

BRITISH STANDARD

**BS EN
10248-1:1996**

Hot rolled sheet piling of non alloy steels —

Part 1: Technical delivery conditions

The European Standard EN 10248-1:1995 has the status of a
British Standard

ICS 77.140.70

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Committees responsible for this British Standard

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National foreword

This British Standard has been prepared by Technical Committee ISE/12 and is the English language version of EN 10248-1:1995 *Hot rolled sheet piling of non alloy steels — Part 1: Technical delivery conditions* published by the European Committee for Standardization (CEN).

Cross-references

Publication referred to	Corresponding British Standard
EN 10002-1	BS EN 10002 <i>Tensile testing of metallic materials</i> Part 1:1990 <i>Method of test at ambient temperature</i>
EN 10020	BS EN 10020:1991 <i>Definition and classification of grades of steel</i>
EN 10021	BS EN 10021:1993 <i>General technical delivery requirements for steel and iron products</i> BS EN 10027 <i>Designation systems for steel</i>
EN 10027-1	Part 1:1992 <i>Steel names, principal symbols</i>
EN 10027-2	Part 2:1992 <i>Steel numbers</i>
EN 10079	BS EN 10079:1993 <i>Definition of steel products</i>
EN 10204	BS EN 10204:1991 <i>Metallic products. Types of inspection documents</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10248-1

June 1995

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Descriptors: Iron and steel products, hot rolled products, sheet pilings, steels, unalloyed steels, chemical composition, grades: quality, classifications, designation, mechanical properties, weldability, surface condition, tests, inspection, marking

English version

Hot rolled sheet piling of non alloy steels —
Part 1: Technical delivery conditions

Palplanches laminées à chaud en aciers non
alliés — Partie 1: Conditions techniques de
livraison

Warmgewalzte Spundbohlen aus unlegierten
Stählen — Teil 1: Technische
Lieferbedingungen

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Foreword

This European Standard was prepared by SC4, Sheet piling, of Technical Committee ECISS/TC10, Structural steels — Qualities, the secretariat of which is held by NNI.

EN 10248 is composed of two parts:

- *Part 1: Technical delivery conditions;*
- *Part 2: Tolerances on shape and dimensions.*

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1995, and conflicting national standards shall be withdrawn at the latest by December 1995.

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1 Scope

This Part of this European Standard specifies the requirements for hot rolled non alloy steel sheet piling in respect of its chemical composition, mechanical properties and conditions of delivery.

The products specified are for general, structural and civil engineering works.

Requirements in respect of tolerances on shape and dimensions are specified in Part 2 of 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 10020, *Definition and classification of grades of steel*.

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

EN 10027-1, *Designation system for steel — Part 1: Steel names, principal symbols*.

EN 10027-2, *Designation system for steel — Part 2: Steel numbers*.

EN 10079, *Definition of steel products*.

EN 10248-2, *Hot rolled sheet piling of non alloy steels — Part 2: Tolerances on shape and dimensions*.

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

ECISS/IC 10, *Designation system for steel — Additional symbols for steel names*.

EU 18, *Selection and preparation of samples and test pieces for steel and iron and steel products*¹⁾.

EU 168, *Iron and steel products — Inspection documents, content*¹⁾.

3 Definitions

For the purpose of this European Standard, the definitions in EN 10020, EN 10021 and EN 10079 shall apply.

NOTE EN 10020 applies with respect to non alloy steel definition with the exception of copper content (see 7.3.2).

4 Information to be supplied by the purchaser

4.1 General

The following information shall be supplied by the purchaser, at the time of the enquiry and order:

- a) details of the product form, length, quantity and any further processing work that is required, e.g. surface treatment;
- b) the designation of the product (in accordance with 6.2);
- c) whether products have to be submitted to inspection and testing and if inspection and testing is required, which type of inspection and which inspection document is required (see 8.1.2).

Where non specific choice is made by the purchaser concerning a) and b) the supplier shall refer back to the purchaser.

NOTE It is recommended that the manufacturer be informed by the purchaser at the time of the order, if the purchaser intends to carry out any surface treatment on the product after delivery.

4.2 Options

A number of options are specified in clause 10. In the event that the purchaser does not indicate a requirement to implement any of these options, the product shall be supplied in accordance with the basic specification.

5 Mass of steel

The calculated mass shall be determined using a conventional volumetric mass of 7,85 kg/dm³.

6 Classification and designation

6.1 Classification

This European Standard specifies six steel grades which are classified as non-alloyed steels according to EN 10020.

6.2 Designation

6.2.1 Steel names²⁾ are assigned to steel grades in Table 1 and Table 2 in accordance with EN 10027-1 and IC 10. Steel numbers are allocated to steel grades in accordance with EN 10027-2.

6.2.2 The products covered by this European Standard shall be designated in the following sequence:

- a) the name of the product, i.e. "Sheet piling";

¹⁾ Until these Euronorms are transformed into European Standards, they may be either implemented as referenced in this European Standard or the corresponding national standards given in Annex B may be implemented in their place.

²⁾ Former national designations (steel names) are listed in Annex C

- b) the number of this European Standard, i.e. EN 10248;
- c) the steel name or number.

EXAMPLE: Sheet piling EN 10248-S320GP or Sheet piling EN 10248-1.0046, indicating a sheet piling product in accordance with EN 10248 made of steel S320GP (steel number 1.0046).

7 Technical requirements

7.1 Steel manufacturing process

7.1.1 The steel manufacturing process shall be at the manufacturer's option. Where specified at the time of the enquiry and order, the steel manufacturing process shall be reported to the purchaser.

Option 1, see **10.2**.

7.1.2 The method of deoxidation shall be at the option of the manufacturer, except that rimming steel shall not be permitted.

7.2 Delivery condition

Unless otherwise agreed, sheet piles shall be delivered in the as rolled condition.

Option 2, see **10.3**.

7.3 Chemical composition

7.3.1 The upper limits applicable for both the ladle and the product analysis shall comply with the values given in Table 1.

7.3.2 Where specified at the time of the enquiry and order, the copper content can be between 0,20 % and 0,35 % or 0,35 % and 0,50 %.

Option 3, see **10.4**.

7.3.3 A maximum carbon equivalent value (CEV) based on the ladle analysis may be agreed at the time of the enquiry and order. The carbon equivalent value shall be determined according to the following formula:

$$CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

Where a carbon equivalent value is agreed the content of the elements in the carbon equivalent formula shall be reported in the inspection document (see **8.8**).

Option 4, see **10.5**.

7.4 Mechanical properties

7.4.1 Under the inspection and testing conditions as specified in clause **8** and in the delivery condition as specified in **7.2**, the mechanical properties shall comply with the relevant requirements of Table 2.

7.4.2 If agreed at the time of the enquiry and order, all steel grades shall be supplied with specified impact properties.

Option 5, see **10.6**.

7.5 Technological properties

7.5.1 Weldability

7.5.1.1 In general, steel sheet pile grades are suitable for arc welding.

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

NOTE 1 With increasing product thickness, increasing strength level and increasing carbon equivalent value the occurrence of cold cracking in the welded zone forms the main risk. Cold cracking is caused by the following factors in combination:

- a) the amount of diffusible hydrogen in the weld metal;
- b) brittle structure of the heat affected zone;
- c) significant tensile stress concentrations in the welded joint.

NOTE 2 When using recommendations in any relevant national standard, the recommended welding conditions and the various welding ranges of the steel grades may be determined depending on the product thickness, the applied welding energy, the design requirements, the electrode efficiency, the welding process and the weld metal properties.

NOTE 3 For high stress welded constructions, steels with appropriate properties may be agreed at the time of the enquiry and order.

Option 4, see **10.5**.

7.5.2 Other requirements

Where specified at the time of the enquiry and order, the suitability and the relevant product quality requirements for hot dip zinc coating may be agreed.

Option 6, see **10.7**.

Where specified at the time of the enquiry and order, the interlock strength may be agreed³⁾

Option 7, see **10.8**.

³⁾ Both the specified value of the interlock strength and the relevant test method shall be agreed

Table 1 — Chemical composition of the ladle and product analysis for hot rolled steel sheet piling^a

Designation EN 10027		Classification EN 10020 ^b	Chemical composition % max ^e											
Steel name	Steel number		C		Mn		Si		P		S		N ^{cd}	
			Ladle	Product	Ladle	Product	Ladle	Product	Ladle	Product	Ladle	Product	Ladle	Product
S240GP	1.0021	BS	0,20	0,25	—	—	—	—	0,045	0,055	0,045	0,055	0,009	0,011
S270GP	1.0023	BS	0,24	0,27	—	—	—	—	0,045	0,055	0,045	0,055	0,009	0,011
S320GP	1.0046	BS	0,24	0,27	1,60	1,70	0,55	0,60	0,045	0,055	0,045	0,055	0,009	0,011
S355GP	1.0083	BS	0,24	0,27	1,60	1,70	0,55	0,60	0,045	0,055	0,045	0,055	0,009	0,011
S390GP	1.0522	QS	0,24	0,27	1,60	1,70	0,55	0,60	0,040	0,050	0,040	0,050	0,009	0,011
S430GP	1.0523	QS	0,24	0,27	1,60	1,70	0,55	0,60	0,040	0,050	0,040	0,050	0,009	0,011
^a see 7.3.														
^b BS (Base steel); QS (Quality steel).														
^c It is permissible to exceed the specified values provided that for each increase of 0,001 % N, the P max content will be reduced by 0,005 %; the N content of the ladle analysis, however, shall not be more than 0,012 %.														
^d The maximum value for nitrogen does not apply if the chemical composition shows a minimum total Al content of 0,020 % or if sufficient other N binding elements are present. The N binding elements shall be mentioned in the inspection document.														
^e If necessary for obtaining certain properties, some additions of V, Nb, Ti . . . can be made at the discretion of the manufacturer.														

Table 2 — Mechanical properties for hot rolled steel sheet piling

Designation EN 10027		Classification EN 10020 ^a	Minimum yield strength ^b R_{eH} N/mm ²	Minimum tensile strength ^b R_m N/mm ²	Minimum elongation on a gauge length of $L_0 = 5,65 \sqrt{S_0}$ A %
Steel name	Steel number				
S240GP	1.0021	BS	240	340	26
S270GP	1.0023	BS	270	410	24
S320GP	1.0046	BS	320	440	23
S355GP	1.0083	BS	355	480	22
S390GP	1.0522	QS	390	490	20
S430GP	1.0523	QS	430	510	19

^a BS (Base steel); QS (Quality steel).

^b The values in the table apply to longitudinal test pieces for the tensile test.

7.6 Surface finish

7.6.1 The material shall be sound and free from any surface flaws which might preclude its use for the purpose for which it is intended.

7.6.2 Repair by grinding and/or welding is permitted, provided that:

- after the elimination of the defect and before welding the thickness shall not be less than 80 % of the nominal thickness;
- the sum of the areas repaired by welding shall not be more than 2 % of the surface area of the sheet pile under inspection;
- the overthickness of the fillet weld shall be ground flush with the surface of the sheet pile;
- the dimensional tolerances specified in EN 10248-2 shall be complied with after repair.

8 Inspection and testing

8.1 General

8.1.1 The products can be supplied with inspection and testing with respect to their compliance with the requirements of this European Standard.

8.1.2 Where inspection and testing is required, the purchaser shall specify at the time of the enquiry and order:

- the type of inspection and testing, i.e. specific or non-specific (see EN 10021),
- the type of the inspection document [see 8.8 and 4.1 c)],

Option 8, see 10.9.

8.1.3 Specific inspection and testing shall be carried out according to 8.2 to 8.8.

8.1.4 Unless otherwise agreed at the time of the enquiry and order, inspection of surface conditions and dimensions shall be carried out by the manufacturer.

Option 9, see 10.10.

8.2 Specific inspection and testing

Where specific inspection and testing is specified [see 8.1.2 a)], a tensile test shall be made (see 8.4). At the time of the enquiry and order, the following supplementary tests may be agreed:

- the impact test (option 5, see 10.6);
- the product analysis, when the products are delivered by cast (option 10, see 10.11).

8.3 Inspection units

The inspection unit shall comprise products of the same section and the same grade as specified in Table 2, produced from the same cast or sequence of casts of the same steel grade and shall have a maximum mass of 125 tonnes.

8.4 Tensile testing

8.4.1 Number of samples

One sample shall be taken from each inspection unit. See 8.3.

8.4.2 Position and preparation of test pieces

Samples shall be taken from the product in accordance with Annex A and test pieces prepared in accordance with EU 18.

8.4.3 Test pieces

Test pieces shall be cut in the longitudinal direction, i.e. parallel to the principal rolling direction, and comply with EN 10002-1.

Proportional test pieces having an initial gauge length $L_0 = 5,65 \sqrt{S_0}$ shall be used, where S_0 is the initial cross sectional area of the test piece.

8.4.4 Test method

The tensile test shall be carried out in accordance with EN 10002-1. Tests shall be carried out in the temperature range 10 °C to 35 °C.

For the specified yield strength in Table 2, the upper yield strength (R_{eH}) shall be determined.

Where a yield phenomenon is not present, the 0,2 % proof strength ($R_{p0,2}$) or the proof strength, 0,5 % total extension ($R_{t0,5}$) shall be determined; in case of dispute the 0,2 % proof strength ($R_{p0,2}$) shall be determined.

8.4.5 Re-testing

Re-testing shall be in accordance with EN 10021.

8.5 Verification of the chemical composition

For the cast analysis, the values given by the producer are applicable.

The product analysis shall be determined, when specified at the time of the enquiry and order. The purchaser shall specify the number of samples and the elements to measure (option 10, see 10.11).

Where required in cases of dispute the determination of the chemical composition of the product shall be in accordance with the relevant European Standards or Euronorms⁴⁾

8.6 Internal defects

Requirements concerning internal defects shall be in accordance with EN 10021.

8.7 Verification of dimensional tolerances

The dimensional tolerances specified in EN 10248-2 shall be verified on one sheet pile per inspection unit.

8.8 Inspection documents

Where specified at the time of the enquiry and order, one of the documents specified in EN 10204 shall be supplied. In these documents, the information A, B and Z and the code numbers C01-C03, C10-C13, C40-C43, and C70-C92 according to EU 168 shall be included, see 4.1 c).

Option 8, see 10.9.

9 Marking

Where agreed at the time of the enquiry and order, a marking will be applied.

Option 11, see 10.12.

This marking shall be located at a position close to one end of each product or on the end cut face, at the manufacturer's discretion. Marking shall be by painting, stencilling, stamping, durable adhesive labels, attached tags or by any other appropriate means.

Products may be supplied in securely tied bundles. In this case, the marking shall be on a label securely attached to the bundle or fixed to the top product of the bundle.

10 Options

10.1 Options are available to the purchaser which shall be specified as required at the time of the enquiry and order (see 4.2).

10.2 Option 1

Where the manufacturing process for the steel shall be indicated (see 7.1.1).

10.3 Option 2

Where an alternative delivery condition to as rolled is required (see 7.2).

10.4 Option 3

Where a copper content between 0,20 % to 0,35 % or 0,35 % to 0,50 % is required (see 7.3.2).

10.5 Option 4

Where a maximum carbon equivalent value is required (see 7.3.3).

10.6 Option 5

Where specific impact properties are required and verified by a test (see 7.4.2 and 8.2).

10.7 Option 6

Where the material is suitable for hot dip zinc coatings (see 7.5.2).

10.8 Option 7

Where an interlock strength is required (see 7.5.2).

10.9 Option 8

Where products have to be submitted to inspection and testing and if inspection and testing is required, which type and which inspection document is required [see 4.1 c), 8.1.2 and 8.8].

10.10 Option 9

Where the purchaser wishes to carry out inspection at the manufacturer's works (see 8.1.4).

10.11 Option 10

Where the product analysis is to be carried out, and in this case, the number of samples to take and the elements to measure (see 8.2 and 8.5).

10.12 Option 11

Where a marking is applied (see clause 9).

⁴⁾ Until these Euronorms are transformed into European Standards, they may be either implemented as referenced in this European Standard or the corresponding national standards may be implemented in their place

Annex A (normative)

Location of samples

Figure A.1 shows the possible location in the product sample of the samples used for the preparation of test pieces (see 8.4.3) for:

- a) U-sheet piling;
- b) Z-sheet piling;
- c) flat sheet piling.

For interlocking H-sheet piling, the location of test pieces shall be in accordance with EU 18.

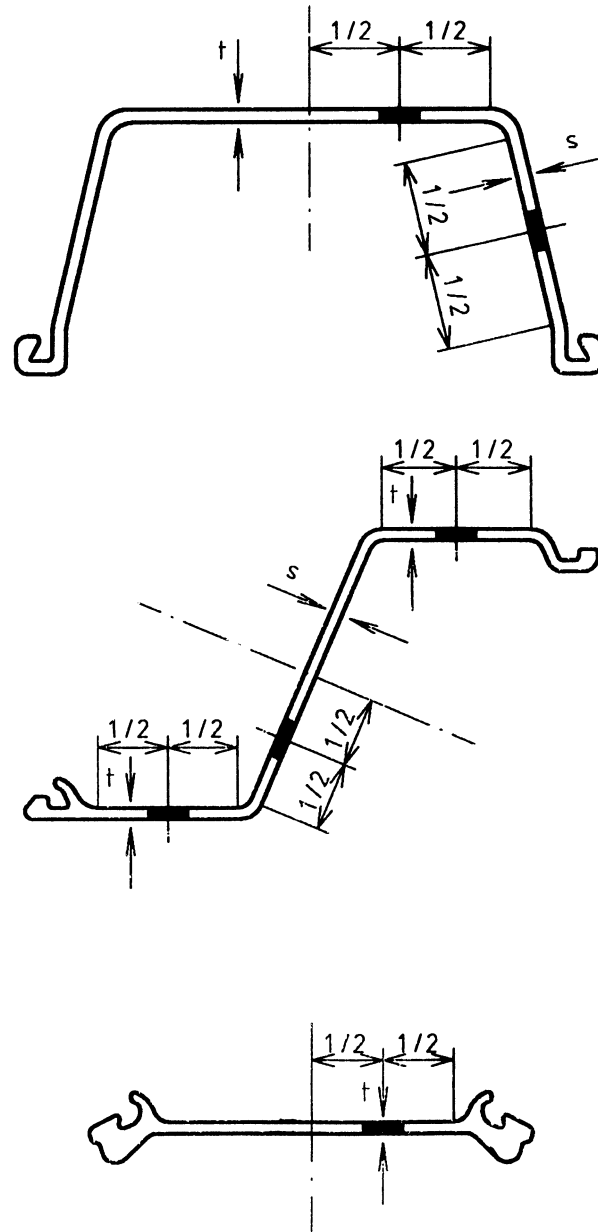
When several solutions are possible, the sample with the greater thickness is chosen.

Annex B (informative)

List of national standards which correspond to referenced Euronorms

Table B.1 lists those national standards which correspond with Euronorms which are referred to in this European Standard.

Until these Euronorms are transformed into European Standards they may be either implemented or referenced in this European Standard or the corresponding national standards which are listed may be implemented in their place.



■ Possible location of sample

Figure A.1

Table B.1 — Euronorms with corresponding national standards

Euronorm	Corresponding national standard in									
	Germany	France	United Kingdom	Spain	Italy	Belgium	Portugal	Sweden	Austria	Norway
18	—	NF A 03-111	BS 4360	UNE 36-300 UNE 36-400	UNI EU 18	NBNA03-001	NP 2451	SS 11 01 20 SS 11 01 05	—	NS 10 005
168	—	—	BS 4360	UNE 36-800	UNI EU 168	—	—	SS 11 00 12	—	—

Annex C (informative)

List of corresponding former national designations

Table C.1 lists those former national designations which are replaced by steel names in accordance with EN 10027-1 in Table 1 and Table 2 of this European Standard.

Table C.1 — List of corresponding former national designations

Designation		Germany	France	United Kingdom	Belgium
Steel name	Steel number				
S240GP	1.0021	StSp 37	E240SP	40 A	PAE250
S270GP	1.0023	StSp 45	E270SP	43 A	PAE270
S320GP	1.0046	—	E320SP	—	PAE320
S355GP	1.0083	StSp S	E360SP	50 A	PAE360
S390GP	1.0522	—	E390SP	—	PAE390
S430GP	1.0523	—	E430SP	—	PAE420

List of references

See national foreword.

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