
Cranes — Maintenance —

Part 1:
General

Appareils de levage à charge suspendue — Entretien —

Partie 1: Généralités

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 23815-1 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 5, *Use, operation and maintenance*.

ISO 23815 consists of the following parts, under the general title *Cranes — Maintenance*:

— *Part 1: General*

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Cranes — Maintenance —

Part 1: General

1 Scope

This International Standard establishes required practices for the maintenance of cranes by owners/users.

2 Normative references

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

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

ISO 4306-2, *Cranes — Vocabulary — Part 2: Mobile cranes*

ISO 4306-3, *Cranes — Vocabulary — Part 3: Tower cranes*

ISO 4309, *Cranes — Wire ropes — Care, maintenance, installation, examination and discard*

ISO 9927-1, *Cranes — Inspections — Part 1: General*

ISO 12480-1:1997, *Cranes — Safe use — Part 1: General*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4306-1, ISO 4306-2, ISO 4306-3 and ISO 12480-1, and the following, apply.

3.1

maintenance

set of activities intended to keep a crane in, or to restore it to, a state in which it can perform its required function

EXAMPLE Monitoring, test and measurement, replacement, adjustment, repair, administrative action (in some cases).

3.2

planned maintenance

preventive maintenance

maintenance carried out in accordance with an established time schedule, and performed according to prescribed criteria, in order to reduce the probability of failure or the degradation of the functioning of a crane

NOTE The time schedule is set according to the elapsed time, the operating time, or the number of uses.

3.3 unplanned maintenance
corrective maintenance
breakdown maintenance
maintenance carried out after occurrence of a failure, or detection of a fault, in order to restore a functional crane to a state in which it can perform a required function

3.4 maintenance programme
programme designed to maintain the crane in a safe operational condition

3.5 responsible person
(maintenance) person appointed by a crane user or owner from those designated as maintenance personnel

4 Maintenance

4.1 Maintenance programme

4.1.1 General

A maintenance programme shall be established in accordance with the manufacturer's instructions. In the absence of manufacturer's instructions, the maintenance programme shall be established by a competent person. Dated records should be placed on file.

NOTE Regarding manuals, see ISO 12478-1.

4.1.2 Maintenance personnel

4.1.2.1 Duties

The maintenance personnel shall be responsible for maintaining the crane and for its safe and satisfactory operation. They shall carry out all necessary maintenance in accordance with the manufacturer's maintenance manual and within the safe system of work.

4.1.2.2 Minimum requirements

The maintenance personnel shall be

- a) competent,
- b) fully conversant with the machinery they are required to maintain and its hazards,
- c) properly instructed and trained, including their attendance at appropriate courses where special equipment is used, and
- d) familiar with ISO 12480-1:1997, Clause 10.

4.2 Planned maintenance

To ensure safe and satisfactory operation of the crane, a properly planned maintenance system shall be established and used.

Manufacturers' instruction books recommend that specific tasks be carried out at stated intervals, and that these periods should not be exceeded. They also specify the lubrication points that require attention, the interval or frequency of greasing and oil changes, and the grades and quality of lubricants to be used.

Furthermore, the instruction books also cover other essential maintenance such as replacement of filters, recommended tyre pressure, frequency of checking the security of fixing bolts and recommended torque settings, as well as other adjustments such as of clutch and brakes.

An effective planned maintenance system should recognize the possible need to prohibit use of the crane until essential maintenance work can be carried out.

4.3 Inspection-based maintenance

According to the result of daily inspection, frequent inspection (weekly, monthly), periodic inspection (quarterly, yearly), thorough inspection and other inspections (condition monitoring, out of service, accident occurrence, repair, earthquake), those items that it is determined are necessary to adjust or repair, or when the exchange of parts is considered necessary, shall be included in the maintenance programme.

4.4 Safety precautions

4.4.1 General

Only appropriately authorized maintenance personnel shall be permitted to work on energized equipment.

4.4.2 Prior to maintenance

The following precautions shall be taken before performing maintenance on a crane.

- a) The crane shall be moved to a location where it will cause the least interference with other cranes and operations in the area.
- b) If a load is attached to the crane, it shall be landed.
- c) All controllers shall be placed in the off position.
- d) A lockout/tag out procedure shall be performed. The tag indicating *under repair* shall be provided, or switches of a control or operating panel shall be locked in the OFF position. The tag or lock shall only be handled by a maintenance person.
- e) Warning signs and barriers shall be utilized on the floor beneath the crane where overhead maintenance work creates a hazard.
- f) The power source of the crane to be maintained shall be isolated.
- g) Before hydraulic equipment is to be disassembled, the hydraulic pressure shall be released.

4.4.3 After maintenance

After maintenance work is completed and before restoring the crane to normal operation:

- guards shall be reinstalled;
- safety devices shall be reactivated, and recalibrated if necessary;
- replaced parts and loose material shall be removed;
- maintenance tools and equipment shall be removed.

4.5 Adjustments and repairs

Any hazardous conditions disclosed by inspection in accordance with ISO 9927-1 shall be corrected before operation of the crane is resumed. Adjustments shall be made to ensure correct functioning of all components.

EXAMPLE Functional operating mechanisms, safety devices, control systems, power plants, braking systems.

In accordance with the routine checks called for in the maintenance programme, the following repairs or replacements shall be provided, as needed for operation:

- parts of functional operating mechanisms which are cracked, broken, corroded, bent or excessively worn;
- parts of the crane structure that are cracked, bent, broken or excessively corroded;
- damaged or worn hooks — repairs of forged hooks by welding or reshaping shall not be permitted;
- pitted or burned electrical contacts should be corrected only by replacement and in sets;
- controller parts should be lubricated as recommended in the manual supplied with the crane;
- function, instruction, caution or warning labels plated on pendant control stations shall be kept legible.

Replacement parts shall be at least equal to the original manufacturer's specifications.

Where repairs of load bearing members are made by welding, identification of materials shall be made and appropriate welding procedures shall be followed.

4.6 Lubrication

All moving parts of the crane for which lubrication is specified should be regularly lubricated. Lubricating systems should be checked for proper delivery of lubricant. Care should be taken to follow the manufacturer's recommendations as to the points and frequency of lubrication, maintenance of lubricant levels, and types of lubricant to be used. Machinery shall be stationary while lubricants are being applied and protection provided unless equipped with automatic or remote lubrication. (See also 4.7.2.2.)

4.7 Rope replacement and maintenance

4.7.1 Rope replacement

When a rope reaches any one of the removal/discard criteria specified in ISO 4309, it may be allowed to operate to the end of the work shift, only if based on the judgement of a qualified person. The rope shall be replaced after that work shift, at the end of the day, or at the latest time prior to the equipment being used by the next work shift.

4.7.2 Rope maintenance

4.7.2.1 General

Rope should be stored to prevent damage or deterioration. Rope shall be unreeled or uncoiled in a manner to avoid inducing a twist in or kinking of the rope. Before cutting the rope, means shall be used to prevent unlaying of the strand. During installation, care should be observed to avoid dragging the rope in dirt or around objects that will scrape, nick, crush or induce sharp bends.

4.7.2.2 Rope lubrication

Rope should be maintained in a well-lubricated condition. Lubricant applied as part of a maintenance programme shall be compatible with the original lubricant and shall be of a type that does not hinder visual inspection.

Those sections of rope that are located over sheaves, or otherwise hidden during inspection and maintenance require special attention when the rope is being lubricated.

4.8 Rated load test

Prior to return to service, all cranes in which load sustaining parts have been altered, replaced or repaired shall be load-tested or subject to approval by a qualified person.

Written report shall be furnished by a competent person, showing test procedure and confirming the adequacy or alterations.

No crane shall be re-rated in excess of the original load ratings unless such rating changes are approved by the crane manufacturer or an authorized person.

4.9 Maintenance records

Maintenance records shall include

- a) the scope of maintenance checks, adjustment and lubrication,
- b) observations on any abnormalities, and
- c) a list of the replacement of components.

Records shall be dated and signed, and kept readily available.