DAA0309761
  - 0.12 Mpa

LUBRICATING OIL SYSTEM without EAV
Schmiereilystem
Self-Regulating Heating Cable  10QTVR2-CT

**Order drawing**

**Specification:**
- **Description:** 10QTVR2-CT
- **Order No.:** 391991-000
- **Area Classification:** Non-hazardous and hazardous locations
- **Traced surface type:** Metal and plastic
- **Chemical Resistance:**
  - Exposure to aqueous inorganic chemicals: Use -CR (modified polyolefin outer jacket)
  - Exposure to organic chemicals or corrosives: Use -CT (fluoropolymer outer jacket)
- **Supply Voltage:** 200-277 VAC
- **Temperature Rating:**
  - Maximum maintain or continuous exposure temperature (power on) 225°F (110°C)
  - Maximum intermittent exposure temperature, 1000 hours (power on) 225°F (110°C)
  - Minimum installation temperature −76°F (−60°C)
- **Minimum Bending Radius:**
  - 13 mm at 20°C
  - 35 mm at −60°C
- **Height:** 4.5 mm
- **Width:** 11.8 mm
- **Weight:** 0.126 kg/m

**MAXIMUM CIRCUIT LENGTH BASED ON TYPE ‘C’ CIRCUIT BREAKERS ACCORDING TO EN60898 SUPPLY VOLTAGE 230 VAC**

<table>
<thead>
<tr>
<th>Electrical protection sizing</th>
<th>Start-up temperature</th>
<th>Maximum heating cable length per circuit [m]</th>
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</thead>
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<td>16A</td>
<td>−20°C</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>+10°C</td>
<td>80</td>
</tr>
<tr>
<td>25A</td>
<td>−20°C</td>
<td>95</td>
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<tr>
<td></td>
<td>+10°C</td>
<td>115</td>
</tr>
<tr>
<td>32A</td>
<td>−20°C</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td>+10°C</td>
<td>115</td>
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<td>40A</td>
<td>−20°C</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td>+10°C</td>
<td>115</td>
</tr>
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</table>

**Substitute for:**

PC  Q-Code  X  S  X  X

---

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Ra 12.5

SHARP EDGES REMOVED

H DEPENDS ON CHOCK THICKNESS

H = A - 45mm

FOR THE RELATION OF A SEE DRAWING DAAD033697
A-A

Ra 3.2

Ra 12.5

12x Ø21

(30°)

SHARP EDGES REMOVED
Ra 12.5/ (✓) SHARP EDGES REMOVED

A-A

Ra 3.2/

24x ø22

ø760

ø458

10

PLATE
OIL DRAIN VERTICAL
Blech
Ölablauf vertikal

W-2S

DAAD037262

PAAD119291
ROUGH CLEANED
WELD QUALITY CLASS Q3

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Product: OIL STRAINER
Gelsieb zum Ölablauf in der Grundplatte

Units: mm, kg
Basic Material: ISO 8015
Surface Protection: SEE GROUP 0344
Tolerancing principle: ISO 8015
General tolerances according to ISO 2768-m

Date: 18.03.2013
Design: A recommendation
Drawing: 9722

Company: Wärtsilä
STRaight Length 244.5

Halter
zum Rahmen des Oelsiebes
FLAT BAR
ON FRAME FOR OIL STRAINE
Flachstahl
zum Rahmen des Oelsiebes

WÄRTSILÄ

Product
W-2S

Units
mm
kg
IDE

05.12.2012
ase06 A.Sekulic

07.12.2012
wwr001 Wroblewski

bha009 Haag

Scale
1:1

Size
A4

Page
1/1

Material
W-FU-235-JR

Not Weight 0.51

Q-Code
XXXXX

Main Dwg.

Standard
ISO JIS

Free Space
t for lic.

Drawing
ID
DAAD033853

Rev. —

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12.5

7

(300.5)

608

23

6
A-A

ø760

ø478

24x ø22

12x ø21

ø724

ø519

RUBBER GASKET
VERTICAL OIL DRAIN
Gummidichtung
Oelablauf vertikal

Product: W-2S

Units: mm

IDE: A_Sekulic

TOLERANCING PRINCIPLE: ISO 286-15

GENERAL TOLERANCES ACCORDING TO ISO 286-15

Scale: 1:4

Design Group: Barlović

Drawing No.: DAAD037284

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Specifications which must be met:

**X92/ B/DF**

### Dimensioning guidelines and capacities for tank design

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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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<td></td>
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<tr>
<td>h2</td>
<td>35</td>
<td>35</td>
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<td>47</td>
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<tr>
<td>Vr</td>
<td>17</td>
<td>19</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>29</td>
<td>31</td>
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<tr>
<td>Distance between suction pipe and bottom of tank</td>
<td>22</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Ag</td>
<td>1.5x suction pipe dia (DN)</td>
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<tr>
<td>Hx</td>
<td>min. 1.5x suction pipe dia</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Volume</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

1. Level after filling of external system, volume and level in the top oil drain tank depend on capacity of pipes, coolers, filters, etc. The oil volume in tank contains a part of the oil quantity, which drains back when the pumps are stopped.

2. The low-level alarm (h2) must be positioned in such a way that a proper pump suction is ensured under the conditions defined by the classification society.

3. Minimum inclination angles comply with the rules of classification society.

4. Distance (d) between suction pipe inlet of the main LO pump and the drain tank bottom has to be in accordance with the requirements of the pump manufacturer. As a guideline, the following formula can be applied: 
   
   \[ d = 0.04 \times \text{DN} + 30 \text{ mm} \]

5. The oil drain tank volume represents the min. requirement. The final tank dimensions must be aligned to dimensions restrictions by ship and engine structure and pump suction requirements.

6. To be kept during engine operation.

**LO DRAIN TANK - FILLING PROCESS**

- **First filling**
  - LO pump stopped
  - LO pump stopped

- **After system commissioning**
  - LO pump stopped
  - LO pump started

- **Second filling**
  - LO pump stopped
  - LO pump started

- **Engine in operation**
  - LO pump stopped
  - LO pump operated
SPECIFICATIONS that need to be met:

20. OUTLET - Lubricating oil for fuel pump lubrication
   - Free flow to fuel pump lubricating oil service tank

28. INLET - Lubricating oil for fuel pump lubrication
   - Lubricating oil temperature: SAE30 = 45±5°C
     SAE40 = 50±5°C
   - Lubricating oil pressure: 4-5 bar
   - Min required lubricating oil flow rate:
     W6X92 | W7X92 | W8X92 | W9X92 | W10X92 | W11X92 | W12X92
     5 m³/h | 7 m³/h | 8 m³/h | 9 m³/h | 9 m³/h | 9 m³/h | 9 m³/h
   - Lubricating oil cleanliness:
     - Full flow filtered by a 25 micron filter
       (absolute sphere passing mesh)
     - Offline cleaning of the fuel pump lubricating oil
       in the service tank by an offline fine filter
       cleaning system (removal efficiency: 98% of all
       particles >3 micron and 50% of all solid particles
       >0.8 micron in one single pass, water removal by
       absorption)
     - OR by centrifugal separator
**SYSTEM PROPOSAL**

**Diagram Description**

- **EC01**: Engine Plant
- **001**: Fuel pump lubricating oil service tank
- **002**: Heating coil (x2)
- **003**: Suction filter respectively silencer
- **004**: Lubricating oil pump (x2)
- **005**: Lubricating oil cooler (x3)
- **006**: Lubricating oil filter (15 micron absolute screen for engine manual)
- **007**: Transition piece (diameter) (x2)
- **008**:Offline draining line filtration system (x2)
- **009**: Automatic temperature control valve (x3)
- **010**: Tank partition wall with opening for venting and oil circulation

**Remarks**

- All vent and drain pipes must be fully functional at all inclination angles at the ship at which the engine must be operated.
- The pump capacity to be selected in regard to the specified lubricating oil flow ratio, the pump delivery head depends on the actual system layout (system pressure drop has to be considered to achieve the specified pressure at engine inlet).
- All pumps to be checked with pipe connection pipes.
- Possible configuration:
  - Dedicated filter element for depth filtration, particle removal efficiency 95% of all particles 10-50 microns and 90% of all solid particles 10-8 microns (to be clean, pass water and not be removed by oil and adsorption. Circulation rate 250 MPA.
  - Automatically maintains the oil temperature in the engine inlet at a min. 40°C (for SA40) or 45°C for SA50/R (especially when the main engine is not in operation for an extended time).
  - Coolant temperature at engine inlet: SA40: 40°C
  - SA50: 45°C
  - Max. temperature increase over the supply unit by 5°C, i.e., reference to the constant temperature set point of engine inlet the following temperatures at cooler inlet have to be considered: SA40: 50°C
  - SA50: 55°C
- The low-level alarm has to be positioned in such a way that an appropriate pump suction is always ensured, i.e., under all ship's conditions of trim on heel defined by class.

**Number of Cylinders**

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# MIDS – WinGD-X92DF - Lubricating Oil System (DG9722)

## TRACK CHANGES

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