SLOVENSKI STANDARD
SIST EN 10207:2005

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Jekla za enostavne tlaļne posode - Tehniļni dobavni pogoji za ploļevine, trakove in palice

Steels for simple pressure vessels - Technical delivery requirements for plates, strips and bars

Stähle für einfache Druckbehälter - Technische Lieferbedingungen für Blech, Band und Stabstahl

Aciers pour appareils a pression simples - Conditions techniques de livraison des tôles, bandes et barres

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Steels for simple pressure vessels - Technical delivery requirements for plates, strips and bars

Aciers pour appareils à pression simples - Conditions techniques de livraison des tôles, bandes et barres

Stähle für einfache Druckbehälter - Technische Lieferbedingungen für Blech, Band und Stabstahl

This European Standard was approved by CEN on 21 February 2005.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document (EN 10207:2005) has been prepared by Technical Committee ECISS/TC 22 “Steels for pressure purposes – Qualities”, 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of an identical text or by endorsement, at the latest by October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

This document supersedes EN 10207:1991.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 87/404/EEC.

For relationship with EU Directive 87/404/EEC, see informative annex ZA, which is an integral part of this document.

NOTE The clauses marked with two dots (●●) contain information relating to agreements which may be made at the time of enquiry and order.

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.

1 Scope

This document specifies the technical delivery requirements for flat products and bars made of steel in accordance with the specifications for pressurized parts in simple pressure vessels as defined in the Directive 87/404/EEC (see Annex A) and standardized in EN 286-1 to -3.

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 testing at ambient temperature.*

EN 10002-5, *Metallic materials — Tensile testing — Part 5: Method of testing at elevated temperatures.*

EN 10020:2000, *Definition and classification of grades of steel.*

EN 10021:1993, *General technical delivery requirements for steel and iron products.*

prEN 10027-1, *Designation systems for steel — Part 1: Steel names.*

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

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

EN 10045-1, *Metallic materials — Charpy impact test — Part 1: Test method.*

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 10052:1993, *Vocabulary of heat treatment terms for ferrous products.*

EN 10058, *Hot rolled flat steel bars for general purposes — Dimensions and tolerances on shape and dimensions.*

EN 10059, *Hot rolled square steel bars for general purposes — Dimensions and tolerances on shape and dimensions.*

EN 10060, *Hot rolled round steel bars for general purposes — Dimensions and tolerances on shape and dimensions.*

EN 10061, *Hot rolled hexagon steel bars for general purposes — Dimensions and tolerances on shape and dimensions.*

EN 10079:1992, *Definition of steel products.*

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

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

EN 10168, *Steel products — Inspection documents — List of information and description.*

EN 10204:2004, *Metallic products — Types of inspection documents.*

EN 10221, *Surface quality classes for hot-rolled bars and rods — Technical delivery conditions.*

EN ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997).*

EN ISO 2566-1, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels (ISO 2566-1:1994).*

EN ISO 14284, *Steel and iron — Sampling and preparation of samples for the determination of chemical composition (ISO 14284:1996).*

CR 10261, *ECISS Information Circular 11 — Iron and steel — Review of available methods of chemical analysis.*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply in addition to or deviating from the terms and definitions in EN 10020:2000, EN 10021:1993, EN 10052:1993, EN 10079:1992 and EN 10204:2004.

3.1
normalizing rolling
rolling process in which final deformation is carried out in a certain temperature range leading to a material condition equivalent to that obtained after normalizing so that the specified values of the mechanical properties are retained even after normalizing

NOTE The symbol for this delivery condition and for the normalized condition is N.

3.2
simple pressure vessel
see Annex A

4 Classification and designation

4.1 Classification

In accordance with the classification system in EN 10020, the steel grades P235S and P265S are non-alloy quality steels and the steel grade P275SL is a non-alloy special steel.

4.2 Designation

The steel grades are designated with steel names and steel numbers. The steel names are allocated in accordance with prEN 10027-1. The steel numbers are allocated in accordance with EN 10027-2.

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 enquiry and order:

a) quantity (mass or total length or number);

b) product form (plate/sheet or strip or bar);

c) surface class for bars (see 7.4.2);

d) European Standard or document specifying the tolerances on dimensions, shape and mass and, if the relevant European Standard or document permits the purchaser certain options, e.g. regarding finishes or tolerance grades, specific information on these aspects (see 7.6);

e) specified dimensions of the product to be delivered (see 7.6);

f) number of this document;

g) designation of the steel grade (steel name or steel number);

5.2 Options

A number of options are specified in this document and listed below. In the event that the purchaser does not indicate a wish to implement any of these options at the time of enquiry and order, the products shall be supplied in accordance with the basic specification (see 5.1).

a. steelmaking process (see 6.1.1);

b. internal soundness (see 7.5);

c. specific inspection (see 8.1.2);

d. additional tests (see 8.3.2);

e. circular test pieces for the tensile test (see Table 5, footnote b);

f. test temperature for tensile test at elevated temperature (see 10.4).

6 Manufacturing process

6.1 Steelmaking

6.1.1 ●● Unless a special steelmaking process has been agreed at the time of enquiry and order, the steelmaking process for steels in accordance with this document shall be at the discretion of the manufacturer.

6.1.2 The steels shall be non-rimming and not susceptible to ageing.

NOTE For these steels covered in Table 1 requirements of the Directive 87/404/EEC were taken into account by the specification of a minimum total aluminium content of 0,020 %.

6.2 Delivery condition

The products shall be delivered in the normalized or in an equivalent condition obtained by normalizing rolling (see 3.1).

7 Requirements

7.1 General

The products shall conform to the requirements of this document.

In addition, the general technical delivery requirements specified in EN 10021 apply.

7.2 Chemical composition

7.2.1 The chemical composition determined from the cast analysis in accordance with 10.1 shall comply with the requirements in Table 1.

7.2.2 The product analysis may deviate from the specified limits for the cast analysis by the values given in Table 2.

Table 1 — Chemical composition (cast analysis) in % by mass

Steel grade		C max.	Si max.	Mn	P max.	S max.	Al_{tot} min.[a]
Steel name	Steel number						
P235S	1.0112	0,16	0,35	0,40 to 1,20	0,025	0,025	0,020
P265S	1.0130	0,20	0,40	0,50 to 1,50	0,025	0,025	0,020
P275SL	1.1100	0,16	0,40	0,50 to 1,50	0,025	0,020	0,020
[a] If sufficient other nitrogen binding elements are present, the minimum total aluminium content does not apply. If such nitrogen binding elements were added to the steel their content shall be given in the inspection document.							

Table 2 — Permissible deviations in the result of the product analysis from the values specified in Table 1 for the cast analysis

Element	Specified values for the cast analysis according to Table 1 % by mass	Permissible deviation[a] of the product analysis from the values listed in Table 1 for the cast analysis % by mass
C	≤ 0,20	+ 0,02
Si	≤ 0,40	+ 0,05
Mn	≤ 1,00	± 0,05
	> 1,00 to ≤ 1,50	± 0,10
P	≤ 0,025	+ 0,005
S	≤ 0,025	+ 0,005
Al	≥ 0,020	- 0,005
[a] If several product analyses are carried out for one cast and if, in this case, values for an individual element are established which fall outside the permitted range for the chemical composition, then it is only permissible that the values either exceed the permissible maximum value or fall short of the permissible minimum value, but not both for one cast.		

7.3 Mechanical properties

The requirements in Tables 3 and 4 apply for test pieces taken, prepared and tested in accordance with clause 9 and 10.2 to 10.4. The values relate to the specified thickness (thickness at ordering) of the products and apply to the delivery conditions specified in 6.2.

Table 3 — Mechanical properties

Steel grade		Minimum yield strength $R_{e,min.}$ for specified thickness t in mm			Tensile strength R_m	Minimum elongation $A_{long.,min.}$ [a,b]				Minimum impact energy $KV_{long.,min}$ [c]	
						L_0 = 80 mm | $L_0 = 5{,}65\sqrt{S_0}$ for specified thickness t in mm					
Steel-name	Steel-number	≤ 16 MPa	16 < t ≤ 40 MPa	40 < t ≤ 60 MPa	MPa	2 < t ≤ 2,5 %	2,5 < t < 3 %	3 ≤ t < 40 %	40 < t ≤ 60 %	at °C	J
P235S	1.0112	235	225	215	360 to 480	20	21	26	25	– 20	28
P265S	1.0130	265	255	245	410 to 530	17	18	22	22	– 20	28
P275SL	1.1100	275	265	255	390 to 510	19	20	24	24	– 50	28

a Minimum elongation after fracture for longitudinal tensile test pieces (see Table 5, footnote a).

b If for flat products in rolled width of ≥ 600 mm in accordance with Table 5 transverse tensile test pieces are tested the minimum values for elongation at fracture are by 2 units lower than the minimum values specified above for longitudinal test pieces.

c Minimum impact energy for longitudinal Charpy-V-notch impact test pieces (see 10.3).

Table 4 — Minimum 0,2 % proof strength $R_{p0,2}$ at elevated temperatures

Steel grade		Product thickness t mm	$R_{p0,2}$ in MPa at a temperature in °C of				
Steel-name	Steel-number		100	150	200	250	300
P235S	1.0112	≤ 60	171	162	153	135	117
P265S	1.0130	≤ 60	194	185	176	158	140
P275SL	1.1100	≤ 40	221	203	176	159	132
		40 < t ≤ 60	212	194			

7.4 Surface condition

7.4.1 For plates, the requirements for surface quality class B2 of EN 10163-2 apply.

7.4.2 For bars, a surface class in accordance with EN 10221 shall be agreed at the time of enquiry and order.

7.5 ●● Internal soundness

The products shall be free from defects that preclude their intended use.

7.6 For plates in thickness equal or greater than 6 mm, special agreements referring to tests on internal soundness may be made on the basis of EN 10160 at the time of enquiry and order. Dimensions and tolerances on dimensions

The dimensions and tolerances on dimensions for the products to be delivered shall be specified to the following dimensional standards:

a) in case of hot rolled steel plates 3 mm thick or above with reference to 10029, thickness tolerance class B.

b) in the case of

— continuously hot rolled wide strip (rolled width ≥ 600 mm),

— or hot rolled slit strip in width < 600 mm made of wide strip,

— or hot rolled sheet in thicknesses under 3 mm

with reference to EN 10051.

c) in the case of hot rolled narrow strip (rolled width < 600 mm) with reference to EN 10048.

d) in the case of bars with

— rectangular section with reference to EN 10058;

— square section with reference to EN 10059;

— round section with reference to EN 10060;

— hexagon section with reference to EN 10061.

7.7 Calculation of mass

A density of 7,85 kg/dm^3 shall be used as the basis for the calculation of the nominal mass from the specified dimensions of the steels specified in Table 1.

8 Inspection

8.1 Types of inspection

8.1.1 The products in accordance with this document shall be checked by non-specific inspection.

8.1.2 ●● By agreement at the time of enquiry and order, specific inspection may be specified.

8.2 Inspection documents

8.2.1 Type of Inspection documents

8.2.1.1 Unless otherwise specified (see 8.1.2), a test report 2.2 in accordance with EN 10204 shall be issued.

8.2.1.2 In the case of specific inspection (see 8.1.2) an inspection certificate 3.1 in accordance with EN 10204 shall be issued.

8.2.2 Content of inspection documents

8.2.2.1 The content of the inspection documents shall be in accordance with EN 10168.

8.2.2.2 The test report 2.2 shall contain the following codes and information:

A – commercial transaction and parties involved;

B – description of products to which the inspection document applies;

C01 to C03 – location and direction of test pieces and testing temperature;