SLOVENSKI STANDARD
SIST EN 10164:2018

01-december-2018

Nadomešča:
SIST EN 10164:2005

Jekleni izdelki z izboljšanimi deformacijskimi lastnostmi, pravokotno na površino izdelka - Tehnični dobavni pogoji

Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions

Stahlerzeugnisse mit verbesserten Verformungseigenschaften senkrecht zur Erzeugnisoberfläche - Technische Lieferbedingungen

Aciers de construction à caractéristiques de déformation améliorées dans le sens perpendiculaire à la surface du produit - Conditions techniques de livraison

Ta slovenski standard je istoveten z: **EN 10164:2018**

ICS:

77.140.01	Železni in jekleni izdelki na splošno	Iron and steel products in general

SIST EN 10164:2018 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 10164

October 2018

ICS 77.140.50; 77.140.70

Supersedes EN 10164:2004

English Version

Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions

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Ref. No. EN 10164:2018 E

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European foreword

This document (EN 10164:2018) has been prepared by Technical Committee ECISS/TC 103 “Structural steels other than reinforcements”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2019, and conflicting national standards shall be withdrawn at the latest by April 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 10164:2004.

The main changes with respect to the previous edition are listed below:

a) Normative references added and updated;

b) Clauses 6.1 and 6.2 revised;

c) Clause 8.2.2.2.3 c) is applicable for thicknesses 20 mm < t ≤ 80 mm;

d) Figure 1 and 4 revised;

e) Clause 12 revised;

f) Standard editorial revised.

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Introduction

Flat products and sections of steel as normally manufactured have deformation properties perpendicular to the surface (through thickness) which are different from those obtained in the surface direction. This anisotropy of the properties may lead to difficulties in welded structures, for instance lamellar tearing.

It is, however, possible to improve the through thickness properties by using additional steel making procedures.

Through thickness properties are characterized in this document by specified values for reduction of area in a through thickness tensile test.

The minimum values for reduction of area in this document cannot by themselves be regarded as ensuring safety against occurrence of lamellar tearing. Indeed, the risk of lamellar tearing is also basically influenced for instance by the type of structure, weld design and welding procedure.

However, the reduction of area is a good general guide to lamellar tear resistance, i.e. the risk of lamellar tearing decreases with increased reduction of area in the through thickness tensile test.

1 Scope

This document specifies deformation properties perpendicular to the surface of the product.

This document can be applied as a supplement to all product standards for flat products and sections of fully killed steels, except stainless steels. It covers products having a nominal thickness (t) between 15 mm and 400 mm of steels with a specified minimum upper yield strength R_{eH} or proof strength $R_{p0,2} \leq 960$ MPa[1)] for which improved through thickness properties are required.

This document can be applied to other steel types if agreed at the time of the order.

This document can be applied to products with thickness between 10 mm ≤ t <15 mm if agreed at the time of the order. See option 1.

This document can be applied to products with thickness t > 400 mm if agreed at the time of the order. See option 2.

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.

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

EN 10021, *General technical delivery conditions for steel products*

EN 10160, *Ultrasonic testing of steel flat product of thickness equal or greater than 6 mm (reflection method)*

EN 10306:2001, *Iron and steel - Ultrasonic testing of H beams with parallel flanges and IPE beams*

3 Terms and definitions

No terms and definitions are listed in this document.

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

4 Designation

Products with requirements for improved deformation properties perpendicular to the surface of the product shall be designated as follows:

— the designation of the steel (according to the relevant product standard);

— the number of this document (EN 10164);

— the designation of the quality class (according to Table 1).

1) 1 MPa = 1 N/mm^2

EXAMPLE Steel according to EN 10025-3 of the grade S355N (1.0545) with requirements for improved deformation properties perpendicular to the surface of the product according to EN 10164 of class Z25:

Steel EN 10025-3 - S355N + EN 10164 - Z25

or

Steel EN 10025-3 - 1.0545 + EN 10164 - Z25

5 Information to be supplied by the purchaser

5.1 Mandatory information

The following information shall be supplied by the purchaser at the time of the order:

a) the designation of the steel (according to the relevant product standard);

b) the designation of the quality class (see Table 1).

Where no specific choice is made by the purchaser, the supplier shall refer back to the purchaser.

5.2 Options

A number of options are specified in Clause 12. In the event that the purchaser does not indicate his wish to implement any of these options, the supplier shall supply in accordance with the basic specification.

6 Requirements

6.1 Reduction of Area

Table 1 gives minimum values for reduction of area for the specified quality classes.

NOTE Reduction of area (Z) is defined in EN ISO 6892-1 as:

$$\left(\frac{So - Su}{So}\right) x100$$

where

S_o is the original cross-sectional area of the parallel length;

S_u is the minimum cross-sectional area after fracture.

The minimum values for reduction of area apply for the whole product, except that for nominal thickness t > 80 mm the requirements do not apply to the mid-thickness region.

For sections, the minimum values for reduction of area apply to the flange.

Table 1 — Quality classes and minimum values for the reduction of area

Quality class	Reduction of area in %	
	Minimum average value of three tests	Minimum individual value
Z15	15	10
Z25	25	15
Z35	35	25

6.2 Internal soundness

Unless otherwise agreed at the time of the order, flat products shall meet the requirements of class S1 in accordance with EN 10160, sections shall meet the requirements of class 2.3 in accordance with EN 10306:2001, Table 2.

See options 3 and 4.

At the discretion of the manufacturer the fulfilment of the requirements on the internal soundness can be demonstrated by carrying out ultrasonic testing or through factory production control system (FPC) and statistical data.

See option 5.

NOTE Application of ultrasonic techniques does not give full information about the susceptibility to lamellar tearing.

7 Inspection - Test unit for through thickness testing

7.1 General

Each consignment shall be subdivided into test units in accordance with 7.2 and 7.3.

7.2 Flat products

The test units for flat products of the quality classes Z15, Z25 and Z35 based on the sulphur content of the ladle analysis are given in Table 2.

Table 2 — Test units for flat products

Quality class	Test unit for		
	S > 0,005 %[a]		**S ≤ 0,005 %[a]**
	Parent plate or coil[b]	max. 40 t[c]	Cast[d]
Z15	-	x[e]	x
Z25	x	-	x[e]
Z35	x	-	x[e]

a Ladle analysis.

b Coil applies to wide strip, narrow strip and slit strip.

c Or part thereof of products of the same cast with the same heat treatment.

d Products with the same heat treatment.

e Unless otherwise agreed at the time of the order. See option 6.

7.3 Sections

The test unit for sections shall consist of products from the same cast, having been subjected to the same heat treatment with a total mass of max. 40 t or part thereof.

8 Preparation of samples and test pieces

8.1 Identification of samples and test pieces

Samples and test pieces shall be traceable to the original product and to the location and orientation in the product.

8.2 Location and orientation of samples and test pieces

8.2.1 Preparation of samples

8.2.1.1 A sample shall be taken from each test unit according to Clause 7.

8.2.1.2 For flat products the sample shall be taken from one end of the product. The sample shall be taken for ingot cast material on the longitudinal axis of the product and for continuously cast material it may be taken at the manufacturer's discretion either on the longitudinal axis of the product or from approximately midway between the edge and the longitudinal axis of the products.

8.2.1.3 For sections the sample shall be taken from one end of the product. The sampling position shall be the flange. The location of the sample is indicated in Figure 1.