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Cranes — Limiting and indicating devices —

Part 3: Tower cranes

Appareils de levage à charge suspendue — Limiteurs et indicateurs —

Partie 3: Grues à tour

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

This document was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee 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 third edition cancels and replaces the second edition (ISO 10245-3:2008), which has been technically revised. The main changes compared to the previous edition are as follows:

— the requirements related to rated capacity indicators have been revised;

— requirements related to event recorder and data logger have been added (Clause 10 and Annex B);

— requirements related to limiting and indicating devices for climbing systems have been added (Clause 11).

A list of all parts in the ISO 10245 series can be found on the ISO website.

Cranes — Limiting and indicating devices —

Part 3:
Tower cranes

1 Scope

This document gives requirements specific to tower cranes for limiting and indicating devices. It is applicable to tower cranes as defined in ISO 4306-3.

It is not applicable to end stops such as buffers used to stop trolleying, travelling or luffing movements, nor to erection, dismantling operations or the changing of a crane's configuration.

NOTE General requirements for the devices are given in ISO 10245-1.

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 10245-1:2008, *Cranes — Limiting and indicating devices — Part 1: General*

IEC 60204-32:2008, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines*

IEC 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10245-1 and the following apply.

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/

3.1
rated capacity
net load that a crane is designed to lift for a given operating condition such as the position of the load, and a given configuration such as the length of the jib

Note 1 to entry: The definition of net load is given in ISO 4306-1:2007, 6.1.3.

3.2
working space limiter
<zone restriction system> device, on cranes, to prevent the risk of moving loads and/or crane parts into a restricted space

3.3
restricted space
space in which movement of the load and/or any crane part is restricted

Note 1 to entry: Depending on the situation when out of service, the jib and the counter-jib can move into the restricted space.

3.4
event recorder
device that records parameters that describe the condition of the crane together with control information when an event triggers the recording of the data

3.5
data logger
device that records at frequent time intervals, parameters that describe the condition of the crane together with control information

Note 1 to entry: The *event recorder* (3.4) and data logger are limited to the recording of the data and do not cover the access and the monitoring of data.

4 Rated capacity limiters and indicators — General requirements

Rated capacity limiters and indicators shall be provided on all cranes having a rated capacity of 1 000 kg or above, or an overturning moment of 40 000 N.m or above due to the load.

Features shall be incorporated to minimize the risk of accidental change of any manual setting device (e.g. by locking, double action).

In addition to the requirement of ISO 10245-1:2008, 4.2.4, rated capacity limiters and indicators can require adjustment after a change in the crane configuration out of normal operation, e.g. reassembly or adding of crane parts like jib extensions.

ISO 10245-1:2008, 4.2.6, is not applicable to tower cranes.

The design and installation of rated capacity indicators and rated capacity limiters shall take into account the need to test the indicator or limiter. Where it is necessary to disconnect parts of the devices during testing, facilities shall be provided to check and/or reset the devices after the test.

If interruption of the power occurs, the setting of limiters and indicators shall be retained.

5 Rated capacity limiters

5.1 Tower cranes shall be equipped with rated capacity limiters as described in ISO 10245-1:2008, 4.3.

5.2 The rated capacity of the tower crane is the static load defined at 100 %.

To cover dynamic effect, the rated capacity limiter shall activate at not more than 110 % of the rated capacity.

5.3 Provision for overriding the rated capacity limiter during normal operation shall not be provided.

Use of an alternative setting of the standard rated capacity limiter foreseen by the manufacturer is not considered as overriding if the crane is kept within its designed and stated capacity as given in the instruction handbook.

6 Rated capacity indicators

6.1 Tower cranes shall be fitted with a rated capacity indicator in accordance with ISO 10245-1:2008, 4.4.

6.2 As the crane approaches its rated capacity, the rated capacity indicator shall give clear and continuous visual and/or audible warning at the operator's control station. The warning shall commence when reaching 90 % of the rated capacity.

6.3 When reaching 100 % of the rated capacity, the rated capacity indicator shall give a clear and continuous warning. The warning shall be visual at the operator's control station and audible to the crane operator and to those in the vicinity of the crane. The warning shall commence at 100 % of the rated capacity.

6.4 Systems shall enable periodic functional checks to be carried out to verify that indicators are operating correctly.

6.5 No provision shall be made for the crane operator to cancel a warning from the control station, except when both audible and visual warnings are used for the same situation, in which case the audible warning has been active for 5 s. If such a cancellation facility is used, the warning shall automatically operate if the crane subsequently returns to a condition requiring an audible warning.

Provision can be made to cancel the audible warning during calibration and testing of the crane.

6.6 There shall be a clear difference between the warning for approach and the warning for overload. For example, a visual warning can be one colour for the approach and another colour for overload.

6.7 Warnings shall be in accordance with IEC 60204-32:2008, 10.2.2, 10.3 and 10.8, and IEC 61310-1.

7 Motion and performance limiting devices

7.1 Motion limiters

7.1.1 Motion limiters shall be provided in accordance with of ISO 10245-1:2008, 4.5.1, and Table 1.

Table 1 — Motion limiters

Type	Required to be provided	
Hosting limiter	Yes	
Lowering limiter	Yes	
Stack rope limiter	No	
Slewing limiter	No, if power supply via a slipping assembly	
Travelling limiter	Yes	
Trolleying limiter	Yes	
Luffing limiter	Yes	
Telescoping limiter	No, during erection	Yes, if under working conditions

[a] A working space limiter and a crane being interdependent of one another, the power supply shall be such that when the crane is “on”, the working space limiter is automatically “on”.

[b] See Annex A.

Table 1 *(continued)*

Type	Required to be provided
Control station position limiter	Yes, if the control station is moved during service
Working space limiter[a]	Not mandatory, at the request of the user
Anti-collision device[b]	Not mandatory, at the request of the user

[a] A working space limiter and a crane being interdependent of one another, the power supply shall be such that when the crane is "on", the working space limiter is automatically "on".

[b] See Annex A.

7.1.2 Where a secondary ("back-up") limiter needs to be provided for a single motion; it shall not be possible to operate the limited motion in both directions after the second limiter has been activated until a reset action has been carried out. This reset action shall not be readily available to the crane operator at the control position. The indication and reset action are not required when the second limiter is a fixed stop designed to absorb the energy of the motion.

7.1.3 Each tower crane shall be equipped with connection points to accommodate an anti-collision device. If parts of a crane and/or loads are in close proximity to another crane, this device shall stop motions and prohibit cranes from colliding and permit the reverse movement of crane functions.

The crane manufacturer shall determine the connection points necessary for the action of the device on the movement or function of the crane.

The choice of these connection points and the given orders shall be such that the device actions are compatible with the normal use of the crane mechanisms (decelerating before stopping high-inertia motions, mechanical brakes application).

All connection points necessary for the installation of the device on the crane motion shall be assembled in a specific collector or on a dedicated cable. This specific collector or dedicated cable shall be installed on all cranes except on self-erecting cranes.

NOTE Annex A provides some guidance for the anti-collision device.

7.1.4 The tower crane shall be capable of being equipped with a working space limiter. This device shall be designed to stop motions in order to avoid entering a restricted space and allow the reverse movement of crane functions.

7.1.5 When it is necessary to override motion limiters in normal operation (e.g. change of the fall number, storage of the trolley), provision may be at the control station.

The overriding devices shall be hold-to-run types and the crane components and the crane's stability shall not be endangered.

7.2 Performance limiters

If a risk exists that the load speed could exceed the maximum authorized speed, without automatic braking, the tower cranes shall be fitted with the following performance limiting devices to ensure that the speed of operation remains within the design limits:

a) hoisting speed limiter;

b) lowering speed limiter;

c) luffing speed limiter where luffing motion is provided.

8 Motion and performance indicating devices

8.1 The tower cranes shall be provided with indicators in accordance with Table 2. The choice is given between the solutions marked with an "X". Other means of providing equivalent information can also be used.

NOTE Indicators for the actual radius and the actual load give a more precise indication than the plates on the jib.

Table 2 — Indicators for tower cranes

	Horizontal jib non-telescopic	Telescopic jib	Articulating (Folding) jib	Luffing jib
Indicating device to show the actual load, the actual radius and the max. radius up to which the load is allowed to be moved.	X	X	X	X
Plates on the jib. The load ratio between two succeeding steps is not greater than 1,5, including the value of the maximum load at the maximum authorised radius and the value of the load at the maximum radius.	X			

8.2 Other indicating devices as described in ISO 10245-1 are recommended, as the indications of parameters shown in data sheets for the crane provide a valuable aid to the operator.

8.3 Indicators shall be in accordance with IEC 60204-32:2008, 10.2.2, 10.3 and 10.8, and IEC 61310-1.

8.4 The response time of indicators shall be appropriate to the rate of change of the parameter indicated, so that they always show the current position.

9 Anemometer

Tower cranes shall be provided with an anemometer, except for self-erecting tower cranes with a height under hook of less than 30 m measured with a horizontal jib.

10 Event recorder and data logger

Recommendations regarding the provision of an event recorder and data logger for tower cranes are given in Annex B.

NOTE Due to national regulation, event recorder and data logger may be mandatory in some countries.

11 Limiting and indicating devices for climbing systems

11.1 Limitation of the balancing moment

A device shall be installed to limit the balancing moment within the safe limits defined by the manufacturer.

This device shall stop all motions, including the motions of both crane and climbing system, except those that allow returning into a safe position, and sending out alarm signals.

The adjustment of this moment shall be set before the climbing operation.

11.2 Adjustment of the working pressure

The maximum climbing force shall be limited by adjusting the hydraulic working pressure to the weight of the actual crane, climbing system, assembly personal, tools and frictional forces.

11.3 Limitation of the maximum working pressure

The maximum working pressure of the climbing system shall be limited at the design pressure considered at the static calculation by a device, which cannot be adjusted without tools.

Annex A
(informative)

Requirements for provision of anti-collision devices on tower cranes

A.1 General

This annex specifies the requirements for the installation of anti-collision devices on tower cranes.

The purpose of an anti-collision device is to avoid the risk of collision between cranes when multiple cranes are operating.

NOTE The decision to install such a device on a crane is under the responsibility of the user and depends on the risk analysis when the cranes are erected on the job site.

A.2 Power supply

When any crane in a group of cranes is working where collision is possible, all cranes should have the anti-collision devices active regardless of whether they are working or not.

The power supply for the anti-collision device may be taken from the crane. If not, and collision is possible, the complete working space of the crane which is in off-state is forbidden area for all the other cranes.

A.3 Indications to be given

A.3.1 To the operator

When there is a cabin, indications should be provided to the crane operator to allow him/her to maintain control during driving and to avoid dangerous areas.

Stopping of system functioning due to a fault or neutralization of the system should be indicated.

This indication may be given by sound or by visual means in the field of vision of the crane operator.

A.3.2 To people nearby

Stopping of system functioning due to a fault or neutralization of the system on a crane should be indicated to people in proximity by a white flashing light visible from the worksite.

Annex B
(informative)

Event recorder and data logger on tower cranes

B.1 General

This annex gives guidelines for event recorder and data logger for tower cranes.

The purpose of event recorder and data logger is to keep record on use and operation of tower crane, carry out real-time monitoring of crane malfunctions or violated operations.

NOTE The decision to install such a device on a crane is under the responsibility of the user and depends on the risk analysis when the cranes are erected on the job site.

B.2 Event recorder

B.2.1 The event recorder is capable of storing a certain amount of data in a memory system. Once the memory fills, the system begins recording over old data (oldest to newest).

B.2.2 Where required, it should record data to assist accident investigation and/or reconstruction.

B.2.3 Events/triggers include but not limited to:

a) overload (load exceeds rated capacity);

b) overtravel;

c) activation of override keys (e.g. boom up);

B.2.4 A suitable interface to read out and download the data should be available.

B.2.5 Suitable measures should prevent the manipulation of the recorded data.

B.2.6 The function of the event recorder should be automatically checked each time the crane is put into operation. An event recorder malfunction should be indicated to the crane operator.

B.3 Data logger

B.3.1 A data logger is a device that can record any data e.g. geometric information, engine data. The data recorded may include the data of events. The data logger is typically capable of storing a certain amount of data in a memory system.

B.3.2 The data should be recorded automatically, independent of the crane operator and events.

B.3.3 Data loggers may be offered as an option and record additional items such as information pertinent to maintenance intervals and equipment operation to support the user.

NOTE 1 Due to national regulation, data recorder could be mandatory.