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Vročje valjana jeklena obešala - 1. del: Tehnični dobavni pogoji

Hot-rolled steel sheet piles - Part 1: Technical delivery conditions

Warmgewalzte Spundbohlen aus Stahl - Teil 1: Technische Lieferbedingungen

Palplanches en acier laminées à chaud - Partie 1 - Conditions techniques de livraison

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Hot-rolled steel sheet piles - Part 1: Technical delivery conditions

Palplanches en acier laminées à chaud - Partie 1 -
Conditions techniques de livraison

Warmgewalzte Spundbohlen aus Stählen - Teil 1:
Technische Lieferbedingungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 459/SC 3.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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prEN 10248-1:2022 (E)**European foreword**

This document (prEN 10248-1:2022) has been prepared by Technical Committee CEN/TC 459 "ECISS – European Committee for Iron and Steel Standardization"¹, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 10248-1:1995.

In comparison with the previous edition, the following technical modifications have been made:

- a) Restructuring of the standard;
- b) Updating of the normative references;
- c) Introduction of grades S460 and S500 in quality GP;
- d) Modification concerning the maximum values for the chemical composition;
- e) Addition of 7.4.3 dedicated for hot-dip zinc-coating and 7.8 for load bearing capacity;
- f) New wording for Clauses 8, 9 and 10 for inspection and testing;
- g) Addition of Clause 12 on the complaints;
- h) Removal of the former Annexes B and C on Euronorms and equivalent designations;
- i) Addition of the Annexes B, C, D and E.

EN 10248 consists of the following parts, under the general title *Hot rolled steel sheet piles*:

— *Part 1: Technical delivery conditions*

— *Part 2: Tolerances on shape and dimensions* <https://standards.iteh.ai/catalog/standards/sist/2ec481cb-b6db-45ba-ac8a-4051c4285dda/sist-en-10248-1-2023>

A further standard prEN 10375 with the title *Hot-rolled steel sheet piles – General (Characteristics, evaluation of conformity and marking)* is in preparation and can be used together with EN 10248 after publication.

¹ Through its sub-committee SC 3 "Structural steels other than reinforcements" (secretariat: DIN).

1 Scope

This document specifies the requirements for hot rolled steel sheet piles in respect of its chemical composition, mechanical properties and conditions of delivery.

The products specified are for general, structural and civil engineering works. The types of steel sheet piles covered by this document are: Z-shaped, U-shaped, straight web, H-shaped with their interlocking bars. The types of interlocks and the requirements in respect of tolerances on shape and dimensions are specified in Part 2 of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1011-2, *Welding - Recommendations for welding of metallic materials - Part 2: Arc welding of ferritic steels*

EN 1990:2002, *Eurocode: Basis of structural design*

EN 1993-5:2007, *Eurocode 3 - Design of steel structures - Part 5: Piling*

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

EN 10021:2006, *General technical delivery conditions for steel products*

EN 10027-1, *Designation systems for steels - Part 1: Steel names*

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

EN 10079:2007, *Definition of steel products*

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

EN 10204, *Metallic products - Types of inspection documents*

EN 10248-2:1995, *Hot rolled sheet piling of non alloy steels - Part 2: Tolerances on shape and dimensions*

CEN/TR 10261, *Iron and steel - European standards for the determination of chemical composition*

EN ISO 148-1, *Metallic materials - Charpy pendulum impact test - Part 1: Test method (ISO 148-1)*

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

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461)*

EN ISO 6892-1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1)*

EN ISO 14284, *Steel and iron - Sampling and preparation of samples for the determination of chemical composition (ISO 14284)*

EN ISO 14713-2:2020, *Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures - Part 2: Hot dip galvanizing (ISO 14713-2:2019)*

prEN 10248-1:2022 (E)**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10021:2006 and EN 10079:2007 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

4 Classification and designation**4.1 Classification****4.1.1 Main quality classes**

The steel grades specified in this document shall be classified as non-alloy quality steels according to EN 10020.

4.1.2 Grades and qualities

This document specifies eight steel grades S240, S270, S320, S355, S390, S430, S460 and S500 on the basis of the minimum specified yield strength at room temperature.

The eight steel grades are supplied in quality GP.

4.2 Designation

4.2.1 For the steel grades covered by this document in Table 1 the steel names shall be allocated in accordance with EN 10027-1; the steel numbers shall be allocated in accordance with EN 10027-2.

4.2.2 The designation of the steel grade shall consist of:

- the number of this document (EN 10248-1);
- the steel name or the steel number.

EXAMPLE Steel sheet piles in accordance with EN 10248-1 made of structural steels (S) with a specified minimum yield strength at room temperature of 430 MPa, followed by GP for steel sheet piles:

EN 10248-1 – S430GP

or

EN 10248-1 – 1.0523

5 Information to be supplied by the purchaser**5.1 Mandatory information**

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

- a) quantity to be delivered;
- b) product name (including all necessary information);
- c) the name of the standard for tolerances on dimensions and shape (see 7.7);
- d) length and delivery form;

- e) steel designation (see 4.2.2);
- f) additional requirements of inspection and testing and all required options (see 5.2 and Clause 13);
- g) type of inspection document according to EN 10204 (see 8.1).

5.2 Options

A number of options are specified in Clause 13. In the event that the purchaser does not indicate his wish to implement any of these options, the supplier shall supply in accordance with the basic specification, see 5.1 a) to e) and g).

6 Manufacturing process

6.1 Steel making process

The steel making process is at the discretion of the manufacturer with the exclusion of the open hearth (Siemens-Martin) process.

See **Option 1**, Clause 13, (Details of manufacturing process).

6.2 Delivery conditions

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

See **Option 2**, Clause 13, (Delivery conditions).

7 Requirements

7.1 General

The requirements in 7.2 and 7.3 apply for sampling, preparation of test pieces and testing specified in Clauses 9 and 10.

7.2 Chemical composition

7.2.1 The chemical composition determined by heat analysis shall comply with the specified values of Table 1.

For elements not defined in tables for the chemical composition for heat analysis, limit values of Table 1 of EN 10020:2000 shall apply as maximum values.

7.2.2 The upper limits applicable for the product analysis are given in Table 2.

For elements not defined in tables for the chemical composition for product analysis, limit values of Table 1 of EN 10020:2000 shall apply as maximum values.

7.2.3 The maximum carbon equivalent values for the grades based on the heat analysis given in Table 1 shall apply.

The maximum carbon equivalent values for the grades based on the product analysis given in Table 2 shall apply.

For determining the carbon equivalent value the following IIW (International Institute of Welding) formula shall be used:

$$CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15} \quad (1)$$

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NOTE 1 General requirements for the welding of steel sheet pile grades are given in EN 1011-2.

NOTE 2 Steels specified in this document 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.

7.2.4 For all steel grades a copper-content between 0,25 % and 0,35 %, or between 0,35 % and 0,50 % (on mass) on the heat analysis can be agreed upon at the time of enquiry and order. In this case, the maximum carbon equivalent value of Table 1 shall be increased by 0,02.

See **Option 3**, Clause 13, (Cu alloyed).

7.3 Mechanical properties**7.3.1 General**

Under the inspection and testing conditions as specified in Clauses 8, 9 and 10, the mechanical properties shall comply with the values given in Table 3.

7.3.2 Impact properties

The impact properties shall be verified by test at the temperature given in Table 3, unless otherwise agreed upon at the time of the order.

Using test pieces of width less than 10 mm, the minimum values given in Table 3 shall be reduced in direct proportion to the cross-sectional area of the test piece.

See **Option 4**, Clause 13, (Verification of impact properties).

7.4 Technological properties**7.4.1 Weldability**

General requirements for arc welding of the steels shall be as given in EN 1011-2. In general, steel sheet pile grades are suitable for arc welding.

NOTE With increasing product thickness and strength level, cold cracking can occur. Cold cracking is caused by the following factors in combination:

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

7.4.2 Flame straightening

Recommendations regarding flame straightening are laid down in CEN/TR 10347.

7.4.3 Hot-dip zinc-coating

EN ISO 1461 should be used to specify coating requirements. EN ISO 14713-2 provides further guidance, including information on the influence of various factors, including steel chemical composition, on the coating formation.

Option 5, Clause 13, can be used to order steels with a chemical composition required for hot-dip zinc coating. When Option 5 is implemented, the purchaser and manufacturer shall agree to a steel composition (heat analysis) of silicon and phosphorous according to either:

Category A (see also EN ISO 14713-2:2020, Table 1, Note 1); or

Category B; or

Category D (limited to $0,25 \% < Si \leq 0,35 \%$)

with required values as cited by the ranges given in EN ISO 14713-2:2020, Table 1, column 2.

NOTE EN ISO 14713-2:2020, Table 1, gives guidance on typical coating characteristics associated with certain steel compositions on the basis of the surface composition of silicon and phosphorous.

The maximum carbon equivalent shall be increased by 0,02 or by 0,01.

In some cases steels above S 460 may be sensitive to cracking during galvanizing and therefore special care should be taken.

See **Option 5**, Clause 13, (Chemical composition for hot dip zinc coating).

7.5 Surface properties

EN 10163-1 and EN 10163-3 shall apply for the permissible surface discontinuities and for the repair of surface defects by grinding and/or welding. Class C, subclass 1 of EN 10163-3 shall apply, unless otherwise agreed upon at the time of the order.

The surface requirements and repair conditions of sheet piles shall apply to all surfaces excluding interlocks and radii at the connection between web and flange.

See **Option 6**, Clause 13, (Other surface class).

7.6 Internal soundness

The internal soundness shall be in accordance with EN 10021.

7.7 Dimensions, tolerances on dimensions and shape, mass

Dimensions, tolerances on dimensions and shape shall be in accordance with the requirements given in the standard EN 10248-2.

The nominal mass shall be determined from the nominal dimensions using a volumetric mass of $7\,850 \text{ kg/m}^3$.

7.8 Load bearing capacity

7.8.1 General

The design of steel sheet pile structures requires determination of the actions on the structure, for example the earth pressure, the water pressure, the surface surcharge, etc., and the appropriate resistances. The actions will give rise to effects all over the structure, for instance internal forces and moments, stresses, strains and displacements. Additional local effects will also be produced for instance at points of load applications. The resistances of the sheet piles to the effects of the loads shall be determined according to the calculation methods defined in EN 1993-5, if applicable. For applicability, reference can be made to Report EUR 20034 EN (Development of unified design rules for steel sheet piles for introduction into EN 1993-5). If a calculation method for a specific resistance is not applicable, the resistance shall be determined by direct testing in accordance with EN 1993-5.

In general, the section resistance can be expressed as the product of the material strength for the chosen steel grade and a specified geometrical section property dependant on the nominal dimensions of the section. The rules for calculating the section properties from the nominal dimensions shall be in accordance with normative Annex B.