
**Ships and marine technology —
Lubricating oil systems — Guidance for
grades of cleanliness and flushing**

*Navires et technologie maritime — Circuits d'huile de graissage —
Guide relatif aux degrés de propreté et de rinçage*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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 28520 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 3, *Piping and machinery*.

Ships and marine technology — Lubricating oil systems — Guidance for grades of cleanliness and flushing

1 Scope

This International Standard provides guidance for flushing of lubricating oil systems, and grading of the resultant cleanliness. The flushing process is twofold:

- to remove dirt from the erection and installation, and
- to demonstrate that the pipes and the system as a whole is sufficiently clean.

Crankcase and, where applicable, gearbox etc. are cleaned separately before flushing, and requirements relating to this are also specified in this International Standard. Similar considerations apply to the system tank and other components of the system.

For this International Standard, the cleaning process is considered as “washing through” when the Reynolds number, R_e , is $\leq 3\,000$, and “flushing” when the $R_e \geq 3\,000$.

NOTE If available, any original equipment manufacturer requirements for flushing take precedence over the requirements outlined in this International Standard.

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 4406, *Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles*

ISO 8501-1, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

ISO 28521¹⁾, *Ships and marine technology — Hydraulic oil systems — Guidance for grades of cleanliness and flushing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

1) To be published.

3.1

main engine

ME

prime mover used for propulsion of the vessel or to drive a ship's generator

3.2

turbocharger

TC

centrifugal blower driven by exhaust-gas turbines and used to supercharge an engine

3.3

lubricating oil

LO

petroleum product designed to reduce friction and heat between moving parts in internal combustion engines

3.4

Reynolds number

R_e

dimensionless ratio of the internal flow forces to the viscous forces within a fluid

NOTE An indicator of the flow characteristics (laminar or turbulent) of a moving fluid.

4 Recommended degrees of pipe cleaning

This clause specifies the recommended degrees of pipe cleaning during and after prefabrication for pipes or parts, possibly followed by inside surface treatment.

To ensure the best possible conditions for flushing, individual prefabricated parts should be made and cleaned, before erection on-board.

4.1 Degrees of pipe cleaning during/after prefabrication

Concerning prefabrication of pipes and parts, it is recommended that these are completely cleaned inside, which means that all welds associated with the welding of pipe sections and pipe branches should be smooth and free of slag, welding spatter, burns and porosities. Fillet welds on flanges should be smooth and finely grounded and should also be free of roundings as these can damage part of the joint faces. Concerning possible subsequent chemical acid-cleaning or mechanical blast-cleaning, the degree of cleaning should correspond to Sa 2 1/2 as specified in ISO 8501-1.

Steel sand should not be used for shot blasting, due to the risk of adhesion by magnetism or rusting; copper (Cu) slag should be used instead. Sealing surfaces are to be mechanically well protected during shot blasting.

4.2 Inside surface treatment

In order to maintain the above-mentioned degree of cleaning before erection on-board, it is recommended that the inside of the pipes be treated with an appropriate oil product.

Painting the inside with appropriate paint is sometimes prescribed by various manufacturers, and any such requirements should be followed.

5 Cleaning of system components

Shot blasting, grinding, painting and welding should not be executed in the near vicinity during cleaning operations on the items listed in 5.1 to 5.4.