SLOVENSKI STANDARD

SIST EN 10025-6:2005

01-januar-2005

Nadomeģļ a:
SIST EN 10137-2:1997

Vroļ e valjani izdelki iz konstrukcijskih jekel ï 6. del: Tehniļ ni dobavni pogoji za ploģļ ate izdelke iz konstrukcijskih jekel z veliko plastiļ no trdnostjo v kaljenem in popuģļ enem stanju

Hot rolled products of structural steels - Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition

Warmgewalzte Erzeugnisse aus Baustählen - Teil 6: Technische Lieferbedingungen für Flacherzeugnisse aus Stählen mit höherer Streckgrenze im vergüteten Zustand

Produits laminés a chaud en aciers de construction - Partie 6: Conditions techniques de livraison pour produits plats des aciers a haute limite d'élasticité a l'état trempé et revenu

Ta slovenski standard je istoveten z: **EN 10025-6:2004**

ICS:

77.140.10	Jekla za toplotno obdelavo	Heat-treatable steels
77.140.50	Ploģļ ati jekleni izdelki in polizdelki	Flat steel products and semi-products

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EUROPEAN STANDARD

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English version

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This European Standard was approved by CEN on 1 April 2004.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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.

CEN members are the national standards bodies of 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.

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Foreword

This document (EN 10025-6:2004) 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 May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

This document supersedes, together with EN 10025-1:2004, EN 10137-1:1995, *Plates and wide flats made of high yield strength structural steels in the quenched and tempered or precipitation hardened conditions – Part 1: General delivery conditions* and EN 10137-2:1995, *Plates and wide flats made of high yield strength structural steels in the quenched and tempered or precipitation hardened conditions - Part 2: Delivery conditions for quenched and tempered steels*.

According to resolution ECISS/TC 10 Nr 2/1999 EN 10137-3:1995, *Plates and wide flats made of high yield strength structural steels in the quenched and tempered or precipitation hardened conditions - Part 3: Delivery conditions for precipitation hardened steels* is withdrawn because the steels from this document are hardly produced at this moment.

The titles of the other parts of this document are:

Part 1: General technical delivery conditions;

Part 2: Technical delivery conditions for non-alloy structural steels;

Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels

Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels;

Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance.

This document has been prepared under Mandate M/120 given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the EU Construction Products Directive (89/106/EEC). For relationship with the EU Construction Products Directive, see informative Annex ZA of EN 10025-1:2004.

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

1 Scope

Part 6 of this document, in addition to part 1, specifies requirements for flat products of high yield strength alloy special steels. The grades and qualities are given in Tables 2 to 4 (chemical composition) and Tables 5 to 7 (mechanical properties) and are supplied in the quenched and tempered condition as given in 6.3.

The steels specified in this document are applicable to hot-rolled flat products with a minimum nominal thickness of 3 mm and a maximum nominal thickness ≤ 150 mm for grades S460, S500, S550, S620 and S690, a maximum nominal thickness ≤ 100 mm for grade S890 and a maximum nominal thickness ≤ 50 mm for grade S960, in steels which, after quenching and tempering, have a specified minimum yield strength of 460 MPa[1]) to 960 MPa[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.

2.1 General standards

EN 1011-2, *Welding – Recommendations for welding of metallic materials - Part 2: Arc welding of ferritic steels.*

EN 10020, *Definition and classification of grades of steel.*

EN 10025-1:2004, *Hot rolled products of structural steels - Part 1: General technical delivery conditions.*

EN 10027-1, *Designation systems for steels - Part 1: Steel names, principal symbols.*

EN 10027-2, *Designation systems for steels - Part 2: Numerical system.*

EN 10163-1, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 1: General requirements.*

EN 10163-2, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 2: Plates and wide flats.*

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

CR 10260, *Designation systems for steels - Additional symbols.*

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

2.2 Standards on dimensions and tolerances (see 7.7.1)

EN 10029, *Hot rolled steel plates 3 mm thick or above - Tolerances on dimensions, shape and mass.*

EN 10048, *Hot rolled narrow steel strip - Tolerances on dimensions and shape.*

EN 10051, *Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels - Tolerances on dimensions and shape.*

EN 10162, *Cold rolled steel sections - Technical delivery conditions - Dimensional and cross-sectional tolerances.*

2.3 Standards on testing

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10025-1:2004 and the following apply.

3.1
quenching
operation which consists of cooling a ferrous product more rapidly than in still air

3.2
tempering
heat treatment applied to a ferrous product generally after quench hardening or other heat treatment to bring the properties to the required level

It consists of heating to specific temperatures (< A_{c1}) and soaking one or more times followed by cooling at an appropriate rate.

4 Classification and designation

4.1 Classification

4.1.1 Main quality classes

The steel grades specified in this document shall be classified as alloy special steels according to EN 10020.

4.1.2 Grades and qualities

This document specifies seven steel grades. They differ in their minimum yield strength at ambient temperature.

All the grades can be delivered in the following qualities as specified at the time of the enquiry and order:

– (no symbol) with specified minimum values of impact energy at temperatures not lower than -20 °C;

– L with specified minimum values of impact energy at temperatures not lower than -40 °C;

– L1 with specified minimum values of impact energy at temperatures not lower than -60 °C (with the exclusion of S960).

4.2 Designation

4.2.1 The designation shall be in accordance with EN 10025-1.

NOTE For a list of corresponding former designations and the former designations from EN 10137-2:1995 see Annex A, Table A.1.

4.2.2 The designation shall consist of:

– the number of this document (EN 10025-6);

– the steel name or the steel number; the steel name consisting of:

  – the symbol S (for structural steel);

  – the indication of the minimum specified yield strength for thickness ≤ 50 mm expressed in MPa[1]);

  – the delivery condition Q;

  – the capital letter L or L1 for the quality with specified minimum values of impact energy at temperatures not lower than -40 °C or -60 °C.

EXAMPLE Structural steel (S) with a specified minimum yield strength at ambient temperature of 460 MPa[1]), in the quenched and tempered delivery condition (Q) and of quality L:

Steel EN 10025-6 – S460QL

or

Steel EN 10025-6 - 1.8906

5 Information to be supplied by the purchaser

5.1 Mandatory information

The information that shall be supplied by the purchaser at the time of the order is specified in EN 10025-1.

In addition to EN 10025-1 the following information shall be supplied by the purchaser at the time of the order:

g) the type of inspection document (see 8.2).

5.2 Options

A number of options are specified in Clause 13. 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.

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

6 Manufacturing process

6.1 Steel making process

The steel making process shall be in accordance with EN 10025-1. If specified at the time of the order the steel making process shall be reported to the purchaser.

See option 1.

6.2 Deoxidation or grain size

The steels specified in this document shall be fully killed. The steels shall have a fine grain structure containing nitrogen binding elements in amounts sufficient to bind the nitrogen.

6.3 Delivery conditions

The products shall be supplied in the quenched and tempered condition (Q) as defined in Clause 3.

NOTE Direct quenching after hot-rolling followed by tempering is considered equivalent to conventional quenching and tempering.

7 Requirements

7.1 General

The following requirements apply when sampling, preparation of test pieces and testing specified in Clauses 8, 9 and 10 are carried out.

7.2 Chemical composition

7.2.1 The chemical composition determined by ladle analysis shall comply with the specified values of Table 2. On special request of the purchaser the manufacturer shall inform the purchaser at the time of the enquiry and order which of the alloying elements appropriate to the steel grade required will be deliberately added to the material to be delivered.

See option 29.

7.2.2 The limits applicable for the product analysis are given in Table 3. The manufacturer shall inform the purchaser at the time of the enquiry and order which of the alloying elements appropriate to the steel grade required will be deliberately added to the material to be delivered. The product analysis shall be carried out when specified at the time of the order.

See option 2.

7.2.3 The maximum carbon equivalent values based on the ladle analysis, given in Table 4 shall apply. For the carbon equivalent value formula see 7.2.3 of EN 10025-1:2004.

7.2.4 When products are supplied with a control on Si e.g. for hot-dip zinc-coating so that there could be a need to increase the content of other elements like C and Mn to achieve the required tensile properties, the maximum carbon equivalent values of Table 4 shall be increased as follows:

– for Si ≤ 0,030 %, increase CEV by 0,02 %;

– for Si ≤ 0,25 %, increase CEV by 0,01 %.

7.3 Mechanical properties

7.3.1 General

7.3.1.1 Under the inspection and testing conditions as specified in Clauses 8, 9 and 10 and in the delivery condition as specified in 6.3 the mechanical properties shall comply with the values given in Tables 5, 6 and 7.

7.3.1.2 For the products specified in this document the nominal thickness applies.

7.3.2 Impact properties

7.3.2.1 The verification of the impact energy value shall be carried out in accordance with EN 10025-1.

Furthermore the verification of the impact energy value shall be carried out, unless otherwise agreed (see 7.3.2.2 and 7.3.2.3) with longitudinal test pieces for:

– Q at -20 ºC;

– QL at -40 ºC;

– QL1 at -60 ºC.

7.3.2.2 Another temperature (given in Tables 6 and 7) may be agreed at the time of the order.

See option 3.

7.3.2.3 If agreed at the time of the enquiry and order transverse impact energy values as given in Table 7 shall apply instead of longitudinal values.

See option 30.

7.3.3 Improved deformation properties perpendicular to the surface

If agreed at the time of the order the products shall comply with one of the requirements of EN 10164.

See option 4.

7.4 Technological properties

7.4.1 Weldability

The steels specified in this document do not have unlimited suitability for the various welding processes, since the behaviour of a steel during and after welding depends not only on the material but also on the dimensions and shape and on the manufacturing and service conditions of the components.

General requirements for arc welding of the steels specified in this document shall be as given in EN 1011-2.

NOTE With increasing product thickness and strength level cold cracking can occur. Cold cracking is caused by the following factors in combination:

– the amount of diffusible hydrogen in the weld metal;

– a brittle structure of the heat affected zone;

– significant tensile stress concentrations in the welded joint.