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Ships and marine technology — Hydraulic oil systems — Guidance for assembly and flushing

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Foreword

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 28522 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 3, *Piping and machinery*.

Ships and marine technology — Hydraulic oil systems — Guidance for assembly and flushing

1 Scope

This International Standard provides guidance for assembly and flushing of hydraulic oil systems. The aim of the flushing process is twofold:

— to remove dirt from the erection, installation, and

— to demonstrate that the pipes and the system as a whole are sufficiently clean.

This International Standard gives guidelines to ensure that pipes and components are mounted and tested correctly. It also gives practical conditions for the flushing oil and filter.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 28521:—[1], *Ships and marine technology — Hydraulic oil systems — Guidance for grades of cleanliness and flushing*

3 Recommended guidelines on assembly

3.1 General

Before assembling it shall be checked that blank-offs on pipes and components are undamaged. If blank-offs are damaged, cleaning shall be repeated.

After the pipe system is assembled, it shall be blown through with dry high-pressure air or nitrogen. In order to remove loose dirt and/or dry out the pipes, lint-free cloths may be pulled through the pipes before connection to components.

Testing for leakage of the pipe system is done with dry high-pressure air, and/or soap and water (with bypassed/blanked-off components). Leakage tests may be postponed during the shock and pressure testing procedure.

Specified flush oil (system or special oil) shall be used to fill the system. System components shall be bypassed.

Flush oil, pumped through a filter when filling, is to be checked carefully. Breathing and refilling shall be secured.

1) To be published.

3.2 Shock test

The pipe system shall be shock tested at least 25 times at a specified test pressure (with components bypassed).

Pump stations, assembled units and components that have not been pre-tested for cleanliness shall be flushed separately, unless they are delivered in a clean condition. This also applies to pipe systems if space on-board does not allow flushing of the assembled pipe systems.

NOTE Flushing the pipe system is possible by means of a separate flush-rig.

4 Recommended guidelines for flushing

Before/during flushing the following shall be observed.

a) The flush-rig must be equipped with the correct filter in relation to β_x, the "beta ratio". β_x is defined as follows: (number of particles filter intakes $> x$ µm)/(number of particles filter discharges $> x$ µm) where "x" is particle size in micrometres (µm).

b) To avoid a large loss of pressure, equivalent pipe dimensions should be connected and flushed separately. Circuits are always connected in series.

c) All built-in components are to be by-passed or blanked off.

d) A vibrating unit may be used during flushing.

e) The recommended flow velocity shall be determined from ISO 28521:—[2], Table 2.

f) The flush oil temperature shall be at least that of expected system service temperature, although not exceeding 60 °C. If the flush oil is disposed of after flushing, a maximum of 80 °C is acceptable. In cold and windy conditions the system may be covered by tarpaulins. It must be checked whether the pump can operate at the reduced viscosity due to the increased oil temperature.

g) The flushing procedure is to be maintained until satisfactory results are observed, see ISO 28521:—[2], Table 1.

h) With the flushing rig operable, system components, blanked-off earlier, are connected to the system according to the service schedule. Flushing oil level shall be maintained.

i) Activation sequence for good performance for all built in components is to be demonstrated and system working pressure is to be raised to normal working pressure simultaneously.

j) Check flush-oil cleanliness level.

5 Pressure testing

Pressure testing according to specification shall be done at this stage (with components by-passed or blanked-off) in order to verify pipe strength, system rigidity and integrity.

2) To be published.

6 Commissioning

The following events shall be considered in sequence when commissioning the system:

a) If non-system oil is used during flushing, it shall be replaced by designated system oil. When filling with clean system oil, a filter shall be used.

b) When the system is properly aligned and oil levels have been verified, the system pump units are to be started.

c) The need for breathing and refilling the oil system shall be observed. Pressure regulating and relief valves are to be adjusted to proper settings.

d) The system supplier representative shall be invited to acknowledge an acceptable level of cleanliness.

e) The system may be started as per normal service instructions for commencing the system performance test, see ISO 28521:—[3)], Table 1.

f) When documentation for achieved cleanliness is requested, proceed according to ISO 28521:—[3)], Table 1.

3) To be published.

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