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Cranes — Limiting and indicating devices —

Part 2: Mobile cranes

Appareils de levage à charge suspendue — Limiteurs et indicateurs —

Partie 2: Grues mobiles

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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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 96, *Cranes*, Subcommittee SC 6, *Mobile cranes*.

This second edition cancels and replaces the first edition (ISO 10245-2:1994), which has been technically revised.

ISO 10245 consists of the following parts under the general title *Cranes — Limiting and indicating devices*:

— *Part 1: General*

— *Part 2: Mobile cranes*

— *Part 3: Tower cranes*

— *Part 4: Jib cranes*

— *Part 5: Overhead travelling and portal bridge cranes*

Cranes — Limiting and indicating devices —

Part 2:
Mobile cranes

1 Scope

This part of ISO 10245 specifies the requirements for devices which limit and/or indicate the loads, motions, performance, and environment of mobile cranes. The general requirements for limiting and indicating devices for cranes are given in ISO 10245-1.

This part of ISO 10245 applies to all mobile cranes as defined in ISO 4306-2. See 4.1 and also 4.2.

NOTE Some basic machine types within this scope are convertible for use in excavating work and other applications not considered to be lifting service. The requirements of this part of ISO 10245 are applicable to such machines only when used as lifting cranes.

2 Normative references

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

ISO 2374:1983, *Lifting appliances — Range of maximum capacities for basic models*

ISO 4306-1:2007, *Cranes — Vocabulary — Part 1: General*

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

ISO 9926-1:1990, *Cranes — Training of drivers — Part 1: General*

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

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

3 Terms and definitions

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

3.1
rated capacity
load that the crane is designed to lift for a given operating condition, e.g. the configuration or position of the load

[SOURCE: ISO 10245-1:2008, 3.12]

3.2
anti-two-block device
device which, when activated, disengages all functions whose movement can cause any part of the lower load block or hook assembly to come into contact with the upper load block, boom or jib point sheave assembly(s)

3.3
two-block damage prevention device
device which, when activated, reduces the wire rope pull caused by contact of the lower load block or hook assembly and upper load block, boom or jib point sheave assembly(s)

Note 1 to entry: The pull should be reduced such that contact will not cause damage to the machine and well-maintained wire rope. It should have a feature which prevents the hook block or hook assembly from rotating to a position which would cause rigging to disengage from the hook.

4 General

4.1 This part of ISO 10245 applies to all new mobile cranes manufactured one year after publication of this part of ISO 10245. It is not the intent of this part of ISO 10245 to require retrofitting of existing equipment. It is intended, however, that when a component is being modified its performance requirement shall be reviewed relative to this part of ISO 10245. If the performance differs substantially, the need to meet the current requirement shall be evaluated by a qualified person selected by the owner (user) and consequent recommended changes shall be made by the owner (user) within one year.

4.2 Devices described within this part of ISO 10245 shall be applied according to Table 1. The tonne limits specified in Table 1 relate to the maximum capacity of the crane (see ISO 2374). Table 1 does not apply to all situations that can be encountered, such as high winds. Application of the devices shall be carried out in the manner required for safe operation of the crane, taking into account the type of crane and its intended use.

4.3 All devices with readouts shall be legible from the operator's station.

5 Rated capacity limiter

5.1 General

The rated capacity limiter shall meet the requirements of ISO 10245-1:2008, 4.3.1, and shall operate in accordance with the requirements stated in ISO 10245-1:2008, 4.3.2.

A rated capacity limiter/indicator shall operate automatically without the need for resetting during a lifting cycle.

Where a crane can be operated in different configurations, there shall be a precise and continuous indication of the crane configuration for which the rated capacity limiter/indicator has been set. As a minimum requirement, the configuration selection device shall provide a direct description of the configuration selected, or indicate a code which can be checked against a separate list of codes/configurations which are given on the capacity chart or attached to it.

On mobile cranes which can be operated in different configurations (e.g. on wheels, on outriggers, different counterweights, different jib length, different number of falls), no unintended change of the configuration selection shall be possible (e.g. location of selection device, separate confirmation of settings).

NOTE 1 Normally there is no check (automatic plausibility check), whether the selected configuration corresponds with the real configuration.

NOTE 2 Acknowledgement by the operator can be used to satisfy the requirement for prevention of unintended configurations changes.

Selections of configurations of the crane not permitted by the manufacturer shall be prevented, unless the discrepancy is acknowledged by the crane operator. The rated capacity limiter shall prevent the crane from supporting a load outside the limits of the permitted radii and outside the positions and

loads shown and/or described on the rated capacity chart or outside the permissible working load of the ropes. The rated capacity limiter shall operate to override the controls of the crane

a) to prevent any motion that will lead to an overload condition (except slewing - where capacity decreases by slewing, power to the slew function in the direction of continued motion will be deactivated), and

b) to prevent dangerous movements of the load.

For a mobile crane, the motions that shall normally be overridden by the rated capacity limiter when triggered are:

a) derricking out;

b) derricking in;

c) hoisting;

d) telescoping out.

NOTE 3 An override key for b) can be provided within the reach of the operator (for derricking in a suspended load).

NOTE 4 The derricking in/luffing in of a grounded load is not to be permitted. Adequate information shall be given in the instruction manual.

5.2 Setting

The rated capacity limiter shall be set to override the crane controls at values between 100 % and 110 % of the rated capacities of the crane. All sensor tolerances within the system must be considered when determining the accuracy of the system.

The rated capacity limiter shall operate between 100 % and 110 % of the rated capacity during calibration and testing, with the crane operating at the lowest possible working speed.

NOTE Rated capacities referred to in 5.2 do not take into consideration adverse operating conditions, e.g. high winds, multilift operation, etc.

6 Rated capacity indicator

6.1 The rated capacity indicator shall give a warning both visually and acoustically of the approach to the rated capacity starting between 90 % and 97,5 % of the rated capacity of the crane.

6.2 The rated capacity indicator shall warn persons visually in the vicinity of the crane whenever the rated capacity limiter overrides the crane controls (see 5.2).

6.3 The rated capacity indicator shall continue its function when the rated capacity limiter is overridden during testing, rigging, or de-rigging.

Provisions can be made to cancel the audible warning during calibration and testing of the crane. Provisions can also be made for a rigging setting that inhibits audible warnings during the rigging of the crane.

6.4 The rated capacity indicator shall be such that its operation, but not necessarily its accuracy, can be checked without applying loads to the crane.

7 Load indicator

7.1 The load indicator shall measure and display net load or hoist medium load being lifted.

7.2 The load indicating system shall be compatible with the maximum capacity of the crane, as specified by the crane manufacturer.

7.3 The accuracy of the load indicating system shall be such that the indicated load is between 100 % and 110 % of the actual load when load exceeds 75 % of rated capacity.

8 Motion limiters

8.1 Operating requirements

Motion limiters shall operate according to ISO 10245-1:2008, 4.5.1. In most cases, the motion limiting devices should be coupled to the crane controls to prevent any such further movement of the crane.

NOTE In the case of hydraulic systems, the extent of travel of operating cylinders or, alternatively, mechanical stops can be considered as meeting this requirement, but it can be necessary to fit pressure-relief valves to prevent overloading of parts of the crane.

8.2 Types of hoisting limiters

Hoisting limiters shall consist of either an anti-two block device or a two-block damage prevention device (see 3.2 and 3.3).

Cranes shall be fitted with a hoisting limiter if it is required to stop all motions which can cause the hook block to make contact with the boom/boom head and cause damage. The bridging device for the hoisting limiter has to be of the type that requires it to be held in the override position.

8.3 Lowering limiter

The lowering limiter shall meet the requirements of ISO 10245-1:2008, 4.5.1.

All cranes shall be fitted with a lowering limiter. As a minimum the lowering limiter shall ensure three turns of rope on the drum. Bridging the lowering limiter shall only be possible for rigging operations, transport, and changing of the rope. The bridging device has to be of the type that requires to be held in the override position.

8.4 Derrick limiter

The device shall be provided with suitable adjustments for obtaining the specified luffing boom and luffing jib angles. Where necessary, the device shall be provided with means for the operator to bypass the limiter to permit momentary re-engagement of the boom or jib derricking power for the purpose of unloading locking devices.

8.5 Attachment backstops

The backstop shall be designed to absorb all the energy imparted to it by the luffing boom or luffing jib according to the maximum allowable wind from front upon sudden release of all rated loads due to failure of the load line or rigging. The backstop shall provide energy-absorbing resistance to the upward and rearward movement of the boom or jib for the last 5° of angular movement about the boom or jib pin.

9 Additional mandatory limiters

The following mandatory limiters shall be fitted to the crane under the following conditions:

a) maximum and minimum boom angle for all configurations;

b) maximum and minimum fly jib angle for luffing fly jib configurations;

c) telescoping for telescopic boom cranes;

d) mast/A-frame position where mast/A-frame shall be kept within limits;

e) slack rope on winches other than load lifting hoists where slack rope can occur.

10 Motion and performance indicators

10.1 Hoisting limit indicator

10.1.1 Operating requirements

The hoisting limit indicator, when activated, shall warn the operator of impending contact of the lower load block or hook assembly with upper load block, boom or jib point sheave assembly(s). The warning shall be both audible and visible to the operator at the operator station only.

10.1.2 Setting

The hoisting limit indicator shall be set to take into account the stopping distance necessary for any motion, e.g. of the hook or telescopic attachment, assuming prudent crane operation.

10.2 Attachment angle indicators

The readout accuracy of angle indicators shall be as follows:

a) For boom or jib angles 65° or more from the horizontal, the indicated angle tolerance shall be 0°/-2° from the actual boom or jib angle;

b) For boom or jib angles less than 65°, the indicated angle tolerance shall be 0°/-3° from the actual boom or jib angle.

10.3 Attachment length indicators

The readout accuracy shall have a tolerance of ±2 % of the actual boom length of telescopic cranes.

10.4 Radius indicator

The accuracy of the radius indicator shall be such that the radius indicated shall be within −0 to +10 % of the actual radius.

10.5 Rope drum rotation indicator

10.5.1 Operating requirements

The device shall indicate rope drum movement by visible, audible ,or tactile means. It shall also indicate the direction of rope travel.

10.5.2 Indicator sensitivity

The indicator shall be able to detect initial drum rotation producing rope travel of 50 mm.

10.6 Crane level indicator

The crane level shall be indicated at or near the crane operating cabin within the view of the crane operator. Mobile cranes supported by outriggers shall have, in addition, a crane level indicator at each outrigger control station where the levelling motion(s) can be controlled. The crane level indicator shall have an accuracy better than ±0,1°.

10.7 Slew indicator

When capacities can change in different work areas, a slew indicator shall be provided and shall perform either a) or b) or both.

a) Indication of slewing from one working area to another.

b) Indication of the azimuth angle between the superstructure and carrier with a tolerance of ±1,5°.

10.8 Additional mandatory indicators

All mobile cranes having a rated capacity of not less than 1 000 kg the following indications shall be given to the operator on the indicator(s) for the current configuration and position of the crane with the following requirements:

10.8.1 Continuous display during crane operation:

a) utilization of rated capacity: for all configurations, given as an analogue display with marking of the loading status of the crane (e.g. green; yellow — approach to rated capacity; red — overload condition);

b) rated capacity: for cranes with a rated capacity in excess of 5 t a display of permitted load in accordance with the rated capacity at the actual radius/outreach or jib angle;

c) working load: for cranes with a rated capacity in excess of 5 t [indication of load on the hook plus mass (weight) of hook and block].

d) radius/outreach: when the crane is on radius/outreach related capacities; on non-slewing cranes, the outreach to the tipping axis shall be displayed.

NOTE For the purpose of error checking or adjustments, special displays other than the continuous display can be selected temporarily during crane operation(s).

10.8.2 Selected display (to be selected manually by the crane operator):

a) Related to capacities — display of:

   1) boom angle: when the crane is on angle related rated capacities;

   2) fly jib angle: for luffing fly jib configurations, when the crane is on angle related rated capacities;

b) display of wind speed: when the crane has a boom/jib combination length in excess of 65 m; the measuring device shall be fitted in a suitable elevated position on the crane which is exposed to the wind. The readout shall be fitted in a position clearly visible to the operator from the operating position and it shall be clearly legible;

c) display of slew range and position: when the crane has slew range related rated capacities;

d) display of boom length: for telescopic boom cranes;

e) display of jib lock: for telescopic jibs with locking mechanisms;

f) display of axle lock: for cranes with axle locking mechanisms;

g) display of falls of hoisting line: for all configurations.

10.8.3 Audible indicator

There shall be an audible warning device

a) for use of the crane operator, and

b) working automatically to give a warning of slewing or travelling of the mobile crane should the vision of the crane operator be obstructed in some areas or for other cautionary purposes.

11 Design factor

When any component of the devices specified in this part of ISO 10245 is employed in the load-supporting system such that its failure could cause the load to be dropped, its design factor shall be not less than the minimum design factor of the other load-supporting members.

12 Inspection

The indicating and limiting devices described in this part of ISO 10245 shall be inspected according to ISO 9927-1.

13 Maintenance

The indicating and limiting devices described in this part of ISO 10245 shall be maintained according to the device manufacturer's written maintenance instructions.

14 Operating instructions and operator training

14.1 The manufacturer shall supply pertinent operating instructions with each limiting and indicating device, including any special limitations or requirements as part of the instruction manual.

14.2 Training of the crane operator shall be conducted according to the requirements of ISO 9926-1 as follows:

Prior to authorization to operate the crane, a check shall be made by a qualified person to ensure that the operator is aware and understands the system manufacturer's written instructions on operation and function.

15 Event recorder

15.1 An event recorder monitors and records load-related data and geometric information when occurrences trigger the system, such as errors, bypasses, overloads, and configuration changes. 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).

15.2 The event recorder is mandatory for mobile cranes and shall record data to assist accident investigation and/or reconstruction.

The minimum amount of different data recorded when the event recorder is triggered shall be:

a) date;

b) time;

c) crane configuration which includes

1) outrigger mode,
2) tire mode,
3) counterweight mode,
4) attachments (fly jib, luffing fly jib, aux. counterweight, etc.),
5) permitted load,
6) actual load,
7) percentage of usage of rated capacity,
8) parts of line,
9) radius of load,
10) boom length,
11) sequence of boom extension,
12) boom angle,
13) jib (fly jib or luffing fly jib) angle (if applicable), and
14) slew orientation;

d) status of any bridging device.

NOTE The data belong to the owner of the crane; he can involve the manufacturer for further analysis.

15.3 Events/Triggers include but not limited to:

a) Overload (load exceeds rated capacity);

b) Activation of override keys (e.g. RCL, boom up, anti-two-block device);

c) Rigging/set-up mode events.

15.4 A suitable interface to read out and download the data shall be available.

15.5 Suitable measures shall prevent the manipulation of the recorded data.

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

15.7 The event recorder shall have a minimum recording capacity of 3 working days for the data (see 15.2). The data can be automatically overwritten; the data of the last working hours shall always be available.

15.8 The content of the event recorder is technically not sufficient for condition monitoring.

16 Data logger

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

