
Cranes — Inspections —

**Part 3:
Tower cranes**

*Appareils de levage à charge suspendue — Vérifications —
Partie 3: Grues à tour*

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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 96, *Cranes*, SC 7, *Tower cranes*.

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.

This second edition cancels and replaces the first edition (ISO 9927-3:2005), which has been technically revised. The main changes compared to the previous edition are as follows:

- in 6.4 and 7.4, information on results inspection has been updated;
- in 7.3, requirements have been revised.

This document is intended to be used in conjunction with ISO 9927-1.

A list of all parts in the ISO 9927 series can be found on the ISO website.

Cranes — Inspections —

Part 3: Tower cranes

1 Scope

This document specifies the regular inspections to be carried out on tower cranes.

It does not cover inspection prior to the first use of a tower crane.

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 4309, *Cranes — Wire ropes — Care and maintenance, inspection and discard*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 General

In order to ensure safe operation of tower cranes, their proper working and operational condition shall be maintained. Therefore, all cranes need to undergo regular inspections. This ensures that deviations from safe conditions are detected and can be rectified. The inspections shall be arranged.

The regular inspections are:

- daily inspections;
- frequent inspections;
- periodic inspections; and
- thorough inspections.

Inspections (periodicity, content, persons in charge, results and reports) shall be in accordance with [Clauses 5](#) to [9](#) and Table A.1 which provides an overview of the inspections.

NOTE The manufacturer can give inspection instructions that differ from those of this document. In this case, the manufacturer's instructions are applicable.

5 Daily inspections

5.1 General

Daily inspection shall be performed before starting. This inspection shall consist of a visual inspection (in general, no dismantling is required) and functional tests as defined hereafter.

They shall be carried out by a competent person (e.g. the crane operator).

5.2 Content

The inspections before each start shall take in:

- a) the functioning of mechanisms, in particular the brakes (generally without load);
- b) the functioning of limiting and indicating devices; and
- c) observation of conspicuous defects, including ropes.

5.3 Results

Any defect shall be pointed out to a person who can make a suitable decision (to leave the tower crane in use, repair, thorough inspection of a part of the tower crane or the whole tower crane, limitation of use).

The causes of these defects shall be investigated, depending on the type of component and defect concerned.

The operator's log shall be updated (date of the repair, method).

6 Frequent inspections

6.1 General

Any defect shall be pointed out to a person who can make a suitable decision (to leave the tower crane in use, repair, thorough inspection of a part of the tower crane or the whole tower crane, limitation of use).

The causes of these defects shall be investigated, depending on the type of component and defect concerned.

The record book shall be updated (date of the repair, method).

6.2 Items to be inspected

The following items shall be inspected:

- a) level of lubricants: leakage of lubricants, greasing;
- b) hydraulic equipment: leakage;
- c) hooks and latches: visible deformation, cracks, wear;
- d) wire ropes: in accordance with ISO 4309;
- e) connections, joints: corrosion, visual inspection;
- f) brake wear: thickness of brake linings, adjustment, noise, etc.;
- g) hydraulic and pneumatic hoses: in particular those which are bent during operations;
- h) electrical installation: state, signs of deterioration, moisture accumulation;

- i) anchorage: braces or guys supporting cranes (condition).

6.3 Periodicity

The periodicity of the frequent inspections shall take into account the actual use of the tower crane and the environment in which the tower crane is working.

The minimum periodicity is as follows:

- a) for 6.2 a) to 6.2 e), monthly;
- b) for 6.2 f) to 6.2 i), twice yearly.

6.4 Results

Any defect shall be pointed out to a person who can make a suitable decision (to leave the tower crane in use, repair, thorough inspection of a part of the tower crane or the whole tower crane, limitation of use).

The causes of these defects shall be investigated, depending on the type of component and defect concerned.

Maintenance record book should be presented. Inspection record book should be presented and updated.

7 Periodic inspections

7.1 General

Periodic inspections are inspections made periodically, as indicated in 7.3, and after each re-erection.

Periodic inspections shall comprise visual inspections (in general, no dismantling is required), and functional tests, both with and without load, as defined below.

They shall be carried out by a competent person (e.g. an experienced technician, see ISO 9927-1).

The competent person shall be in possession of:

- the report of the previous inspections; and
- the automatic registered data, where available, (cycles, hours, days, loads, etc.) permitting knowledge of the service time of the components for which data exist.

7.2 Content

The periodic inspections shall include the content of the frequent inspections.

The functional tests for all components shall be performed in the most unfavourable position for these components:

- a) verification of the tower crane's identification and plates;
- b) verification of the presence of the instruction handbook;
- c) verification of the records of maintenance;
- d) verification of the components, equipment and steel structure. Compare the component installed on the tower crane with the component listed in the documentation;
- e) consideration of the condition of equipment indicating its deterioration:
 - the gear or its components are loose and its oil (lubricant) leaks;

- visible couplings between particular components (e.g. motor, gear, brakes, drums) show wear or damage;
 - unusual noise and vibration is noticeable;
 - unusual high temperature is noticeable;
 - fastening bolts are loose, fissured or defective;
 - brake linings are worn or damaged;
 - the general condition (corrosion, dirt) is doubtful;
 - the electrical installation (cable entries, cable attachments) shows damage;
 - wire ropes (see ISO 4309);
 - hooks (see [Annex B](#));
- f) functional tests. Functioning and efficiency, with the rated load of:
- mechanisms, in particular the brakes; and
 - limiting and indicating devices;
- g) steel structure and rails:
- welding;
 - corrosion;
 - remaining deformation;
 - cracks;
- h) support of the tower crane/crane-track.

For an example, see ISO 9927-1:2013, Annex A.

7.3 Periodicity

Tower cranes shall be inspected at least each year and after each re-erection.

NOTE 1 Some verifications can be performed when the tower crane is dismantled.

NOTE 2 Changing the hoist rope reeving, i.e. from 2 falls to 4 falls or addition of a jib extension or tower section are not considered as dismantling and re-erection.

NOTE 3 After folding and unfolding of a self-erecting tower crane, there is need only for an inspection limited to [7.2](#) b), c), f), g) and h).

7.4 Results

Periodic inspections shall be recorded. This report shall indicate the components verified and remaining defects. An example of such a report is presented in Table C.1.

The report shall be given to a person who can make a suitable decision (to leave the tower crane in use, repair, thorough inspection of a part of the tower crane or the whole tower crane, limitation of use).

The causes of these defects shall be investigated, depending on the type of component and defect concerned.

Maintenance record book should be presented. Inspection record book should be presented and updated.

8 Thorough inspections

8.1 General

Thorough inspections are detailed inspections made with a periodicity according to [8.3](#) (and as identified in Table A.1).

They shall be performed by a competent person, capable of defining the actions needed to be taken depending on the results of these inspections (e.g. an expert engineer, see ISO 9927-1).

The competent person shall be in possession of:

- the report of the previous inspections; and
- the automatic registered data, where available, (cycles, hours, days, loads, etc.) permitting knowledge of the service time of the different components for which data exist.

8.2 Content

The thorough inspections shall comprise at least all the elements of the periodic inspections.

A thorough inspection can require non-destructive tests and/or dismantling if considered justified, taking into account:

- the content of the previous verifications (daily, frequent, periodic or thorough);
- the results of the current tests; and
- the result of the current visual checks.

When dismantling, special care shall be taken in order to avoid mistakes or wrong operation while following the maintenance instructions. If these are not available, the manufacturer of the tower crane or of the component concerned should be contacted for assistance.

During the thorough inspection, particular attention shall be given to the following:

- vibration;
- unusual noise or temperature;
- poor general condition, corrosion;
- alignment of machinery, motors and gears, rails, wheels, shafts;
- brakes;
- connections, bolts, pins.

8.3 Periodicity

8.3.1 Periodicity for tower cranes or components for tower cranes with no automatic data recording of use

Thorough inspection of a component or the tower crane is recommended at periodic intervals as recommended by the manufacturer and no longer than every 5 years.

8.3.2 Periodicity for tower cranes or components for tower cranes with automatic data recording of use

The instruction handbook should contain the periodicity of the thorough inspection of the crane and of the corresponding components based on the registered data, at least at the intervals given in [8.3.1](#).

In addition to the periodicity, the manufacturer should give guidance to reinitialize the value of the parameter (return to zero, keep the value as new origin, etc.).

8.4 Results

The report of the thorough inspection shall contain the result of the inspection made by the competent person as well as their conclusions and recommendations, including the time until the next thorough inspection.

An example of such a report is given in [Annex C](#).

When the tower crane or a component is not used as classified or is in a condition which seems to be hazardous, the competent person (see [8.1](#)) recommends appropriate action.

The causes of defects shall be investigated, depending on the type of component and defect concerned.

Maintenance record book should be presented. Inspection record book should be presented and updated.

9 Exceptional inspection

9.1 General

The inspection shall be carried out after:

- a) exceptional circumstances, such as:
 - extreme weather conditions (storm);
 - an earthquake of medium seismic intensity;
 - overload, collision or foundation disturbance;
 - fire;
 - premature component failure;
- b) substantial modification, for example, increase of rated capacity, change of mechanisms, transfer of control station, change of power, change in design of the load-bearing structure, welding on the load-bearing structure, modification of control system or change in operating condition relative to the class of utilisation and load spectrum.

The verifications shall be performed by a competent person (experienced technician or engineer, depending on the nature of the verification).

9.2 Content

The extent of the inspection shall be proportional to any damage or modification that can have occurred.

Annex A
(normative)

Overview of inspections

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Table A.1 — Overview of inspections

	Daily inspection	Frequent inspection	Periodic inspection	Thorough inspection
When (periodicity)	— Before each start up of the tower crane	— Monthly or every six months and/or according to the manufacturer's	— At a determined period (given in national regulations, given by the manufacturer or recommendation) — After dismantling/re-erection	— After finding a fundamental failure — At a determined period, either: — given in national regulations — given by the manufacturer, or — given by recommendation following report (frequent or periodic inspection) — As recommended in 8.3
What (content)	See 5.2	See 6.2	See 7.2	See 8.2
How	— Visual inspections — Functional tests Without dismantling	— Visual inspections — Functional tests Without dismantling	— Visual inspections, including reading of recording instruments — Functional tests (loaded and unloaded) Without dismantling, if not otherwise required by the manufacturer.	— Same as for the periodic inspection If necessary, with dismantling or measurement (play) or specific tests on all or part of the tower crane
By whom	Competent person (e.g. crane operator)	Competent person (experienced technician)	Competent person (experienced technician)	Competent person (engineer)
^a Systematic changes of certain parts can be recommended by the manufacturer or by a competent person.				

Table A.1 (continued)

Inspection results	Daily inspection	Frequent inspection	Periodic inspection	Thorough inspection
	— OK, or	— OK or,	— OK, or	— Date of the next inspection
	— request for repair if fault found, or	— request for repair if fault found or,	— request for repair if fault found, or	— Partial or total changes ^a , or
	— can give rise to a request for a thorough inspection (repetitive cases, major fault, etc.), or	— can give rise to a request for a thorough inspection (repetitive cases, major fault, etc.), or	— can give rise to a request for a thorough inspection (repetitive cases, major fault, etc.), or	— scrapping, or
Report	or	— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)	— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)	— request for repair, or
	— can give rise to a request for adequate information (e.g. driving, instructions, limit of use, etc.)	— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)	— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)	— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)
Maintenance book	Not systematic	Not systematic	The report shall include a check list of the points checked and a summary of the detected defects.	The report shall contain the findings of the competent person as well as his conclusions — list of repairs, period before next thorough inspection, tests to be performed, proposal for general overhaul, etc.
	Updating of maintenance book if repair is involved	Updating of maintenance book with reports on maintenance work, defects, damages, repairs, etc.	Updating of maintenance book with reports on maintenance work, defects, damages, repairs, etc.	Updating of maintenance book with reports on maintenance work, defects, damages, repairs, etc.
^a Systematic changes of certain parts can be recommended by the manufacturer or by a competent person.				

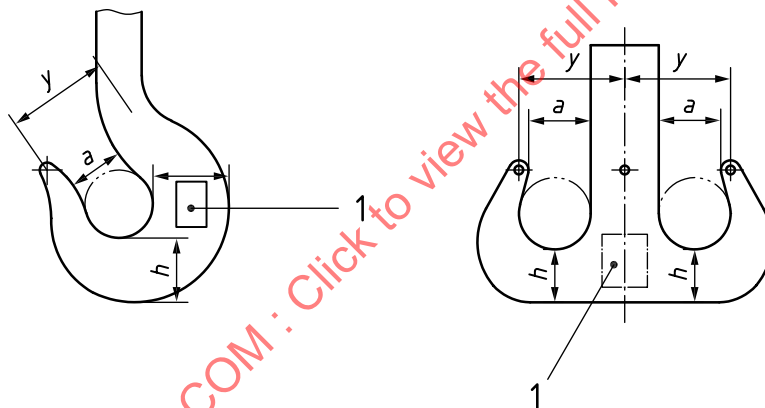
Annex B (informative)

Verification of hooks

This annex gives an example for the verification of hooks.

To apply the following method, the initial dimensions of the hooks need to be known. They are available from the manufacturer of the tower crane or of the hook.

- Deformation: if the openings a and y (see [Figure B.1](#)) have widened by more than 10 %, which is the maximum permissible limit, replace the load hook.
- Surface fissures: damage and surface fissures may be removed notchless, provided that the permissible tolerance levels are not exceeded.
- Wear: on single or twin hooks, it shall not be greater than 5 % of height h (see [Figure B.1](#)). It is not permitted to carry out welding work on load hooks, e.g. to compensate for wear.
- Hook neck shaft: cracks.



Key

- 1 marking
 a, y openings
 h height

Figure B.1 — Shape and dimensions of hooks

Annex C (informative)

Example of report for periodic, thorough or exceptional inspections

Company:

Date:

Crane type:

Serial No.: _

Manufacturer:

Year of construction:

Address of customer/hirer:

Construction site:

Stock number:

Person undertaking the inspection:

Signature:

Inspection observations:

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[illegible][illegible]

Table C.1 (continued)

No.	Subassembly	Part to be checked	Existing or complete		Condition or maintenance		Function		Repair or replacement		Re-examination	
			+	-	+	-	+	-	+	-	Necessary	
											Yes	No
3	Signs/safety distances	Type plate										
		Signs										
		Warning signs										
		Safety distances										
		to										
		to										
		to										
		to										
		Barriers										
+ met												
- not met												
not necessary												

[illegible]

Table C.1 (continued)

No.	Subassembly	Part to be checked	Existing or complete		Condition or maintenance		Function		Repair or replacement		Re-examination	
			+	-	+	-	+	-	+	-	Necessary	Carried out
5	Slewing gear	Clearance of the slewing ring										
		Fastening of the slewing ring										
		Test run of the slewing										
		Slewing gear pinion										
		Fastening of the gear										
		Slewing gear brake										
		Free jib slewing										
		Guarding of danger spots										

+ met

- not met

0 not necessary

Table C.1 (continued)

No.	Subassembly	Part to be checked	Existing or complete		Condition or maintenance		Function		Repair or replacement		Re-examination		
			+	-	+	-	+	-	+	-	Necessary	Carried out	
											Yes	No	Date/Signature
6	Hoisting winch	Coupling											
		Changing gear											
		Interlock of changing gear											
		Rope drum mounting											
		Fastening of the hoisting winch											
		Clearance of brake linings											
		Brake disk											
		Brake release unit											
		Springs											
		Brake test											
		Lowering without power											
		Rope fastening											
		2 safety turns											

Table C.1 (continued)

No.	Subassembly	Part to be checked	Existing or complete		Condition or maintenance		Function		Repair or replacement		Re-examination			
			+	-	+	-	+	-	+	-	Necessary		Carried out	
											Yes	No		Date/Signature
7	Luffing gear	Coupling												
		Changing gear												
		Interlock of changing gear												
		Rope drum mounting												
		Fastening of the hoisting winch												
		Clearance of brake linings												
		Brake disk												
		Brake release unit												
		Springs												
		Brake test												
		Lowering without power												
		Rope fastening												
		2 safety turns												
+ met														
- not met														
o not necessary														

Table C.1 (continued)

No.	Subassembly	Part to be checked	Existing or complete		Condition or maintenance		Function		Repair or replacement		Re-examination		
			+	-	+	-	+	-	+	-	Necessary		Carried out
											Yes	No	
8	Auxiliary hoisting winch	Coupling											
		Changing gear											
		Interlock of changing gear											
		Rope drum mounting											
		Fastening of the hoisting winch											
		Clearance of brake linings											
		Brake disk											
		Brake release unit											
		Springs											
		Brake test											
		Lowering without power											
		Rope fastening											
		2 safety turns											

Table C.1 (continued)

[illegible]

Table C.1 (continued)

No.	Subassembly	Part to be checked	Existing or complete		Condition or maintenance		Function		Repair or replacement		Re-examination		
			+	-	+	-	+	-	+	-	Necessary		Carried out
											Yes	No	
11	Tower construction	Welds free of cracks											
		Corner posts											
		Diagonals											
		Bolt connections											
		Pin connections											
		Tower joints											
12	Jib construction	Welds free of cracks											
		Upper and lower chords											
		Diagonals											
		Bolt connections											
		Pin connections											
		Jib joints											
+ met													
- not met													
not necessary													

Table C.1 (continued)

No.	Subassembly	Part to be checked	Existing or complete		Condition or maintenance		Function		Repair or replacement		Re-examination	
			+	-	+	-	+	-	+	-	Necessary	
											Yes	No
13	Counter-jib	Welds free of cracks										
		Counter-jib chords/girder										
		Diagonals										
		Bolt connections										
		Pin connections										
		Counter-jib joints										
14	Access, walkways, platforms	Ladders										
		Hoop guards										
		Personal protective equipment against falls from a height										
		Walkways										
		Platforms										
		Safety device against falling down										