
**Cranes — Limiting and indicating
devices —**

**Part 1:
General**

*Appareils de levage à charge suspendue — Limiteurs et indicateurs —
Partie 1: Généralités*





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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 8, *Jib cranes*.

This third edition cancels and replaces the second edition (ISO 10245-1:2008), which has been technically revised.

The main changes compared to the previous edition are as follows:

- this document has been updated to be consistent with ISO 10245-2, ISO 10245-3, ISO 10245-4 and ISO 10245-5;
- [Clause 3](#) has been revised to be consistent with ISO 4306-1;
- the definition and requirements of event recorder and data logger have been included in this document, consistently with the requirements of ISO 10245-2, ISO 10245-3, ISO 10245-4 and ISO 10245-5;
- [Formula \(1\)](#) has been revised to be consistent with ISO 8686-1 for indirect and direct acting limiters;
- the term “rated capacity limiter” has been supplemented to include the term “load limiter” for clarification.

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

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.

Cranes — Limiting and indicating devices —

Part 1: General

1 Scope

This document 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 the ISO 10245 series.

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

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

ISO 10245-2, *Cranes — Limiting and indicating devices — Part 2: Mobile cranes*

ISO 10245-3, *Cranes — Limiting and indicating devices — Part 3: Tower cranes*

ISO 10245-4, *Cranes — Limiting and indicating devices — Part 4: Jib cranes*

ISO 10245-5, *Cranes — Limiting and indicating devices — Part 5: Overhead travelling and portal bridge cranes*

3 Terms and definitions

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

anti-collision device

device used to prevent cranes or parts of cranes from colliding with a fixed load-lifting attachment or other crane(s) when they are manoeuvred simultaneously in the same space

Note 1 to entry: A *working space limiter* (3.17) can 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
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

**3.4
derricking limiter**

device used to prevent the raising or lowering of a jib, boom, fly jib, "A-frame" or mast beyond specified limits

**3.5
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

**3.6
indicator**

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

**3.7
lowering limiter**

device used to ensure that the minimum engagement of the lifting medium

EXAMPLE The minimum number of turns of rope on the hoist drum, is maintained at all times during operation, mechanical device designed to prevent the chain from running out of engagement with the driving mechanism.

**3.8
motion limiter**

limiting device which initiates either the stopping and/or restriction of designated crane motion

Note 1 to entry: See the examples given in [4.5.1.1](#).

**3.9
performance limiter**

device that prevents a design performance characteristic from being exceeded

Note 1 to entry: See the examples given in [4.5.2.1](#).

**3.10
rated capacity**

maximum net load or, for mobile cranes, hoist medium load that the crane is designed to lift for a given crane *configuration* ([3.2](#)) and load location during normal operation

**3.11
rated capacity indicator**

indicating device that automatically provides acoustic and/or visual warnings

Note 1 to entry: For particular crane types, reference should be made to ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5 for details.

Note 2 to entry: See [4.4.1.2](#) a).

3.12**rated capacity limiter or load limiter**

limiting device that automatically prevents the crane from handling loads in excess of its *rated capacity* (3.10) by more than a specified value

3.13**slack rope limiter**

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

3.14**slewing limiter**

device used to prevent slewing beyond specified limits

EXAMPLE A device to prevent continuous rotation.

3.15**telescoping limiter**

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

3.16**travelling and traversing limiter**

device used to prevent all types of movement along rail tracks or runways beyond specified limits

3.17**working space limiter**

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

Note 1 to entry: Working space limitation is often achieved by a combination of different limiters.

3.18**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

3.19**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* (3.18) and data logger are limited to the recording of the data and do not cover the access and the monitoring of data.

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, temperature, condensation, vibration;
- 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 limiters and 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 or load limiters or indicators

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

NOTE 1 National regulations can apply other values.

NOTE 2 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 A data logger or event recorder shall be provided if required by ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5.

4.2.3 The rated capacity limiter or load limiter or rated capacity indicator shall perform in accordance with the requirements of this document for all rated capacities and all configurations described in the operating manual supplied by the manufacturer.

4.2.4 If a crane can be operated with different configurations, there shall be an indication of the crane configuration for which the rated capacity limiter or load limiter or rated capacity 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.

4.2.5 The rated capacity limiter or load limiter or rated capacity indicator shall operate automatically for all configurations and positions of the crane.

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

4.2.7 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.

4.2.8 The design and installation of rated capacity limiter or load limiter or rated capacity indicator shall allow for the possibility 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.

4.2.9 The design and installation of rated capacity limiter or load limiter or rated capacity indicator 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.

4.2.10 The rated capacity limiter or load limiter or 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.

4.3 Rated capacity limiter or load limiter

4.3.1 General

4.3.1.1 The rated capacity limiter or load 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 [Formula \(1\)](#):

$$1 + \frac{a}{g} \leq \frac{Q_L}{Q_{GL}} \leq \phi_2 \quad (1)$$

where

a is the design mean acceleration for hoisting;

g is the acceleration due to gravity;

ϕ_2 is the factor for hoisting a grounded load from ISO 8686-1;

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

ϕ_2 is either the factor ϕ_2 or a factor chosen within the following limits:

- $\leq 1,1$ for indirect-acting limiters, using sensors and switches off the energy supply;
- $\leq 1,6$ 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 rated capacity limiter or load limiter shall override the controls of the crane to prevent any condition that increases 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 increase the overload.

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

4.3.2.3 The rated capacity limiter or load 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. For specific warning limits for particular crane types, reference should be made to ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5;
- b) warn the crane operator and persons in the danger zone when the rated capacity limiter or load 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 capacity limiter or load limiter has been overridden. Specific requirements for overriding limiters shall be in accordance with ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5.

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.

4.5 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 of the same motion, 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 part, for particular crane types, reference should be made to ISO 10245-2, ISO 10245-3, ISO 10245-4 or ISO 10245-5 for details. 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 can 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 that can be required 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
- slack 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.

5 Inspection

5.1 The indicating and limiting devices described in this document shall be inspected and the inspection documented according to ISO 9927-1.

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.

6 Maintenance

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

7 Operating instructions and operator training

The manufacturer shall supply 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.

Bibliography

- [1] ISO 8686-1:2012, *Cranes — Design principles for loads and load combinations — Part 1: General*
- [2] ISO 9926-1:1990, *Cranes — Training of drivers — Part 1: General*
- [4] ISO 9928-1:2015, *Cranes — Crane operating manual — Part 1: General*
- [5] ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

