



DRAFT INTERNATIONAL STANDARD ISO/DIS 16143-3

ISO/TC 17/SC 4

Secretariat: DIN

Voting begins on
2012-12-03

Voting terminates on
2013-03-03

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Stainless steels for general purposes —

Part 3: Wire

Aciers inoxydables pour usage général —

Partie 3: Fil

[Revision of first edition (ISO 16143-3:2005)]

ICS 77.140.20; 77.140.65

ITeH STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/22-a040fe-5c0e-4555-b75a-3656d88ea0be/iso-16143-3-2014>

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/22a040fe-5c0e-4555-b75a-3656d88ea0be/iso-16143-3-2014>

Copyright notice

This ISO document is a Draft International Standard and is copyright-protected by ISO. Except as permitted under the applicable laws of the user's country, neither this ISO draft nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured.

Requests for permission to reproduce should be addressed to either ISO at the address below or ISO's member body in the country of the requester.

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

Reproduction may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Designation	2
5 Information to be supplied by the purchaser	2
6 Manufacturing conditions.....	3
6.1 General	3
6.2 Treatment conditions	3
6.3 Surface finish	3
6.3.1 Cold drawn	4
6.3.2 Annealed	4
6.3.3 Polished finish	4
7 Requirements.....	4
7.1 Manufacturing process	4
7.2 Delivery condition	4
7.3 Chemical analysis	4
7.3.1 Cast analysis.....	4
7.3.2 Product analysis.....	4
7.4 Mechanical properties.....	4
7.4.1 Mechanical properties for annealed wire.....	4
7.4.2 Mechanical properties of hard-drawn wire.....	4
7.5 Tolerances on dimension	5
8 Inspection, testing and conformance of products.....	5
8.1 General	5
8.2 Inspection and testing procedures and types of inspection documents.....	5
8.3 Specific inspection and testing	6
8.3.1 Extent of testing	6
8.3.2 Selection and preparation of samples and test pieces	6
8.4 Test methods	6
8.4.1 Product analysis.....	6
8.4.2 Tensile test.....	6
8.4.3 Measurement of the wire diameter	6
8.5 Retests.....	6
9 Packing and Marking.....	6
Annex A (informative) Designations of the steels given in Table 1 and of comparable grades covered in ASTM-, EN-, JIS- and GB-Standards	17
Bibliography.....	19

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.

This second edition cancels and replaces the first edition (ISO 16143-3:2005) which has been technically revised.

ISO 16143 consists of the following parts, under the general title *Stainless steels for general purposes*:

- Part 1: *Corrosion resistant flat products*
- Part 2: *Corrosion resistant semi-finished products, bars and sections*
- Part 3: *Wire*

Stainless steels for general purposes — Part 3: Wire

1 Scope

This part of ISO 16143 specifies requirements for stainless steel wire for common use for which no product standard exists. It includes round, flat and shaped wire (such as square, hexagonal or rectangular wire), made of the most commonly used types of stainless steels for general corrosion resistance and high-temperature service. The wire may be supplied in coils or in straightened and cut lengths.

NOTE Steel wire made of corrosion resistant stainless steel is manufactured from steels mentioned in ISO 16143-2, and steel wire intended for high-temperature purposes is manufactured from steels mentioned in ISO 4955.

In addition to this part of ISO 16143, the general technical delivery requirements of ISO 404 are applicable.

Excluded from this part of ISO 16143 are

- wire for cold heading;
- welding wire, and
- any wire for which a specific product standard exists

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

ISO/TS 4949, *Steel names based on letter symbols*

ISO 4955, *Heat-resistant steels*

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 15510, *Stainless steels — Chemical composition*

ISO 16143-2, *Stainless steels for general purposes — Part 2: Semi-finished products, bars, rods and sections*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6929 and the following apply.

3.1

stainless steel

steel with at least 10,5 % Cr and maximum 1,2 % C

3.2

wire

cold-worked product generally of constant cross-section throughout its length, the dimensions of the section being very small compared with the length

NOTE 1 The cold working is accomplished by drawing rod through a reducing die or by passing under pressure between driven rolls and recoiling the drawn product. The cross-section is generally circular, sometimes oval, rectangular, square, hexagonal, octagonal or another shape (other than strip).

NOTE 2 Adapted from the definition in ISO 6929:1987.

4 Designation

For the steel grades covered by this International Standard, the steel names as given in the tables are allocated in accordance with ISO/TS 4949.

For the steel grades covered by this International Standard, the steel numbers as given in the tables are allocated in accordance with ISO 15510.

5 Information to be supplied by the purchaser

The purchaser shall clearly state, at the time of ordering, the following information:

- the desired quantity;
- the term “wire” or “straightened and cut wire”;
- the diameter or, for non-round wire, the characteristic dimension;
- for round wire the tolerances in accordance with Table 5, (N) for normal tolerances and (R) for restricted tolerances; for non-round wire, the desired tolerances on dimensions;
- the type of material (steel);
- the number of this part of ISO 16143 (ISO 16143-3);
- the steel name or steel number of the steel grade and the standard manufacturing condition of the wire (see 6.2);
- if applicable, the tensile-strength level in accordance with Table 4 (for hard-drawn wire);
- any further optional test agreed between manufacturer and purchaser at the time of enquiry and order (see 8.2.3.b)
- the type of coiling;
- the type of inspection document and its designation in accordance with ISO 10474 (see 8.2.1).

EXAMPLE 1 2 t round stainless steel wire of 2,00 mm diameter with normal tolerances (N) in accordance with Table 5 of ISO 16143-3 made of a steel grade with name X20Cr13 and number 4021-420-00-I, as specified in ISO 16143-3, standard manufacturing condition +A, in coils of about 500 kg, inspection document 3.1 as specified in ISO 10474 is designated as follows:

2 t wire 2,00 N
ISO 16143-3 – X20Cr13+A in coils of about 500 kg
ISO 10474 – 3.1

or

2 t wire 2,00 N
ISO 16143-3 – 4021-420-00-I +A in coils of about 500 kg
ISO 10474 – 3.1

EXAMPLE 2 5 t round stainless steel wire of 3,00 mm diameter with restricted tolerances (R) in accordance with Table 5 of ISO 16143-3 made of a steel grade with name X6CrNi18-12 and number, as specified in ISO 16143-3, hard drawn with a tensile strength 1 600–1 900 MPa, on spools of about 300 kg, inspection document 3.1 as specified in ISO 10474 is designated as follows:

5 t wire 3,00 R
ISO 16143-3 – X6CrNi18-12 +C1600 on spools of about 300 kg
ISO 10474 – 3.1

or

5 t wire 3,00 R
ISO 16143-3 – 4304-305-00-I +C1600 on spools of about 300 kg
ISO 10474 – 3.1

6 Manufacturing conditions

6.1 General

If not stated otherwise, the manufacturing procedure is at the discretion of the manufacturer.

6.2 Treatment conditions

The wire shall be specified in one of the following conditions, depending on the structure.

Condition +A: The wire is annealed as final heat treatment. Note that this material may be slightly deformed by straightening, cold work, size control or finish. This will result in a slight increase of the tensile strength.

Condition +AT: The wire is solution annealed as final heat treatment. Note that this material may be slightly deformed by straightening, cold work, size control or finish. This will result in a slight increase of the tensile strength.

Condition +C: The wire is hard drawn as the last operation, in order to achieve higher strength.

6.3 Surface finish

If not specified otherwise, the surface finish of the wire is one of the following, depending on previous processing steps.

6.3.1 Cold drawn

This is the natural finish resulting from the drawing to final size, generally with cold-drawing lubricant left on. The finish will be duller for dry drawn wire or shinier for wire that is wet drawn. Fine sizes are commonly wet drawn, whereas coarser sizes are commonly dry drawn. Special bright finishes, lubricant removal etc. required for special end-use must be negotiated with the manufacturer.

6.3.2 Annealed

A dull matt appearance, necessarily associated with the dead soft condition of annealed wire when no final drawing is permitted. With an additional surface treatment, a bright appearance can be realized.

6.3.3 Polished finish

A smooth and uniform bright finish of cold processed (+C) material obtained by mechanical smoothing, burnishing, abrading or grinding.

7 Requirements

7.1 Manufacturing process

The steel-making process for products according to this part of ISO 16143 shall be in accordance with ISO 4955 and ISO 16143-2. The wire processing, insofar as it is not specified in this part of ISO 16143 or agreed between the parties, shall be at the discretion of the wire drawer.

7.2 Delivery condition

The product shall be supplied as described in Clause 6 and agreed in the order.

7.3 Chemical analysis

7.3.1 Cast analysis

The chemical composition requirements given in Table 1 apply with respect to the chemical composition of the cast analysis.

7.3.2 Product analysis

The product analysis may deviate from the limiting values for the cast analysis given in Table 1 by the values listed in Table 2.

NOTE It is under discussion to change the deviations to the values according to ASTM.

7.4 Mechanical properties

7.4.1 Mechanical properties for annealed wire

The tensile strength and elongation shall satisfy the requirements of Table 3. It specifies the mechanical properties at room temperature in the annealed condition. For austenitic, austenitic-ferritic and precipitation-hardening steels, the wire is in the condition +AT, for ferritic and martensitic steels, this is in the condition +A.

7.4.2 Mechanical properties of hard-drawn wire

This wire is in condition (+C). The tensile strength will depend on the degree of work hardening, the specific type of steel and the processing of the material. The tensile strength is specified by a minimum and maximum.

Not all the tensile strength levels listed in Table 4 can be achieved for all steel grades. Therefore, the required tensile-strength level shall be agreed between the manufacturer and the purchaser at the time of ordering.

Table 4 gives an overview of the standardized tensile-strength levels and the corresponding minimum and maximum.

7.5 Tolerances on dimension

For round wire, the purchaser shall specify normal tolerance (N) or restricted tolerance (R), as defined in Table 5. For non-round wire, tolerances shall be agreed upon at the time of ordering.

The out of roundness is the difference between the largest and the smallest diameter in the same cross-section of the wire. The cross-section shall be perpendicular to the longitudinal wire axis. The out-of-roundness shall not exceed half the total diameter tolerance specified for coils.

8 Inspection, testing and conformance of products

8.1 General

The manufacturer shall carry out appropriate process control, inspection and testing to assure himself that the delivery complies with the requirements of the order.

This includes the following:

- a suitable frequency of verification of the dimensions of the products;
- an adequate intensity of visual examination of the surface quality of the products;
- an appropriate frequency and type of test to ensure that the correct grade of steel is delivered.

The nature and frequency of these verifications, examinations and tests are determined by the manufacturer, based on the degree of consistency that has been determined by the evidence of his quality system. In view of this, verifications by specific tests for these requirements are not necessary, unless otherwise agreed.

8.2 Inspection and testing procedures and types of inspection documents

8.2.1 Products complying with this International Standard shall be ordered and delivered with one of the inspection documents as specified in ISO 10474. The type of document shall be agreed upon at the time of enquiry and order. If the order does not contain any specification of this type, a test report 2.2 shall be issued.

8.2.2 If, in accordance with the agreements made at the time of ordering, a test report is to be provided, this shall cover:

- a) the statement that the material complies with the requirements of the order;
- b) the results of the cast analysis for all elements specified for the type of steel supplied.

8.2.3 If, in accordance with the agreements in the order, an inspection certificate 3.1 or 3.2 of ISO 10474 is to be provided, the specific inspections and tests described in 8.3 shall be carried out and their results shall be certified in the document.

In addition to 8.2.2, the document shall cover:

- a) the results of the tests of Table 6;
- b) the results of any optional test or inspection agreed when ordering.

8.3 Specific inspection and testing

8.3.1 Extent of testing

The tests to be carried out, the composition and size of the test units, and the number of sample products, samples and test pieces to be taken are given in Table 6.

8.3.2 Selection and preparation of samples and test pieces

The general conditions for selection and preparation of samples and test pieces shall be in accordance with ISO 377 and ISO 14284. The samples shall be taken from products in the delivery condition.

8.4 Test methods

8.4.1 Product analysis

Unless otherwise agreed when ordering, the choice of a suitable physical or chemical method of analysis to determine the product analysis is at the discretion of the manufacturer. In cases of dispute, the analysis shall be carried out by a laboratory approved by the two parties. In these cases, the reference method of analysis shall be agreed, where possible, with reference to ISO/TR 9769.

8.4.2 Tensile test

The tensile test shall be carried out in accordance with ISO 6892-1 and it shall be performed under controlled conditions in accordance with clause 5 of ISO 6892-1. The tensile strength (R_m) shall be measured and, for annealed material only, the elongation (A).

8.4.3 Measurement of the wire diameter

The diameter of the round wire shall be measured in a cross-section perpendicular to the wire axis with a micrometer of appropriate precision. Any dimensional measurement methods to be used on non-round wire shall be agreed upon at the time of ordering.

8.5 Retests

Retests shall be in accordance with ISO 404.

9 Packing and Marking

9.1 Packing shall be such that it permits normal handling and shipping without damage. The dimensions of the units shall be agreed between the manufacturer and the purchaser at the time of ordering

9.2 The products shall be marked with the manufacturer's trademark or symbol, the steel name or number, the manufacturing condition of the wire, the tensile level (for hard-drawn wire). The product shall also be marked with cast number, thickness or dimension as well as an identification number related to an appropriate inspection certificate.

9.3 Unless otherwise agreed the method of marking and the material of marking shall be at the option of the manufacturer. Its quality shall be such that it shall be durable for at least one year, can withstand normal handling and can be stored in unheated storage under cover. Corrosion resistance of the product shall not be impaired by the marking.

9.4 Each unit shall be marked by means of a label attached to the coil, spool or bundle or, by agreement at the time of enquiry and order, by inking, adhesive labels, electrolytic etching or stamping;