
Cranes — Inspections —

**Part 3:
Tower cranes**

Appareils de levage à charge suspendue — Vérifications —

Partie 3: Grues à tour

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Published in Switzerland

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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.

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 9927-3 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 7, *Tower cranes*.

ISO 9927 consists of the following parts, under the general title *Cranes — Inspections*:

- *Part 1: General*
- *Part 3: Tower cranes*

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Cranes — Inspections —

Part 3: Tower cranes

1 Scope

This part of ISO 9927 specifies the regular inspections to be carried out on tower cranes. It is intended to be used in conjunction with ISO 9927-1. It does not cover inspection prior to the first use of a tower crane.

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

ISO 9927-1:1994, *Cranes — Inspections — Part 1: General*

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3 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 by the user.

The regular inspections are

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

NOTE The manufacturer can give inspection instructions that differ from those of this part of ISO 9927. In this case, it is the manufacturer's instructions that are applicable.

Annex A gives an overview of the inspections (periodicity, content, persons in charge, results and reports).

4 Daily inspections

4.1 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 driver).

4.2 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.

4.3 Results

Any defect shall be pointed out to a person who can take 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 sought depending on the type of component and defect concerned.

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

5 Frequent inspections

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5.1 General

Frequent inspections shall comprise visual inspections (in general, no dismantling is required), as specified in 5.2, and the functional tests according to 4.2.

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

5.2 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).

5.3 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 5.2 a) to 5.2 e), monthly;
- b) for 5.2 f) to 5.2 i), twice yearly.

5.4 Results

Any defect shall be pointed out to a person who can take 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 sought, depending on the type of component and defect concerned.

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

6 Periodic inspections

6.1 General

Periodic inspections are inspections made periodically, as indicated in 6.3, 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.

6.2 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.

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For an example, see ISO 9927-1:1997, Annex A.

6.3 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 of the pulley block 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 b), c), f), g) and h) of 6.2.

6.4 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 Annex C.

The report shall be given to a person who can take 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 sought, depending on the type of component and defect concerned.

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

7 Thorough inspections

7.1 General

Thorough inspections are detailed inspections made with a periodicity according to 7.3 (and as identified in Annex A).

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.

7.2 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.

7.3 Periodicity

7.3.1 Periodicity for tower cranes or components for tower cranes with no automatic registration on use

Thorough inspection of a component or the tower crane is recommended at periodic intervals, as follows:

- 4 years;
- 8 years;
- 10 years;

- 12 years;
- 14 years;
- every year after 14 years.

7.3.2 Periodicity for tower cranes or components for tower cranes with automatic registration of data on 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 7.3.1.

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

7.4 Results

The report of the thorough inspection shall contain the result of the inspection made by the competent person as well as his 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 7.1) will recommend appropriate action.

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

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

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8 Exceptional inspection

8.1 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,
- b) after 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).

8.2 Content

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

Annex A
(normative)

Overview of inspections

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When (periodicity)	Daily inspection	Frequent inspection	Periodic inspection	Thorough inspection
	<p>— Before each start up of the tower crane</p>	<p>— Monthly or every six months and/or according to the manufacturer's</p>	<p>— At a determined period (legal, given by the manufacturer or recommendation)</p> <p>— After dismantling/re-erection</p>	<p>— After finding a fundamental failure</p> <p>— At a determined period, either legal,</p> <p>— given by the manufacturer, or</p> <p>— given by recommendation following report (frequent or periodic inspection)</p> <p>— As recommended in 7.3</p>
What (content)	See 4.2	See 5.2	See 6.2	See 7.2
How	<p>— Visual inspections</p> <p>— Functional tests</p> <p>Without dismantling</p>	<p>— Visual inspections</p> <p>— Functional tests</p> <p>Without dismantling</p>	<p>— Visual inspections, including reading of recording instruments</p> <p>— Functional tests (loaded and unloaded)</p> <p>Without dismantling, if not otherwise required by the manufacturer.</p>	<p>— Same as for the periodic inspection</p> <p>If necessary, with dismantling or measurement (play) or specific tests on all or part of the tower crane</p>
By whom	Competent person (e.g. crane driver)	Competent person (experienced technician)	Competent person (experienced technician)	Competent person (engineer)
Inspection results	<p>— OK, or</p> <p>— request for repair if fault found, or</p> <p>— can give rise to a request for a thorough inspection (repetitive cases, major fault, etc.), or</p> <p>— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)</p>	<p>— OK or,</p> <p>— request for repair if fault found or,</p> <p>— can give rise to a request for a thorough inspection (repetitive cases, major fault, etc.) or</p> <p>— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)</p>	<p>— OK, or</p> <p>— request for repair if fault found, or</p> <p>— can give rise to a request for a thorough inspection (repetitive cases, major fault, etc.), or</p> <p>— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)</p>	<p>— Date of the next inspection</p> <p>— Partial or total changes ^a, or</p> <p>— scrapping, or</p> <p>— request for repair, or</p> <p>— can give rise to a request for adequate information (driving, instructions, limit of use, etc.)</p>

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