BRITISH STANDARD

BS EN
10162:2003

Cold rolled steel sections — Technical delivery conditions — Dimensions and cross-sectional tolerances

National foreword

This British Standard is the official English language version of EN 10162:2003. It supersedes BS 2994:1976 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/10, Flat rolled steel products, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 21 and a back cover.

Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD

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EN 10162

April 2003

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Cold rolled steel sections - Technical delivery conditions - Dimensional and cross-sectional tolerances

Profilés en acier formés à froid - Conditions techniques de livraison - Tolérances dimensionnelles et sur sections transversales

Kaltprofile aus Stahl - Technische Lieferbedingungen - Grenzabmaße und Formtoleranzen

This European Standard was approved by CEN on 21 February 2003.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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Foreword

This document (EN 10162:2003) has been prepared by Technical Committee ECISS /TC 13 "Flat products for cold working - Qualities, dimensions, tolerances and specific tests" the secretariat of which is held by IBN.

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 October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

Annex A is normative and annex B is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies dimensional and cross-sectional tolerances for cold rolled steel sections produced on roll-forming machines.

It applies to cold-rolled sections for general use (standard sections) produced from steels conforming to EN 10025, EN 10142 and EN 10147 and in the form of rectangular L, U, C, Z and Omega cross sections as well as split tubes (see Figures 1 to 6).

It also applies to cold rolled sections for special applications (special sections) produced from steels listed in clause 5 with other radii, tolerances and shapes.

NOTE Examples of special sections are sections for steel-framed buildings, door frames and sections for rolling stock, automobiles and bridge engineering (see Figures 7 and 8).

This European Standard does not apply to drawn, pressed or folded cold formed sections, cold rolled steel piling or sections manufactured on the basis of special standards.

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 (including amendments).

ENV 606, *Bar coded transport and handling labels for steel products*

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test at ambient temperature*

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

EN 10021:1993, *General technical delivery requirements for steel and iron products*

EN 10025, *Hot-rolled products of non-alloy structural steels - Technical delivery conditions*

prEN 10025-2, *Hot-rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10029, *Hot rolled steel plates 3 mm thick or above - Tolerances on dimensions, shape and mass*

EN 10045-1, *Metallic materials - Charpy impact test - Part 1: Test method*

EN 10048, *Hot rolled narrow steel strip - Tolerances on dimensions and shape*

EN 10051, *Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels - Tolerances on dimensions and shape*

EN 10079:1992, *Definition of steel products*

EN 10088-1, *Stainless steels - Part 1: List of stainless steels*

EN 10088-2, *Stainless steels – Part 2: Technical delivery conditions for sheet / plate and strip for general purposes*

EN 10111, *Continuously hot-rolled low carbon steel sheet and strip for cold forming - Technical delivery conditions*

EN 10113-1, *Hot rolled products in weldable fine grain structural steels - Part 1: General delivery conditions*

EN 10113-2, *Hot rolled products in weldable fine grain structural steels - Part 2: Delivery conditions for normalized/normalized rolled steels*

EN 10113-3, *Hot rolled products in weldable fine grain structural steels - Part 3: Delivery conditions for thermomechanical rolled steels*

EN 10130, *Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions*

EN 10131, *Cold rolled uncoated low carbon and high yield strength steel flat products for cold forming - Tolerances on dimensions and shape*

EN 10139, *Cold rolled uncoated mild steel narrow strip for cold forming - Technical delivery conditions*

EN 10140, *Cold rolled narrow steel strip - Tolerances on dimensions and shape*

EN 10142, *Continuously hot-dip zinc coated low carbon steel strip and sheet for cold forming - Technical delivery conditions*

EN 10143, *Continuously hot-dip metal coated steel sheet and strip - Tolerances on dimensions and shape*

EN 10147, *Continuously hot-dip zinc coated structural steel strip and sheet - Technical delivery conditions*

EN 10152, *Electrolytically zinc coated cold rolled steel flat products - Technical delivery conditions*

EN 10154, *Continuously hot-dip Aluminium-Silicon (AS) coated steel strip and sheet - Technical delivery conditions*

EN 10169-1, *Continuously organic coated (coil coated) steel flat products - Part 1: General information (definitions, material, tolerances, test methods)*

ENV 10169-2, *Continuously organic coated (coil coated) steel flat products - Part 2: Products for building exterior applications*

EN 10204:1991, *Metallic products - Types of inspection documents*

EN 10214, *Continuously hot-dip zinc-aluminium (ZA) coated steel strip and sheet - Technical delivery conditions*

EN 10215, *Continuously hot-dip aluminium-zinc (AZ) coated steel strip and sheet - Technical delivery conditions*

EN 10258, *Cold rolled stainless steel and narrow strip and cut lengths – Tolerances on dimensions and shape*

EN 10259, *Cold rolled stainless steel wide strip and plate / sheet – Tolerances on dimensions and shape*

CR 10260, *Designation systems for steel - Additional symbols*

EN 10268, *Cold-rolled flat products made of high yield strength micro-alloyed steels for cold forming - General delivery conditions*

EN ISO 377:1997, *Steel and steel products - Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997)*

EN ISO 14284:2002, *Steel and Iron - Sampling and preparation of samples for the determination of chemical composition (ISO 14284:1996).*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 10020:2000, EN 10021:1993, EN 10079:1992, EN 10204:1991, EN ISO 377:1997, EN ISO 14284:2002 and the following apply:

3.1
cold rolled sections
products of various shapes having a constant cross section over their entire length. They are produced from hot or cold rolled flat products (with or without surface coatings) by purely cold forming without significantly affecting the thickness of the original flat product (e.g. by cold rolling, drawing, pressing, pressbreaking)

3.2
split tube
cold rolled steel section which is not produced from a tube

4 Designation

4.1 Designation of cold rolled sections for general applications

4.1.1 General

Standard sections shall be designated in accordance with 4.1.2 and 4.1.3.

NOTE The designation of standard sections does not require drawings.

4.1.2 Section details

For a complete designation of rectangular cold rolled sections the following details shall be given in the indicated sequence (see Figures 1 to 6)*:*

a) description of the form of the section (e.g. L, U, C, Z, Omega or split tube);

b) all side lengths in chain (outer dimensions see Figures 1 to 6). In case the width of flanges or lips of a section are unequal the larger one shall be stated first. For split tubes, see 4.1.3;

c) wall thickness in mm (separated from the side dimensions by a multiplication sign x);

d) ID letters for the required edge, (NK = mill edge, GK = sheared edge; see also 6.2);

e) length description (standard, fixed or exact lengths) ;

f) length in mm when fixed or exact lengths of section are to be supplied (see 6.3 and 7.4.3);

g) number of the present standard EN 10162;

h) designation of the steel grade or the steel number (see clause 5);

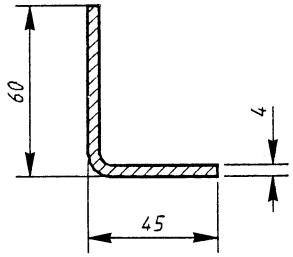
i) number of the European Standard which covers the steel grade under h).

4.1.3 Designation of split tubes

In the case of split tubes dimension of height and width shall be stated only once (see example in 4.1.4 d).

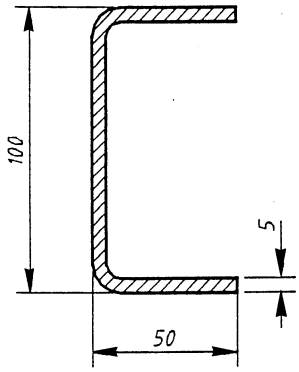
NOTE This assumes that the gap is in the middle of a narrow side and the width of the gap does not exceed 1 x t (t = wall thickness). Details of the designation of other split tubes are given in 4.2.

Dimensions in millimetres



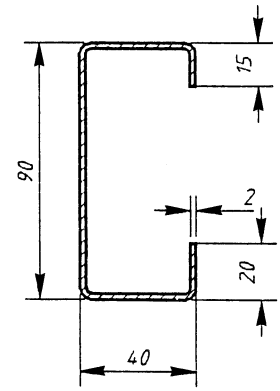
L 60/45 x 4

Figure 1



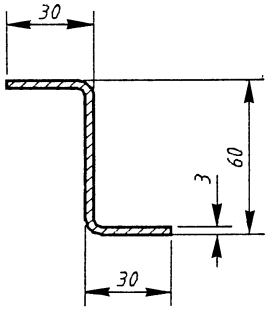
U 50/100/50 x 5

Figure 2



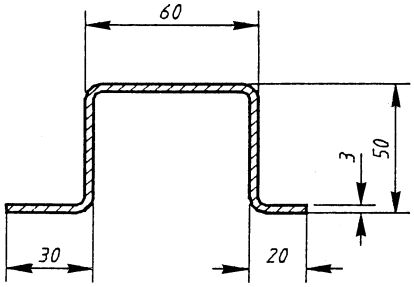
C 20/40/90/40/15 x 2

Figure 3



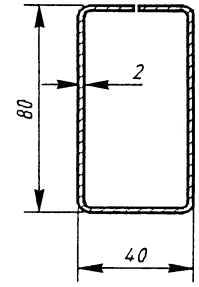
Z 30/60/30 x 3

Figure 4



Omega 30/50/60/50/20 x 3

Figure 5



Split tube 80/40 x 2 (*)

Figure 6

Figures 1 to 6: Examples of cold rolled steel sections and their designations

Dimensions in millimetres

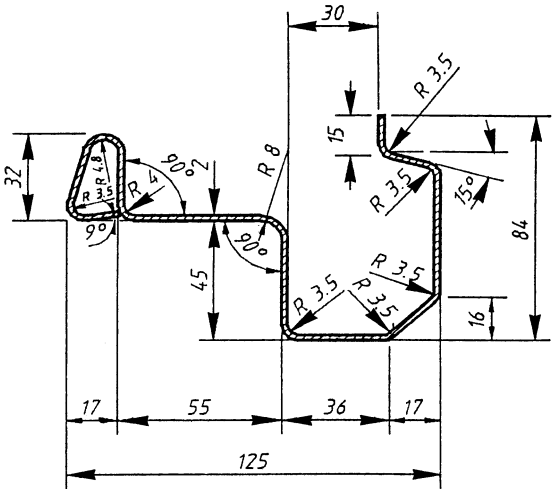


Figure 7

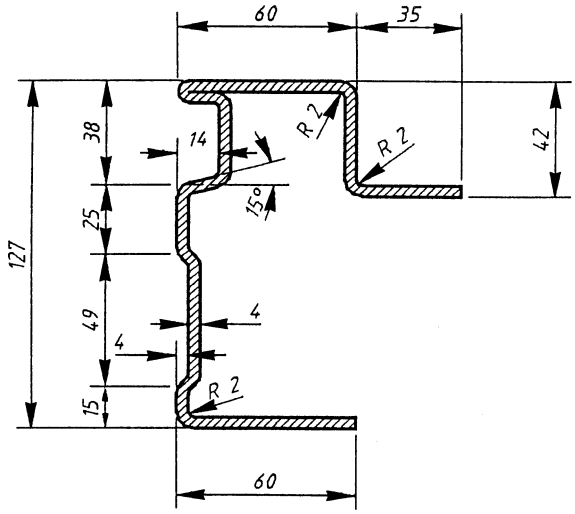


Figure 8

Figures 7 and 8: Examples of cold rolled steel sections for special applications

4.1.4 Designation examples

Designations shall be made as follows**:**

a) channel section (U section) as per Figure 2 supplied in standard length and manufactured from S235JRG2 (1.0038) steel conforming to EN 10025:

   U 50/100/50 x 5 standard length EN 10162 S235JRG2 (1.0038) EN 10025

b) C section as show in Figure 3 with sheared edges, supplied in exact lengths of 3500 mm, manufactured from steel DC03 A (1.0347) conforming to EN 10130:

   C 20/40/90/40/15 x 2 GK x exact length 3 500 EN 10162 DC03 A (1.0347) EN 10130

c) 'Omega' section as per Figure 5 with sheared edges, supplied in standard lengths, manufactured from galvanised steel DX52D + Z (1.0350) Z100 MB-C conforming to EN 10142:

   'Omega' 30/50/60/50/20 x 3 GK standard length EN 10162 DXD52D + Z (1.0350) Z100 MB-C EN 10142

d) split tube as show in Figure 6 supplied in a fixed length of 7 300 mm, manufactured from galvanised steel S250 GD + Z (1.0242) Z275 NA-0 conforming to EN 10147:

   Split tube 80/40 x 2 x fixed length 7 300 EN 10162 S250GD + Z (1.0242) Z 275 NA- 0 EN 10147

4.2 Designation of cold rolled sections for special applications

The designation of cold rolled steel sections for special applications shall be made with a drawing giving the required shapes, dimensions and cross-sectional and dimensional tolerances.

5 Steel grades

5.1 Unless otherwise agreed at the time of ordering, cold rolled sections shall be manufactured from hot or cold rolled flat steel products in accordance with the following standards:

EN 10025, EN 10088-2, EN 10111, EN 10113-1, EN 10113-2, EN 10113-3, EN 10130, EN 10139, EN 10142, EN 10147, EN 10152, EN 10154, EN 10268, EN 10214, EN 10215, EN 10169-1, ENV 10169-2.

5.2 The required steel grade shall be stated in the designation (see clauses 4 and 14).

6 Delivery conditions

6.1 Supply condition

Unless otherwise agreed, cold rolled sections shall be delivered in the condition in which they left the cold rolling machine.

6.2 Edge condition

Unless otherwise agreed, cold rolled sections shall be supplied with either sheared edges, in which case a slight burr is permitted, or with mill edges according to the manufacturer's choice. Where other edges are agreed, the letters NK (mill edge) or GK (sheared edge) shall be stated in the designation (see 4.1).

Other edges (e.g. rounded or chamfered) shall be specially agreed.

6.3 Lengths

Cold rolled sections are supplied either in standard, fixed or exact lengths subject to the permitted length tolerances given in Table 4 (see 7.4.4).

Orders from standard or fixed lengths may include short lengths of not less than 2000 mm up to a maximum of 5% of the total mass delivered.

NOTE If fixed or exact lengths are to be supplied, the required length and the designation ‘fixed length’ or ‘exact length’ should be stated on the order form (see clauses 4 and 14).

6.4 End condition

Unless otherwise agreed, the ends of cold rolled sections shall be cut square. If in special cases a certain angle tolerance or a reduced cutting burr is required, this shall be agreed at the time of ordering. Burrs typical for the cutting method used as well as a slight deformation at the end due to the cutting method are permitted.

6.5 Delivered quantities

6.5.1 The delivered quantity may vary +/- 10 % from the ordered quantity. If the customer has specified that the ordered quantity shall not be exceeded, the delivered quantity shall not fall short of the ordered quantity by more than 20 %. If the customer specifies that the delivered quantity shall not fall short of the ordered quantity, the delivered quantity shall not exceed the ordered quantity by more than 20%.

6.5.2 If a specified number of cold rolled sections of fixed or exact length is to be ordered, the permitted differences between ordered and delivered quantities shall be agreed.

7 Requirements

7.1 Mechanical and technological properties

The mechanical and technological properties are governed by the specifications of the initial products given in the European Standards listed in clause 5, provided the sampling conditions stated in 9.2.1 are complied with.

7.2 Surface condition

7.2.1 Unless otherwise agreed, the surface-condition of cold rolled steel sections shall be in accordance with the requirements of the relevant European Standards for the initial products (see clause 5).

Slight traces of rolling marks such as scratches or grazes shall not be cause for rejection as long as the tolerances permitted for the base product are not exceeded.

In the case of cold rolled sections made from hot rolled base products, surface defects caused by corrosion or scaling are permitted as long as they do not cause the minimum thickness (see 7.4.2) to fall below the permitted limit.

All special surface requirements, in particular in the case of coated cold rolled sections, shall be agreed at the time of ordering.

7.2.2 It is inevitable that traces of the lubricant used during cold forming remain on the surface. Special requirements regarding the cleanliness of the surface shall be specially agreed.

7.2.3 For the removal of surface defects, the requirements of EN 10021 shall apply.

7.3 Nominal dimensions

7.3.1 Cross sectional dimensions

This standard does not give any details of preferred cross-sectional dimensions for the cold rolled sections. These dimensions shall be agreed at the time of ordering.

7.3.2 Internal bending radii

The internal bending radii between the flat sides of the cold rolled steel sections which are dependent on the type of steel, steel grade and thickness of the original flat product shall be in accordance with Tables A.1 to A.3 for the there mentioned types of steel. These radii apply only to standard sections. Radii for special sections shall be agreed.

Any varying bending radii especially for other steel grades or surface-treated products shall be agreed (e.g. for fine grain alloyed structural steels).

The tolerance for internal bending radii is +/- 20 %. The minimum tolerance, however, is +/- 0,5 mm.

7.4 Permitted dimensional and cross-sectional tolerances

7.4.1 General

The following tolerances given for thickness, cross section and angles may accumulate unless agreed otherwise.

7.4.2 Thickness

The permitted thickness tolerances of the used strip or sheet apply also to nominal wall thickness of the cold rolled sections. These values are specified in the following standards: EN 10029, EN 10048, EN 10051, EN 10131, EN 10140, EN 10143, EN 10258, EN 10259.

If these standards specify several tolerance categories for the nominal thickness of the flat product, the standard tolerances apply to the production of the cold rolled section unless other tolerances have been agreed at the time of ordering.

Changes in the wall thickness may occur in the bending areas of the cold rolled sections due to the rollforming process.

7.4.3 Cross section

7.4.3.1 The permitted tolerances for the cross-sectional dimensions of cold rolled sections for special applications (special sections) shall be agreed at the time of ordering and specified on the drawings.

If no other details have been specified for cold rolled sections for special applications (special sections) (see 4.2), the characteristics given in 7.4.3.2 shall apply to such sections.

7.4.3.2 Tolerances for the cross-sectional dimensions of cold rolled sections for general applications (standard sections) shown in Figures 1 to 6 shall be in accordance with Tables 1 and 2. These sections shall have the following characteristics:

a)	bending angle of bends:	90°
b)	internal bending radii:	see annex A
c)	minimum external dimension limited by 2 radii:	10 x wall thickness
d)	minimum external dimension limited by 1 radius and a free edge:	1 x internal radius + 3 x wall thickness
e)	width of the gap in split tubes (always in the centre of a narrow side):	max 1 x wall thickness

Table 1 — Permitted tolerances for external dimensions limited by 2 radii (e.g. web of a channel)

Wall thickness	Permitted external dimension tolerances (mm)				
(mm) t	≤ 40	> 40 ≤ 100	> 100 ≤ 200	> 200 ≤ 400	> 400
≤1,5	± 0,50	± 0,50	± 0,75	± 1,25	a
>1,5 ≤ 3	± 0,75	± 0,75	± 1,00	± 1,50	± 1,75
> 3 ≤ 6	± 1,00	± 1,00	± 1,25	± 1,75	± 2,00
> 6 ≤ 8	-	± 1,25	± 1,50	± 2,00	± 2,50
>8	a	a	a	a	a

a Tolerances shall be agreed at the time of ordering.

Table 2 — Permitted tolerances for outside dimensions limited by one radius and a free edge [a] [b]

Wall thickness	Permitted external dimension tolerances (mm)				
(mm) t	≤ 40	> 40 ≤ 100	> 100 ≤ 150	> 150 ≤ 200	> 200
≤ 1,5	± 0,75	± 0,75	± 1,00	c	c
> 1,5 ≤ 3	± 0,80	± 1,00	± 1,25	± 1,50	c
> 3 ≤ 6	± 1,00	± 1,25	± 1,50	± 1,75	± 2,00
> 6 ≤ 8	± 1,25	± 1,50	± 1,75	± 2,00	± 2,25
>8	c	c	c	c	c

a Permitted tolerances are governed by the larger of the two external dimensions.

b The values given apply to cold rolled sections with sheared edges. For sections with mill edges the permitted tolerances are to be doubled.

c The permitted tolerances are to be agreed by time of ordering.

7.4.3.3 The permitted angular tolerances are governed by the values given in Table 3 provided the bending radii comply with the values given in annex A.

Table 3 — Permitted angular tolerances

Length of shorter flange (mm)	Permitted angular tolerance
≤ 10	± 3°
> 10 ≤ 40	± 1°45’
> 40 ≤ 80	± 1°15’
> 80 ≤ 110	± 1°
>110	± 0°45’

7.4.4 Length

Length tolerances shall be in accordance with Table 4 (see also 6.3).

Table 4 — Permitted length tolerances

Length designation	Length (mm)	Tolerance (mm) [a]	Ordering information [b]
Standard	6 000	0/+ 50	specify 'standard length'
Fixed length	4 000 to 24 000	0/+ 50	specify length (mm) and add 'fixed length'
Exact length	≤ 2 000 > 2 000 ≤ 6 000 > 6 000 ≤ 10 000 > 10 000 ≤ 15 000 > 15 000	± 1 ± 2 ± 3 ± 4 ± 6	specify length (mm) and add 'exact length'

[a] In the case of exact lengths the total tolerance band may be either wholly positive or wholly negative if agreed between supplier and customer (e.g. 0/+2 mm instead of +/- 1 mm).

[b] See 4.1.2.

7.4.5 Straightness

The permitted deviation q from the straight line (see Figure 9) shall not exceed 0,002 x l (length).

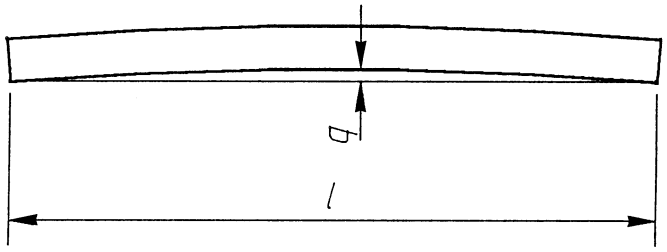


Figure 9 — Straightness

In the case of complex cross section such as markedly asymmetrical sections, the permitted straightness tolerances shall be agreed at the time of enquiry and order.

7.4.6 Twist

The angle of twist shall not exceed 1 degree per meter. In the case of complex sections the permitted twist shall be agreed at the time of enquiry and order.

7.4.7 Concavity, convexity

The tolerances for concavity or convexity of the flat sides (see Figure 10) shall not exceed 0,8% of *h* (*h*'); however, the minimum tolerance is 0,5 mm. The tolerance of concavity and convexity is independent of the cross-sectional tolerances and cannot be included in the latter. Concavity or convexity within the permitted dimensional tolerances is always permitted.

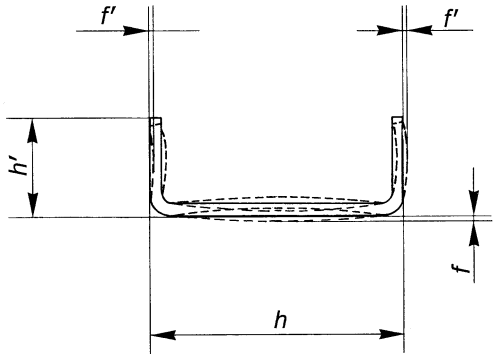


Figure 10 — Concavity, convexity

7.5 Mass

The theoretical mass of cold rolled steel sections of non alloyed steel shall be calculated from the nominal dimensions of the cross-sectional area using a specific density of 7,85 kg/dm^3. When using other grades of steel the corresponding specific densities given in the appropriate quality standards shall be used.

By assessing any possible difference between the actual and theoretical mass of cold rolled steel sections the permitted dimensional tolerances for the original flat product (see 7.4.2) and the permitted dimensional tolerances of the cold rolled steel section itself (see 7.4.3) shall be taken into account. For stainless steels, these are found in EN 10088-1.

7.6 Gross-cross-sectional characteristics

Since no standard dimensions have been specified for cold rolled sections, the present standard does not contain any table for gross-cross-sectional characteristics. The calculation of the gross-cross-sectional characteristics shall be carried out using the nominal dimensions. For structural purposes, the required reductions shall be carried out in accordance with the rules required for structural application (e.g. ENV 1993-1-3).

8 Further processing

NOTE See annex B.

8.1 Cold rolled sections may be processed further either by the manufacturer or by the purchaser. A general suitability of cold rolled sections for any type of application does not exist. The purchaser therefore shall take into account any further processing such as welding, hot dip galvanising, cold forming etc., as well as the application when selecting the grades of steel (see clause 5).

8.2 Any further processing (e.g. by cutting, drilling, welding, hot dip galvanising or other surface treatments) can cause a change in the shape, straightness, twist and surface-quality of the supplied products. Further processing by cold or hot forming can affect all mechanical and technological characteristics of the cold rolled sections (see 7.6).

9 Test requirements

9.1 Number of test samples

An acceptance test shall be agreed at the time of ordering. At the same time the number of samples of cold rolled section subjected to mechanical testing and/or dimensional checking shall be agreed as well.

9.2 Test procedure

9.2.1 Mechanical and technological characteristics

Tests of mechanical and technological characteristics of cold rolled steel sections are generally carried out on test samples taken from the original flat product.

If so agreed at time of ordering, the test can be carried out also on samples, which are taken from the cold rolled steel section. These samples shall be taken at a suitable distance from the areas, which have been cold rolled during the manufacturing of the section and at a distance of at least 50 mm from the ends of the cold rolled steel section.

The tests are subject to the specifications laid down for the flat bare products in EN 10002-1 and EN 10045-1. The result of the tests shall comply with the requirements of the base product (see 5.1)

9.2.2 Dimensions

9.2.2.1 All measurements to verify the cross-sectional shape and dimensions, shall be carried out at a distance of at least 250 mm from the end of the sections to exclude any influence of end-flare on measured results.

The thickness of the section shall be measured on the flat sides of the section (see 7.4.2).

9.2.2.2 Straightness and twisting of a section (see 7.4.5 and 7.4.6) shall be checked over the entire length of a section resting on a flat base (see Figure 9).

9.2.2.3 The length shall be measured along the centreline of the largest surface.

9.2.2.4 The dimensional checks shall be carried out using suitable equipment having a sufficiently high accuracy.

9.2.3 Surface condition

The surface condition of a cold rolled section shall be visually inspected without the use of optical magnifiers.

9.3 Retests

Retests shall be subject to the specification laid down in EN 10021.

9.4 Material test certificates

One of the test certificates listed in EN 10204 shall be issued if agreed at the time of ordering.

10 Identification, marking

The cold rolled sections shall be marked individually or by the bundle with the following information:

a) section dimensions or drawing number;

b) steel grade and quality category;

c) reference indicating that the sections have been manufactured and tested on the basis of this standard; CE marking, if required;

d) manufacturer’s name or logo;

e) production code;

f) identification of the external testing body, if required;

g) bar coding according to ENV 606 can supplement marking, when the above mentioned minimum information is also given in clear text.

Unless agreed otherwise, the method of marking is left to the manufacturer's discretion. Marking the sections by stamping shall however always be agreed.

11 Packing

The sections are generally supplied in bundles with a maximum mass of 3 tonnes; the bundles are tied only with straps. Special packing shall be agreed.

12 Protection of surfaces, storage and transport

Normally the sections are supplied without any specific protection against corrosion (see 6.1 and 7.2.2). Any required surface protection shall be agreed at the time of ordering.

With galvanised cold rolled sections the special storage and transport requirements applicable to zinc coated products shall be observed (see EN 10142 and EN 10147).

13 Complaints

Settlement of complaints shall be in accordance with EN 10021.

14 Ordering information

To enable the manufacturer to supply exactly the cold rolled sections required by the customer, the following information shall be provided by the customer:

a) description of the cold rolled section by stating the exact shape or giving a drawing number (see clause 4) and quoting this standard;

b) quantity ordered in the form of number of units, kilograms or meters;

c) name or number of the steel grade; in addition the number of the EN covering the required grade of steel shall be stated (see clause 5);

d) type of length - standard, fixed or exact length (see Table 4);

e) length in the case of fixed or exact lengths (see Table 4);

and in addition:

f) edge identification letters (see 6.2);

g) required deviation from the size and/or position of the length tolerance in the case of exact lengths (see Table 4, footnote 1);

h) special requirements in the case of further processing (see clause 8);

i) type of test required (see clause 9;)

j) type of test certificate (see 9.4);

k) special identification or marking (see clause 10);

l) special packing (see clause 11);

m) special surface protection (see clause 12);

n) end use of the product.

Annex A
(normative)

Inside bending radii

As it is not possible to have a general specification for inside bend radii for all steels named in 5.1 of this standard in one Table, guidelines for inside bend radii for the mainly used steel grades are provided in this annex.

Inside bend radii deviating from these guidelines shall be agreed at the time of ordering.

For all other steelgrades named in sub-section 5.1 of this standard the internal corner radii are subject to an agreement between client and producer of cold rolled steel section at the time of ordering.

In case of continuously organic coated (coil coated) steel flat products, acceptable (tight) bending radii depend on the substrate specified and the organic coated material applied.

Table A.1 — Cold forming of hot rolled flat products of non alloy structural steel

Steel grade conforming prEN 10025-2 designation		**Minimum recommended inside bend radii for nominal thickness (t) in mm**			
According to EN 10027-1 and CR 10260	According to EN 10027-2	$t \leq 4$	$4 < t \leq 6$	$6 < t \leq 8$	$t > 8$
S235JRC	1.0122	1t	1t	1,5t	To be agreed at the time of ordering
S235JOC	1.0115				
S235J2C	1.0119				
S275JRC	1.0128	1t	1t	1,5t	
S275JOC	1.0140				
S275J2C	1.0142				
S355JOC	1.0554	1t	1,5t	1,5t	
S355J2C	1.0579				
S355K2C	1.0594				

Table A.2 — Cold roll forming of flat products of continuously hot-dip zinc coated structural steels

Steel grade conforming EN 10147 designation		Minimum recommended inside bend radii for nominal thickness (t) in mm	
According to EN 10027-1 and CR 10260	According to EN 10027-2	$t \leq 3$	$t > 3$
S250GD+Z	1.0242	0,5t	To be agreed at the time of ordering
S280GD+Z	1.0244	1t	
S320GD+Z	1.0250	1,5t	
S350GD+Z	1.0529	1,5t	
S220GD+Z	1.0241	0,5t	
NOTE This is valid for zinc coatings of Z 100 up to Z 450. For zinc coatings of Z 600, the internal bending radii are to be agreed at the time of ordering.			

Table A.3 — Cold roll forming of flat products of continuously hot-dip zinc coated low carbon steels

Steel grade conforming EN 10142 zinc coating	Minimum recommended inside bend radii for nominal thickness (t) in mm	
	$t \leq 3$	$t > 3$
Z100, ZF100 Z140, ZF140 Z200 Z225 Z275	1 t [a]	To be agreed at the time of ordering
Z350	1t [b]	
Z450 Z600	1t	
[a] According EN 10142, an internal bending radius of zero is permitted for zinc coatings up to and including Z 275.		
[b] According EN 10142, an internal bending radius of 0,5 t is permitted for zinc coating of Z 350.		

Annex B
(informative)

Further processing

In addition to producing a large variety of cross sections, the manufacturers can also carry out a wide range of further processing operations.

Such operations are, in particular: special end cuts, deburring, perforating, notching, nibbling, stamping, denting for spot welding, indenting, spot and continuous welding, notched jointing (for folding), surface treatment, surface coating, etc.

All these operations may affect all mechanical and technological characteristics of the cold rolled sections.

Bibliography

ENV 1993-1-3:1996, *Eurocode 3: Design of steel structures – Part 1-3: General rules - Supplementary rules for cold formed thin gauge members and sheeting*