UDC 669.14-41 : 621.642-98 : 620.1 April 1993

Flat products made from steel for pressure purposes
General requirements
English version of DIN EN 10028 Part 1

DIN
EN 10028
Part 1

Flacherzeugnisse aus Druckbehälterstählen; allgemeine Anforderungen

This standard supersedes
parts of
DIN 17 280, July 1985 edition,
and, together with
DIN EN 10 028 Part 2,
supersedes
DIN 17 155, October 1983
edition, and, together with
DIN EN 10 028 Part 3 and
DIN EN 10 113 Parts 1 and 2,
supersedes
DIN 17 102, October 1983
edition.

European Standard EN 10028-1 : 1992 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 its preparation was the *NormenausschuB Eisen und Stahl* (Steel and Iron Standards Committee), Technical Committee *Stähle für den Druckbehälterbau.*

This standard is based in large part on the June 1989 draft of DIN 17 155 Part 1 (cf. Amendments), and incorporates general requirements that will also be specified in EN 10028-4 (currently in preparation).

DIN 50049 corresponds to European Standard EN 10204 referred to in clause 2 of the EN.

Note regarding SEW 028

It should be noted that *Stahl-Eisen-Werkstoffblatt* (Iron and steel materials sheet) (SEW) 028 includes steels that have been approved for pressure vessel construction in Germany by the *Verband der Technischen Überwachungsvereine* (Association of Technical Inspection Boards). This document is obtainable from *Verlag Stahleisen mbH*, Postfach 10 51 64, D-4000 Düsseldorf.

Standards referred to

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

DIN 50049 Inspection documents for the delivery of metallic products

Previous editions

DIN 17 102: 10.83; DIN 17 155 Part 1: 10.51, 01.59; DIN 17 155 Part 2: 10.51, 01.59x; Supplement to DIN 17 155: 05.52; Supplement to DIN 17 155 Part 2: 03.64, 06.69; DIN 17 155: 10.83; DIN 17 280: 07.85.

Amendments

In comparison with the October 1983 editions of DIN 17 102 and DIN 17 155, and the July 1985 edition of DIN 17 280, the following amendments have been made.

a) The specifications are now covered in EN 10028 Parts 1 to 4, and have been editorially revised.

b) Requirements regarding the scope of testing have been revised.

c) Further amendments are given in EN 10028 Parts 2 and 4 (the latter being at the stage of draft).

International Patent Classification

G 01 L 7/00
G 01 N 33/20

Continued overleaf.
EN comprises 8 pages.

Editor's note

*This standard reproduces the official text of the English version of EN 10028-1 as issued by CEN. In its preparation for publication as DIN EN 10028 Part 1 (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 *The text of subclause 4.2 does not reflect the German version, which refers to 'wide strip' (as opposed to 'coil') and to 'slit strip' (as opposed to 'slit coil').*

2 *To avoid confusion, the term 'delivery condition' should be replaced by 'heat treatment condition' in item g) of subclause 6.2 and in subclauses 8.2 and 8.4.1.*

3 *To make the sense complete, item a) of subclause 9.1.2 should be amended to read: 'The details specified for categories A, B and Z in EURONORM 168, and the . . .'*

4 *For ease of reading, item e) of subclause 9.1.2 should be amended to read: 'The results of impact testing in the case of products from which V-notch test pieces having a width of 5 mm or more and a height of 10 mm can be taken, in accordance with sections C 00 to C 03 and C 40 to C 43 of EURONORM 168.'*

5 *For the sake of clarity, the term 'dimensional test' should be replaced by 'check for dimensional accuracy' in subclause 9.2.*

6 *By way of correction, the title of subclause 9.3 should read: 'Scope of testing'.*

7 *For the sake of accuracy, subclause 9.3.4 should be amended to read: 'It shall be the manufacturer's responsibility to check all products for materials identity.'*

8 *For the sake of accuracy and to reflect the German text, the first sentence of subclause 9.4.2 should be amended to read: 'Test pieces for the tensile test at ambient temperature, the impact test, and the tensile test at elevated temperature shall be taken so that their axis coincides with a line that is one-fourth of the product width away from the product edge.'*

9 *For ease of comprehension, the Note to subclause 9.4.2 should be amended to read: 'Where the specifications of EN 10164 require that test pieces be taken in the direction of thickness from the middle range of the specimen width, it shall be permitted to comply with them instead of the specifications of subclause 9.4.2 of this EN, except in cases of arbitration.'*

10 *For ease of reading, subclause 9.4.2.1 should be amended to read: 'Where agreement has been reached at the time of ordering regarding a particular heat treatment condition (i.e. other than the usual condition), samples shall be treated to the usual condition prior to testing.'*

11 *For the sake of clarity, the third indented item of subclause 10.1 should be amended to read: 'either the cast number and test piece number, or a number which indicates the cast from which the product originates'.*

12 *For the sake of comprehension, the first paragraph of subclause 10.2 should be amended to read: 'Plate and sheet . . . at one end, with the marking upright, to indicate the main direction of rolling. If this is not possible, the direction of rolling shall be marked directly.'*

13 *To avoid confusion, the second paragraph of subclause 10.2 should be amended to read: 'Unless otherwise agreed at the time of ordering, stamped marks shall be outlined in colour.'*

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10 028-1

December 1992

UDC 669.14-41:621.642-98:620.1

Descriptors: iron and steel products, metal plate, steel strip, steel, pressure equipment, designation, specifications, heat treatment condition, tests, marking.

English version

Flat products made of steels for pressure purposes

Part 1: General requirements

Produits plats en aciers pour appareils à pression.
Partie 1: Prescriptions générales

Flacherzeugnisse aus Druckbehälterstählen.
Teil 1: Allgemeine Anforderungen

This European Standard was approved by CEN on 1992-12-21.

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 bibliographic 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.

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CEN

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

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

Ref. No. EN 10 028-1: 1992 E

Contents

NOTE: The clauses marked ● contain information relating to agreements which are to be made at the time of ordering. The clauses marked ●● contain information relating to agreements which may be made at the time of ordering.

Foreword

This European Standard was prepared by ECISS/TC 22 'Steels for pressure purposes; qualities', the Secretariat of which is held by DIN.

Within the framework of the ECISS (European Committee for Iron and Steel Standardization) programme, ECISS/TC 22 was allocated the task of revising EURONORM 28-85 'Steel plate, sheet and strip with elevated temperature properties; technical delivery conditions' and (where relevant to pressure vessel construction) EURONORM 113-72 'Weldable fine grain structural steels' and replacing them with a European Standard.

At its meetings in July and November 1990, ECISS/TC 22 approved the present document. The following ECISS members were represented at the meetings: Austria, Finland, France, Germany, Italy, Norway, Sweden, United Kingdom.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by June 1993 at the latest.

In accordance with 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 Part of EN 10028 specifies general technical delivery conditions for flat products, used principally for the construction of pressure vessels, made from:

a) weldable unalloyed and alloy steels with elevated temperature properties as specified in EN 10028-2;

b) normalized weldable fine grain steels as specified in EN 10 028-3; and

c) nickel alloy steels with low temperature toughness as specified in EN 10028-4.

NOTE: Other steels are used nationally for the same applications as the steels for pressure purposes covered in Parts 2, 3, and 4 of this EN. Such steels are not necessarily excluded from the scope of this EN, provided they comply with the relevant European or national standard for pressure vessel construction.

1.2 The general technical delivery conditions specified in EN 10 021 also apply to products supplied in accordance with this European Standard.

2 Normative references

This European Standard incorporates, by dated or 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 dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 10002-1	Metallic materials; tensile testing. Part 1: Method of test at ambient temperature
EN 10002-5	Metallic materials; tensile testing. Part 5: Method of test at elevated temperatures
EN 10020	Definition and classification of grades of steel
EN 10021[1])	General technical delivery conditions for steel and steel products
EN 10027-1	Designation systems for steel. Part 1: Steel names, principal symbols
EN 10027-2	Designation systems for steel. Part 2: Numerical system
EN 10028-2	Flat products made of steels for pressure purposes. Part 2: Non-alloy and alloy steels with specified elevated temperature properties
EN 10028-3	Flat products made of steels for pressure purposes. Part 3: Weldable fine grain steels, normalized
EN 10028-4[1])	Flat products made of steels for pressure purposes. Part 4: Nickel alloy steels with specified low temperature properties
EN 10029	Hot rolled plates 3 mm thick or above; tolerances on dimensions, shape and mass
EN 10045-1	Metallic materials; Charpy impact test. Part 1: Method of test
EN 10051	Continuously hot-rolled uncoated plate, sheet and strip of non-alloy steels; tolerances on dimensions and shape
EN 10052[1])	Vocabulary of heat treatment terms for ferrous products
EN 10079	Definitions of steel products
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[1])	Steel products with improved deformation properties perpendicular to the surface of the product; technical delivery conditions
EN 10204	Metallic products; types of inspection documents
ISO 2566-1:1984	Steel; conversion of elongation values; carbon and low alloy steels
EU 18-79[2])	Selection and preparation of samples and test pieces for steel and iron and steel products
EU 48-84[2])	Hot rolled narrow steel strip; tolerances on dimensions and shape
EU 160-86[2])	Ultrasonic testing of steel plate of thickness equal to or greater than 6 mm (reflection method)
EU 168-86[2])	Iron and steel products; inspection document contents

3 Definitions

For the purposes of this European Standard, the following definitions apply.

3.1 Unalloyed and alloy steels, quality steel and special steel

The definitions given in EN 10020 apply for classification into unalloyed and alloy steels and into quality and special steels.

3.2 Product shapes

The definitions given in EN 10079 apply for the various product shapes.

3.3 Types of heat treatment

3.3.1 The definitions given in EN 10052 apply.

3.3.2 normalizing rolling: Normalizing rolling is a rolling process in which the final deformation is carried out within a certain temperature range, which results in a material condition that is equivalent to that obtained after normalizing, so that the specified mechanical properties are retained even after subsequent normalizing.

The symbol N shall be used to designate this condition and the normalized condition.

NOTE: In international publications, the term 'controlled rolling' is often used to mean both 'normalizing rolling' and 'thermomechanical rolling'. However, in view of the different uses of the products, a distinction between the terms is necessary.

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[1]) At present at the draft stage.

[2]) ●● Prior to adoption as a European Standard, this EURONORM or a corresponding national standard may be applied, depending on the agreement reached at the time of ordering (see annex A).

4 ● Dimensions and tolerances on dimensions

The nominal dimensions and tolerances on dimensions shall be agreed at the time of ordering, with reference being made to the dimensional standards listed below.

4.1 For hot rolled plate, refer to EN 10029 or EN 10051.

4.2 For continuously hot rolled coil+) (rolled width 600 mm or more) and hot rolled slit coil+) in widths less than 600 mm, refer to EN 10051.

4.3 For hot rolled narrow strip (rolled width less than 600 mm), refer to EURONORM 48.

4.4 ●● Unless otherwise agreed at the time of ordering, class B as specified in EN 10029 shall apply for the tolerance on thickness of plate.

5 Calculation of mass

A density of 7,85 kg/dm^3 shall be used as the basis for calculation of the nominal mass of steel as covered in EN 10 028-2, EN 10028-3 and EN 10028-4.

6 Designation and ordering

6.1 Designation of steel grades

The material designations used (see EN 10028-2, EN 10028-3 and EN 10 028-4) are in accordance with EN 10027-1, and the material numbers (see EN 10028-2, EN 10028-3 and EN 10 028-4), with EN 10 027-2.

6.2 ● Ordering

The complete order for a product as specified in this European Standard shall include the following information:

a) the quantity required;

b) the type of flat product;

c) the European Standard or EURONORM specifying the tolerances on dimensions, shape and mass (see clause 4) and, if the relevant European Standard or EURONORM so permits, specific information on any properties to be selected by the purchaser (e.g. particular edge finishes or alternative tolerance classes);

d) the nominal dimensions of the product;

e) the number of this European Standard;

f) the designation of the steel grade;

g) the delivery condition,+) if it differs from the usual condition specified in EN 10028-2, EN 10028-3 and EN 10 028-4.

At the time of ordering, special agreements may be made regarding the subclauses marked ● ●.

7 Classification into grades

7.1 The information given in Parts 2, 3, and 4 of this European Standard shall apply with regard to classifying the steels into unalloyed and alloy steels, quality steels and special steels.

7.2 ● The selection of the steel shall be the responsibility of the purchaser.

8 Requirements

8.1 Steelmaking process

The steel shall be made in an electric furnace using the oxygen method or an equivalent method. The steel shall be killed.

8.2 Delivery condition+)

See EN 10028-2, EN 10028-3 and EN 10028-4 (see also 3.3.2).

8.3 Chemical composition

See EN 10028-2, EN 10028-3 and EN 10028-4.

8.4 Mechanical properties

8.4.1 The values of mechanical properties specified in EN 10 028-2, EN 10028-3 and EN 10028-4 shall apply for test pieces taken and prepared in accordance with 9.4.2. The values apply to the nominal thickness (thickness ordered) of the product and to the usual delivery condition+) (see EN 10028-2, EN 10 028-3 and EN 10028-4).

●● Agreement may be reached at the time of ordering regarding any values of mechanical properties to be complied with after additional heat treatment.

8.4.2 The values of impact energy apply to transverse test pieces for the steel grades specified in EN 10028-2 and for longitudinal and transverse test pieces for the steel grades specified in EN 10 028-3 and EN 10028-4.

8.4.3 Where impact testing can only be carried out using test pieces under 10 mm but not less than 5 mm wide, the minimum values given in EN 10028-2, EN 10028-3 and EN 10028-4 shall be reduced in proportion to the cross-sectional area of the test pieces.

8.4.4 ●● For products of thickness 15 mm and above, it may be agreed at the time of ordering to satisfy the requirements of one of the quality classes Z 15, Z 25 or Z 35 as specified in EN 10 164 regarding minimum values for the reduction in area after fracture at right angles to the product surface.

8.5 Surface condition

For plate, the requirements of surface quality class B 2 as specified in EN 10163-2 shall apply.

8.6 ●● Internal soundness

In the case of plate with a thickness of 6 mm or more, particular agreement regarding internal soundness may be reached on the basis of EURONORM 160.

9 Testing

9.1 Type and content of inspection documents

9.1.1 ● An inspection document covering the results of specific testing as described in EN 10204 shall be supplied for products complying with this EN. The type of inspection document shall be indicated at the time of ordering.

9.1.2 The inspection document shall include the following information.

a) The information blocks+) A, B and Z of EURONORM 168, along with the tempering temperature in the case of quenched and tempered or annealed products.

b) The steelmaking process used, in accordance with section C 70 of EURONORM 168.

c) The results of the cast analysis, in accordance with sections C 71 to C 92 of EURONORM 168.

d) The results of tensile testing at ambient temperature, in accordance with sections C 00 to C 03 and C 10 to C 13 of EURONORM 168.

e) For products from which V-notch test pieces ≥ 5 mm wide and 10 mm high may be taken from the impact test:

the results of these tests in accordance with sections C 00 to C 03 and C 40 to C 43 of EURONORM 168.+)

f) The results of the visual examination of the products, in accordance with category D of EURONORM 168.

g) Where any one of the following optional tests have been agreed at the time of ordering, the information relating to:

g1) the product analysis, in accordance with sections C 71 to C 92 of EURONORM 168);

g2) verification of the 0,2 % proof strength at elevated temperature, in accordance with sections C 00 to C 03, C 10 and C 11 of EURONORM 168;

g3) verification of the minimum reduction in area after fracture at right angles to the product surface, in accordance with sections C 00 to C 03, C 10 and C 14 to C 29);

g4) the results of ultrasonic testing for internal soundness, in accordance with category D of EURONORM 168.

9.2 Tests to be carried out

The following tests shall be carried out:

- tensile test at ambient temperature;
- impact test at one test temperature;
- dimensional test;+)
- visual examination of the surface condition;
- tests specially agreed at the time of ordering (e.g. product analysis, tensile test at elevated temperature, tensile test in the direction of thickness, ultrasonic test).

9.3 Number of tests+)

9.3.1 If it has been agreed at the time of ordering to determine the chemical composition by product analysis, one test piece per cast, unless otherwise agreed, shall be taken for determining the elements specified for the particular steel grade in EN 10028-2, EN 10028-3 or EN 10028-4.

9.3.2 The test unit for the tensile test at ambient temperature and the impact test shall consist of:

- the coil in the case of strip and split strip;
- the rolled plate in the case of sheet or plate.

If a rolled plate or a coil is divided into several heat treatment batches for quenching in liquid, each heat treatment batch shall be regarded as a test unit. The specifications given in figure 1 shall apply for the number of samples to be taken per test unit.

9.3.3 If agreed at the time of ordering, the 0,2 % proof stress at elevated temperature shall be determined. Unless otherwise agreed, one test piece per cast shall be tested.

9.3.4 The manufacturer shall take suitable measures to prevent materials becoming mixed up.+)

9.3.5 The dimensions of the products shall be checked.

9.3.6 The surface condition of all products shall be checked.

9.4 Sampling and sample preparation

9.4.1 Sampling and sample preparation shall be in accordance with the requirements specified in EURONORM 18. In addition, the requirements specified in 9.4.2 shall apply for mechanical tests.

9.4.2 The specimens shall be taken at ¼ product width (see figure 1) for the tensile test at ambient temperature, the impact test and the tensile test at elevated temperature.+) In the case of strip, test pieces shall be taken at a sufficient distance from the end of the strip.

NOTE: If specimens have to be taken from the mid-width position in accordance with the requirements for through-thickness testing as specified in EN 10164, the specimens to be taken as specified in 9.4.2 may also be taken from there except in cases of arbitration.+)

9.4.2.1 If, following agreement at the time of ordering, the products are not to be delivered in the usual delivery condition, the specimen shall be treated to the usual delivery condition prior to the test.+)

9.4.2.2 One transverse test piece, which should be flat (cf. second paragraph), shall be taken from each sample for the tensile test at ambient temperature. At least one rolled surface shall remain on rectangular test pieces. However, both rolled surfaces shall generally be left on the test piece in the case of products up to 40 mm thick.

Round test pieces are permissible, but should only be used where the product thickness is greater than 40 mm, and they shall be at least 10 mm in diameter. These test pieces shall be taken so that their axes coincide with a line one-fourth of the product width away from the edge or as near as possible thereto.

9.4.2.3 Three transverse test pieces or, in the case of the steel grades specified in EN 10028-3 and EN 10028-4 and where so agreed, three longitudinal test pieces shall be taken from the samples for the impact test. In the case of product thicknesses up to 40 mm, one side of the test piece shall be as close as possible to the rolled surface.

In the case of product thicknesses exceeding 40 mm, test pieces shall be taken so that their axes coincide with a line one-fourth of the product width away from the edge or as near as possible thereto.

The notch shall be at right angles to the product surface.

9.4.2.4 For the tensile test at elevated temperature, one test piece shall be taken from one sample per test unit (see 9.3.3) and prepared in accordance with EN 10002-5.

9.5 Test procedure

9.5.1 Unless otherwise agreed at the time of ordering, the choice of a suitable physical or chemical method for the product analysis shall be at the manufacturer's discretion. In cases of dispute, the analysis shall be carried out by a laboratory which has been approved by both parties. In this case, the method to be used shall be the subject of agreement, reference being made where possible to the relevant ENs or EURONORMs.

9.5.2 The tensile test at ambient temperature shall be carried out as described in EN 10002-1, generally using test pieces with an original gauge length, L_0, equal to $5{,}65\sqrt{S_0}$, where S_0 is the cross-sectional area of the test piece. Test pieces with a constant gauge length may be used, in which case the value of elongation at fracture shall be converted in accordance with ISO 2566-1. In cases of dispute, products with a thickness ≥ 3 mm shall have an original gauge length, L_0, equal to $5{,}65\sqrt{S_0}$.

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

9.5.3 The impact test on V-notch test pieces shall be carried out as described in EN 10045-1, the test temperatures being as specified in EN 10028-2, EN 10028-3 and EN 10028-4.

The minimum values of impact energy specified in EN 10028-2, EN 10028-3 or EN 10028-4 apply for the mean from three test pieces, but only one single value may be lower, by not more than 70 %, than the specified minimum value.

If the above conditions are not satisfied, an additional set of three test pieces shall be taken from the same sample and retested. In order to regard the test unit as acceptable after testing the second set, the following requirements shall be met:

1) the mean value from six tests shall be greater than or equal to the specified minimum value;

2) not more than two of the six single values shall be less than the specified minimum value;

3) not more than one of the six single values shall be lower than 70 % of the specified minimum value.

If these requirements are not met, the sample shall be sorted out, and retests shall be carried out on the remainder of the test unit.

For product thicknesses between 5 and 10 mm, the width of impact test pieces shall be either equal to the product thickness, or equal to 5 mm or 7,5 mm (see 8.4.3).

Products less than 5 mm thick need not undergo impact testing.

9.5.4 The 0,2 % proof strength at elevated temperature shall be determined as described in EN 10002-5. Where required, verification shall be based on one of the temperatures given in table 4 of EN 10028-2 or EN 10028-3.

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

9.5.5 Visual examination of the surface condition shall be carried out without optical aids.

9.5.6 If an ultrasonic test for internal soundness has been agreed for plate of 6 mm or more in thickness, the requirements specified in EURONORM 160 shall apply.

9.6 Retests

See EN 10021.

10 Marking

10.1 The products shall be marked with:

- the manufacturer's mark;
- the designation of the steel grade;
- either with the cast number or the test piece number or with a continuous number from which it is possible to deduce this information;+)
- the inspector's mark (in the case of works inspectors, only if agreed between manufacturer and client).

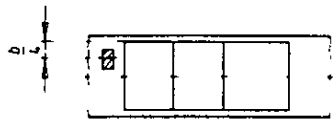
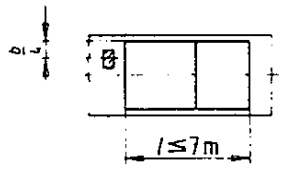
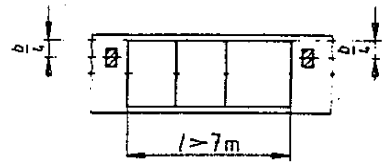
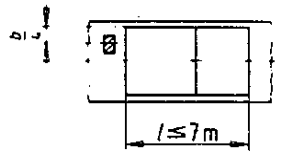
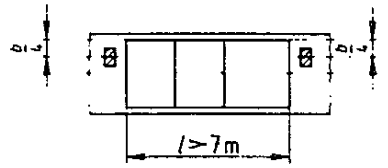
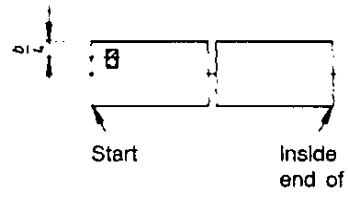
Plate and sheet shall be marked by stamping; thin sheet (less than about 5 mm) may also be marked by painting.

Sheet and strip supplied in bundles shall bear a securely attached tag.

10.2 Plate and sheet not supplied in bundles shall be marked at one end so that it is upright and indicates the main direction of rolling. If this is not possible, the direction of rolling shall be marked.+)

●● Unless otherwise agreed at the time of ordering, a mark applied by stamping shall have a coloured frame.+)

10.3 ●● Any other marks to be made shall be the subject of agreement at the time of ordering.

Product	Steel grade	Sheet/plate thickness mm	Product length supplied, per rolled plate m	One sample shall be taken from each test unit at the zones marked ▨ for preparing test pieces in accordance with 9.4
Plate/ sheet	Unalloyed	≤ 50	All sizes	
		> 50	≤ 7	
			> 7	 [1]
	Alloy	All sizes	≤ 7	
			> 7	 [1]
Strip	No distinction.	All sizes	—	 [2]

[1]) The samples may also be taken from the other side of the product.
[2]) For sheet cut from strip, the strip shall be regarded as the test unit, provided the sheet is not to be quenched in liquid.

Figure 1: Locations from which samples are to be taken

Annex A (informative)

List of national standards corresponding to the EURONORMs referred to

Either the EURONORMs referred to or the corresponding national standards given in table A.1 may be applied until they are adopted as European standards.

Table A.1: EURONORMs and corresponding national standards

EURO-NORM	Corresponding national standard in									
	Germany	France	United Kingdom	Spain	Italy	Belgium NBN	Portugal NP	Sweden	Austria	Norway
18		NF A 03 111	BS 1501 BS 1502	UNE 36-300 UNE 36-400	UNI-EU 18	A 03-001	2451	SS 11 01 20 SS 11 01 05	–	10 005 10 006
48		NF A 46 100	BS 1449	UNE 36-553	UNI 6685		–	–		–
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	–	–