INTERNATIONAL STANDARD

ISO 16120-1

Second edition
2011-07-01

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 16120-1:2011(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.

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 16120-1 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 17, *Steel wire rod and wire products*.

This second edition cancels and replaces the first edition (ISO 16120-1:2001), which has been technically revised.

ISO 16120 consists of the following parts, under the general title *Non-alloy steel wire rod for conversion to wire*:

— *Part 1: General requirements*

— *Part 2: Specific requirements for general-purpose wire rod*

— *Part 3: Specific requirements for rimmed and rimmed substitute, low-carbon steel wire rod*

— *Part 4: Specific requirements for wire rod for special applications*

Non-alloy steel wire rod for conversion to wire —

Part 1:
General requirements

1 Scope

1.1 ISO 16120 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.

1.2 This part of ISO 16120 covers general requirements and 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.

1.3 In addition to the requirements of this part of ISO 16120, the general technical delivery requirements specified in ISO 404 apply.

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

ISO 404:1992, *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 — Definitions and classification*

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

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 16120-2:2011, *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 16120-4:2011, *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.

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

NOTE 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

NOTE Adapted from ISO 404:1992.

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

NOTE Adapted from ISO 404:1992.

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

4 Classification

The classification of the steel grades covered by this part of ISO 16120 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 ISO 16120:

a) quantity to be delivered;

b) cross-section and product type (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 in 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 Clause 3 and 4.6 of ISO 16120-2:2011 and Clause 3 and 4.8 of ISO 16120-4:2011;

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

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); if nothing is mentioned in the order, class A will be delivered;

l) where applicable, the microstructure (see ISO 16120-4:2011, 4.11);

m) where applicable, suitability for galvanizing;

n) where applicable, suitability for direct drawing;

o) where applicable, the quality system (see 7.2);

p) where applicable, the method of binding and labelling.

Items g) to p) are options. If the purchaser does not indicate a wish to implement any of these options, the supplier shall supply the product in accordance with the basic specifications of Items a) to f).

The following are two ordering examples.

EXAMPLE 1 For grades ordered according to chemical composition, 100 tonnes of round wire rod, nominal diameter of 12 mm with dimensional tolerances according to ISO 16124, class T1, steel grades ISO 16120-2 – C52D in the as-rolled condition with an inspection document 3.1.B according to ISO 10474

100 t round wire rod ISO 16124-12,0T1
ISO 16120-2 – C52D
ISO 10474 inspection document 3.1.B

EXAMPLE 2 For grades ordered according to tensile strength, 200 tonnes of round wire rod, nominal diameter of 5,5 mm with dimensional tolerances according to ISO 16124, class T1, steel grades ISO 16120-4 – C##D2 with tensile strength 1020 MPa in the as-rolled condition with an inspection document 3.1.B according to ISO 10474.

200 t round wire rod ISO 16124-5,5T1
ISO 16120-4 – C##D2-1020
ISO 10474 inspection document 3.1.B

NOTE ## means “to be left blank” since the carbon content is at the discretion of the supplying mill, and the supplying mill indicates the exact number of ## based on the grade designation until shipment. See Table 1 of ISO 16120-2:2011 and ISO 16120-4:2011, respectively, for the grade designation.

6 Production process

At the request of the purchaser at the time of enquiry and ordering, the steel making and manufacturing process shall be made known to the purchaser. Those processes that are specifically agreed upon shall not be changed without the prior agreement of the purchaser.

7 Requirements

7.1 General

Suppliers are responsible, using the means they think fit, for inspecting their product in accordance with various quality criteria specified. In view of the practical difficulties in inspecting a coil of wire rod along its entire length, it cannot be proved that no value greater than the specified limits is to be found in the coil as a whole. Statistical evaluation of performances applicable to all coils may be agreed between the purchaser and the manufacturer at the time of ordering.

7.2 Quality system

If agreed between the supplier and purchaser at the time of enquiry and order, the wire rod supplied shall be produced under a mutually acceptable quality system.

7.3 Method of delivery

Wire rod shall be delivered by heat or part of a heat. Unless otherwise specified, the number of heats per delivery should be minimized as far as possible.

7.4 Delivery condition

Wire rod shall be supplied in the as-rolled state, in coils of one continuous length with non-aligned turns, but capable of being unwound in a regular manner during subsequent processing.

The coils shall be cut back at both ends to provide a product of uniform shape and properties.

8 Dimensions, mass and tolerances

The dimensions, mass and tolerances of the wire rod shall be in accordance with the requirements of ISO 16124.

9 Inspection

9.1 Inspection and inspection documents

Inspection and inspection documents shall be in accordance with ISO 404 and ISO 10474.

9.2 Extension of inspection

If the order is accompanied by a request for an inspection certificate or an inspection report, the inspection shall be carried out in accordance with Table 1. If the order requires an inspection document 3.1.C or 3.2, the purchaser shall supply to the manufacturer the name and address of the organization or person nominated to carry out the inspection.

Table 1 — Extension of inspection

Subject of test	General-purpose wire rod (ISO 16120-2)	Rimmed and rimmed substitute, low-carbon wire rod (ISO 16120-3)	Wire rod for special applications (ISO 16120-4)
Surface discontinuities	0	0	0
Decarburization	—	—	0
Non-metallic inclusions	—	0	0
Core segregation	0	—	0
Product analysis	0	0	0
Tensile strength	0	0	0
Microstructure	—	—	0[a]
—: is not carried out 0: is carried out only if part of the options agreed at the time of ordering			
[a] See Annex D.			

9.3 Acceptance unit, number of samples and test pieces

Unless otherwise agreed, the acceptance unit is composed of wire rod of the same cross-sectional dimension, originating from the same heat, and rolled in the same continuous lot.

If specific inspection is required, the number of samples and test pieces given in Table 2 shall apply. For wire rod for special applications, a higher frequency of sampling may be agreed. If non-specific inspection is required, the performance statistics or suitable data may be used.

Table 2 — Acceptance unit and number of samples and test pieces

Type of requirement	Number of samples or test pieces
Product analysis	3, from 3 different coils originating from the same heat, but not necessarily rolled in the same continuous lot[a]
Permissible depth of surface discontinuities Permissible depth of decarburization Non-metallic inclusions Tensile strength Microstructure	1 per 20 t with a minimum of 3 and a maximum of 5 per acceptance unit[a]
Core segregation	10[b]
[a] Another number of samples to be examined may be agreed upon between the supplier and purchaser at the time of ordering, depending upon the process capability. [b] The number of samples to be examined may be agreed upon between the supplier and the purchaser, with preferably a minimum of 10.	

9.4 Sampling and preparation of samples and test pieces

9.4.1 Chemical composition

Where it has been agreed to verify the chemical composition of the product, sampling and preparation of samples for heat analysis shall be carried out in accordance with ISO 14284.

9.4.2 Tensile strength

If it is agreed to perform the tensile test, samples shall be taken and prepared in accordance with ISO 377.

9.4.3 Decarburization, surface discontinuities, non-metallic inclusions, core segregation and microstructure

For testing for decarburization, surface discontinuities, non-metallic inclusions, core segregation and microstructure, the required number of test pieces shall be taken from one end of individual cropped coils (see 7.4).

9.5 Test methods

9.5.1 Chemical composition

The methods for heat analysis shall be in accordance with ISO/TR 9769. The methods to be applied for the verification of the product analysis shall be agreed upon at the time of ordering. In case of dispute about analytical methods, the chemical composition shall be determined in accordance with a reference method.

9.5.2 Tensile strength

The tensile test is carried out on wire rod in the as-rolled condition in accordance with ISO 6892-1.

9.5.3 Surface discontinuities

The method to be used for revealing and measuring surface discontinuities shall be chosen by the supplier.

9.5.4 Decarburization

Testing for decarburization shall be carried out on the wire rod in the as-rolled condition, in accordance with ISO 3887. Decarburization is inspected by microscope, preferably at a magnification of 200×, on a transverse metallographic test piece that has been suitably etched.

The depth of decarburization of the sample is considered as being the average of eight measurements at the ends of four diameters (or diagonals) located at 45° to each other, starting from the zone of maximum decarburization and avoiding starting from a defective zone. In the calculation of the above average value, any measuring point of the seven remaining situated in a local surface discontinuity shall not be taken into account in the calculation. The depth of decarburization is measured normal to the surface of the test piece.

9.5.5 Non-metallic inclusions

The tests shall be carried out on the wire rod in the as-rolled condition and in accordance with 5.5 of ISO 16120-3:2011 and with 4.6 of ISO 16120-4:2011.

9.5.6 Core segregation

The method for determining the core segregation shall be by macrographic examination on a transverse section of the sample, as described in Annex A.

9.5.7 Microstructure

The tests shall be carried out on the wire rod in the as-rolled condition. The method for determining the microstructure shall be carried out as specified in Annex D.

9.6 Retest

Retests of wire rod and their criteria should be as specified in ISO 404.

10 Marking

Each coil in each consignment shall be marked with the following information:

a) dimensions of the cross-section of the wire rod;

b) steel grade;

c) heat number;

d) the name and/or symbol of the supplying mill;

e) any subsequently agreed information.

Unless otherwise agreed upon, the marking shall withstand pickling. The durability of the labels utilized for marking shall be agreed upon at the time of ordering.

11 Disputes

See ISO 404.

Annex A
(normative)

Determination of core segregation

A.1 Scope

This annex is applicable for wire rod made from continuously cast steel with a carbon content of at least 0,40 % and defined in this part of ISO 16120. The method described below is a macrographic method aimed at determining and evaluating the core segregation present in continuously cast high-carbon wire rod by revealing the carbon segregation.

A.2 Term and definition

For the purposes of this annex, the following term and definition apply.

A.2.1
core segregation
local variation in chemical composition that is noticeable over a cross-section of wire rod by macrographic examination and that concerns primarily the segregation resulting from a solidification process in continuous casting

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

NOTE 2 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.

A.3 Principle

Chemical heterogeneity is revealed by chemical etching of a cross-section of the wire rod using a nital solution.

The images observed by macrographic examination are compared with the pictures shown in the reference chart and are classified accordingly.

A.4 Preparation of samples

A.4.1 Cutting

The surface to be examined is a transverse section from each sample to be examined. This is obtained by gradually cutting at low speed. At all times, excessive heating shall be avoided by means of appropriate cooling.

A.4.2 Polishing

The specimen is polished stepwise by using graduated emeries, and finishing with fine diamond paste of grain size 1 µm.

After polishing to a mirror finish, the specimen is carefully washed with water and dried using alcohol.

A.4.3 Etching

The nital solution is a solution of 2 ml of nitric acid (ρ_{20} = 1,33 g/ml) in 100 ml of ethanol.

The polished surface is etched at ambient temperature in the nital solution for a minimum of 10 s until the surface is etched clearly.

After etching, the surface is dried using alcohol.

A.4.4 Evaluation of the segregation

The etched surface is observed with a binocular microscope using illumination under a small angle with such a magnification as to obtain approximately the same dimension as in the reference chart.

The pictures in the chart are limit references for each class concerned.

Actual pictures are compared, positioned and graded within the reference chart. They are assigned the class of the reference picture equal to or worse than the picture under observation.

A.4.5 Classes of the segregation

See Figure A.1.

The reference chart presents 5 classes of segregation.

— Class 1: without segregation zone;

— Class 2: core segregation with slight contrast (medium-grey);

— Class 3: core segregation with medium contrast (dark grey);

— Class 4: core segregation with pronounced contrast (small black core);

— Class 5: core segregation with heavy contrast (big black core).

A.4.6 Evaluation of the test results

It is generally accepted that a large number of results are required for a statistically significant evaluation of the core segregation of a heat or a shipment. The core segregation evident on an individual sample is only of limited value. For this reason, and to limit the number of tests to an economically acceptable level, it is advisable to use the determination of the segregation as part of a quality system.

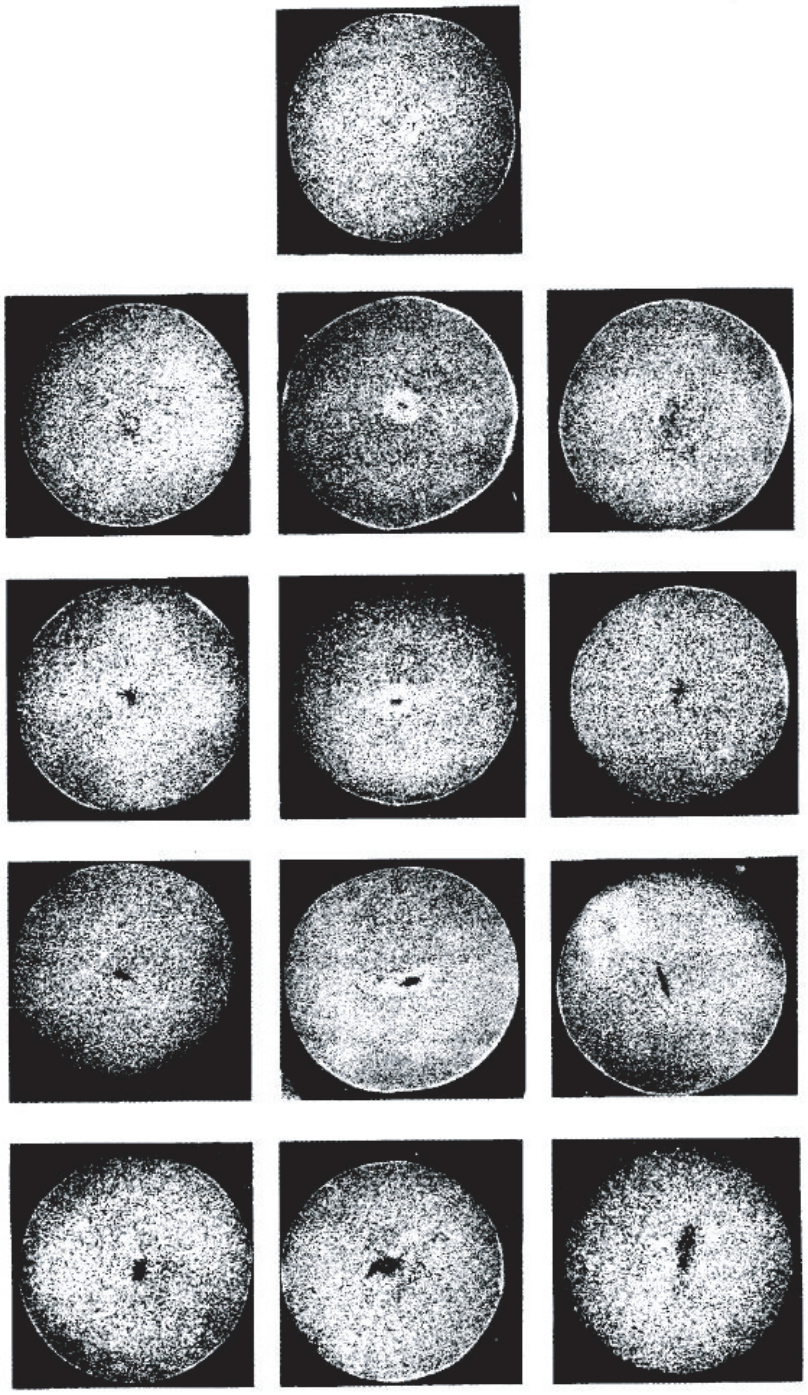


Figure A.1 — Reference chart for core segregation comparison

Annex B
(informative)

Measurement of surface discontinuities

B.1 Introduction

This annex is applicable for all grades of wire rod specified in ISO 16120-2, ISO 16120-3, and ISO 16120-4. The method described is a micrographic method aimed at determining and evaluating the magnitude of surface discontinuities as described in B.2 to B.4.

B.2 Term and definition

For the purposes of this annex, the following term and definition apply.

B.2.1
surface discontinuity
any measurable discontinuity in the surface of the wire rod, introduced at some point during the manufacturing process

B.3 Principle

Surface discontinuities are revealed by examination, using a microscope, of a polished section of the wire rod. The polished section may be etched.

B.4 Preparation of samples

B.4.1 Cutting

The surface to be examined is a transverse section.

B.4.2 Polishing

The specimen is polished stepwise using graduated emeries, finishing with the fine diamond paste.

After polishing to a mirror finish, the specimen is carefully washed with water, cleaned with alcohol and dried.

B.4.3 Etching

The specimen may be examined in the etched or unetched condition. If etched, a nital etchant, which is a solution of 2 ml of nitric acid (ρ_{20} = 1,33 g/ml) in 100 ml of ethanol, is used. The polished surface is etched at ambient temperature in the etching solution for a minimum of 10 s or until the surface is etched clearly.

After etching, the surface is cleaned using alcohol and dried.

B.4.4 Evaluation of the depth of the surface discontinuity

The surface is observed with an optical microscope at a magnification appropriate to the rod diameter and depth of discontinuity. The whole circumference of the specimen shall be examined.

B.4.5 Reporting of results

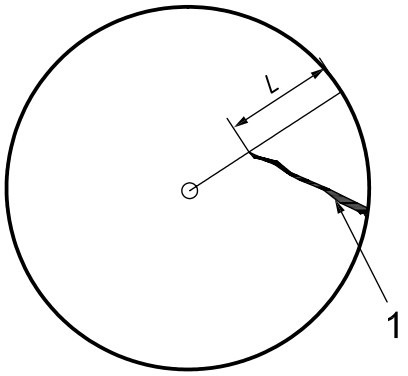
The results may be reported in two ways, “radial depth” or “actual length”:

Radial depth

— is defined as the distance between the surface of the wire rod and the end point of the discontinuity, measured along a radius, as shown in Figure B.1.

Actual length

— is defined as the distance from the point at which the discontinuity breaks the surface to its end point (see Figure B.2). In cases where the discontinuity is non-linear, an approximation method is used by notionally dividing the discontinuity into a number of linear portions, then summing the individual lengths (see Figure B.3).

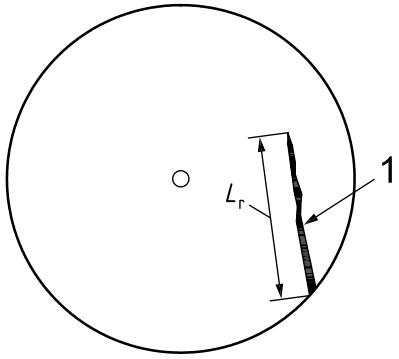


Key

1 discontinuity

L radial depth

Figure B.1 — Measurement of surface discontinuities: Case 1

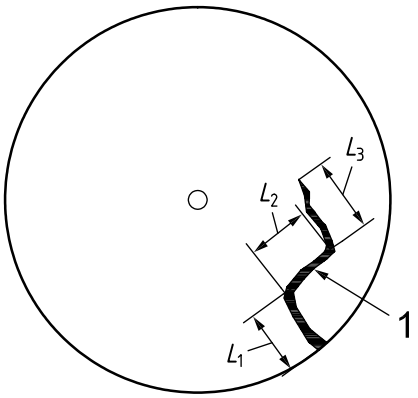


Key

1 discontinuity

L_r actual length

Figure B.2 — Measurement of surface discontinuities: Case 2



Key

1 discontinuity

L_r actual length

$L_r = L_1 + L_2 + L_3$

Figure B.3 — Measurement of surface discontinuities: Case 3

Annex C
(informative)

Mechanical damage

C.1 Introduction

This annex is intended to provide information concerning the types and appearance of mechanical damage on wire rod, which, if sufficiently severe, can result in failure either during drawing or during subsequent processing.

C.2 Term and definition

For the purposes of this annex, the following term and definition apply.

C.2.1
mechanical damage
any discernible contact which the wire rod encounters after the rolling and coiling operation, i.e. during subsequent handling of the coil, and which marks the surface

NOTE 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).

C.3 Illustrations of mechanical damage and the consequences

C.3.1 Types of damage and probable causes

There are three types of damage, which are shown in Figures C.1 to C.3.

Figure C.1 — Abrasive damage caused by coil-to-coil contact

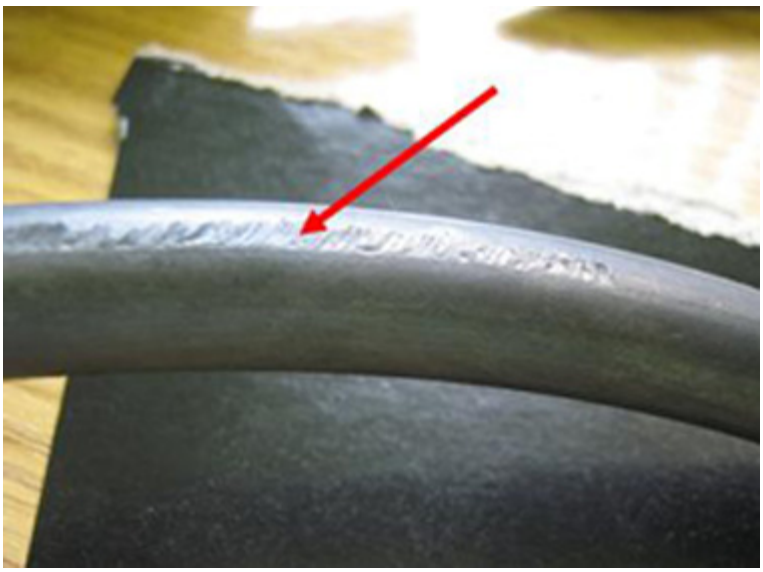


Figure C.2 — Damage caused by abrasive contact with concrete floor

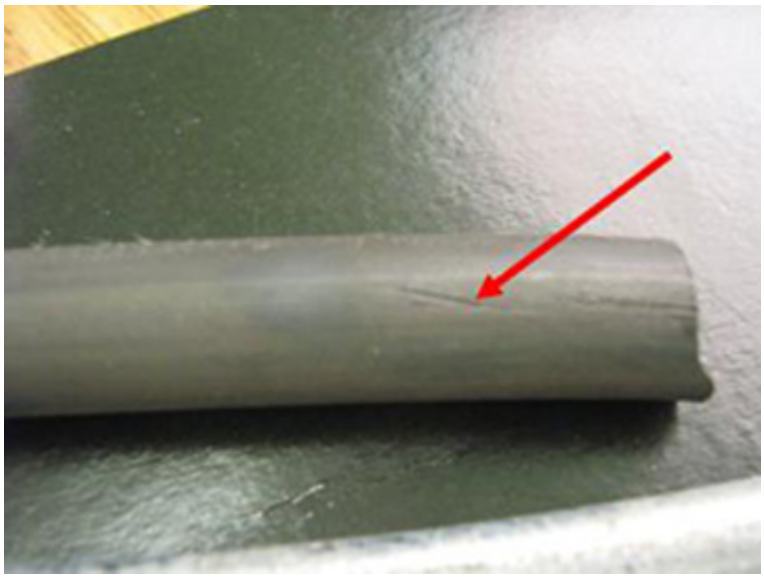


Figure C.3 — Damage caused by coil-to-coil contact during stacking

C.3.2 Consequences of mechanical damage

Figure C.4 shows an area of mechanical damage on the rod surface (indicated by an arrow) which has acted as the initiation point for a fracture which has occurred. Figures C.5 and C.6 are photomicrographs (at magnifications of ×18 and ×118 respectively) showing that the mechanical damage can be associated with frictional martensite, the result of abrasive contact between the wire rod surface and a material of higher hardness.

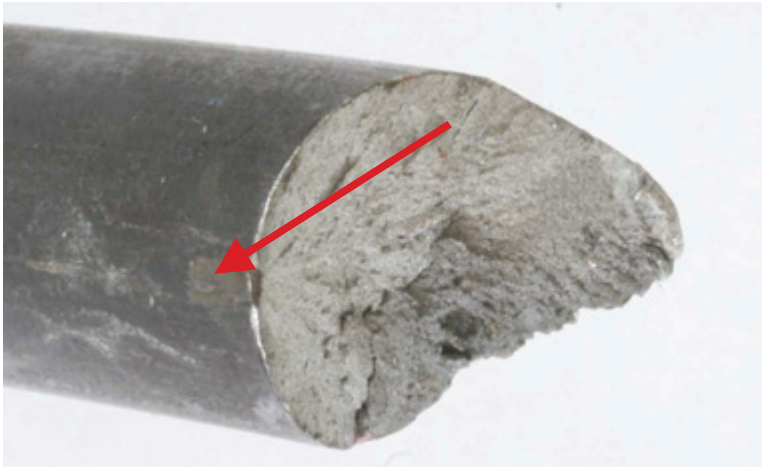


Figure C.4 — Mechanical damage on the rod surface (indicated by an arrow)

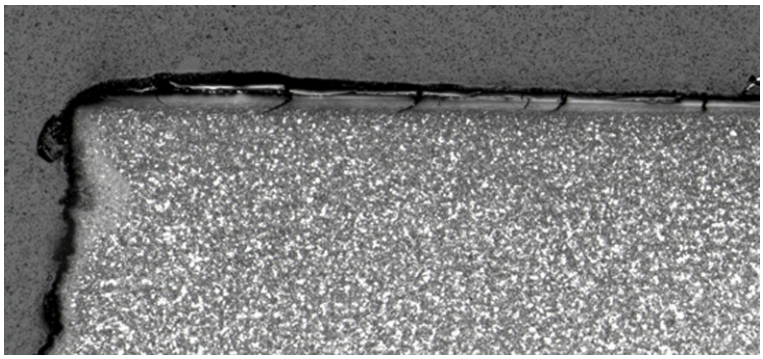


Figure C.5 — Photomicrograph (magnification ×18) of mechanical damage

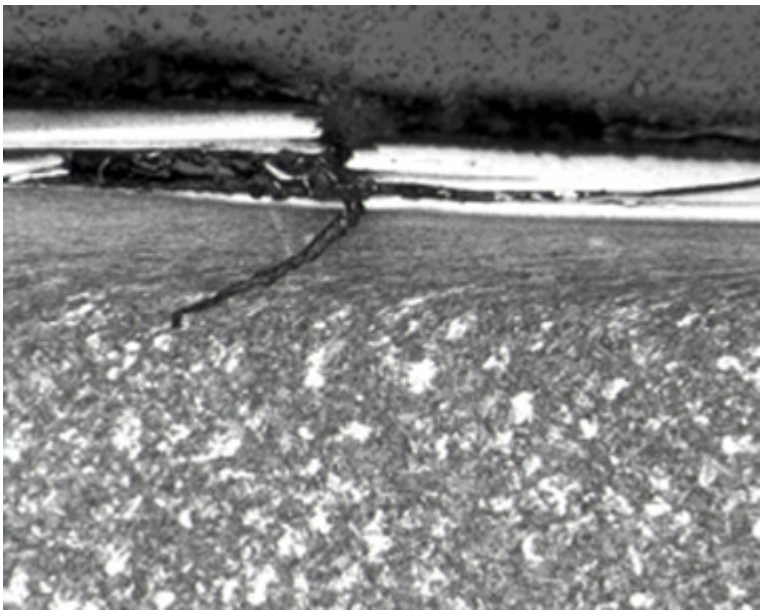


Figure C.6 — Photomicrograph (magnification ×118) of mechanical damage

C.4 Avoidance of mechanical damage

The measures in C.4.1 to C.4.3 are normally adopted to avoid mechanical damage during the various stages of processing after the rod is discharged from the production line.

C.4.1 Transposition of coils (i.e. lifting, loading and unloading)

a) The contact surface between the carrying device (C-hook or pole truck) and the coil should be made of soft steel or fitted with an inlay of aluminium or another “soft” material.

b) Lifting of coils should be vertical, to avoid dragging against the ground, steelwork or other coils.

c) Slings should be of fabric or another non-metallic material. If the use of chain or rope is unavoidable, it should be coated or sleeved with plastic or another non-harmful material.

C.4.2 Coil storage

a) Coils should be stored on wood, rubber matting, or another softer material. “Soft” spacers (made of hardboard or cardboard) should be placed between coils.

b) Where coils are stacked on top of each other in layers, “soft” spacers [as in C.4.2, Item a)] should be used between layers.

c) For those grades of wire rod where the surface quality is especially sensitive, single-layer storage should be used.

C.4.3 Transportation

a) Trucks and wagons should ideally be fitted with purpose-designed carriers (normally termed “wells” or “cradles”) to prevent movement of the coil during transportation, and to prevent contact with other coils.

b) As a minimum, the floor of the truck/wagon/vessel should be of wood or another non-harmful material, or protected with the same.

c) “Soft” spacers [as in C.4.2, Item a)] should be placed vertically between coils to prevent coil-to-coil abrasive damage. (Movement of coils during transportation can result in considerable abrasive damage if such a measure is not adopted.)

d) Where coils have to be strapped into a fixed position to ensure safe transportation, strapping material should be of softer material than the steel (e.g. fabric).

Annex D
(normative)

Determining the percentage of resolvable pearlite

D.1 Scope

This annex is applicable to wire rod made from continuously cast steel with a carbon content greater than 0,40 %. The method described is a micrographic method aimed at determining and evaluating the percentage of resolvable pearlite present in high-carbon wire rod by revealing and assessing the steel microstructure.

D.2 Principle

Resolvable pearlite is revealed by chemical etching of a polished section of the wire rod using an appropriate etchant.

D.3 Preparation of samples

D.3.1 Cutting

The surface to be examined can be a longitudinal or transversal section.

D.3.2 Polishing

The specimen is polished stepwise using graduated emeries, finishing with fine diamond paste.

After polishing to a mirror finish, the specimen is carefully washed with water, cleaned with alcohol and dried.

D.3.3 Etching

One of two etchants can be used:

a) a picral etchant, which is a saturated solution of picric acid in ethanol;

b) a nital etchant, which is a solution of 2 ml of nitric acid (ρ_{20} = 1,33 g/ml) in 100 ml of ethanol.

The polished surface is etched at ambient temperature in the etching solution for a minimum of 10 s or until the surface is etched clearly.

After etching, the surface is cleaned using alcohol and dried.

D.4 Evaluation of the percentage of resolvable pearlite

The etched surface is observed with an optical microscope at a magnification of $\times$500, using a numerical aperture of 0,8. The light source shall typically be white light, but another light source can be used.

A representative sample area is to be examined. The investigated sample area should be in the middle between the core and the surface (1/2 radius). Typically, 500 individual points are assessed.

In the photomicrograph below (Figure D.1: magnification ×500), the pearlitic structure is seen to be largely unresolvable, but with small areas of resolvable pearlite (wherein the ferrite and cementite laths can be separately distinguished).

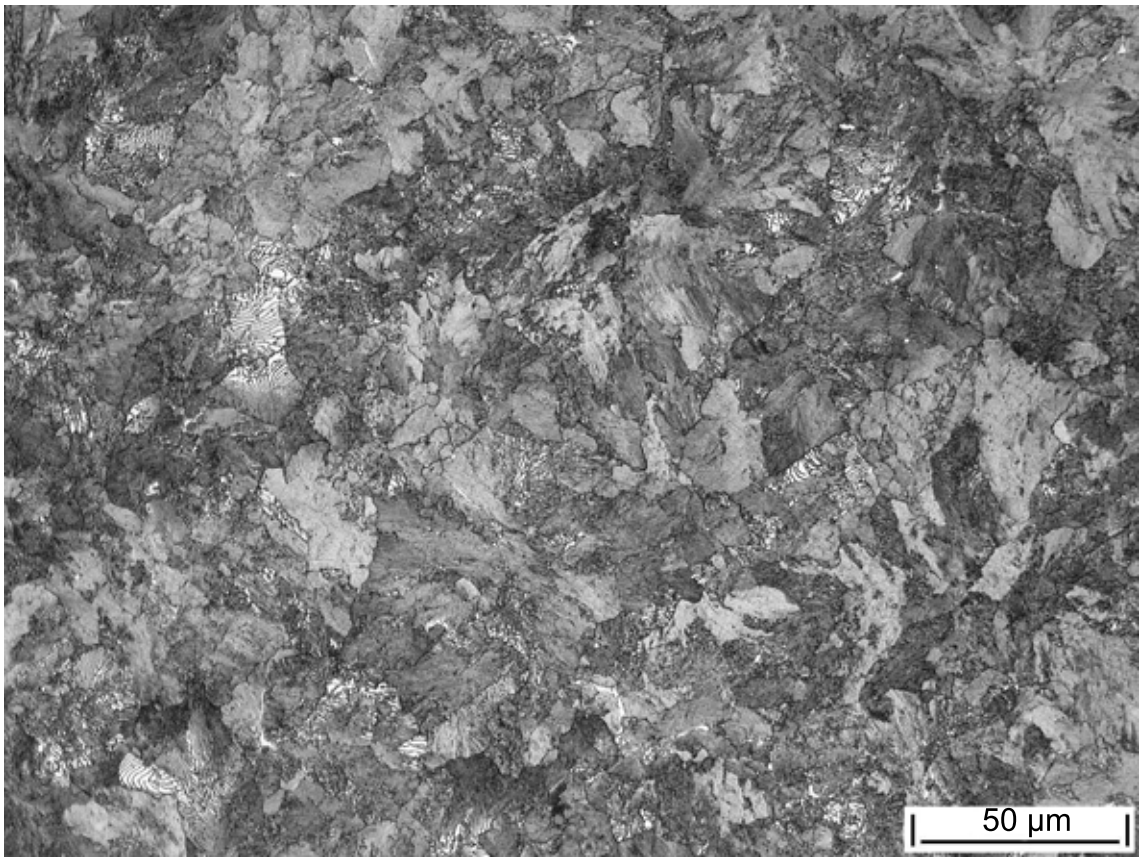


Figure D.1 — Pearlitic structure with largely unresolvable pearlite and small areas of resolvable pearlite (×500)

D.5 Reporting of results

If requested by the customer, the amount of resolvable pearlite, in percent, shall be reported in the certificate.

Bibliography

[1] ISO 683-17, *Heat-treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels*

[2] EN 10204, *Metallic products — Types of inspection documents*

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