

INTERNATIONAL STANDARD

ISO
9328-1

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Steel plates and strips for pressure purposes — Technical delivery conditions —

Part 1: General requirements

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Tôles et bandes en acier pour service sous pression — Conditions techniques de livraison —
Partie 1: Prescriptions générales

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Reference number
ISO 9328-1:1991(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9328-1 was prepared by Technical Committee ISO/TC 17, *Steel*, Sub-Committee SC 10, *Steel for pressure purposes*.

Parts 1 to 5 of ISO 9328 cancel and replace the first editions of ISO 2604-4:1975, ISO/TR 2604-7:1986 and ISO 2604-8:1985 of which they constitute a technical revision.

ISO 9328 consists of the following parts, under the general title *Steel plates and strips for pressure purposes — Technical delivery conditions*:

- *Part 1: General requirements*
- *Part 2: Unalloyed and low-alloyed steels with specified room temperature and elevated temperature properties*
- *Part 3: Nickel-alloyed steels with specified low temperature properties*
- *Part 4: Weldable fine grain steels with high proof stress supplied in the normalized or quenched and tempered condition*
- *Part 5: Austenitic steels*

Annex A forms an integral part of this part of ISO 9328. Annexes B and C are for information only.

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Introduction

In addition to summarizing ISO 2604-4, ISO/TR 2604-7 and ISO 2604-8, parts 1 to 5 of ISO 9328 contain the following amendments, in particular:

- a) The general requirements for flat products for pressure purposes are covered in this part of ISO 9328 for all steel groups, so that incidental differences in the requirements for the various groups are avoided.
- b) The optional requirements other than the requirements concerning
 - the steel type,
 - the dimensions,
 - the type of document,

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— the testing temperature for the verification of the elevated temperature proof stress, as far as such verifications are mandatory, ISO 9328-1:1991

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are covered in annex A. The standard therefore becomes more flexible so that the part "Materials" of standards for the various types of pressure vessels and boilers can be restricted to the essential by references to the applicable part of ISO 9328 and to the special requirements appropriate to the specific type of vessel.

- c) The requirements for the chemical composition and the properties for the individual steel groups are covered in parts 2 to 5 of ISO 9328 so that further revisions will be less complicated.
- d) Parts 1 to 5 of ISO 9328 also cover strip.
- e) Only the aluminium-treated unalloyed steels were retained because of their higher yield strength at room temperature, their better impact properties and their better behaviour in the continuous casting process.

To the types with a minimum yield strength of 235 N/mm², 265 N/mm², 295 N/mm² (now 290 N/mm²), 315 N/mm², a type with 355 N/mm² was added.

- f) The low alloyed types P30 (1,2 % Mn, 0,5 % Mo) and P33 (0,5 % Cr, 0,6 % Mo, V) were deleted because of decreasing importance.
- g) In ISO 2604-4 the Al content for the CrMo-alloyed steels was restricted to $\leq 0,020$ % (*m/m*), because of the opinion that higher aluminium contents would have a negative effect on the creep ductility and the creep strength of the steel. An assessment showed, however, that the lowest creep ductility values were found for steels which are not Al-treated and that it is difficult to verify, within the temperature ranges and curves normally applied for these steels, a

negative effect of Al on the creep rupture strength. In addition, some countries reported that they had over 20 years experience with Al-treated steels. As Al additions are sometimes necessary in order to comply with the impact properties specified by the customers, the restriction of the Al-content was eliminated.

- h) The low temperature grade P41 was deleted. The low temperature grades 11 MnNi 53 and 13 MnNi 63 were inserted.
- i) It was not regarded as necessary to differentiate, in the case of austenitic steels, between low temperature and room temperature grades. The grades P49, P52 and P55 of ISO 2604-4 were consequently deleted and footnote 4 to table 1 of ISO 9328-5 added. Grade P67 was also not retained.

The following austenitic steels were inserted in ISO 9328-5:

- the nitrogen bearing steels X 2 CrNiN 18 10, X 2 CrNiMoN 17 12, X 2 CrNiMoN 17 13 and X 2 CrNiMoN 17 13 5,
- the elevated temperature grades X 7 CrNiTi 18 10, X 7 CrNiNb 18 10 (as a substitute for the earlier type P56), X 7 CrNiMoB 17 12 and X 8 NiCrAlTi 32 21,
- the types X 6 CrNiMoTi 17 12, X 6 CrNiMoNb 17 12, X 3 CrNiMo 18 16 4 and X 2 CrNiMoCu 25 20 5.

- j) The requirements for the chemical composition and the properties were partly amended, for example to take into more consideration the influence of the product thickness or to align the requirements with those in other International Standards, for example ISO 683-13.
- k) Recommendations for the processing, in particular the welding of fine grain steels, were introduced by a reference to a Technical Report which is being prepared (see note to 5.4).
- l) More specific requirements for surface quality were inserted by reference to ISO 7788.
- m) When acceptance tests are ordered, no impact tests are to be carried out for austenitic steels (unless A.7 or A.8 are ordered).
- n) Wherever impact tests are required these shall be carried out at the lowest temperature for which impact values are specified.
- o) For steels with minimum elevated temperature proof stress values, except those austenitic steels for which no creep rupture properties are specified, verification of the elevated temperature proof stress values by specific testing is mandatory.
- p) For austenitic steels the testing by batches, instead of the testing of each individual plate as rolled, is admitted under certain conditions (see table 2).

Steel plates and strips for pressure purposes — Technical delivery conditions —

Part 1: General requirements

1 Scope

1.1 This part of ISO 9328 covers the technical delivery conditions for plates and strip for pressure purposes manufactured from the following internationally used steels (see note 1):

- a) the unalloyed and low-alloyed steels with specified room temperature and elevated temperature properties covered in ISO 9328-2,
- b) the nickel-alloyed steels with specified low temperature properties covered in ISO 9328-3,
- c) the weldable normalized or quenched and tempered high strength fine grain steels (room temperature, elevated temperature and low temperature grades) covered in ISO 9328-4 (see note 3), and
- d) the austenitic steels (room temperature and elevated temperature grades) covered in ISO 9328-5.

NOTES

1 As well as the internationally used steels for pressure purposes covered in ISO 9328-2, ISO 9328-3, ISO 9328-4 and ISO 9328-5 there are other steels used regionally or nationally for the same application.

These other steels shall not be precluded by parts 2 to 5 of ISO 9328 provided that they comply with the concerned international or national standards for vessel constructions.

2 The following International Standards also apply for steel products for pressure purposes:

- ISO 2604-1, ISO 2604-2, ISO 2604-3, ISO 2604-5, ISO 2604-6, and ISO 4978.

3 In combination with the fine grain steels of ISO 9328-4 the term “quenched and tempered” also covers the precipitation-hardened fine grain steels.

4 It should be noted that not all steel types are available in the form of strip.

1.2 In special cases, variations of the requirements of parts 1 to 5 of ISO 9328 or additions to them may form the subject of an agreement at the time of enquiry and order. (See annex A.)

1.3 In addition to the requirements of parts 1 to 5 of ISO 9328 the general technical delivery requirements in ISO 404 apply, unless otherwise indicated in this part of ISO 9328.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9328. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9328 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 148:1983, *Steel — Charpy impact test (V-notch)*.

ISO 377-1:1989, *Selection and preparation of samples and test pieces of wrought steels — Part 1: Samples and test pieces for mechanical test*.

ISO 377-2:1989, *Selection and preparation of samples and test pieces of wrought steels — Part 2: Samples for the determination of the chemical composition*.

ISO 404:1981, *Steel and steel products — General technical delivery requirements.*

ISO 783:1989, *Metallic materials — Tensile testing at elevated temperature.*

ISO 2566-1:1984, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels.*

ISO 2566-2:1984, *Steel — Conversion of elongation values — Part 2: Austenitic steels.*

ISO 3651-1:1976, *Austenitic stainless steels — Determination of resistance to intergranular corrosion — Part 1: Corrosion test in nitric acid medium by measurement of loss in mass (Huey test).*

ISO 3651-2:1976, *Austenitic stainless steels — Determination of resistance to intergranular corrosion — Part 2: Corrosion test in a sulphuric acid/copper sulphate medium in the presence of copper turnings (Monypenny Strauss test).*

ISO 4948-1:1982, *Steels — Classification — Part 1: Classification of steels into unalloyed and alloy steels based on chemical composition.*

ISO 4978:1983, *Flat rolled steel products for welded gas cylinders.*

ISO 4995:1991, *Hot-rolled steel sheet of structural quality.*

ISO 4996:1991, *Hot-rolled steel sheet of high yield stress structural quality.*

ISO 6892:1984, *Metallic materials — Tensile testing.*

ISO 6929:1987, *Steel products — Definitions and classification.*

ISO 7452:1984, *Hot-rolled structural steel plates — Tolerances on dimensions and shape.*

ISO/TR 7705:1991, *Guidelines for specifying Charpy V-notch impact prescriptions in steel specifications.*

ISO 7788:1985, *Steel — Surface finish of hot-rolled plates and wide flats — Delivery requirements.*

ISO 9328-2:1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 2: Unalloyed and low-alloyed steels with specified room temperature and elevated temperature properties.*

ISO 9328-3:1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 3: Nickel-alloyed steels with specified low temperature properties.*

ISO 9328-4:1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 4:*

Weldable fine grain steels with high proof stress supplied in the normalized or quenched and tempered condition.

ISO 9328-5:1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 5: Austenitic steels.*

ISO 9444:1990, *Hot-rolled stainless steel wide strip and sheet — Tolerances on dimensions and form.*

3 Definitions

3.1 For the term “steel” the definition in ISO 4948-1 applies. Classification into “unalloyed steels” and “alloyed steels” is also given in this International Standard.

3.2 For the terms “plate” and “strip” the definitions in ISO 6929 apply.

4 Ordering and designation

4.1 The purchaser shall state on his enquiry and order the indications and requirements given below:

a) indication of the product form (“plate” or “strip”);

b) number of the International Standard covering the requirements on dimensions, shape and tolerances of the product mentioned in item a) (see 5.8);

c) nominal dimensions of the product;

d) any necessary additional indications in cases where the International Standard mentioned in item b) contains alternatives (e.g. different tolerance classes, edge conditions, optional requirements etc.);

e) the designation “steel” and the number of the applicable part of ISO 9328;

f) designation of the steel type required (see table 1 of ISO 9328-2, ISO 9328-3, ISO 9328-4 and ISO 9328-5);

NOTE 5 The designations previously used in ISO 2604-4^[6], ISO/TR 2604-7^[9] and ISO 2604-8^[10] are given in annex B for comparison.

g) in the case of the nickel-alloyed steels of ISO 9328-3, if for special reasons the choice between the heat-treatment conditions given in table 1 of ISO 9328-3 cannot be left to the discretion of the manufacturer, the preferred type of heat treatment (see A.2).

NOTE 6 Where the steels are further fabricated by welding, it may be appropriate to check whether the intended welding conditions are compatible with the heat-treatment conditions intended by the manufacturer.

- h) for the steels of table 3 of ISO 9328-2 and table 4 of ISO 9328-4 and for those steels of table 3 of ISO 9328-5 which are also included in table 4 of ISO 9328-5, the temperature selected from the relevant table for which the elevated temperature proof stress is to be verified (see table 3);
- i) the symbol for the document required (see 6.1 and table 1);
- j) where one or more of the supplementary requirements of annex A shall apply, the appropriate clause number of annex A (e.g. A.7) and eventually any necessary details.

Example: Plates according to ISO 7452 with nominal dimensions 30 mm × 2 500 mm × 6 000 mm and thickness tolerance class A (TCA), manufactured in accordance with ISO 9328-4, of steel type PLH 420 TN, with an inspection certificate of the qualified department of the manufacturer's work (symbol IC, see table 1).

The temperature for the verification of the elevated temperature proof stress shall be 350 °C.

An additional room temperature tensile test, an additional tensile test at 350 °C and three additional transverse Charpy-V-notch impact tests at -20 °C on test pieces from samples subjected to an additional heat treatment of 15 h at 600 °C shall be carried out. (See A.5.)

Designation:

Plate ISO 7452 - 30 × 2 500 × 6 000 - TCA

Steel ISO 9328-4 - PLH 420 TN

Document ISO 404 - IC

Additional agreements:

- a) Temperature for the verification of the elevated temperature proof stress: 350 °C.
- b) Applicable supplementary requirements of A.5 for 15 h at 600 °C.

4.2 The manufacturer shall indicate in his offer the following:

- a) in the case of fine grain steels according to tables 1A or 1B of ISO 9328-4, the chemical composition of his type of alloy (see 5.2.2.1);

- b) in the case of fine grain steels according to table 1B of ISO 9328-4, whether he will supply the steel in the quenched and tempered or in the precipitation-hardened condition (see 1.1, note 3).

5 Requirements

5.1 Manufacturing process

5.1.1 Steelmaking process

The steel shall be produced by one of the basic oxygen processes or by the electric or open hearth process or by a combination of these. The steelmaking process shall be decided by the steel manufacturer unless otherwise agreed.

Other processes may be used by agreement between the interested parties.

5.1.2 Type of deoxidation

All steels shall be fully killed.

5.1.3 Heat treatment condition

The products shall be supplied in the heat-treatment condition indicated in table 1 of ISO 9328-2, ISO 9328-3 and ISO 9328-5 and tables 1A and 1B of ISO 9328-4 for the particular steel type ordered. (See A.2.)

5.1.3.1 For products usually supplied in the normalized condition, in the case of small thicknesses and in special cases, an additional tempering treatment may be necessary for fine grain steel grades with $R_{e,min} \geq 420$ N/mm² to achieve the mechanical properties specified in ISO 9328-4.

5.1.3.2 For the unalloyed steels according to table 1 of ISO 9328-2, for steels 11 MnNi 5 3 and 13 MnNi 6 3 according to table 1 of ISO 9328-3 and for the normalized fine grain steels according to table 1A of ISO 9328-4, the application of controlled temperatures during and after rolling may take the place of normalizing, provided the specified properties are complied with and can also be obtained after a further normalizing treatment.

When hot forming flat products of these steels after delivery, these shall not be heated to more than 1 100 °C, and shall be cooled to a temperature below the transformation temperature, then normalized at the temperature given for guidance in table 1 of ISO 9328-2 and ISO 9328-3 or table 1A of ISO 9328-4.

However, the final normalizing may also be omitted after hot forming, provided that:

a) the hot forming is carried out in one operation at the normalizing temperature;

or

if hot forming is carried out in more than one operation, the product is cooled below the transformation temperature before the last operation and this operation is then carried out at the normalizing temperature;

and

b) the specified properties are complied with and can also be obtained after a further normalizing treatment.

5.1.3.3 In the case of coils, some of the ferritic steels are delivered in the heat-treatment conditions indicated in table 1 of ISO 9328-2 and ISO 9328-3, or table 1A of ISO 9328-4. However, for other ferritic steels the heat treatment is normally done after cutting the coils into sheets.

5.1.3.4 For the quenched and tempered fine grain steels see item b) of 4.2.

5.1.4 Surface treatment (finish)

5.1.4.1 The products shall be supplied without descaling with the exceptions given in 5.1.4.2 and 5.1.4.3.

5.1.4.2 Products of austenitic steels shall be supplied with a pickled surface. (See alternative in table A.1, last line, and in A.3.)

5.1.4.3 When an inspection of the surface by a special method is ordered (see A.11), the surface shall be descaled.

5.1.5 Cast separation

The products shall be delivered separated by casts.

5.2 Chemical composition

5.2.1 For the steels covered in ISO 9328-2, ISO 9328-3 and ISO 9328-5, the following applies.

5.2.1.1 The chemical composition determined by the cast analysis shall be within the limits given in table 1 of ISO 9328-2, ISO 9328-3 and ISO 9328-5. (See A.4.)

Elements not quoted in these tables shall not be intentionally added without the agreement of the purchaser, other than for the purpose of finishing the heat.

5.2.1.2 On samples taken and prepared in accordance with ISO 377-2 the results of a product analysis (see A.6) shall not deviate from the specified limits for the cast analysis by more than the values given in table 2 of ISO 9328-2, ISO 9328-3 and ISO 9328-5.

5.2.2 For the normalized and the quenched and tempered fine grain steels covered in ISO 9328-4 the following applies:

5.2.2.1 The chemical composition of the individual fine grain steel may be different, depending on the type of alloy additions selected by the manufacturer and on the thickness of the product. It shall, however, in each case comply with the requirements for the results of the cast analysis given for the relevant steel type in tables 1A and 1B of ISO 9328-4.

As the chemical composition influences the welding characteristics, the manufacturer shall describe in his offer the type of alloy which he will supply. For this purpose, he shall indicate the limiting values for the cast analysis for the carbon content and the content of the elements listed below if those were added to the steel.

— for steels of table 1A: Al, Cu, N, Nb, Ni, Ti, V;

— for steels of table 1B: Si, Mn, Al, B, Cr, Cu, Mo, N, Nb, Ni, Ti, V, Zr.

5.2.2.2 The results of a product analysis (see A.6), on samples taken and prepared in accordance with ISO 377-2, shall not deviate from the limiting values indicated by the manufacturer for the cast analysis of his type of alloy by more than the values given in table 2 of ISO 9328-4.

5.3 Mechanical properties

5.3.1 The products, when supplied in the heat treatment condition indicated in 5.1.3 and tested in accordance with 6.2.1 or A.7, A.8 or A.9, shall comply with the requirements for the tensile and impact properties given or referred to in table 1 of ISO 9328-2, ISO 9328-3 and ISO 9328-5 and tables 1A and 1B of ISO 9328-4 (see note).

NOTE 7 The impact values specified in table 1 of ISO 9328-2 and ISO 9328-5 and table 3 of ISO 9328-3 and ISO 9328-4 apply to the standard test piece 10 mm x 10 mm. When only the application of subsidiary test pieces is possible, the values shall be proportional to the thickness of the test piece.

5.3.2 Estimates of the average stress rupture properties are given in table 4 of ISO 9328-2 and ISO 9328-5.

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(See A.4.)

5.4 Weldability

The steels covered by Parts 2 to 5 of ISO 9328 are generally regarded as being weldable. However, the general weldability of the steels cannot be guaranteed, as the behaviour of the steel during and after welding is dependent not only on the steel, but also on the welding conditions and the final use for which the steel is employed. Therefore, where appropriate, the welding procedure shall be agreed between the interested parties at the time of enquiry and order.

NOTE 8 A Technical Report giving guidelines for the fabrication and especially for welding of normalized or quenched and tempered fine grain steels is being prepared.

5.5 Physical properties

A Technical Report dealing with the physical properties of steels is being prepared. (See also 5.9.)

5.6 Internal soundness

The steel shall be free from internal defects likely to have an adverse effect. (See A.10.)

5.7 Surface quality

5.7.1 For plates, the requirements for the surface quality and for the repair of surface defects given in ISO 7788 apply.

5.7.2 For strip, the requirements for surface imperfections and for their removal given in ISO 404 apply.

5.8 Dimensions, shape and tolerances

5.8.1 The dimensions and shape of the products shall comply within the agreed tolerances (see 5.8.2) with the requirements of the order.

5.8.2 Requirements for the tolerances on dimensions and shape are covered by ISO 4995, ISO 4996, ISO 7452 and ISO 9444.

The agreements for tolerances at the time of enquiry and order shall, as far as possible, be based on one of these International Standards.

5.9 Calculation of nominal mass

Any calculation of the nominal mass of the products shall be based on the following density values:

- unalloyed and alloyed steels (see ISO 9328-2, ISO 9328-3 and ISO 9328-4): 7,85 kg/dm³
- austenitic stainless CrNi steels (see ISO 9328-5): 7,92 kg/dm³

- austenitic stainless CrNiMo steels (see ISO 9328-5): 7,98 kg/dm³

6 Inspection, testing and conformity of products

6.1 Inspection and testing procedures and types of documents

6.1.1 Table 1 gives a survey of the inspection procedures and the related documents according to ISO 404 which may be agreed upon at the time of enquiry and order for deliveries according to the applicable part of ISO 9328.

6.1.2 An inspection certificate IC shall be supplied, unless otherwise agreed.

6.1.3 The document shall contain the following.

- a) The number of the applicable part of ISO 9328 and the steel designation which shall be regarded as a claim by the manufacturer that the product has been manufactured in accordance with the appropriate requirements of the applicable part of ISO 9328. The accuracy of this claim is solely the manufacturer's responsibility.
- b) All symbols, letters or numbers which in addition to the information given in item a) are necessary to relate the order, the document, the test pieces, test results and products to each other and, if necessary, to the various sampling and testing conditions and deliveries.
- c) The steelmaking method.
- d) The results of the cast analysis for all elements specified for the steel type supplied.

In the case of normalized or quenched and tempered fine grain steels, the elements for which, in accordance with 5.2.2.1, limiting values are given in the offer shall be regarded as specified elements in addition to carbon, phosphorus and sulfur.
- e) The heat treatment with, in the case of tempered or quenched and tempered deliveries or reference test pieces, the heat-treatment temperatures and cooling conditions applied.
- f) The results of all the tests and inspections specified in table 3 and 6.2.2.
- g) The results of all the tests and inspections ordered in supplementary requirements (see annex A).

- h) The statement that the material complies with the requirements of the order.
- i) The identification of the inspector and/or, where appropriate, the inspection authority.

6.2 Specific inspection and testing

6.2.1 Mechanical testing

6.2.1.1 For the selection and preparation of the samples and test pieces the general requirements given in ISO 377-1 apply.

6.2.1.2 The test units and the number and position of samples to be taken are given in table 2. The type, the number, the position and direction of the test pieces to be taken per sample and the test methods to be applied are given in table 3.

6.2.2 Visual and dimensional inspection

Each product shall be inspected visually and appropriate checks shall be made for compliance with the dimensional tolerances. (See A.11.)

6.2.3 Retests

6.2.3.1 Where for one or more test units, one or more tests give unsatisfactory results, and if in such a case no indications for material confusion exist, the manufacturer has the choice between withdrawing the concerned test units (e.g. for retreatment or sorting in accordance with ISO 404) or retaining them. If they are retained, retests are to be carried out according to the following rules.

6.2.3.2 If, as in the case of the tensile tests or product analysis (see A.6), only one test of the concerned type was carried out on the concerned sample and gave the unsatisfactory result, two new tests of the same type shall be carried out.

In cases where the test unit consists of a parent plate or a coil the two new test pieces shall be taken from the sample concerned.

In cases where the test unit consists of a batch (see table 2) one of the two new test pieces shall be taken

from the concerned sample, the other from another item of the concerned batch.

The results of both retests must comply with the requirements. Otherwise the test unit is to be rejected.

6.2.3.3 If, in the case of impact tests, the average value of the three tests to be carried out on test pieces from one sample is lower than the specified value, or if the average value meets the specified requirement but two of the values are lower than the specified value, or if any one value is lower than 70 % of the specified value, three additional test pieces shall be taken from the same sample and tested.

The average value of the six tests shall be not less than the specified value. Not more than two of the individual values may be lower than the specified value and not more than one may be lower than 70 % of this value.

If the requirement is not complied with, the concerned parent plate or coil is to be rejected.

If the sample represented a batch from two further products of the batch, three further impact test pieces each are to be taken and to be tested. If the results of these two additional test series do not in every respect comply with the requirements, the batch is not accepted.


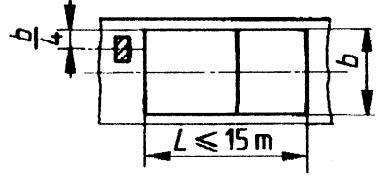
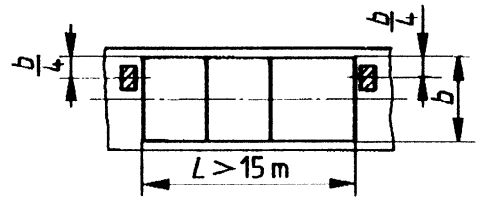
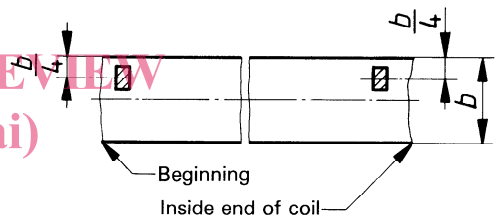
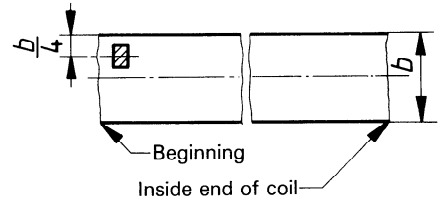
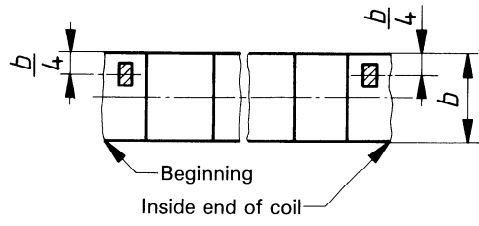
7 Marking

7.1 The products shall be marked legibly to show:

- a) the designation or material number¹⁾ for the type of steel, as given in the tables of parts 2 to 5 of ISO 9328;
- b) the brand mark, symbol or logo of the manufacturer of the products;
- c) symbols, letters or numbers which relate the test certificates, test pieces and products to each other.

7.2 The marking shall be carried out according to the specifications in table 4 unless otherwise agreed at the time of enquiry and order.

1) The material numbers will be inserted later.

Line No.	Product	Further conditions See table 2, line No.	Taking of test samples
			A test sample for making the test pieces listed in table 3 shall be taken from each sample product at points marked  1)
1	Plates (including plates cut from strip)	1a and 1c	
2		1b and 1d	
3		1e	
4		2a (ferritic steels)	
5		2b (austenitic steels)	

1) In relation to the width b the samples may be taken from either side of the centre line of the plate/sheet or strip.

Figure 1 — Position of test samples