SLOVENSKI STANDARD
SIST EN 10164:2005

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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 Verfomungseigenschaften senkrecht zur Erzeugnisoberfläche - Technische Lieferbedingungen

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

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This European Standard was approved by CEN on 4 November 2004.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Contents

Foreword

This document (EN 10164:2004) has been prepared by Technical Committee ECISS/TC 10 “Structural steels – Grades and qualities”, the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

This document supersedes EN 10164:1993, *Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions.*

During the 5 year review of EN 10164:1993 the members of ECISS/TC 10 agreed to revise EN 10164:1993. It was asked to actualise the normative references and to bring the text in line with “Iron and steel standardization – Model for a product standard”. In the scope the product thickness is increased to 400 mm to be in line with EN 10025-2. The upper yield strength is increased to 960 MPa to be in line with EN 10025-6.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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.

There is no direct relationship between these values and the integrity of structures, because the risk of lamellar tearing is also basically influenced by the type of structure, weld design and welding procedure. The minimum values for reduction of area in this document cannot therefore by themselves be regarded as ensuring safety against occurrence of lamellar tearing.

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 through thickness properties and associated test methods for flat products and sections of steel.

This document may 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 thickness between 15 mm and 400 mm inclusive 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.

The application of this document to other product thicknesses and other steel types shall be the subject of agreement at the time of the order.

See option 1.

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.

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test at ambient temperature*

EN 10021, *General technical delivery requirements for steel and iron products*

EN 10160, *Ultrasonic testing of steel flat product of thickness equal to 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 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).

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

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1) 1 MPa = 1 N/mm^2.

4 Information to be supplied by the purchaser

4.1 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.

4.2 Options

A number of options are specified in Clause 11. 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.

5 Requirements

5.1 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 10002-1 as:

$$\left(\frac{S_o - S_u}{S_o}\right) \times 100$$

where

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

S_u is the minimum cross-sectional area after fracture.

For flat products the minimum values for reduction of area apply to the whole product.

For sections the minimum values for reduction of area apply to either the flange or the web depending on where the samples are taken (see 7.1.1.3).

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

5.2 Ultrasonic testing

Flat products shall be submitted to an ultrasonic examination in accordance with the requirements of EN 10160. Sections shall be submitted to an ultrasonic examination in accordance with the requirements of EN 10306.

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 option 2.

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

6 Inspection

6.1 Test units

6.1.1 General

Each consignment shall be subdivided into test units in accordance with 6.1.2 and 6.1.3.

6.1.2 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	if agreed	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 3