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Cranes — Inspections —

Part 5: Bridge and gantry cranes, including portal and semi-portal cranes and their supporting structures

Appareils de levage à charge suspendue — Vérifications —

Partie 5: Ponts et portiques roulants, y compris les ponts portiques et semi-portiques et leurs structures portantes

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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 on 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.

The committee responsible for this document is ISO/TC 96, *Cranes*, Subcommittee SC 9, *Bridge and gantry cranes*.

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

Cranes — Inspections —

Part 5: Bridge and gantry cranes, including portal and semi-portal cranes and their supporting structures

1 Scope

This document specifies the inspections to be carried out on bridge and gantry 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 bridge or gantry 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*

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

3 Terms and definitions

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

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

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
competent person
person who has the necessary practical and theoretical knowledge and the necessary experience of the crane and equipment used in the lifting operation to carry out the function satisfactorily

Note 1 to entry: Some countries have legislation about the qualifications required for persons inspecting cranes.

4 General

In order to ensure safe operation of bridge and gantry 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

— exceptional inspections.

If the crane is to be used for lifting a person, an appropriate inspection and risk assessment should be carried out before the lift is commenced.

The manufacturer's instructions for inspection shall take precedence over the requirements of this document.

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

5 Daily inspections

5.1 General

Daily inspections shall be carried out at the start of each shift during which the crane is to be used. These are to test the functionality of the crane and visually check for any defects (in general, no dismantling is required). It is essential that these are carried out from a position of safety. Visual and auditory checks are normally made from floor level unless a better permanent vantage point is available.

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

5.2 Content

The inspections shall include the following:

a) the functioning of emergency stop controls;

b) the functioning of all crane motion controls (generally without a load);

c) the functioning of electrical isolator switch;

d) the functioning of motion limiting devices, exercising caution while making checks in case of malfunction;

e) the functioning of brakes (generally without a load);

f) the functioning of limiting and indicating devices and audible warning devices, where fitted;

g) a visual examination of the general condition of the crane structure and mechanisms, with particular attention to the ropes, chains or belts, the sheaves, the hook and its latch;

h) any unusual noises or erratic movement during operation;

i) for cab-controlled cranes and cranes with access to the bridge, a visual examination to ensure that the work areas on the crane are tidy and free from any item which might fall, that access and egress from the cab is adequate and that the appropriate fire-fighting equipment is available and serviceable;

j) a visual examination of the condition of the cab controls, the pendant and associated cables or remote control station as appropriate; in particular, the condition of the casings and seals of pendant and remote controls, as damage can lead to false commands;

k) where an intelligent self-diagnosis and fault-finding system is provided, checking any information on the display;

l) a visual examination to ensure that there are no obstructions in the path of travel of the crane and power feed system and that adequate precautions are in place to prevent collisions; in particular for portal and semi-portal cranes, a check for any debris or other track obstructions;

m) a visual examination to ensure that the crane signage is present and legible including the rated capacity, any individual hoist and hoist combination capacities and motion signage on crane/hoist structures corresponding to the operator controls.

In respect of d) above, when it is impractical, due to speed or distance, to check long travel limiting devices on every occasion, a check need only be made when the crane is to be used in their vicinity.

5.3 Results

Written records of all daily checks shall be kept and include at least the following information:

— identity of the crane;

— date of inspection;

— result of the check, i.e. whether or not the crane passed;

— name and signature of the person carrying out the check.

NOTE This can be kept to a minimum by, for example, completing a single line of a pro-forma record card located near the crane.

Any defect found shall be reported to a person authorized and competent to decide on the action to take (e.g. to leave the crane in use, repair it, make a more detailed inspection of a part of the crane or the whole crane or, in the event that the crane is not safe to use, to isolate and lock-off the crane to prevent further use until the problem has been resolved).

The crane record shall be updated with the result of the inspection and the action taken.

6 Frequent inspections

6.1 General

Frequent inspections shall comprise visual and auditory inspections as specified in 6.2, and the functional tests according to 5.2.

NOTE In general, no dismantling is required, although it might be convenient to schedule the inspections concurrently with planned preventive maintenance.

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

6.2 Items to be inspected

In addition to any checks specified by the manufacturer, the following items, as summarized in Table 1, shall be inspected:

a) all wire ropes for broken wires, flattening, basket distortion or other signs of damage, excessive wear and surface corrosion in accordance with ISO 4309, other lifting media such as chain or webbing belts for damage or excessive wear;

b) all rope, chain or belt terminations, pins and retaining devices, and inspection of all sheaves, for damage, worn bushes or seizure;

c) all hooks, safety latches and other load lifting attachments for damage, free movement or wear and a visual inspection of the hook shank thread and securing nut for undue movement, which might indicate wear or corrosion;

d) the structure for damage, for example, deformation, cracked welds and loose bolts and other fasteners;

e) all wheels and wheel flanges for damage and excessive wear;

f) all guide roller systems for deformation, damage and excessive wear;

g) buffers to check they are present when required and for damage;

h) whether all moving parts are adequately lubricated with an appropriate lubricant;

i) the electrical equipment including the insulation resistance and a check for exposure to contamination by oil, grease, water or dirt;

j) the electric power feed system;

k) crane-mounted lighting if fitted;

l) the rails and end stops;

m) crane-anchoring devices if fitted;

n) the presence of, and the condition of, all guards.

o) whether all controls are clearly marked and function correctly;

p) the functioning of the crane though all its motions while checking for any unusual noises, unusual high temperature or erratic movement during operation;

q) any load limiter. This shall at least comprise a physical check of the load limiter components, paying particular attention to cables, connectors and mountings;

r) the functional effectiveness of the braking system and that it is suitable for the application. This might need to include seeking confirmation from the crane operator. When there is doubt about the functional effectiveness, a test shall be carried out with the rated load;

Table 1 — Items to be inspected

Type of inspection	Inspection item
Visual examination	a), b), c), d), e), f), g), h), i), j), k), l), m), n), o), q)
Functional test (generally without load)	o), p), r)
Measurement	a), i) — insulation resistance only

6.3 Periodicity

The periodicity of the frequent inspections shall take into account the actual use of the crane and the environment in which the crane is working. The maximum period shall not exceed 6 months unless, following a detailed review of the crane condition and operation, a competent person deems it appropriate to extend the inspection period to suit the crane usage.

6.4 Results

Written records of all frequent inspections shall be kept and include at least the following information:

— date of the inspection;

— name of person carrying out the inspection;

— description and unique identification number of the equipment inspected;

— nature and extent of the inspection;

— results of the inspection, including details of the condition of critical components which need to be monitored, for example, a wire rope showing signs of wear.

The record shall be maintained with the crane's historical records and made available to the competent person responsible for the periodic inspection.

Any defect found shall be reported to a person authorized and competent to decide on the action to take (e.g. to leave the crane in use, repair it, make a more detailed inspection of a part of the crane or the whole crane or, in the event that the crane is not safe to use, to isolate and lock-off the crane to prevent further use until the problem has been resolved).

The crane record shall be updated with the result of the inspection and the action taken.

7 Periodic inspections

7.1 General

Periodic inspections are inspections made periodically, as indicated in 7.3.

Periodic inspections shall comprise visual inspections and functional tests, both with rated load and without load, as defined in 7.2, 6.2 and 5.2.

NOTE In general, no dismantling is required unless the inspection indicates potential defects which require further investigation.

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* as specified in 6.2.

In addition to any checks specified by the manufacturer, the following items shall be inspected as applicable:

NOTE This list is not exhaustive. An example of a periodic inspection checklist is shown in Annex B.

a) end carriage structures;

b) long travel drive including motor, coupling and gearbox, wheels, axles, bearings and brakes;

c) bridge girders;

d) crab structure;

e) cross travel drive including motor, coupling and gearbox, wheels, axles, bearings and brakes;

f) cross travel rails;

g) hoist mechanism including motor, brake, couplings, gearbox, drum and bearings;

h) operator cab and seating;

i) platforms and access ladders;

j) supporting structures;

k) gantry beams, rails and fixings;

l) end stops and buffers;

m) electrical power feed system.

Assessment criteria

The following assessment criteria shall be applied:

NOTE This list is not exhaustive.

a) alignment — within the manufacturer's tolerance;

b) corrosion — affecting strength or functionality;

c) cracks — affecting strength or functionality;

d) damage — affecting strength or functionality;

e) distortion — affecting strength or functionality;

f) functionality — as intended by the manufacturer;

g) leaks — affecting strength, functionality and slips;

h) lubrication — adequacy;

i) markings — presence, accuracy and condition;

j) mode of operation — as intended by the manufacturer;

k) rope fit — as specified by the manufacturer;

l) rope reeving — as specified by the manufacturer;

m) rope specification — as specified by the manufacturer;

n) rope condition;

o) obstructions — impeding safe access;

p) security — attachment of components and sub-structures, fasteners, welds, etc.;

q) seizure — full or partial seizure of rotating components;

r) tidiness — general housekeeping;

s) wear — affecting strength or functionality.

7.3 Periodicity

The periodicity of the periodic inspection shall take into account the actual use of the crane, the environment in which the crane is working, the manufacturer's instructions and any legal requirements.

7.4 Results

Written records of all periodic inspections shall be kept and include at least the following information:

— date of the inspection;

— name of person carrying out the inspection;

— description and unique identification number of the equipment inspected;

— nature and extent of the inspection;

— results of the inspection, including details of the condition of critical components which need to be monitored, for example, a wire rope showing signs of wear.

The record shall be maintained with the crane's historical records.

Any defect found shall be reported to a person authorized and competent to decide on the action to take.

Defects which present an immediate or imminent danger indicate that the frequent inspection and maintenance regimes are inadequate to ensure that the crane is maintained in a safe and serviceable condition. If such defects are found, the inspection and maintenance regimes should be reviewed and adjusted accordingly.

The crane record shall be updated with the result of the inspection and the action taken.

8 Exceptional inspection

8.1 General

The inspection shall be carried out after exceptional circumstances.

Exceptional circumstances include an overload beyond that allowed for by any load limiter, collision, use for particularly arduous duties, failure of a structural component, subjected to weather in excess of design parameters, up-rating of rated capacity or changing to a more arduous or hazardous duty.

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

8.2 Content

The extent of the inspection shall be proportional to the nature of the exceptional circumstances and the extent of any damage, repairs or modifications and should take into account the reports of previous thorough examinations, where applicable.