INTERNATIONAL STANDARD

ISO 16120-1

Third edition
2017-05

Non-alloy steel wire rod for conversion to wire —

Part 1: General requirements

Fil-machine en acier non allié destiné à la fabrication de fils —

Partie 1: Exigences générales

Reference number
ISO 16120-1:2017(E)

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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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 17, *Steel wire rod and wire products*.

This third edition cancels and replaces the second edition (ISO 16120-1:2011), which has been technically revised.

The main changes compared to the previous edition are:

— core segregation, surface discontinuity and mechanical damage have been added to the terms and definitions;

— determination of cementite network in high-carbon steel wire rod (9.5.8 and Annex E) added.

A list of all parts in the ISO 16120 series can be found on the ISO website.

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Non-alloy steel wire rod for conversion to wire —

Part 1: General requirements

1 Scope

The ISO 16120 series is applicable to wire rod of non-alloy steel intended for wire drawing and/or cold rolling. The cross-section can be circular, oval, square, rectangular, hexagonal, octagonal, half-round or another shape, generally with at least 5 mm nominal dimension, and with a smooth surface.

This document specifies general requirements for non-alloy steel wire rod for conversion to wire. It is not applicable to products for which standards exist or are in development, for example:

— steel wire rod intended for heat treatment;

— free-cutting steel wire rod;

— steel wire rod for cold heading and cold extrusion;

— steel wire rod intended for the production of electrodes and products for welding;

— steel wire rod for welded fabric for reinforcement for concrete;

— steel wire rod for ball and roller bearings (see ISO 683-17);

— steel wire rod for wire for high fatigue strength mechanical springs, such as valve springs.

In addition to the requirements of this document, the general technical delivery requirements specified in ISO 404 apply.

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 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing*

ISO 404:2013, *Steel and steel products — General technical delivery requirements*

ISO 3887, *Steels — Determination of depth of decarburization*

ISO 4885, *Ferrous products — Heat treatments — Vocabulary*

ISO 4948-1, *Steels — Classification — Part 1: Classification of steels into unalloyed and alloy steels based on chemical composition*

ISO 4948-2, *Steels — Classification — Part 2: Classification of unalloyed and alloy steels according to main quality classes and main property or application characteristics*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 6929, *Steel products — Vocabulary*

ISO/TR 9769, *Steel and iron — Review of available methods of analysis*

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ISO 10474, *Steel and steel products — Inspection documents*

ISO 14284, *Steel and iron — Sampling and preparation of samples for the determination of chemical composition*

ISO 16120-2:2017, *Non-alloy steel wire rod for conversion to wire — Part 2: Specific requirements for general-purpose wire rod*

ISO 16120-3:2011, *Non-alloy steel wire rod for conversion to wire — Part 3: Specific requirements for rimmed and rimmed substitute, low-carbon steel wire rod*

ISO 16120-4:2017, *Non-alloy steel wire rod for conversion to wire — Part 4: Specific requirements for wire rod for special applications*

ISO 16124, *Steel wire rod — Dimensions and tolerances*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 377, ISO 404, ISO 4885, ISO 4948-1, ISO 4948-2 and ISO 6929 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
rod
hot-rolled finished product hot-wound into irregular coils

Note 1 to entry: Rod used for wire-drawing purposes in coil form is generally termed wire rod.

3.2
heat analysis
chemical analysis representative of the heat, by a method determined at the steelmaker's discretion

[SOURCE: ISO 404:2013, 3.11, modified.]

3.3
product analysis
chemical analysis carried out on a sample of the product taken after the final hot rolling operation

[SOURCE: ISO 404:2013, 3.12, modified.]

3.4
resolvable pearlite
two-phased structure in which ferrite and iron carbide lamellae can be clearly observed under optical microscopy in certain conditions

3.5
core segregation
local variation in chemical composition that is noticeable over a cross-section of wire *rod* (3.1) by macrographic examination and that concerns primarily the segregation resulting from a solidification process in continuous casting

Note 1 to entry: It is for this reason that an examination, specifically for carbon core segregation, will reveal the presence of segregation.

Note 2 to entry: A different technique is used to assess grain boundary cementite (which may be detrimental to further processing), the formation of which is related to carbon segregation and the cooling rate after wire rod rolling. However, grain boundary cementite should not be confused with core segregation.

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3.6
surface discontinuity
measurable discontinuity in the surface of the wire *rod* (3.1), introduced at some point during the manufacturing process

3.7
mechanical damage
discernible contact which the wire *rod* (3.1) encounters after the rolling and coiling operation, i.e. during subsequent handling of the coil, and which marks the surface

Note 1 to entry: The contact can be introduced by abrasion or impact and can occur between coils or between the coil and any other material capable of inducing damage (concrete, steel or other materials).

Note 2 to entry: See Annex C.

4 Classification

The classification of the steel grades covered by this document is indicated in ISO 16120-2, ISO 16120-3 and ISO 16120-4 for the corresponding steel grades.

5 Ordering information to be supplied by the purchaser

The following information shall be supplied by the purchaser at the time of enquiry and order, to enable the supplier to comply satisfactorily with the requirements of the ISO 16120 series:

a) quantity to be delivered;

b) cross-section and product type (e.g. round wire rod, square wire rod, hexagonal wire rod, etc.);

c) nominal dimensions of the wire rod and tolerance class in accordance with ISO 16124 (if another tolerance class such as T1 is required);

d) reference to the relevant part of ISO 16120, i.e. ISO 16120-2;

e) steel grade, including any variations, and/or the addition of other elements, as permitted by ISO 16120-2 and ISO 16120-4;

(For steels according to ISO 16120-2 and ISO 16120-4, wire rod can also be ordered by the mean tensile strength; see ISO 16120-2:2017, Clause 3 and 4.6 and ISO 16120-4:2017, Clause 3 and 4.8. When ordering to tensile strength, it is necessary also to indicate the required tolerances on tensile strength ranges — Option A or Option B.)

f) type of inspection and inspection document in accordance with ISO 10474 (or in accordance with other regional standards, e.g. EN 10204);

g) surface condition (where different from the as-rolled condition);

h) dimensions and mass of coils;

i) where applicable, indication of the type of descaling (chemical cleaning or mechanical);

j) where applicable, the amount of microalloying elements (see ISO 16120-2 and ISO 16120-4);

k) where applicable, class B for the depth of decarburization (see ISO 16120-4);

NOTE If nothing is mentioned in the order, class A will be delivered;

l) where applicable, the microstructure (see ISO 16120-4:2017, 4.11);

m) where applicable, suitability for galvanizing;

n) where applicable, suitability for direct drawing;

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