UDC 669.14-41 : 621.642.98 : 620.1

January 1992

Steel plate, strip and bars for the manufacture of simple pressure vessels

Technical delivery conditions
English version of DIN EN 10 207

DIN
EN 10 207

Stähle für einfache Druckbehälter; technische Lieferbedingungen für Blech, Band und Stabstahl

European Standard EN 10 207 : 1991 has the status of a DIN Standard.

A comma is used as the decimal marker.

National foreword

This standard has been prepared by ECISS/TC 22.

The responsible German body involved in the preparation of this standard was the *Normenausschuß Eisen und Stahl* (Steel and Iron Standards Committee), Technical Committee *Stähle für den Druckbehälterbau.*

The DIN Standards corresponding to the European Standards (or EURONORMs) referred to in clause 2 of the EN are as follows:

European Standard	DIN Standard
EN 286-1	DIN EN 286 Part 1
EN 10 002-1	DIN EN 10 002 Part 1
EN 10 020	DIN EN 10 020
prEN 10 021	DIN EN 10 021 (at present at the stage of draft)
EN 10 027-1	DIN EN 10 027 Part 1
EN 10 029	DIN EN 10 029
EN 10 045-1	DIN EN 10 045 Part 1
EN 10 051	DIN EN 10 051
EN 10 079	DIN EN 10 079
EN 10 163-2	DIN EN 10 163 Part 2
EN 10 204	DIN 50 049
EURONORM 58	DIN 1017 Part 1
EURONORM 59	DIN 1014 Part 1
EURONORM 60	DIN 1013 Part 1
EURONORM 61	DIN 1015

Standards referred to

(and not included in **Normative references** and **Annex B**)

DIN 1013 Part 1	Hot rolled steel round bars; dimensions and tolerances
DIN 1014 Part 1	Hot rolled steel square bars for general purposes; dimensions and tolerances
DIN 1015	Hot rolled steel hexagons; dimensions, tolerances and mass
DIN 1017 Part 1	Hot rolled steel flats for general purposes; dimensions, tolerances and mass

Editor's note

This standard reproduces the official text of the English version of EN 10 207 as issued by CEN. In its preparation for publication as DIN EN 10 207 (English version), certain points have been noted which we consider to be in need of correction. These have been marked +). The suggested amendments are given below and will be forwarded to the responsible CEN Secretariat for its consideration.

In presentation, orthography, punctuation and hyphenation, the aim has been to implement the PNE Rules consistently. Obvious errors (e.g. redundancies and omissions) have been rectified without further reference.

Suggested amendments

1 *'plate' should be substituted for 'plates' and 'strip' for 'strips' in cases where reference is made to the semi-finished product (e.g. title, subclauses 4.1 and 8.5.1).*

2 *According to the International System of Units, in subclause 9.2.2.1, 'mass' is to be substituted for 'weight'.*

3 *'non-alloy steel' has been used throughout instead of 'unalloyed steel' (which is the common technical term).*

EN comprises 10 pages.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10 207

November 1991

UDC 669.14-41 : 621.642.98 : 620.1

Descriptors: iron and steel products, metal bars, metal plates, steels, strip, pressure vessels, delivery conditions.

English version

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

Aciers pour appareils à pression simples; conditions techniques des 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 1991-11-30. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Contents

NOTE: The clauses marked with a point (•) contain information relating to agreements which are to be made on ordering. The clauses marked with two points (••) contain information regarding agreements which may be made on ordering.

Foreword

This European Standard has been drawn up by Technical Committee ECISS/TC 22 'Steels for pressure purposes' for the reasons given in clause 1.

ECISS/TC 22 accepted this document at its meeting in February 1990. The following ECISS member bodies were represented at that meeting: Austria, Belgium, Finland, France, Germany, Italy, Norway, Sweden and United Kingdom.

This European Standard was approved by CEN on 1991-09-26.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

1.1 This European Standard has been established in order to provide complete technical delivery conditions for flat products and bars made of steel which must comply 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.

1.2 The general technical delivery conditions of prEN 10 021 also apply to deliveries in accordance with this European Standard.

2 Normative references

This European Standard incorporates, by undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For undated references, the latest edition of the publication referred to applies.

Directive 87/404/EEC, as of 25 June 1987, on the harmonization of the laws of the Member States relating to simple pressure vessels

EN 286-1	Simple unfired pressure vessels designed to contain air or nitrogen; design, manufacture and testing
EN 10 002-1	Metallic materials; tensile testing. Part 1: Method of test at ambient temperature
EN 10 002-5	Metallic materials; tensile testing. Part 5: Method of test at elevated temperature
EN 10 020	Definition and classification of grades of steel
EN 10 029	Hot rolled steel plates 3 mm thick or above; tolerances on dimensions, shape and mass
EN 10 045-1	Metallic materials; Charpy impact test. Part 1: Test method
EN 10 051	Continuously hot rolled uncoated sheet and strip of non-alloyed and alloyed steels; tolerances on dimensions and shape
EN 10 079	Definition of steel products
EN 10 163-2	Delivery requirements for surface condition of hot rolled steel plates, wide flats and sections. Part 2: Plates and wide flats
EN 10 204	Metallic materials; types of inspection documents
prEN 10 021	General technical delivery requirements for steel and iron products
EN 10 027-1	Designation system for steel. Part 1: Steel names
EURONORM 18 [1])	Selection and preparation of samples and test pieces for steel and steel products

[1]) Until these EURONORMs are transferred into European Standards, they can either be implemented or reference made to corresponding national standards, the list of which is given in annex B to this European Standard

EURONORM 48 [1])	Specifications for hot rolled narrow steel strip – Tolerances on dimensions, shape and mass
EURONORM 52 [1])	Vocabulary of the heat treatment for ferrous products
EURONORM 58 [1])	Hot rolled flats to general purposes
EURONORM 59 [1])	Hot rolled square bars for general purposes
EURONORM 60 [1])	Hot rolled round bars for general purposes
EURONORM 61 [1])	Hot rolled steel hexagons
EURONORM 160 [1])	Ultrasonic testing of steel plate of thickness equal to or greater than 6 mm (reflection method)
EURONORM 168 [1])	Iron and steel products – Inspection documents – Contents
ISO 2566-1 : 1984	Steel; conversion of elongation values; carbon and low alloy steels
ISO 2566-2 : 1984	Steel; conversion of elongation values; austenitic steels

3 Definitions

3.1 non-alloy steel, quality steel and special steel:

The definitions given in EN 10 020 apply.

3.2 product forms: The definitions in EN 10 079 apply.

3.3 Type of heat treatment

3.3.1 The definitions in EURONORM 52 apply.

3.3.2 Under the term 'normalizing rolling' is understood a rolling process in which the 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.

The short form of this condition of delivery and of the normalized condition is N.

NOTE 1: In international publications for both the normalizing as well as thermomechanical rolling, the expression 'controlled rolling' may be found. However, in view of the different applicability of the products, a distinction between the terms is necessary.

NOTE 2: It may be that in the future the symbol 'N' for normalizing or normalizing rolling will be replaced by 'TN' (see EN 10 027-1, table 1).

3.4 simple pressure vessel: See annex A.

4 • Dimensions and tolerances on dimensions

The nominal dimensions and tolerances on dimensions for the product shall be agreed on ordering, with reference to the following dimensional standards:

4.1 In the case of hot rolled steel plates [+]) 3 mm thick or above, with reference to EN 10 029, thickness tolerance class B.

4.2 In the case of

- continuously hot rolled wide strip (rolled width $\geq$ 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 10 051.

4.3 In the case of hot rolled narrow strip (rolled width $<$ 600 mm), with reference to EURONORM 48.

4.4 In the case of bars with

- rectangular section, to EURONORM 58;
- square section, to EURONORM 59;
- round section, to EURONORM 60;
- hexagonal section, to EURONORM 61.

5 Calculation of mass

A density of 7,85 kg/dm³ shall be used as the basis for the calculation of the nominal mass from the nominal dimensions of all steels included in table 1.

6 Designation and ordering

6.1 Designation of the steel grades

The steel names (see table 1) have been formulated in accordance with EN 10 027-1.

6.2 • Ordering

The order of a product conforming to this EN shall include the following information:

a) the quantity required;

b) the product form;

c) the European Standard or document specifying the tolerances on dimensions, shape and mass (see clause 4) 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;

d) the nominal dimensions of the product to be delivered;

e) the number of this EURONORM;

f) the designation of steel grade.

Special agreements regarding the subclauses marked with two points (••) may be made on ordering.

7 Classification and selection of steels

7.1 The classification of the steel according to EN 10 020 is indicated in table 1.

7.2 • The selection of steel is the responsibility of the purchaser.

8 Requirements

8.1 Steel manufacturing process

8.1.1 The steels shall be made using a basic oxygen process or an electric furnace process, or by technically equivalent processes.

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

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

For [1]), see page 2.

8.2 Delivery condition

The products shall be delivered in the normalized or in an equivalent condition obtained by normalizing rolling (see 3.3.2).

8.3 Chemical composition

8.3.1 The chemical composition determined from the cast analysis shall comply with the requirements in table 1.

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

8.4 Mechanical properties

The requirements in tables 3 and 4 apply for test pieces taken, prepared and tested in accordance with 9.3 and 9.4. The values relate to the nominal thicknesses (thicknesses on ordering) of the products and apply to the delivery condition specified in 8.2.

8.5 Surface condition

8.5.1 For plates, the requirements for surface quality class B 2 of EN 10 163-2 shall apply.

8.5.2 • Until publication of a European Standard for the surface condition of bars, these requirements shall be agreed at the time of ordering.

8.6 •• Internal soundness

For plates in thicknesses equal to or greater than 6 mm, special agreements referring to internal soundness may be made on the basis of EURONORM 160 when ordering.

9 Inspection and testing

9.1 Required types and content of inspection documents

9.1.1 Unless otherwise agreed (see 9.1.2), on the basis of non specific inspections a test report as defined in 2.2 of EN 10 024 shall be issued with the following information:

a) the information groups A, B and Z of EURONORM 168;

b) the results of the cast analysis in accordance with the code numbers C 71 to C 92 in EURONORM 168;

c) the data for a tensile test at room temperature in accordance with the code numbers C 01 to C 03 and C 10 to C 13 of EURONORM 168;

d) for products from which Charpy V-notch impact test pieces with a thickness of $\geq$ 5 mm and a width of 10 mm can be taken: The data for such tests according to the code numbers C 01 to C 03 and C 40 to C 43 of EURONORM 168.

9.1.2 •• At the time of ordering, by requiring an inspection certificate of type 3.1 B of EN 10 204, specific inspection and testing in accordance with the conditions in 9.2 to 9.5 may be agreed. The inspection certificate shall in this case contain the following information:

a), b) As under 9.1.1a) and b).

c), d) As under 9.1.1 c) and d). The data must however stem from specific inspection and testing and shall therefore, where necessary, additionally cover the code number C 00 of EURONORM 168.

e) The result of the visual examination of the products (see information group D of EURONORM 168).

f) If one or more of the following optional tests were agreed when ordering; the relevant information for

f1) product analysis (code numbers C 71 to C 92 of EURONORM 168);

f2) the verification of the 0,2 % proof stress at elevated temperature (code numbers C 00 to C 03, C 10 and C 11 of EURONORM 168);

f3) ultrasonic tests on internal soundness (information group D of EURONORM 168).

9.2 Test units and number of samples and test pieces for specific inspection and testing

9.2.1 •• Product analysis

Product analysis shall be carried out if specified at the time of ordering. The test unit is the cast. The purchaser shall specify the number of samples and the elements to be determined.

9.2.2 Tensile tests at ambient temperature and impact tests

9.2.2.1 If, at the time of ordering, in accordance with 9.1.2, the issuing of an inspection certificate has been agreed, the test units presented for specific inspection of the tensile properties at ambient temperature and, where necessary (see 9.1.1 d)), the impact tests, shall contain products of the same cast, the same production process, the same form and the same thickness range as specified in table 3 for the yield strength. The weight +) of the individual test units shall be 40 t or part thereof.

9.2.2.2 Per test unit, one sample shall be taken.

9.2.2.3 Per sample, one tensile test piece and, where possible (see 9.1.1 d)), three impact test pieces shall be taken.

9.2.3 •• Verification of the 0,2 % elevated temperature proof stress

If specially agreed at the time of ordering, the 0,2 % elevated temperature proof stress shall be verified. In this case, unless otherwise agreed, one test piece per cast shall be tested.

9.2.4 Visual examination

Each product shall be examined.

9.2.5 •• Ultrasonic tests

If, for plates in thicknesses $\geq$ 6 mm, ultrasonic tests were specially agreed at the time of ordering, each plate shall be tested unless otherwise agreed. The tests may be carried out before the plates are cut to their final size.

9.3 Selection and preparation of samples and test pieces

9.3.1 General

The samples and test pieces shall be selected and prepared in accordance with the general conditions in EURONORM 18. In addition, the following shall apply:

9.3.2 Position of the samples and test pieces for mechanical tests

9.3.2.1 For flat products the sample shall be taken so that the distance of the test pieces from the edge of the long side of the product corresponds approximately to the following:

- in the case of products with a rolled width (w) of $\geq$ 600 mm: to $w/4$;
- in the case of products with a rolled width (w) of $<$ 600 mm: to $w/3$.

NOTE: The verification of the mechanical properties is normally carried out before slitting. In the unusual cases

where their verification is required after slitting, suitable measures shall as far as possible be taken to find out the location of test pieces specified above.

The test pieces shall be taken at a sufficient distance from the end of the product.

For the distance of the test pieces from the rolled surface, the indications in figure 1 apply.

9.3.2.2 For bars, see figure 2.

9.3.3 Orientation of the axis of test pieces for mechanical tests

9.3.3.1 For flat products, the specifications in figure 1 apply.

9.3.3.2 For bars, longitudinal test pieces are to be taken in accordance with figure 2.

9.4 Test procedures

9.4.1 Product analysis

If a product analysis has been ordered, unless otherwise agreed on ordering, the choice of a suitable physical or chemical analytical method shall be at the discretion of the manufacturer. In cases of dispute, the analysis shall be carried out by a laboratory approved by both parties. In this case, the analytical method to be used shall be agreed, if possible, with reference to corresponding European Standards or EURONORMs.

9.4.2 Tensile test at ambient temperature

9.4.2.1 The tensile test at ambient temperature shall be carried out in accordance with EN 10 002-1, taking in account the additional or deviating conditions specified for flat products in figure 1, footnote 1, and for bars in figure 2, footnotes 1 and 2.

9.4.2.2 The yield stress shall be determined as the upper yield stress (R_{eH}), or, if this is not pronounced, the 0,2% proof stress ($R_{p0,2}$) shall be determined.

9.4.3 Impact test

9.4.3.1 The impact test on Charpy V-notch test pieces shall be carried out as specified in EN 10 045-1 at the temperature given for the relevant steel in table 3.

9.4.3.2 The assessment of the results of the impact tests shall be based on a sequential method, as follows:

a) The average value of a set of three test pieces shall meet the specified requirement. One individual value may be below the specified value, provided that it is not less than 70% of that value.

b) If the conditions under a) are not complied with, then an additional set of three test pieces shall be taken from the same sample and tested. To consider the test unit as acceptable, after testing the second set, the following conditions shall be satisfied simultaneously:

i) the average value of six tests shall be greater than the specified minimum value;

ii) not more than two of six individual values shall be lower than the specified minimum value;

iii) not more than one of the six individual values shall be lower than 70% of the specific value.

If these conditions are not satisfied, the sample unit is rejected and retests are carried out on the remainder of the test unit.

9.4.3.3 If, because of too small a product thickness, it is not possible to prepare Charpy V-notch test pieces with the normal width of 10 mm, subsize test pieces with a height of 10 mm and a width equal to the product thickness or equal to 5 or 7,5 mm shall be tested and the applicable impact energy values shall be taken from figure 3.

9.4.4 0,2% proof stress at elevated temperature

The 0,2% proof stress values at elevated temperature specified in table 4 apply for tests carried out in accordance with EN 10 002-5. Verification, if required, shall be carried out at one of the temperatures given in table 4.

●● This temperature may be agreed on ordering; otherwise, the test shall be carried out at 300 °C.

9.4.5 Visual examination

The visual examination of the surface condition shall be carried out without optical aids.

9.4.6 Ultrasonic test

If an ultrasonic test has been agreed for plate of thickness ≥ 6 mm for checking the internal soundness, the requirements of EURONORM 160 shall apply.

9.5 Retests

See prEN 10021.

10 Marking

The products shall be marked by painting or stamping or by durable adhesive labels or attached tags, with the following:

- the designation of the steel;
- a number by which the cast and, if an inspection certificate has been ordered, the sample product can be identified;
- the manufacturer's name or trademark.

Marking shall be at a position close to one end of each product or on the end cut face, at the manufacturer's discretion.

●● Unless otherwise agreed at the time of ordering, no hard stamping is permitted.

It is permissible for light products to be supplied in securely tied bundles. In this case, the marking shall be on a label attached to the bundle or on the top product of the bundle.

Table 1: Chemical composition (cast analysis) and classification of the steels

Steel	Classification [1]	% C max.	% Si max.	% Mn	% P max.	% S max.	% Al [2] tot. max.
SPH 235	UQ	0,16	0,35	0,40 to 1,20	0,035	0,030	0,020
SPH 265	UQ	0,20	0,40	0,50 to 1,50	0,035	0,030	0,020
SPHL 275	US	0,16	0,40	0,50 to 1,50	0,030	0,025	0,020

[1] UQ = non-alloy quality steel; US = non-alloy special steel.

[2] If sufficient other nitrogen binding elements are present, the minimum total aluminium content does not apply. If such other 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 lower or upper limits of the cast analysis

Element	Specified values for the cast analysis according to table 1 % by mass	Permissible deviation [1] of the product analysis from the values listed in table 1 for the cast analysis % by mass
C	$\leq$ 0,20	+0,02
Si	$\leq$ 0,40	+0,05
Mn	$\leq$ 1,00 > 1,00 to $\leq$ 1,50	±0,05 ±0,10
P	$\leq$ 0,035	+0,005
S	$\leq$ 0,030	+0,005
Al	$\geq$ 0,020	−0,005

[1] 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 maximum permitted value or fall short of the minimum permitted value. It is not acceptable for both to apply for one cast.

Table 3: Mechanical properties

Steel	$R_{e,min}$ [1] for nominal thicknesses, in mm, of			R_m [1]	$A_{long.;min.}$ [1] [2] for nominal thicknesses, in mm, of				$KV_{long.}$ [1]	
					$L_0 = 80$		$L_0 = 5{,}65\sqrt{S_0}$			
	$\leq$ 16	> 16 $\leq$ 40	> 40 $\leq$ 60		> 2 $\leq$ 2,5	> 2,5 < 3	$\geq$ 3 $\leq$ 40	> 40 $\leq$ 60	at	min.
	N/mm²			N/mm²	%				°C	J
SPH 235	235	225	215	360 to 480	20	21	26	25	−20	28
SPH 265	265	255	245	410 to 530	17	18	22	22	−20	28
SPHL 275	275	265	255	390 to 510	19	20	24	24	− 50	28

[1] $R_{e,min}$ = minimum yield strength (see 9.4.2.2); R_m = tensile strength.

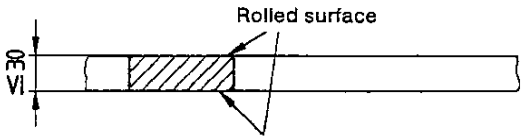
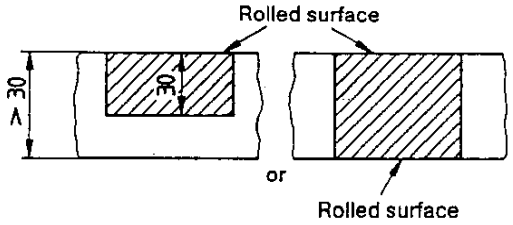
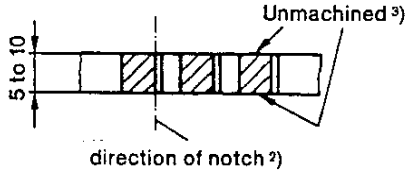
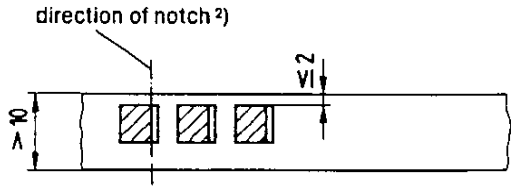
$A_{long.;min.}$ = minimum elongation at fracture for longitudinal tensile test pieces (see figure 1, footnote 1); L_0 = gauge length; S_0 = area of the cross section within the gauge length.

$KV_{long.;min.}$ = minimum impact energy for longitudinal Charpy V-notch impact test pieces (see 9.4.3).

[2] If for flat products in rolled widths of $\geq$ 600 mm in accordance with figure 1, transverse tensile test pieces are tested, the minimum values for the elongation at fracture are by 2 units lower than the minimum values specified above for longitudinal test pieces.

Table 4: 0,2 % proof stress at elevated temperature

Steel	Product thickness mm	0,2 % proof stress at 100 °C | 150 °C | 200 °C | 250 °C | 300 °C N/mm² min.				
SPH 235	≤ 60	171	162	153	135	117
SPH 265	≤ 60	194	185	176	158	140
SPHL 275	≤ 40	221	203	176	159	132
	> 40 ≤ 60	212	194			

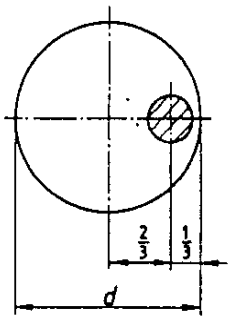
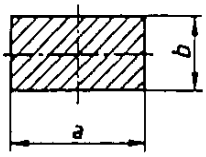
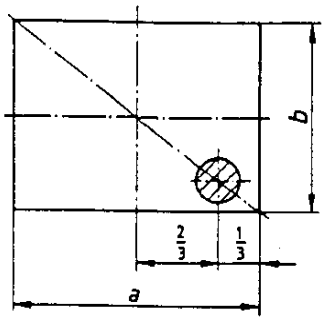
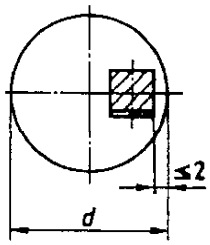
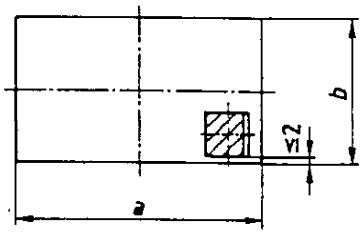
Type of test	Thickness of product mm	Orientation of the test pieces for a rolled width of: < 600 mm	Orientation of the test pieces for a rolled width of: ≥ 600 mm	Distance of the test piece from the rolled surface mm
Tension [1]	≤ 30	Longitudinal	Transverse	
	> 30			
Impact [2]	≥ 5 ≤ 10	Longitudinal	Longitudinal	
	> 10			

[1] In case of doubt or dispute, for products of thickness greater than or equal to 3 mm, use proportional test pieces of gauge length, $L_0 = 5{,}65\sqrt{S_0}$. For normal testing, for reasons of economy, test pieces of a constant measuring length may be used provided the result obtained for elongation after breaking is converted by a recognized formula (see, for example, ISO 2566). For products of thickness greater than 30 mm, round test pieces may be used if agreed between the parties.

[2] The axis of the notch shall be perpendicular to the surface of the product.

[3] Or machined to, if possible, 7,5 mm, otherwise, 5 mm (see 9.4.3.3).

Figure 1: Test piece location for flat products (see further details in 9.3.2)

Test pieces for		Products with round cross section	Products with rectangular cross section
	Tensile test	$d \leq 25$ [1]  $d > 25$ [2] 	$b \leq 25$ [1]  $b > 25$ [2] 
	Impact test [3]	$d \geq 16$ [4] 	$b \geq 12$ [4] 

[1] For products with small dimensions (d or $b \leq 25$ mm), the test piece should, if possible, consist of an unmachined full section of the product.

[2] For products of diameter or thickness ≤ 40 mm, the manufacturer may either apply
- the rules specified for products of diameter or thickness ≤ 25 mm, or
- take the test piece at a location nearer the centre than indicated in the figure.

[3] For products of round cross section, the axis of the notch is approximately a diagonal; for products with rectangular cross section, the axis of notch is perpendicular to the greatest rolled surface.

[4] For products of round cross section with a diameter ≥ 12 mm and < 16 mm or of rectangular cross section with the thickness, $b \geq 5$ mm and < 12 mm and a width, $a \geq 12$ mm, subsize test pieces shall be taken in accordance with 9.4.3.3.

Figure 2: Test piece location in bars

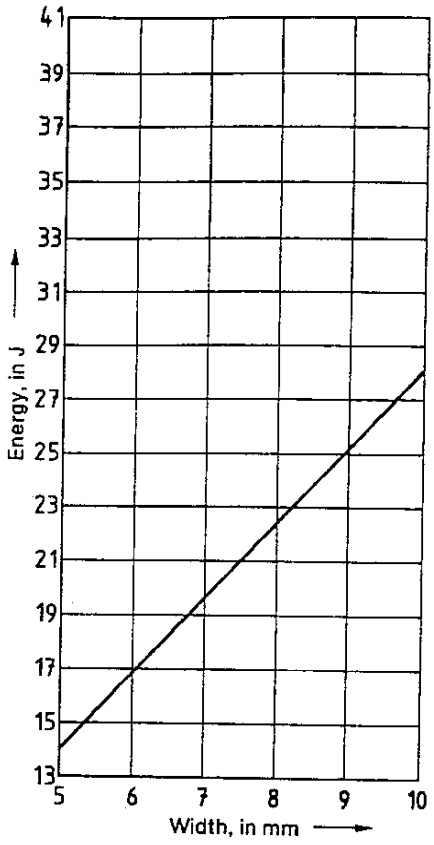


Figure 3: Minimum impact energy values (J) for impact test pieces with a width between 5 and 10 mm

Annex A

(informative)

Definition of 'simple pressure vessel'

For defining the term 'simple pressure vessel', article 1, clauses 2 and 3 of Directive 87/404/EEC are cited in the following:

Article 1

2. For the purposes of this Directive, 'simple pressure vessel' means any welded vessel subjected to an internal gauge pressure greater than 0,5 bar, which is intended to contain air or nitrogen, and which is not intended to be fired.

Moreover,

- the parts and assemblies contributing to the strength of the vessel under pressure shall be made either of non-alloy quality steel or of non-alloy aluminium or non-age hardening aluminium alloys,
- the vessel shall be made of:
  - either a cylindrical part of circular cross section closed by outwardly dished and/or flat ends which revolve around the same axis as the cylindrical part,
  - or two dished ends revolving around the same axis,
- the maximum working pressure of the vessel shall not exceed 30 bar and the product of that pressure and the capacity of the vessel (PS.V) shall not exceed 10 000 bar · litre,
- the minimum working temperature must be no lower than −50 °C and the maximum working temperature shall not be higher than 300 °C for steel and 100 °C for aluminium or aluminium alloy vessels.

3. The following vessels shall be excluded from the scope of the Directive:
- vessels specifically designed for nuclear use, failure of which may cause an emission of radioactivity,
- vessels specifically intended for installation in or the propulsion of ships and aircraft,
- fire extinguishers.

Annex B

(informative)

List of national standards which correspond with EURONORMs referenced

Until the following EURONORMs are transformed into European Standards, they can either be implemented or reference made to the corresponding national standards as listed in table B.1.

Table B.1: EURONORMs with corresponding national standards

EURO-NORM	Germany	France	United Kingdom	Spain	Italy	Belgium	Portugal	Sweden	Austria	Norway
18	–	NF A 03-111	BS 1501 BS 1502	UNE 36-300 UNE 36-400	UNI-EU 18	A 03-001	NP 2451	SS 11 01 20 SS 11 01 05	–	10 005 10 006
48	DIN 1016	NF A 46-100	BS 1449	UNE 36-553	UNI 6685	–	–	–	DIN 1016	–
52	DIN 17 014	NF A 02-010 NF A 02-012	BS 6562	UNE 36-0061	UNI-EU 52	–	NP 1697	SS 01 66 01 SS 21 27 50	–	–
58	DIN 1017 T 1	NF A 45-005 [1]	BS 4360	UNE 36-543	UNI-EU 58	A 34-201	–	SS 21 21 50	M 3230	1902
59	DIN 1014 T 1	NF A 45-004 [1]	BS 4360	UNE 36-542	UNI-EU 59	A 34-202	NP 333 + 334	SS 21 27 25	M 3226	1901
60	DIN 1013 T 1	NF A 45-003 [1]	BS 4360	UNE 36-541	UNI-EU 60	A 34-203	NP 331	SS 21 25 02	M 3221	1900
61	DIN 1015	NF A 45-006 [1]	BS 970	UNE 36-547 UNE 07-278	UNI 7061	A 34-204	–	–	M 3237/ M 3228	–
160	–	NF A 04-305	BS 5996	UNE 36-100	UNI 5329	–	–	–	–	–
168	–	NF A 03-116	BS 1501 BS 1502	UNE 36-800	UNI-EU 168	–	–	SS 11 00 12	–	–

[1] NF A 45-001 and NF A 45-101 shall be added for the tolerances.