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Hladno oblikovana jeklena obešala - 1. del: Tehnični dobavni pogoji

Cold formed steel sheet piles - Part 1: Technical delivery conditions

Kaltgeformte Spundbohlen aus Stahl - Teil 1: Technische Lieferbedingungen

Palplanches profilées à froid en acier - Partie 1 : Conditions techniques de livraison

Ta slovenski standard je istoveten z: **prEN 10249-1**

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Cold formed steel sheet piles - Part 1: Technical delivery conditions

Palplanches profilées à froid en acier - Partie 1 : Conditions techniques de livraison

Kaltgeformte Spundbohlen aus Stahl - 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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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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European foreword

This document (prEN 10249-1:2022) 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 10249-1:1995.

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) New definitions 3.1 and 3.3;

d) Specification of grades from EN 10149-2 (S355MC, S420MC) and EN 10149-3 (S355NC, S420NC) suitable for cold forming;

e) Modification concerning the maximum values for the chemical composition;

f) Addition of 7.4.2 for formability and flame straightening, 7.4.3 dedicated for hot-dip zinc-coating and 7.8 for load bearing capacity;

g) New wording for Clauses 8, 9 and 10 for inspection and testing;

h) Addition of Clause 12 on the complaints;

i) Removal of the former Annexes A and B on Euronorms and equivalent designations;

j) Addition of the Annexes A, B and C.

EN 10249 consists of the following parts, under the general title *Cold formed steel sheet piles*:

— *Part 1: Technical delivery conditions*

— *Part 2: Tolerances on dimensions and shape*

A further standard prEN 10376 with the title *Cold formed steel sheet piles – General (Characteristics, evaluation of conformity and marking)* is in preparation and can be used together with EN 10249 after publication.

[1] Through its sub-committee SC 5 “Steels for heat treatment, alloy steels, free-cutting steels and stainless steels” (secretariat: DIN).

1 Scope

This document specifies the requirements for cold formed steel sheet piles produced from hot rolled strip or sheet with a thickness equal to or greater than 3 mm 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, Omega-shaped and trench sheets. 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 1993-5, *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 10025-2, *Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels*

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 10149-2, *Hot rolled flat products made of high yield strength steels for cold forming - Part 2: Technical delivery conditions for thermomechanically rolled steels*

EN 10149-3, *Hot rolled flat products made of high yield strength steels for cold forming - Part 3: Technical delivery conditions for normalized or normalized rolled steels*

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

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

EN 10249-2, *Cold formed 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*

CEN/TR 10347, *Guidance for forming of structural steels in processing*

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

3 Terms and definitions

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

3.1
product range
group of products produced by one manufacturer for which the test results for one or more characteristics from any one product within the range are valid for all other products within this range

3.2
cold-formed steel sheet pile
product made by cold forming on a rolling machine or on a brake press; the form of the product is such that when threading their interlocks, they constitute a continuous sheet pile structure

3.3
trench steel sheet pile
product made by cold forming on a rolling machine or on a brake press, without interlocks; the form of the product is such that when overlapping the profiles ends, they constitute a sheet pile structure

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 seven steel grades suitable for cold forming according to the following standards:

— EN 10025-2 – S235JRC, S275JRC, S355J0C;

— EN 10149-2 – S355MC, S420MC;

— EN 10149-3 – S355NC, S420NC.

4.2 Designation

4.2.1 For the steel grades covered by this document in Table C.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, i.e. EN 10249-1;

— the steel name or the steel number.

EXAMPLE Steel sheet piles in accordance with EN 10249-1 made of structural steels (S) with a specified minimum yield strength at room temperature of 235 MPa:

EN 10249-1 – S235JRC

or

EN 10249-1 – 1.0122

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 is 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 cold formed 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 EN 10025-2, EN 10149-2 and EN 10149-3. The grades and the chemical composition of the steels of EN 10025-2, EN 10149-2 and EN 10149-3 are listed for information in Table C.1 of Annex C.

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 the corresponding tables of EN 10025-2, EN 10149-2 and EN 10149-3. The upper limits applicable for the product analysis of grades of EN 10025-2, EN 10149-2 and EN 10149-3 are listed for information in Table C.2 of Annex C.

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 C.1 shall apply.

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

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

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.

7.3 Mechanical properties

7.3.1 Yield Strength – Tensile Strength – Elongation

Under the testing conditions as specified in Clauses 8, 9 and 10, the yield strength, the tensile strength and the elongation at fracture shall comply with the relevant requirements of Table 1 and in conformity with EN 10025-2, EN 10149-2 or EN 10149-3.

7.3.2 Impact energy

Under the testing conditions as specified in Clauses 8, 9 and 10, the impact energy shall comply with the relevant requirements of Table 1.

Using test pieces of width less than 10 mm, the minimum values given in Table 1 shall be reduced in direct proportion to the cross-sectional area of the test piece.

See ***Option 3***, 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 Formability and flame straightening

7.4.2.1 General

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

7.4.2.2 Roll forming

Hot rolled coils with a nominal thickness ≤ 8 mm shall be suitable for the production of sheet piles by cold rolling. Steels according to EN 10025-2 are suitable for bend radii given in Table 12 of EN 10025-2:2019, the grades and qualities to which this applies are given in Table 9 of EN 10025-2:2019.

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 4, 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 ≤ 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 ***Option 4***, Clause 13, (Chemical composition for hot dip zinc coating).

7.5 Surface condition

EN 10163-1 and EN 10163-2 shall apply for the permissible surface discontinuities and for the repair of surface defects by grinding and/or welding. Class A, subclass 1 of EN 10163-2 shall apply, unless otherwise agreed upon at the time of the order.

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

Cutting burrs which may exist at the ends of the sheet piling are acceptable provided that they do not impair the fitness of the profiles to be interlocked and their use.

See ***Option 5***, 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 10249-2.

The nominal mass shall be determined from the nominal dimensions using a volumetric mass of 7 850 kg/m^3.

7.8 Load bearing capacity

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.

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.

8.2 Content of inspection document

The inspection document shall include, in accordance with EN 10168, the following codes and/or information, where applicable: