Specifications which must be met:

OUTLET - Exhaust gas manifold waste gate
- Size of connection flange described in the pipe connection plan.
- Pipe diameter according to value B, defined on page 2.
- Waste gate connection pipe to main exhaust gas pipe should be kept as short as possible to avoid swirl and extensive back pressure.

OUTLET - Exhaust gas turbocharger
- Exhaust gas temperature and volume flow according to GTD
- The total back pressure of the exhaust gas system must be kept in the admissible range of:
  Design maximum (new condition) in gas mode and in diesel mode without exhaust gas treatment system: 30 mbar
  Design maximum (new condition) in diesel mode with exhaust gas treatment system: 60 mbar
  Operational maximum in gas mode: 45 mbar
  Operational maximum (faulted condition) in diesel mode without exhaust gas treatment system: 50 mbar
  Operational maximum (faulted condition) in diesel mode with exhaust gas treatment system: 80 mbar
- Pipe dimensions laid out according to the recommended gas velocities provided in the Marine Installation Manual (MIM) and by GTD.
  - The exhaust piping must be arranged in a way to avoid gases from accumulating.
  - The piping layout must consider the thermal expansion and vibration from turbocharger (TC) and main engine (ME). Thermal expansion of the ME to be calculated according to the formula in MIM. TC specific thermal expansion are provided by the TC supplier
  - Explosion relief devices with flameless pressure relief (rupture discs or spring loaded valves) must be installed in accordance with class requirements.
  - A continuous (extensive) exhaust gas flow into the engine room must be avoided.
  - Supports (fixation points) for carrying piping and exhaust gas system components deadweight must be installed in sufficient size and amount. In admissible tensions in the piping and forces acting on the turbocharger are not acceptable.
  - Exhaust gas pipes of several engines must not be connected.
  - Drains in adequate size and amount must be installed in the exhaust gas piping.
  - When the noise level on the bridge wing exceeds the class requirement (normally 60 - 70 dB(A)) a silencer must be applied.
  - An exhaust gas collector after the turbocharger must be installed.
### Main Engine X92DF

<table>
<thead>
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<th>No of Cyl.</th>
<th>A (mm) × 13</th>
<th>B (mm) × 13</th>
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### SYSTEM COMPONENTS
- 007 Compressor × 8
- 008 Exhaust gas pipe × 10
- 009 Expansion valve (valve to closed valves) × 4
- 011 Boiler × 2
- 015 Silencer (with water separator) × 11
- 016 Support × 4
- 018 Waste gate pipe
- 019 Transition piece × 1
- 020 Exhaust gas collector

### ENGINE COMPONENTS
- 017 Turbocharger
- 028 Foul gas manifold waste gate

### OUTLET
- 070 Exhaust gas turbine
- 071 Exhaust gas manifold waste gate

### Remarks:
- Drain plugs and drain cocks to be installed where necessary.
- All relevant dimensions and tolerances for the engine case connections.
- To be delivered by external supplier and to be installed by the shipyard.
- To be delivered by the engine builder and to be equipped on engine side.
- Installed as fixed or sliding type in accordance with requirements. In between fixed supports compressor information must be installed.
- Pipe material and connection to be determined by the shipyard after consideration of the system layout and measurement based on calculation specific calculation.
- Type of inlet anti backfire disks or self-closing spring loaded valve to be selected in accordance with class requirements and specification of the shipyard. When the security of the exhaust gas system is required. Never use the same pipes for a combination with high pressure gas systems. The pipe arrangement must be lower than 0.4 which may result in high exhaust gas pressure.
- Area ratio between the exhaust pipe diameter 3:1.6
- Slotted angle = 45°
- Dimension of expansion joint components must be defined by the shipyard in order to accept the thermal growth of exhaust manifold and exhaust pipe. All dimensions of the pipes covered by components must be lower than 1.5 times MPS with exhaust gas pressure.
- Pipe arrangement on engine side before compressor is to be non-return pipe size manifold.
- To be laid out and installed according to the requirements.
- Windows mounted on engine side and painted black.
- Optional: Manufacturer is required to meet noise requirements.
- Optional:
- The provided dimensions refer to an R1 rated engine, and serve just as a proposal to move the complete layout data as provided by the manufacturer.
Specifications which must be met:

OUTLET - Exhaust gas manifold waste gate
- Size of connection flange described in the pipe connection plan.
- Pipe diameter according to value B, defined on page 2.
- Waste gate connection pipe to main exhaust gas pipe should be kept as short as possible to avoid swirl and extensive back pressure.

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  - Operational maximum (faulted condition) in diesel mode with exhaust gas treatment system: 50 mbar
  - Operational maximum (faulted condition) in diesel mode without exhaust gas treatment system: 80 mbar
- Pipe dimensions laid out according to the recommended gas velocities provided in the Marine Installation Manual (MIM) and by GTD.
- The exhaust piping must be arranged in a way to avoid gases from accumulating.
- The piping layout must consider the thermal expansion and vibration from turbocharger (TC) and main engine (ME). Thermal expansion of the ME to be calculated according to the formula in MIM, TC specific thermal expansion are provided by the TC supplier.
- Explosion relief devices with flameless pressure relief (rupture discs or spring loaded valves) must be installed in accordance with class requirements.
- A continuous (extensive) exhaust gas flow into the engine room must be avoided.
- Supports (fixation points) for carrying piping and exhaust gas system components deadweight must be installed in sufficient size and amount. In admissible tensions in the piping and forces acting on the turbocharger are not acceptable.
- Exhaust gas pipes of several engines must not be connected.
- Drains in adequate size and amount must be installed in the exhaust gas piping.
- When the noise level on the bridge wing exceeds the class requirement (normally 60 - 70 dB(A)) a silencer must be applied.
- An exhaust gas collector after the turbocharger must be installed.
### Main Engine XP019

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**Exhaust System with Three Turbochargers**

- **Part 1:** Turbocharger 001
- **Part 2:** Turbocharger 002
- **Part 3:** Turbocharger 003

- #1: Fixed Pitch Propeller (FPP) Controllable Pitch Propeller
- #2: Main Engine

**Engine Components**

- **Outlet 1:** Exhaust gas turbine
- **Outlet 2:** Exhaust gas manifold waste gate

**Engine Consistency**

- A: Drain plugs and drain cocks to be installed where necessary.
- B: Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connections.
- C: To be delivered by external supplier and to be installed by the shipyard.
- D: To be delivered by the engine builder, to be already equipped on engine side.
- E: Installed as fixed or sliding type in accordance with requirements. Between fixed supports a compensator should be added. Installation details and requirements depend on the installation specific calculation.
- F: Origin of the pipes is taken from the shipbuilder's drawing. The pipes follow the ship's keel line. Dimensions are calculated and adjusted to the connecting configuration and the available space. The pipe dimensions are given in the technical drawing and are based on the available space. The pipe dimensions in the technical drawing are the real dimensions of the pipes. The pipe connections are shown in the technical drawing. The actual pipe dimensions are the ones specified in the technical drawing. The pipe dimensions in the technical drawing are the real dimensions of the pipes. The pipe connections are shown in the technical drawing. The actual pipe dimensions are the ones specified in the technical drawing.
MIDS_WinGD-X92DF_EXHAUST-SYSTEM (DG9726)

TRACK CHANGES

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