



SLOVENSKI STANDARD
kSIST FprEN ISO 683-17:2014
01-september-2014

Toplotno obdelana jekla, legirana in avtomatna jekla - 17. del: Jekla za kroglične in valjčne ležaje (ISO/FDIS 683-17:2014)

Heat-treated steels, alloy steels and free-cutting steels - Part 17: Ball and roller bearing steels (ISO/FDIS 683-17:2014)

Für eine Wärmebehandlung bestimmte Stähle, legierte Stähle und Automatenstähle - Teil 17: Wälzlagerstähle (ISO/FDIS 683-17:2014)

Aciers pour traitement thermique, aciers alliés et aciers pour décolletage - Partie 17: Aciers pour roulements (ISO/FDIS 683-17:2014)

Ta slovenski standard je istoveten z: FprEN ISO 683-17 rev

ICS:

77.140.10	Jekla za toplotno obdelavo	Heat-treatable steels
77.140.20	Visokokakovostna jekla	Stainless steels

kSIST FprEN ISO 683-17:2014 **en**

FINAL
DRAFTINTERNATIONAL
STANDARDISO/FDIS
683-17

ISO/TC 17/SC 4

Secretariat: DIN

Voting begins on:
2014-06-19Voting terminates on:
2014-08-19

**Heat-treated steels, alloy steels and
free-cutting steels —****Part 17:
Ball and roller bearing steels***Aciers pour traitement thermique, aciers alliés et aciers pour
décolletage —**Partie 17: Aciers pour roulements*iTeh STANDARD PREVIEW
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Reference number
ISO/FDIS 683-17:2014(E)

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Published in Switzerland

ISO/CEN PARALLEL PROCESSING

This final draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement. The final draft was established on the basis of comments received during a parallel enquiry on the draft.

This final draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel two-month approval vote in ISO and formal vote in CEN.

Positive votes shall not be accompanied by comments.

Negative votes shall be accompanied by the relevant technical reasons.

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ISO/FDIS 683-17:2014(E)

Contents		Page
Foreword		v
1 Scope		1
2 Normative references		1
3 Terms and definitions		2
4 Classification and designation		2
4.1 Classification		2
4.2 Designation		2
5 Information to be supplied by the purchaser		2
5.1 Mandatory information		2
5.2 Options/Supplementary or special requirements		3
6 Manufacturing process		3
6.1 General		3
6.2 Deoxidation		3
6.3 Heat treatment and surface condition at delivery		3
7 Requirements		4
7.1 Chemical composition and hardenability		4
7.2 Microstructure		4
7.3 Non-metallic inclusions		5
7.4 Internal soundness		5
7.5 Surface quality		5
7.6 Shape, dimensions and tolerances		5
8 Inspection		5
8.1 Testing procedures and types of inspection documents		5
8.2 Frequency of testing		6
8.3 Specific inspection and testing		6
9 Test methods		6
9.1 Chemical analysis		6
9.2 Hardness and hardenability tests		6
10 Marking		7
Annex A (normative) Supplementary or special requirements		19
Annex B (informative) Designations of the steels given in Tables 3, 5 and 6 and of comparable grades covered in various designation systems		22
Annex C (informative) Dimensional standards applicable to products complying with this part of ISO 683		24
Bibliography		25

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. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 17, *Steel*, Subcommittee SC 4, *Heat treatable and alloy steels*.

This third edition cancels and replaces the second edition (ISO 683-17:1999), which has been technically revised. <https://standards.iteh.ai/catalog/standards/sist/d06d6dff-b9d6-40a1-b31e-850f84cb787b/sist-en-iso-683-17-2015>

ISO 683 consists of the following parts, under the general title *Heat treatable, alloy steels and free-cutting steels*:

- *Part 1: Non-alloy steels for quenching and tempering*
- *Part 2: Alloy steels for quenching and tempering*
- *Part 4: Free-cutting steels*
- *Part 5: Nitriding steels*
- *Part 9: Wrought free-cutting steels*
- *Part 10: Wrought nitriding steels*
- *Part 11: Case-hardening steels*
- *Part 14: Hot-rolled steels for quenched and tempered springs*
- *Part 15: Valve steels for internal combustion engines*
- *Part 17: Ball and roller bearing steels*
- *Part 18: Bright steel products*

Heat-treated steels, alloy steels and free-cutting steels —

Part 17: Ball and roller bearing steels

1 Scope

1.1 This part of ISO 683 specifies the technical delivery requirements for five groups of wrought ball and roller bearing steels as listed in [Table 3](#), namely

- through-hardening bearing steels (steels with about 1 % C and 1 % to 2 % Cr),
- case-hardening bearing steels,
- induction-hardening bearing steels (unalloyed and alloyed),
- stainless bearing steels, and
- high-temperature bearing steels.

1.2 This part of ISO 683 applies to the products and heat-treatment conditions given in [Table 1](#) and the surface conditions given in [Table 2](#).

1.3 In addition to this part of ISO 683, the general technical delivery requirements of ISO 404 are applicable.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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, *Steel and steel products — General technical delivery requirements*

ISO 642, *Steel — Hardenability test by end quenching (Jominy test)*

ISO 643, *Steels — Micrographic determination of the apparent grain size*

ISO 3763, *Wrought steels — Macroscopic methods for assessing the content of non-metallic inclusions*

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

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

ISO 4967, *Steel — Determination of content of non-metallic inclusions — Micrographic method using standard diagrams*

ISO/FDIS 683-17:2014(E)

ISO 4969, *Steel — Macroscopic examination by etching with strong mineral acids*

ISO 5949, *Tool steels and bearing steels — Micrographic method for assessing the distribution of carbides using reference photomicrographs*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ISO 6929, *Steel products — Vocabulary*

ISO 9443, *Heat-treatable and alloy steels — Surface quality classes for hot-rolled round bars and wire rods — Technical delivery conditions*

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*

3 Terms and definitions

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

3.1 ball and roller bearing steels

steels for rings and/or rolling bodies which use balls and rollers to maintain the separation between the moving parts of the bearing

4 Classification and designation**4.1 Classification**

The classification of the relevant steel grades is allocated in accordance with ISO 4948-1 and ISO 4948-2. All steel grades covered by this part of ISO 683 are special steels.

4.2 Designation

For the steel grades covered by this part of ISO 683, the steel names given in the relevant tables are allocated in accordance with ISO/TS 4949

5 Information to be supplied by the purchaser**5.1 Mandatory information**

The manufacturer shall obtain the following information from the purchaser at the time of enquiry and order:

- a) the quantity to be delivered;
- b) the designation of the products form (billets, bars, rod, wire, tubes, rings, discs, etc.);
- c) either the reference to the dimensional standard and the dimensions and tolerances selected from it (see 7.6) or the designation of any other document covering the dimensions and tolerances required for the product;
- d) a reference to this part of ISO 683, i.e ISO 683-17;

- e) the designation of the steel grade (see [Table 3](#));
- f) the symbol for the heat-treatment condition on delivery (see [6.3.1](#) and [Table 1](#));
- g) usually designation for an inspection certificate [3.1](#) or, if required, an inspection certificate 3.2 in accordance with ISO 10474.

5.2 Options/Supplementary or special requirements

A number of options are specified in this part of ISO 683 and listed below. If the purchaser does not indicate the wish to implement any of these options, the products will be supplied in accordance with the basic specifications of this part of ISO 683 (see [5.1](#)).

- a) If another surface condition than 'hot-worked' or a special surface quality is required, the surface condition (see [Table 2](#)), and the surface quality (see [7.5](#)).
- b) Any requirement concerning the hardenability (+H) (see [7.1.3](#) and [Table 5](#)) and the verification of hardenability and if agreed the information about calculation of the hardenability (see [9.2.2](#)).
- c) Any supplementary requirement that shall be complied with, the symbol and, where necessary, the details of this supplementary requirement (see [Annex A](#)).

EXAMPLE 50 hot-rolled round bars according to ISO 1035-1 with nominal diameter of 50,0 mm, nominal length of 8 000 mm and with tolerance class S on diameter of $\pm 0,40$ mm and tolerance class L2 on length of +100/0 mm in accordance with ISO 1035-4 and with hot-worked surface made of steel grade ISO 683-17, 100Cr6 (see [Table 3](#)) in annealed condition to achieve spheroidized carbides (+AC), with an inspection certificate 3.1 in accordance with ISO 10474:

50 round bars ISO 1035-1/-4 – 50,0 S × 8 000 L2 steel grade ISO 683-17:—, 100Cr6+AC inspection certificate ISO 10474:—, 3.1

6 Manufacturing process

6.1 General

With the restrictions given by the requirements in [6.2](#) and [6.3](#) the manufacturing process of the steel and of the products is left to the discretions of the manufacturer.

If requested, the purchaser shall be informed about the steel making process used.

Remelting of the steel may be agreed upon at the time of enquiry and order.

6.2 Deoxidation

All steels shall be deoxidized.

6.3 Heat treatment and surface condition at delivery

6.3.1 Heat-treatment condition

The products shall be delivered in one of the heat-treatment conditions given in [Table 1](#), lines 2 to 10, as agreed at the time of enquiry and order. If there is no agreement, the products shall be delivered in the untreated condition.

6.3.2 Particular surface conditions

If agreed upon at the time of enquiry and order, the products shall be delivered in one of the particular surface conditions given in [Table 2](#), lines 3 to 9.

ISO/FDIS 683-17:2014(E)

6.3.3 Traceability of the cast

Each product shall be traceable to the cast, see [Clause 10](#).

7 Requirements

7.1 Chemical composition and hardenability

7.1.1 General

[Table 1](#) gives a survey of combinations of usual heat-treatment conditions at delivery, product forms and requirements according to [Tables 3](#) to [6](#) (chemical composition, hardenability, maximum hardness, hardness range).

7.1.2 Chemical composition

The chemical composition determined by cast analysis shall comply with the values in [Table 3](#).

Permissible deviations between the limiting values for cast analysis and the values for product analysis are given in [Table 4](#).

The product analysis shall be carried out when specified at the time of the enquiry and order (see [9.1](#) and [A.2](#)).

7.1.3 Hardenability

Where the steel is not ordered according to hardenability requirements, i.e. where the steel type designations of [Table 3](#) and not the designations given in [Table 5](#) are applied, the requirements for hardness specified in [Table 6](#) (see also [Table 1](#), column 9) apply, as appropriate, for the particular heat-treatment condition. In this case, the values of hardenability given in [Table 5](#) are for guidance purposes only.

Where the steel is ordered to hardenability requirements by using the designations given in [Table 5](#) the values of hardenability given in [Table 5](#) apply in addition to the requirements cited in [Table 1](#), column 9 (see footnote b to [Table 3](#)).

7.1.4 Hardness

The hardness in the usual conditions of delivery is given in [Table 6](#).

7.2 Microstructure

7.2.1 Austenitic grain size of case-hardening and induction-hardening bearing steels

Case-hardening steels and induction-hardening steels shall have a fine grain size of 5 or finer (see ISO 643). For verification of the grain size, see [A.3](#).

7.2.2 Spheroidization and distribution of carbides

7.2.2.1 For deliveries in treatment conditions +AC and +AC+C, the carbides of the through-hardening steels shall be spheroidized and the carbides of the stainless and high-temperature bearing steels shall be predominantly spheroidized. Case-hardening steels may show remnants of incompletely spheroidized carbides. For the degree of spheroidization see [A.4](#).

7.2.2.2 For distribution of carbides, see [A.5](#).