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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee 8, *Ships and marine technology*, Subcommittee 4, *Outfitting and deck machinery*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Ships and marine technology — Marine cranes — Operation and maintenance requirements

1 Scope

This document specifies the operation and maintenance requirements of marine cranes, including electro-hydraulic cylinder luffing cranes, electro-hydraulic wire rope luffing cranes and electric wire rope luffing cranes.

This document is applicable to the following types of marine cranes operating in harbour or sheltered water conditions:

— deck cranes mounted on ships for handling equipment, cargo or containers in harbour or sheltered water conditions;

— floating cranes mounted on barges or pontoons for handling loads in harbour or sheltered water conditions;

— grab cranes mounted on ships, barges or pontoons for operating in harbour or sheltered water conditions;

— engine room, stores cranes, etc. mounted on ships for handling equipment and stores in harbour or sheltered water conditions.

For other marine cranes not covered by the above descriptions or for other environmental conditions this document can be referred.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3828, *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*

ISO 4306-1, *Cranes — Vocabulary — Part 1: General*

ILO C152. *Occupational Safety and Health (Dock Work) Convention, 1979*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3828 and ISO 4306-1 and the following apply.

3.1
manufacturer certificate
certificate issued by a marine crane manufacturer to confirm that the marine crane has been designed, manufactured and tested as required by the design standards and the requirements of the purchaser

Note 1 to entry: Suitable quality control according to quality management systems should also be confirmed.

3.2
competent organisation
organisation which carries out the approval, examination, testing and certification of marine cranes, such as Classification Societies

3.3
harbour or sheltered water conditions
water conditions where the ship will not experience significant motion due to wave action and where the significant wave height is not greater than 0,6 m

3.4
administration
flag state or competent authority under which jurisdiction the ship is registered and which authorises the *competent organisation* (3.2)

3.5
inspection
activity which is to be performed by the crane operator before and/or after crane operation and for the purposes of effective maintenance in order to ensure that the crane is in correct working condition as required by the manufacturer's instructions for use

4 Basic requirements

4.1 Documentation

The following documents shall be available throughout the lifetime of the marine crane.

— Manufacturer certificate.

— Instructions for use.

— Maintenance and repair records.

— "Register of Ships' Lifting Appliances and Cargo handling gear" according to Model Form and Certificates as required by Article 25(2) of ILO C152, if any.

— Certificates of Test and Thorough Examination of Lifting Appliances, Loose Gear and Wire rope according to Model Form and Certificates as required by Article 25(2) of ILO C152, if any.

— Certificates in addition, or different to, those required by ILO C152 as required by the Administration, if any.

The instructions for use shall contain the following information as a minimum:

— installation and commissioning instructions;

— general arrangement plans and schematics of electrical, hydraulic and pneumatic arrangements;

— instructions for safe operation;

— instructions for inspection before and after operations;

— instructions for out-of-service condition of the crane;

— instructions related to safe lifting of personnel (if applicable);

— operational limitations;

— information concerning the safe working load (SWL) of the crane and load-capacity chart;

— regular inspection instructions;

— identification of components;

— maintenance instructions;

— spare part lists;

— troubleshooting instructions.

4.2 Tools and accessories

Spare parts, tools and accessories which are required for routine operation and maintenance of the marine crane shall be readily available.

5 Operation

5.1 Precautions prior to use

Before operating the marine crane, the operator shall complete the pre-use inspection in accordance with the crane manufacturer's instructions for use.

The inspection shall cover the following as a minimum.

- Check that all parts (e.g. components, loose gear, etc.) of the marine crane and any other load bearing part involved in the lifting operation (e.g. eyeplates on the load to be lifted) are fit for purpose.
- Check that all required maintenance has been carried out.
- Check of correct function and status of safety/limiting devices, crane controls and indicators.
- Check whether the following signs and marking, as a minimum, are intact:
  - manufacturer's plate for the crane;
  - general marking of the marine crane and items of loose gear (e.g. SWL, outreach, etc.);
  - danger, warning and caution signs as defined in the instruction for use;
  - SWL vs. outreach charts (incl. environmental conditions and operational limitations).

The crane operator needs to ensure that the environmental conditions and the requirements of the actual lifting task are not exceeding the operational limitations and capability of the crane as defined by the crane manufacturer.

The following aspects shall be considered as a minimum.

- Capabilities of the crane are compatible with the actual lifting task (e.g. crane configuration, SWL, outreach, capacity and application of loose gear, etc.).
- Environmental conditions are not exceeding operational limitations (e.g. wind speed, significant wave height, location of the lift limited to harbour or sheltered waters, temperature, snow and ice, visibility, etc.).
- Lay down area capable of accommodating the lifted loads.
- Area of operation and view to the load is clear and unobstructed at all times (otherwise technical solutions are to be implemented providing an equivalent level of safety for the lifting operation).

5.2 Operation

The operation of the marine crane shall in general be in compliance with the requirements of the crane manufacturer as defined in the instructions for use.

The following aspects shall be observed as a minimum throughout the lifting operation in order to ensure that the operational limitations are not exceeded:

- change of environmental conditions;

— actual lifting conditions and potential changes during the lift (e.g. space available, other moving structures in way, potential changes of centre of gravity, approaching operational limitations, etc.);

— risk of contact between load or crane with any other structure;

— start and stop of motions (e.g. load swing, etc.);

— reserves for cases of emergency (e.g. SWL, space available for stopping, etc.);

— combination of cranes (if allowed by the administration) and combination of possible movements of the crane.

5.3 After operation

The requirements as given in the instructions for use concerning tasks to be carried out by the crane operator or maintenance personnel, after crane operations are completed, shall be observed.

Following completion of operation, any damages shall be recorded and repaired and any special maintenance shall be recorded and carried out.

The marine crane shall be powered down, locked and properly secured in its stowage arrangement.

Any requirements for the preparation of the marine crane for sailing of the vessel in an open sea environment shall be defined by the crane manufacturer and stated in the instruction for use (e.g. closure of ventilation openings, etc.).

Items of loose gear (e.g. hook blocks, grabs, spreader beams, etc.) shall also be safely secured and stowage arrangements separate to the marine crane may be required to be foreseen and applied.

The marine crane and items of loose gear need to be checked to ascertain whether they are in a suitable condition to be safely stowed.

In case the marine crane or items of loose gear are damaged but need to stay on board for a voyage, additional means of stowage may need to be applied.

6 Maintenance

6.1 General

The required maintenance plan shall be defined by the marine crane manufacturer in the instructions for use or in a separate document. The maintenance instructions shall address and minimize the risk of damages to, and the correct and safe function of, the marine crane or items of loose gear, ensuring safe and reliable operation and function. The following aspects shall be addressed in particular:

— structural (e.g. limits of corrosion and wear, damage, replacement of components and parts, etc.);

— mechanical (e.g. limits of wear, lubrication systems, brakes, etc.);

— electrical (e.g. damaged cables, etc.);

— hydraulic or pneumatic (e.g. damaged pipes and hoses, leaking or damaged hydraulic valves or cylinders, etc.);

— safety, protection, limiting, indicating and control devices and systems (e.g. correct function of devices).

Parts of the crane which do not usually last the design lifetime of the crane (e.g. wire ropes, brake linings, bearings, etc.) shall be specially identified by the crane manufacturer in the maintenance plan. The items shall be specially inspected and appropriately maintained, to assure their timely replacement in order to ensure safe and reliable operation of the marine crane. Any discard criteria and corrosion allowance shall be defined as required by the crane manufacturer and the competent organisation (e.g.

discard criteria for wire ropes, corrosion allowable for pins, etc.). In case of conflict, the more onerous requirement shall apply.

6.2 Maintenance intervals

The crane manufacturer shall define the required maintenance intervals for each part and component for which routine maintenance is required. Any maintenance activity shall be properly documented.

7 Inspection by the crane manufacturer

In case the maintenance and pre-use and post-use inspections carried out by the ship's crew in accordance with the instructions for use issued by the manufacturer reveals any issues which are outside the instructions for use, the crane manufacturer shall be consulted for assistance. This is of particular importance in case any safety critical components and systems are affected.

8 Troubleshooting

8.1 Troubleshooting for common issues

Common issues of a marine crane are all failures, fault indications, system messages and other undesirable events which are described in the manufacturer's instructions for use and which are foreseen by the manufacturer to be dealt with by the qualified and authorised personnel on-board.

8.2 Troubleshooting for remaining issues

The troubleshooting of any remaining issues are defined as issues which are not addressed in the instructions for use and for which the marine crane manufacturer has not authorised the personnel on-board to deal with such issues.

The troubleshooting of such issues shall only be carried out by the crane manufacturer or qualified personnel who have been authorised by the crane manufacturer.

Damaged or incorrectly functioning cranes shall be taken out-of-service immediately and shall be properly stowed in order to ensure that the crane does not pose a risk to the ship's safety.

Defective or damaged cranes shall not continue operation with a reduced SWL.