
Hladno oblikovani varjeni votli konstrukcijski profili iz jekla - 2. del: Mere, mejni odstopki in značilnosti profilov

Cold formed welded steel structural hollow sections - Part 2: Tolerances, dimensions and sectional properties

Kaltgefertigte geschweißte Hohlprofile für den Stahlbau aus unlegierten Baustählen und aus Feinkornbaustählen - Teil 2: Grenzabmaße, Maße und statische Werte

Profils creux de construction soudés, formés à froid en aciers non alliés et à grains fins - Partie 2 : Tolérances, dimensions et caractéristiques de profil

Ta slovenski standard je istoveten z: prEN 10219-2

<https://standards.iteh.ai/catalog/standards/sist/05aed010-3419-4b34-a9b9-fba7fc5467c6/sist-en-10219-2-2019>

ICS:

77.140.45	Nelegirana jekla	Non-alloyed steels
77.140.70	Jekleni profili	Steel profiles

oSIST prEN 10219-2:2018**en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 10219-2

August 2018

ICS 77.140.75

Will supersede EN 10219-2:2006

English Version

**Cold formed welded steel structural hollow sections - Part
2: Tolerances, dimensions and sectional properties**

Profils creux de construction soudés, formés à froid en
aciers - Partie 2 : Tolérances, dimensions et
caractéristiques du profil

Kaltgeformte geschweißte Hohlprofile für den Stahlbau
- Teil 2: Grenzabmaße, Maße und statische Werte

This draft European Standard is submitted to CEN members for second enquiry. It has been drawn up by the Technical Committee ECISS/TC 103.

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
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European foreword

This document (prEN 10219-2:2018) has been prepared by Technical Committee ECISS/TC 103 “Structural steels other than reinforcements”, the secretariat of which is held by DIN.

This document is currently submitted to the second CEN Enquiry.

This document will supersede EN 10219-2:2006.

This standard consists of the following parts:

- EN 103xx, *Steel structural hollow sections – General (Characteristics, evaluation of conformity and marking) – in preparation*
- EN 10219-1, *Cold formed welded steel structural hollow sections - Part 1: Technical delivery conditions*
- EN 10219-2, *Cold formed welded steel structural hollow sections - Part 2: Tolerances, dimensions and sectional properties*

It forms part of a series of standards on hollow sections together with EN 10210-1 and EN 10210-2.

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1 Scope

This document specifies tolerances for cold formed welded circular, square, rectangular and elliptical structural hollow sections, manufactured in wall thicknesses up to 40 mm, in the following size ranges:

- circular: Outside diameters up to 2 500 mm;
- square: Outside dimensions up to 500 mm × 500 mm;
- rectangular: Outside dimensions up to 500 mm × 300 mm;
- elliptical: Outside dimensions up to 480 mm × 240 mm.

The formulae for calculating sectional properties of sections manufactured to the dimensional tolerances of this standard, to be used for the purposes of structural design, are given in Annex A.

Dimensions and sectional properties for a limited range of more common sizes are given in Annex B.

NOTE The designation of the sections' major axis (yy) and its minor axis (zz) align with the axis designation used for structural design in the structural Eurocodes.

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 10219-1, *Cold formed welded structural hollow sections of non-alloy and fine grain steels — Part 1: Technical delivery conditions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10219-1 apply.

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

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

4 Symbols

For the purposes of this document, the symbols defined in Table 1 apply.

Table 1 — Symbols and definitions

Symbol	Unit	Definition
A	cm ²	Cross-sectional area
A_m	mm ²	Area of the surface delimited by the perimeter at mid-thickness
A_s	m ² /m	Superficial area per metre length
B	mm	Specified side dimension of a square hollow section. Specified dimension of the shorter side of a rectangular hollow section. Specified outside dimension of an elliptical section on its minor axis
C_1/C_2	mm	Length of corner region of a square or rectangular hollow section

Symbol	Unit	Definition
C_t	cm ³	Torsional modulus constant
D	mm	Specified outside diameter of a circular hollow section
D_{\max}/D_{\min}	mm	The maximum and minimum outside diameter of a circular hollow section measured in the same plane
e	mm	Deviation from straightness
H	mm	Specified dimension of the longer side of a rectangular hollow section. Specified outside dimension of an elliptical section on its major axis
I	cm ⁴	Second moment of area
I_t	cm ⁴	Torsional inertia constant (polar moment of inertia in the case of circular hollow sections only)
i	cm	Radius of gyration
L	mm	Length
M	kg/m	Mass per unit length
O	%	Out-of-roundness
P	mm	External perimeter of an elliptical hollow section
R	mm	External corner radius of a square or rectangular hollow section
T	mm	Specified thickness
U	mm	Perimeter of an elliptical hollow section at mid-thickness
V	mm	Total measured twist
V_1	mm	Twist measured at one end of a section
W_{el}	cm ³	Elastic section modulus
W_{pl}	cm ³	Plastic section modulus
x_1	mm	Concavity of a side of a square or rectangular hollow section
x_2	mm	Convexity of a side of a square or rectangular hollow section
yy	—	Axis of cross-section, major axis of a rectangular hollow section
zz	—	Axis of cross-section, minor axis of a rectangular hollow section
θ	°	Angle between adjacent sides of a square or rectangular hollow section

5 Information to be obtained by the manufacturer

5.1 Mandatory information

The following mandatory information from this part of EN 10219 shall be obtained by the manufacturer at the time of enquiry and order:

- the dimensions (see Clause 8);
- the type of length, length range or length (see Table 4);

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NOTE This information is included in the list of information to be obtained by the manufacturer contained in EN 10219-1:2006, Clause 5.

5.2 Options

An option is specified in this part of EN 10219. In the event that the purchaser does not indicate a wish to implement one of these options at the time of enquiry and order, the manufacturer shall supply in accordance with the basic specification.

Option 2.1 Out-of-roundness tolerances for diameter to thickness ratio exceeding 100 (see Table 2, footnote a).

6 Tolerances

6.1 Tolerances shall not exceed the values given in Table 2 for shape and mass, Table 3 for external corner profiles, Table 4 for manufacturer's delivered length and Table 5 for the height of the internal and external weld bead of submerged arc welded hollow sections.

6.2 The internal corners of square and rectangular hollow sections shall be rounded.

NOTE The internal corner profile is not specified.

Table 2 — Tolerances on shape, straightness and mass

Characteristic	Circular hollow sections	Square and rectangular hollow sections		Elliptical hollow section
		Side length mm	Tolerance	
Outside dimensions (D , B and H)	$\pm 1\%$ with a minimum of $\pm 0,5$ mm and a maximum of ± 10 mm	$H, B < 100$ $100 \leq H, B \leq 200$ $H, B > 200$	$\pm 1\%$ with a minimum of $\pm 0,5$ mm $\pm 0,8\%$ $\pm 0,6\%$	$\pm 1\%$ with a minimum of $\pm 0,5$ mm
Thickness (T)	For $D \leq 406,4$ mm: $T \leq 5$ mm $\pm 10\%$ $T > 5$ mm $\pm 0,5$ mm For $D > 406,4$ mm: $\pm 10\%$ with a maximum of ± 2 mm	$T \leq 5$ mm $\pm 10\%$ $T > 5$ mm $\pm 0,5$ mm		$T \leq 5$ mm $\pm 10\%$ $T > 5$ mm $\pm 0,5$ mm
Out-of-roundness (O)	2 % for hollow sections having a diameter to thickness ratio not exceeding 100 ^a	—		—
Concavity/convexity (x_1 , x_2) ^b	—	Max. 0,8 % with a minimum of 0,5 mm		—

Characteristic	Circular hollow sections	Square and rectangular hollow sections		Elliptical hollow section
		Side length mm	Tolerance	
Squareness of side (θ)	—	$90^{\circ} \pm 1^{\circ}$		—
External corner profile (C_1 , C_2 or R)	—	See Table 3		—
Twist (V)	—	2 mm plus 0,5 mm/m length		—
Straightness (e)	0,20 % of total length and 3 mm over any 1 m length	0,15 % of total length and 3 mm over any 1 m length		0,20 % of total length and 3 mm over any 1 m length
Mass per unit length (M)	± 6 % on individual delivered lengths			
<div><div>a</div><div>When the diameter to thickness ratio exceeds 100, application of tolerance on out-of-roundness is not required, unless specifically agreed (see 5.2).</div></div> <div><div>b</div><div>The tolerance on convexity and concavity is independent of the tolerance on outside dimensions.</div></div>				

Table 3 — Tolerances on external corner profiles

Dimensions in millimetres

Thickness T	External corner profile C_1 , C_2 or R^a
$T \leq 6$	$1,6T$ to $2,4T$
$6 < T \leq 10$	$2,0T$ to $3,0T$
$10 < T$	$2,4T$ to $3,6T$
^a The sides need not be tangential to the corner arcs.	

Table 4 — Tolerances on manufacturer's delivered length

Dimensions in millimetres

Type of length ^a	Range of length or length L	Tolerance
Random length	$4\,000 < L \leq 16\,000$ with a range of 2 000 per order item	10 % of sections supplied may be below the minimum for the ordered range but not shorter than 75 % of the minimum range length
Approximate length	$\geq 4\,000$	$+50_0$ mm
Exact length ^b	$< 6\,000$	$+10_0$ mm
	$6\,000 \leq L \leq 10\,000$	$+15_0$ mm
	$> 10\,000$	$+5_0$ mm +1 mm/m
^a The manufacturer shall establish at the time of enquiry and order the type of length required and the length range or length. ^b Common lengths available are 6 m and 12 m.		

Table 5 — Tolerance on height of internal and external weld seam for submerged arc welded hollow sections

Dimensions in millimetres

Thickness, T	Maximum weld bead height
$\leq 14,2$	3,5
$> 14,2$	4,8

7 Measurement of size and shape

7.1 General

All external dimensions, including out-of-roundness, shall be measured at a distance from the end of the hollow section of not less than D for circular sections, B for square sections or H for rectangular and elliptical sections, with a minimum of 100 mm.

All dimensional and shape tolerances indicated in Tables 2, 3 and 5 shall be verified according to a procedure fixed by the manufacturer.

7.2 Outside dimensions

For circular hollow sections the diameter (D) and for elliptical hollow sections the outside dimensions (B and H) shall be measured either directly, e.g. using a calliper gauge, or for circular tubes by circumference tape at the discretion of the manufacturer.

The limiting cross-sectional positions for measuring B and H for square and rectangular hollow sections are shown in Figure 1.

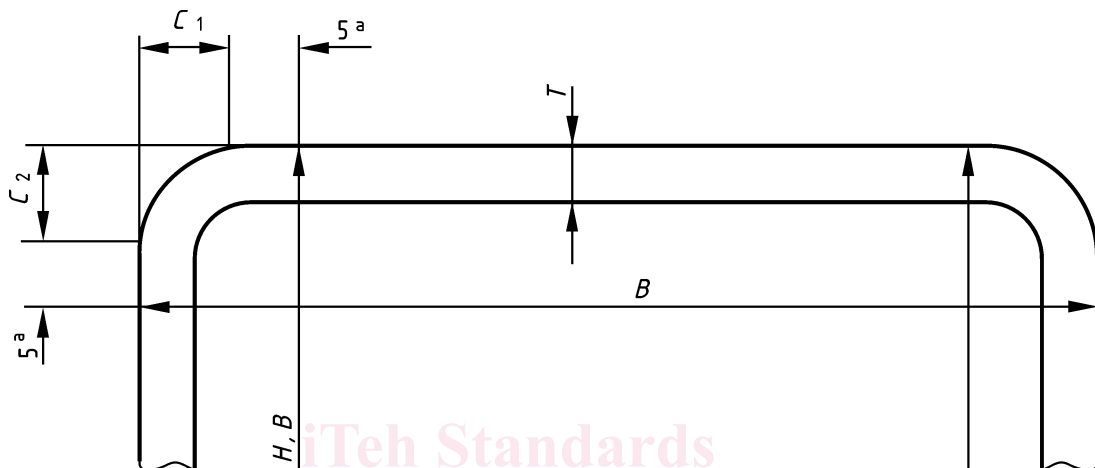
7.3 Thickness

The thickness (T) shall be measured at a position not less than $2T$ from the weld.

The limiting cross-sectional positions for measuring the thickness of square and rectangular hollow sections are shown in Figure 1.

NOTE Thickness is normally measured within a distance of half the outside diameter or half the dimension of the longer side from the end of the section.

Dimensions in millimetres



Key

^a This dimension is a maximum when measuring B or H and a minimum when measuring T

Figure 1 — Limiting cross-sectional positions for measuring the dimensions B , H and T for square or rectangular hollow sections

7.4 Out-of-roundness

The out-of-roundness (O) of a circular hollow section shall be calculated from the following formula, but see Annex A for piling tube:

$$O(\%) = \frac{D_{\max} - D_{\min}}{D} \times 100$$

7.5 Concavity and convexity

The concavity (x_1) or the convexity (x_2) of the sides of a square or rectangular hollow section shall be measured as shown in Figure 2.

The percentage concavity or convexity shall be calculated as follows:

$$\frac{x_1}{B} \times 100\%; \frac{x_2}{B} \times 100\%; \frac{x_1}{H} \times 100\%; \frac{x_2}{H} \times 100\%$$

where B and H are the dimensions of the sides containing the concavity x_1 or the convexity x_2 .

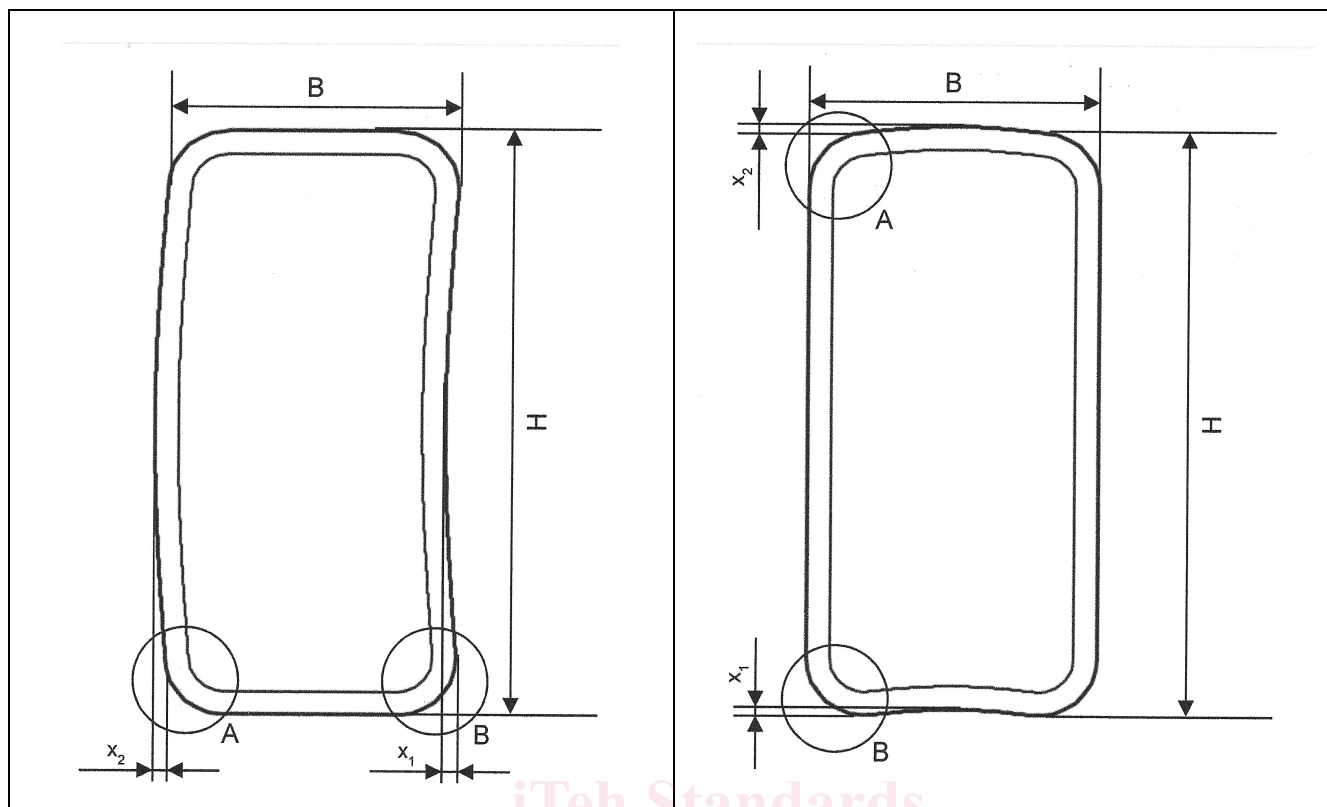


Figure 2 — Measurement of concavity/convexity of square or rectangular hollow sections

7.6 Squareness of sides

The deviation from squareness of the sides of a square or rectangular hollow section shall be measured as the difference between 90° and θ as shown in Figure 3.

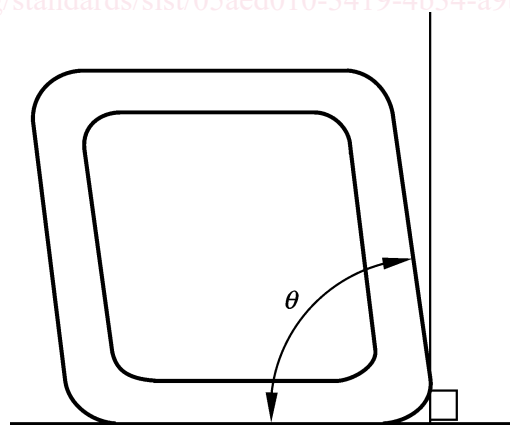


Figure 3 — Squareness of sides of square or rectangular hollow sections

7.7 External corner profile

7.7.1 The external corner profile of a square or rectangular hollow section shall be measured according to 7.7.2 or 7.7.3 at the discretion of the manufacturer.

7.7.2 The corner arc shall be measured with a radius gauge.