



# SLOVENSKI STANDARD SIST EN 10248-1:2023

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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

Ta slovenski standard je istoveten z: **EN 10248-1:2023**

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77.140.70	Jekleni profili	Steel profiles

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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 Stahl - Teil 1:  
Technische Lieferbedingungen

This European Standard was approved by CEN on 17 January 2023.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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**EN 10248-1:2023 (E)****European foreword**

This document (EN 10248-1:2023) has been prepared by Technical Committee CEN/TC 459/SC 3 “Structural steels other than reinforcements”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by September 2023, and conflicting national standards shall be withdrawn at the latest by September 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 10248-1:1995.

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

- a) Document was restructured;
- b) Normative references were updated;
- c) Grades S460 and S500 in quality GP were introduced;
- 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*

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.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

## 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,<sup>1</sup> *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, *Hot-rolled steel sheet piles - 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 2566-1, *Steel - Conversion of elongation values - Part 1: Carbon and low-alloy steels (ISO 2566-1:2021, Corrected version 2022-06)*

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)*

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<sup>1</sup> As impacted by EN 1990:2002/A1:2005.

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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)*

### 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 specified 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 specified 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:

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

**7.2.4** For all steel grades a copper-content between 0,20 % and 0,35 %, or between 0,35 % and 0,50 % on the heat analysis (for different corrosion protection levels) can be agreed upon at the time of enquiry and order. In both cases, the maximum carbon equivalent value of Table 1 shall be increased by 0,02.

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

**7.2.5** When products of grades S270 to S355 are supplied with a control on Si, e. g. for hot-dip zinc-coating, so that there could be a need to increase the content of other elements like C and Mn to achieve the required tensile properties, the maximum carbon equivalent values of Table 1 may be increased as follows:

— for Si ≤ 0,04 %, increase the value of the CEV by 0,02;

— for Si ≤ 0,25 %, increase the value of the CEV by 0,01.

**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 energy).

**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 1** 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.

**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.

**7.4.2 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  $0,25 \% < \text{Si} \leq 0,35 \%$ )

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 (see 7.2.5).

In some cases, steels above S460 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  $7\,850 \text{ kg/m}^3$ .

**EN 10248-1:2023 (E)****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 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.

**7.8.2 Interlock resistance of straight web sheet piles**

The interlock resistance of straight web sheet piles shall be agreed at the time of enquiry and order, and shall be tested according to the conditions as specified in 9.2.4.

**7.8.3 Resistance of crimped points of U-shaped sheet piles**

Crimped points can be used to enhance the shear force transmission in the interlocks of U-shaped sheet piles.

If crimped points are used to enhance the shear force transmission in the interlocks of U-shaped sheet piles, the resistance shall be agreed at the time of enquiry and order, and shall be tested according to the testing procedure specified in 9.2.5.

If agreed at the time of enquiry and order, the manufacturer can replace the crimping of interlocks by intermittent welding of interlocks that achieves the same shear force transmission.

**EXAMPLE** Triple U-shaped sheet piles delivered with one common interlock crimped and one common interlock partially welded.

See **Option 7**, Clause 13, (Welding of common interlocks).

**7.8.4 Interlock performance criteria**

The interlock performance criteria shall comply with the requirements of 9.2.6.

**8 Inspection****8.1 Type of inspection and inspection document**

The products shall be delivered either with specific or non-specific inspection and testing to indicate compliance with the order and this document. The manufacturer shall obtain from the purchaser the information which inspection document according to EN 10204 is required, otherwise a test report 2.2 will be issued.

In the case of specific inspection, testing shall be carried out according to the requirements of 8.3, Clauses 9 and 10.