INTERNATIONAL STANDARD

ISO 10245-1

Second edition
2008-01-15

Cranes — Limiting and indicating devices —

Part 1: General

Appareils de levage à charge suspendue — Limiteurs et indicateurs —

Partie 1: Généralités

Reference number
ISO 10245-1:2008(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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 10245-1 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 8, *Jib cranes*.

This second edition cancels and replaces the first edition (ISO 10245-1:1994), 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 1: General

1 Scope

This part of ISO 10245 specifies general requirements for limiting and indicating devices for cranes that are applicable to loads and motions, performance and environment. These devices restrict operation and/or provide the operator or other persons with operational information.

The specific requirements for the various types of crane are given in the other parts of ISO 10245.

It is emphasized that the safe and reliable operation of limiters and indicators depends upon regular inspection and maintenance.

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4306-1 and the following apply.

3.1
anti-collision device
device used to prevent cranes or parts of cranes from colliding with a fixed load-lifting attachment when they are manoeuvred simultaneously in the same space

NOTE A working space limiter may perform the function of an anti-collision device in certain applications.

3.2
configuration
combination and position of structural members, counterweights, support or outrigger position, hook block reeving and similar items assembled, positioned and erected in accordance with manufacturers' instructions and ready for operation

3.3
continuous warning
warning visually by means of either a flashing or uninterrupted light, or audibly by either a pulsing or uninterrupted sound, that persists throughout the time during which the condition being indicated exists

3.4
control station position limiter
device used on cranes having a control station that can be moved by powered movement to different positions, to prevent movement of the control station beyond specified limits

3.5
derricking limiter
device used to prevent the raising or lowering of a jib, boom, fly jib, “A-frame” or mast beyond specified limits

3.6
hoisting limiter
device used to prevent either the fixed load-lifting attachment from being raised such that it inadvertently strikes the crane structure or any other specified upper limitation of the load-lifting attachment from being exceeded

3.7
indicator
device that provides warnings and/or data to facilitate the competent control of the crane within its design parameters

3.8
lowering limiter
device used to ensure that the minimum engagement of the lifting medium, e.g. the minimum number of turns of rope on the hoist drum, is maintained at all times during operation

3.9
lowering limiter
mechanical device designed to prevent the chain from running out of engagement with the driving mechanism

3.10
motion limiter
device which restricts a crane motion or initiates the stopping of the motion

NOTE See the examples given in 4.5.1.1.

3.11
performance limiter
device that automatically prevents a design performance characteristic from being exceeded

NOTE See the examples given in 4.5.2.1.

3.12
rated capacity
load that the crane is designed to lift for a given operating condition (e.g. the configuration or position of the load)

3.13
rated capacity indicator
device which, within specified tolerance limits, gives a continuous indication that the rated capacity is exceeded

NOTE 1 On certain crane types, the rated capacity indicator will give another continuous indication when the rated capacity is approached.

NOTE 2 See 4.4.1.2 a).

3.14
rated capacity limiter
device that automatically prevents the crane from handling loads in excess of its rated capacity, taking into account the dynamic effects during normal operational use

3.15
reference outreach or radius
horizontal distance between a vertical line through the centre of gravity of a load and the corresponding tipping line

3.16
slack rope limiter
device used to stop motion in the event of the rope becoming slack

3.17
slewing limiter
device used to prevent slewing beyond specified limits

3.18
telescoping limiter
device used to prevent the extension or retraction of a member beyond specified limits

3.19
travelling and traversing limiter
device used to prevent all types of movement along rail tracks or runways beyond specified limits

3.20
working space limiter
device used to prevent a fixed load-lifting attachment and/or parts of the crane from entering a prohibited space

NOTE Working space limitation is often achieved by a combination of different limiters.

4 Safety requirements and/or measures

4.1 Limiters and indicators

4.1.1 The crane manufacturer shall select a device having a specification that is compatible with the designed use of the crane, taking the following into account:

a) the operating environment, e.g. relative humidity, freezing, condensation;

b) the rated capacity;

c) crane characteristics;

d) electromagnetic compatibility.

4.1.2 The installation of limiters and indicators shall be carried out in a manner that does not reduce the required strength of the crane.

4.1.3 The effects (e.g. forces, stopping distances) resulting from the operation of the limiter shall be within the design constraints of the crane.

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

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

4.1.6 Devices shall be capable of withstanding the shock loads and vibrations transmitted to them during normal usage, erection, rope changing, dismantling and maintenance of the crane.

4.1.7 Painting or other corrosion protection shall not affect the correct functioning of limiters and indicators.

4.2 General requirements for rated capacity limiters and indicators

4.2.1 Rated capacity limiters and indicators shall be provided on all cranes having a rated capacity of 3 t and above. It is, however, recommended for cranes of 1 t and above, or an overturning moment of 40 000 · m and above.

NOTE For rope or chain hoists for which the rated capacity does not vary with the position of the load, the risk assessment can show that the rated capacity indicator is not necessary.

4.2.2 The rated capacity limiter/indicator shall perform in accordance with the requirements of this part of ISO 10245 for all rated capacities and all configurations described in the operating manual supplied by the manufacturer.

4.2.3 If a crane can be operated with different configurations, there shall be an indication of the crane configuration for which the rated capacity limiter/indicator has been set. Where a configuration selecting device is provided, a direct description of the configuration selected shall be provided on the device, or a code which can be checked against a separate list of codes/configurations.

4.2.4 Rated capacity limiters and indicators shall operate automatically for all configurations and positions of the crane.

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

4.2.6 The number of setting positions of the configuration selection device(s) shall relate to the number of configurations provided for the crane. Positions which are not utilized shall render the crane inoperative or not cause an unsafe crane condition if selected.

4.2.7 The design and installation of rated capacity indicators and rated capacity limiters shall take into account the need to test the crane with overloads, without dismantling or permanently affecting the performance of 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.

4.3 Rated capacity limiters

4.3.1 General

4.3.1.1 The rated capacity limiter shall prevent the crane from operating outside the limits of the positions and loads shown and/or described on the rated capacity chart.

4.3.1.2 The rated capacity limit setting, Q_L, shall meet the limitations specified in Equation (1):

$$1 + \frac{a}{g} \leqslant \frac{Q_L}{Q_{GL}} \leqslant \phi_2 \tag{1}$$

where

a is the design mean acceleration for hoisting;

g is the acceleration due to gravity;

Q_{GL} is the gross load, comprising hoist medium, fixed load-lifting attachment and the rated capacity;

ϕ_2 is either the amplifying factor used in the proof of competence calculation of the crane in accordance with ISO 8686-1:1989, 6.1.2.2.1, or a factor chosen within the following limits:

— $\leqslant$ 1,1 for indirect-acting capacity limiters, using sensors and switches off the energy supply;

— $\leqslant$ 1,6 for direct acting capacity limiters, e.g. friction torque limiters, usually associated with power driven chain hoists.

4.3.2 Operating requirements

4.3.2.1 When the load on the crane exceeds the rated capacity, the rating capacity limiter shall override the controls of the crane to prevent any condition that will increase the overload.

For particular crane types, reference should be made to ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5 for details of motions that will increase the overload.

4.3.2.2 The rated capacity limiter shall not prevent the crane operator from returning the controls to the "stop" position nor from initiating actions that will move the crane to a reduced-loading or unloaded condition.

4.3.2.3 The rated capacity limiter, once triggered, shall continuously override the controls concerned until the overload has been removed and the relevant control lever has been returned to the neutral position.

4.4 Rated capacity indicators

4.4.1 Operating requirements

4.4.1.1 The rated capacity indicator shall give visual or audible warnings, or both, for all motions of the crane that induce a load in excess of the rated capacity as shown in the information supplied by the manufacturer for the particular crane.

4.4.1.2 The rated capacity indicator shall

a) for those cranes where the rated capacity varies with the position of the load, warn the crane operator when the rated capacity is approached,

b) warn the crane operator and persons in the danger zone when the rated capacity limiter is activated,

c) for those cranes where a limiter override is provided, warn the crane operator and persons in the danger zone whenever the rated limiter has been overridden.

4.4.1.3 When the rated capacity is approached, the rated capacity indicator shall give a warning at a value which gives the crane operator time to react to the warning and prevent the crane from being overloaded.

For particular crane types, reference should be made to ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5 for details of motions that will increase the overload.

4.4.1.4 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 may have a manual cancellation facility that becomes operable after the 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 may be made to cancel the audible warning during calibration and testing of the crane.

4.4.2 Form of warning

4.4.2.1 Warnings for both the approach to rated capacity, in cases where it is required, and for rated capacity being exceeded shall be continuous. There shall be a clear difference between the warning for approach and the warning for overload, e.g. a visual warning may be one colour for the approach and another colour for overload.

4.4.2.2 Visual warnings for the crane operator shall be positioned to be in full view from every control station without obscuring the crane operator's view of the load and its immediate surroundings.

4.4.2.3 Warnings shall be clearly identifiable in the specified ambient conditions.

4.4.3 Provision for daily checking

The rated capacity indicator shall be such that a functional check of its circuitry and response (but not necessarily its accuracy) can be performed without applying loads to the crane.

4.5 Motion and performance limiters

4.5.1 Motion limiters

4.5.1.1 Any motion which has a designed restriction of movement, and those motions which have a restriction specified by the user, shall be provided with motion limiters.

EXAMPLE Hoisting limiter, lowering limiter, slack rope limiter, slewing limiter, travelling and traversing limiter, derricking limiter, telescoping limiter, control station position limiter, working space limiter, anti-collision device.

For particular crane types, reference should be made to ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5.

4.5.1.2 The effect of one motion upon another shall be taken into account where that motion can cause another limit to be exceeded.

4.5.1.3 Where a motion is provided with one motion limiter, after the triggering of that motion limiter, movement in the opposite direction, to a safe condition, shall be possible without resetting.

4.5.1.4 Where a risk assessment has determined that a secondary (“back-up”) limiter needs to be provided for a single motion, failure of the first limiter shall result in an indication of the failure to the crane operator by the means specified in the appropriate International Standard for the particular crane type. To ensure continued safety of the machine, 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.

4.5.1.5 If two or more motions can be carried out simultaneously, the design of the motion limiters shall take into account the effects of the possible combinations.

4.5.2 Performance limiters

4.5.2.1 A motion shall have a performance limiter if

a) the motion has a designed performance limitation, and/or

b) there is an external force which could cause the performance limitation to be exceeded (e.g. gravity).

Performance limiters need not be provided if the performance limits are prevented from being exceeded by the design of the system.

Examples of aspects of crane performance to be limited are speed and acceleration/deceleration.

4.5.2.2 If two or more motions can be carried out simultaneously, the design of the performance limiter shall take into account the effects of these combinations.

4.6 Indicators

4.6.1 Indicators shall be fitted to cranes in accordance with the requirements for specific crane types as given in ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5.

Indication of the relevant parameters shown on the duty chart for the crane provides a valuable aid to the operator. Examples of such parameters are

— radius,

— angle,

— rated capacity,

— proximity to rated capacity,

— actual load,

— jib length,

— falls of hoisting line,

— wind speed,

— crane level,

— skew,

— drum rotation, and

— slake rope.

4.6.2 Continuous and unambiguous visual, audible or tactile indication shall be provided for the crane operator when required, for example, by means of a needle moving across a scale, the approach of two pointers, or digital display.

4.6.3 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.

5 Inspection

5.1 Prior to daily operation, a check shall be made to ensure that the systems function in accordance with the system manufacturer's written instructions.

Identified system malfunctions shall be corrected, in accordance with the system manufacturer's instructions, prior to the continued usage of the system.

5.2 Every twelve months or more frequently, the system shall be inspected and tested by a qualified person; if calibration is required, it shall be done by a qualified person.

The crane owner (user) shall maintain a record of the dates and the results of the annual (minimum) or periodic inspections for the crane. Records should be kept where available by an appointed person.

6 Maintenance

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

7 Operating instructions and operator training

The manufacturer shall supply pertinent operating instructions with each limiting and indicating device, including any special limitations or requirements, which shall be included in the operator's training programme.

8 Information for use

8.1 Instructions shall be provided for the protection of limiters and indicators when arc welding is carried out on the crane.

8.2 Instructions shall be provided for the actions to be taken to protect the limiter/indicator when overload testing the crane.

8.3 Warnings shall be provided to prevent excessive paint from being applied to critical areas.

NOTE Attention is drawn to ISO 12100-2:2003, Clause 5.

Bibliography

[1] ISO 8686-1:1989, *Cranes — Design principles for loads and load combinations — Part 1: General*

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

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

[4] ISO 9928-1:1990, *Cranes — Crane driving manual — Part 1: General*

[5] ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

[6] ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

ICS 53.020.20

Price based on 9 pages