
**Cranes — Wire ropes — Care and
maintenance, inspection and discard**

*Appareils de levage à charge suspendue — Câbles — Entretien
et maintenance, inspection et dépose*



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Published in Switzerland

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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.

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 4309 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 3, *Selection of wire ropes*.

This fourth edition cancels and replaces the third edition (ISO 4309:2004), which has been technically revised. It also incorporates the Amendment ISO 4309:2004/Amendment 1:2008.

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Introduction

A wire rope on a crane is regarded as an expendable component, requiring replacement when the results of inspection indicate that its condition has diminished to the point where further use would be unwise from a safety standpoint.

By following well-established principles, such as those detailed in this International Standard, along with any additional specific instructions provided by the manufacturer of the crane or hoist and/or by the manufacturer of the rope, this point should never be exceeded.

In addition to encompassing the guidance on storage, handling, installation and maintenance, which was first introduced in the last revision, this International Standard also provides discard criteria for those running ropes which are subjected to multi-layer spooling, where both field experience and testing demonstrate that deterioration is significantly greater at the cross-over zones on the drum, than at any other section of rope in the system.

It also provides more realistic discard criteria covering decrease in rope diameter and corrosion, and gives one method for assessing the combined effect of deterioration at any position in the rope.

When correctly applied, the discard criteria given in this International Standard are aimed at retaining an adequate safety margin. Failure to recognize them can be extremely harmful, dangerous and damaging.

To assist those who are responsible for "care and maintenance" as distinct from those who are responsible for "inspection and discard", the procedures are conveniently separated.

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Cranes — Wire ropes — Care and maintenance, inspection and discard

1 Scope

This International Standard establishes general principles for the care and maintenance, and inspection and discard of steel wire ropes used on cranes and hoists.

This International Standard is applicable to those ropes used on the following types of cranes, the majority of which are defined in ISO 4306-1:

- a) cable and portal cable cranes;
- b) cantilever cranes (pillar jib, wall or walking);
- c) deck cranes;
- d) derrick and guy derrick cranes;
- e) derrick cranes with rigid bracing;
- f) floating cranes;
- g) mobile cranes;
- h) overhead travelling cranes;
- i) portal or semi-portal bridge cranes;
- j) portal or semi-portal cranes;
- k) railway cranes;
- l) tower cranes;
- m) offshore cranes, i.e. cranes mounted on a fixed structure supported by the sea bed or on a floating unit supported by buoyancy forces.

This International Standard applies to rope on cranes used for hook, grabbing, magnet, ladle, excavator or stacking duties, whether operated manually, electrically or hydraulically.

This International Standard also applies to rope used on hoists and hoist blocks.

In view of the fact that the exclusive use of synthetic sheaves or metal sheaves incorporating synthetic linings is not recommended when single-layer spooling at the drum, due to the inevitability of wire breaks occurring internally in large numbers before there is any visible evidence of any wire breaks or signs of substantial wear on the periphery of the rope, no discard criteria are given for this combination.

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 17893, *Steel wire ropes — Vocabulary, designation and classification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17893 and the following apply.

3.1 nominal diameter

d
diameter by which the rope is designated

3.2 measured diameter

actual diameter
 d_m
average of two measurements, taken at right angles to one another, of the diameter that circumscribes the rope cross-section

3.3 reference diameter

d_{ref}
measured diameter of a section of rope that is not subject to bending, taken directly after the rope has been broken in

NOTE This diameter is used as the baseline for uniform decrease in diameter.

3.4 cross-over zone

that portion of rope coincident with a crossing over of one wrap by another as the rope traverses the drum or rises from one layer to the next at the drum flange

3.5 wrap

one revolution of rope around a drum

3.6 reel

flanged spool on which rope is wound for shipment or storage

3.7 wire rope periodic inspection

in-depth visual inspection of the rope plus measurement of the rope and, if practicable, an assessment of its internal condition

NOTE This is sometimes referred to as a “thorough examination”.

3.8 competent person

(wire rope inspection) person having such knowledge and experience of wire ropes on cranes and hoists as is necessary for that person to assess the condition of the rope, make a judgement as to whether it may remain in service and stipulate the maximum time interval between inspections