BRITISH STANDARD

BS 5950-7: 1992

Structural use of steelwork in building —

Part 7: Specification for materials and workmanship: cold formed sections

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Civil Engineering and Building Structures Standards Policy Committee (CSB/-) to Technical Committee CSB/27, upon which the following bodies were represented:

British Constructional Steelwork Association Ltd.
British Industrial Fasteners Federation
British Railways Board
British Steel Industry
Department of the Environment (Building Research Establishement)
Department of the Environment (Construction Directorate)
Department of the Environment (Property Services Agency)
Health and Safety Executive
Institution of Civil Engineers
Institution of Structural Engineers
Royal Institute of British Architects
Steel Construction Institute
Welding Institute

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Cold Rolled Sections Association
Construction Industry Research and Information Association
Flat Roofing Contractors' Advisory Board
Metal Roof Deck Association
Storage Equipment Manufacturers Association

This British Standard, having been prepared under the direction of the Civil Engineering and Building Structures Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on
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Contents

Foreword

This Part of BS 5950 has been prepared under the direction of the Civil Engineering and Building Structures Standards Policy Committee. BS 5950 is a document combining codes of practice to cover the design, construction and fire resistance of steel structures and specifications for materials, workmanship and erection.

It comprises the following Parts:

— *Part 1: Code of practice for design in simple and continuous construction: hot rolled sections;*

— *Part 2: Specification for materials, fabrication and erection: hot rolled sections;*

— *Part 3: Design in composite construction;*

— *Section 3.1: Code of practice for design of simple and continuous composite beams;*

— *Section 3.2*[1)]*: Code of practice for design of composite columns and frames;*

— *Part 4: Code of practice for design of floors with profiled steel sheeting;*

— *Part 5: Code of practice for design of cold formed sections;*

— *Part 6*[1)]*: Code of practice for design of light gauge profiled sheeting;*

— *Part 7: Specification for materials and workmanship: cold formed sections and profiled sheets;*

— *Part 8: Code of practice for fire resistant design;*

— *Part 9*[1)]*: Code of practice for stressed skin design.*

It has been assumed in the drafting of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover,pages i to iv, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

[1)] In preparation.

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Section 1. General

1.1 Scope

This Part of BS 5950 specifies requirements for the materials, fabrication and erection, using cold formed sections, of structural steelwork in building. It also specifies requirements for profiled sheets for cladding, roof decking and flooring in buildings up to the time the product is delivered to the building site, but not for their erection on site.

The special requirements pertaining to the fabrication of curved profiled sheets are not included.

NOTE 1 The installation of profiled steel sheet cladding is covered in BS 5427.[2)]

The requirements given in this Part apply to the materials and the assembly process, but the designer needs to be aware of those items which affect the design.

NOTE 2 The requirements specified herein, whilst suitable for inclusion in contract documents, may need to be modified to align with specific needs.

NOTE 3 The titles of the publications referred to in this standard are listed on page 12.

1.2 Definitions

For the purposes of this Part of BS 5950, the following definitions apply.

1.2.1
designer

appropriately qualified and experienced person responsible for the structural design

1.2.2
fabricator

organization which produces finished steel members ready for assembly on site

1.2.3
manufacturer

organization which produces a basic structural component, such as a bolt, a steel section or a steel sheet

1.3 Major symbols

B flange width
C outstand
D profile depth
L length
W cover width
e deviation
t thickness

[2)] Some requirements for the erection, use and maintenance of profiled sheets in buildings are given in ECCS 41 "European Recommendations for Steel Construction: Good practice in steel cladding and roofing" published by the European Convention for Constructional Steelwork, obtainable from the Steel Construction Institute, Silwood Park, Buckhurst Road, Ascot, Berkshire SL5 7QN.

Section 2. Materials

2.1 Structural steel

2.1.1 Steels for cold formed sections

Steels used for the manufacture of cold formed sections for use as structural members shall comply with the requirements for the relevant strength grade of one of the standards listed below, but excluding grades with a minimum yield strength greater than 450 N/mm^2, as follows:

BS 1449-1

BS 2989

BS 6830

BS EN 10025

BS EN 10130

BS EN 10142

When an organic coating or metallic coating not covered by BS 2989 is applied before forming it shall be as specified by the designer.

NOTE It is expected that further European Standards in the BS EN 10xxx series will gradually supersede BS 1449, BS 2989 and BS 6830.

2.1.2 Steels for profiled sheet

Steels used for the manufacture of profiled sheet for use as roof or wall cladding, roof decking or flooring shall comply with the requirements for the relevant strength grade of one of the following:

BS 1449-1

BS 2989

BS 6830

BS EN 10130

BS EN 10142

When an organic coating or metallic coating not covered by BS 2989 is applied before forming it shall be as specified by the designer.

NOTE 1 The specific requirements for material in profiled steel sheets are given in BS 5950-4.
NOTE 2 See note to **2.1.1**.

2.1.3 Other steels

Where steels other than those specified in **2.1.1** or **2.1.2** are to be used, they shall meet the relevant performance requirements of the appropriate British Standards cited in **2.1.1** and **2.1.2**.

2.1.4 Strength of steels

Where the material used to manufacture cold formed sections or profiled steel sheets is supplied as complying with the requirements of grades HR 3 or HR 4 of BS 1449, or of grades Z 1 or Z 2 of BS 2989, the design strength shall be taken as the relevant value given in BS 5950-5 or BS 5950-6 as appropriate.

For further certificated steels, the minimum yield strength given in the relevant specification shall be used for the formed section or profiled sheet.

Alternatively, for any steel, the strength of the sheet material shall be determined by testing in accordance with BS EN 10002-1. Every coil or bundle of material used shall be tested and test certificates shall be provided if required.

Where the steel section or sheet is to be hot dip galvanized, or undergoes any other heating process after fabrication, steps shall be taken to ensure that the design strengths given in BS 5950-4, BS 5950-5 or BS 5950-6, as appropriate, are achieved.

2.2 Fasteners

2.2.1 Ordinary bolts

Ordinary bolts and nuts shall comply with BS 3692, BS 4190 or BS 4933 as appropriate, or alternatively with the strength grades of BS 3692 but with the dimensions, finish and tolerances of BS 4190. In either case, the nuts shall be of at least the strength grade appropriate to the grade of bolt with which they are used. As a third alternative, bolts and nuts complying with BS 4395 shall be used.

2.2.2 Plain washers

Plain washers for use with ordinary bolts and nuts shall comply with BS 4320.

2.2.3 High-strength friction grip fasteners

High-strength friction grip bolts, nuts and washers shall comply with BS 4395, except where other proprietary types are specified or approved by the designers. Where other proprietary types of high-strength friction grip fasteners are used, they shall have mechanical properties similar to bolts complying with BS 4395 and shall be capable of being reliably tightened to at least the minimum preloads specified in BS 4604.

2.2.4 Screw fasteners

Self-tapping screws shall comply with BS 4174.

All other proprietary screw fasteners shall be as specified or approved by the designer.

2.2.5 Rivets

Rivets shall comply with BS 641 or BS 4620.

All other proprietary rivets shall be as specified or approved by the designer.

2.2.6 Powder-actuated fasteners

Powder-actuated fasteners shall be as specified or approved by the designer. The thickness of the base material into which the fastener is fixed shall be not less than 6 mm.

2.3 Welding consumables

All welding consumables shall comply with BS 639 or BS 2901-1 as appropriate.

The welding consumables and procedures used shall be such that the yield strength and the tensile strength of deposited weld metal shall be not less than the respective minimum values for the parent metal being welded, except where the designer specifies or approves the use of lower strength welds.

Section 3. Fabrication

3.1 Methods

Fabrication methods shall be chosen so as to minimize any damage to pre-applied protective coatings. Where any damage does occur it shall be made good as specified in **3.6**.

3.2 Cutting

Cutting shall be by shearing, cropping or sawing. Burrs which can cause injury or prevent the proper alignment or bedding of sections or sheeting shall be removed. After cutting, all parts required to be in surface-to-surface contact shall be free from distortion.

3.3 Holing

Holes in cold formed sections shall be punched or drilled. The holes shall be free from burrs which would prevent solid seating of the parts after tightening.

Slotted holes shall either be punched in one operation or else formed by punching or drilling two round holes and completed by high-quality flame cutting and dressing to ensure that the bolt can freely travel the full length of the slot.

3.4 Identification

Where required by the purchaser, each piece or bundle shall be suitably identified or marked before delivery in such a way that will facilitate the erection sequence. The mark shall not damage the material.

3.5 Handling and storage

Cold formed sections, profiled sheets and accessories shall be suitably packed and stored to provide protection against any damage. All material shall be handled in such a way as to prevent any damage. Any necessary repairs shall be carried out in such a way as not to weaken the material or damage the protective coating.

3.6 Repair of protective coatings

Where damage to protective coating has occurred, repairs shall be carried out to restore the coating to the specified quality of protection.

Section 4. Assembly and erection of structures in cold formed sections

4.1 General

All components shall be assembled and erected in such a manner that they are not bent, twisted or otherwise damaged.

Drifting to align holes shall not enlarge the holes or distort the metal.

4.2 Bolting

It shall be assumed that washers are required except where the drawings or design documents state that washers are not required. Where washers are required, they shall be used under both the bolt head and the nut. In the case of countersunk bolts, washers shall be used under the nut.

NOTE 1 Where it is proposed to specify or agree that washers need not be used, reference should be made to **8.2.5** of BS 5950-5:1987.

The threaded portion of each bolt shall project through the nut at least one thread.

The nuts on connections subject to vibration shall be secured to prevent loosening. Self-locking nuts shall be used or else the nuts shall be secured by the use of locknuts or upsetting of the threads of the bolts after assembly and tightening.

Where slotted holes are provided for movement connections, the joint shall be free to move over the full length of the slots. Slots in an outer ply shall be covered by cover plates of appropriate dimensions and thickness.

All bolts, nuts and washers shall be protected against corrosion. Where the connected parts are protected against corrosion, the protection system used for the bolts shall be compatible (see **4.9**).

Bolts, nuts and washers used to connect metal-sprayed or galvanized steelwork shall be spun galvanized or sherardized or else electroplated with zinc, cadmium or aluminium.

NOTE 2 Electroplated finishes may not provide the same degree of protection as metal-sprayed or galvanized steelwork.

4.3 Friction grip fasteners used in the pre-tensioned condition

The use of pre-tensioned high-strength friction grip bolts complying with BS 4395 shall be in accordance with BS 4604.

Where the use of other types of pre-tensioned friction grip fasteners is permitted (see **2.2.3**), they shall be installed in accordance with the manufacturer's recommendations and shall be tightened to at least the minimum shank tensions specified in BS 4604.

4.4 Screw fixings

Screw fixings shall be installed in accordance with the manufacturer's recommendations.

4.5 Rivets

Rivets shall be installed in accordance with the manufacturer's recommendations.

4.6 Welding

4.6.1 Arc welding

Arc welding shall be in accordance with BS 5135.

NOTE 1 For through-deck welding reference should be made to appendix A of BS 5950-3.1:1990.

Fusion faces and the surrounding surfaces shall be free from heavy scale, moisture, oil, paint or any other substance which might affect the quality of the weld or impede the progress of welding.

NOTE 2 This is particularly important when a hydrogen-controlled welding process is used. Certain proprietary protective coatings are specially formulated with the intention that they should not interfere with welding. The use of such coatings is not excluded by the requirements of this clause but, if so required, their acceptability should be demonstrated by means of specimen welds (see BS 6084).

4.6.2 Spot welding

Resistance spot welding of coated and uncoated steel shall be in accordance with BS 1140.

4.7 Erection

4.7.1 General

The erection of the steelwork for the structural frame shall be planned and carried out so as to ensure safe working conditions at all times.

NOTE For guidance, reference may be made to BS 5531 and Health and Safety document GS 28.[3)]

Throughout the erection of the structure, the steelwork shall be securely bolted or fastened in order to ensure that it can adequately withstand all loadings liable to be encountered during erection, including, where necessary, those from erection plant and its operation. Any temporary bracing or temporary restraint shall be left in position until such time as erection is sufficiently advanced so as to allow its safe removal.

All connections to any temporary bracing or other members provided for erection purposes shall be so made that they do not weaken the permanent structure or impair serviceability.

[3)] Available from HMSO, 49 High Holborn, London WC1V 6HB (for personal callers) or by post from HMSO Publications Centre, PO 276, London SW18 5DT.

4.7.2 Purlins and sheeting rails

Where anti-sag bars are used, they shall be installed prior to the commencement of fixing the cladding.

4.7.3 Alignment

Each part of the structure shall be aligned as soon as practicable after it has been erected. Permanent connections shall not be made between members until sufficient of the structure has been aligned, levelled, plumbed and temporarily connected to ensure that members will not be displaced during subsequent erection or alignment of the remainder of the structure.

4.7.4 Accuracy of construction

The accuracy with which the steelwork is erected shall be as stated on the drawings or in the design documents. Where values are not specified, those given in **4.8** shall be applied.

Due account shall be taken of the effects of temperature on the structure and on the measuring instruments whenever measurements are made for setting-out and erection or for any subsequent dimensional checks.

4.7.5 Supports and foundations

4.7.5.1 *Positioning and setting-in of foundation bolts*

Foundation bolts shall be set out within the limits for position and level specified in **4.8**

Foundation bolts shall be held firmly in position during all setting-in operations, and care shall be taken to ensure that the full movement tolerances are achieved.

Bolts, threads and nuts shall be protected against damage, cement grout, corrosion, etc. at all stages of construction.

Where tubes are to be concreted into foundations to be used at a later stage for grouting-up of bolt pockets, they shall be securely fixed and effectively sealed to prevent ingress of grout from the surrounding concrete during placing operations.

Pockets formed around fabrication bolts shall be kept clean and free from debris, water, etc.

Proprietary bolting systems shall be used in accordance with the manufacturer's recommendations.

4.7.5.2 *Packings*

Packs, shims and other supporting devices shall be flat, of adequate strength and rigidity, and not larger than necessary. Where packings are to be left in position and subsequently grouted, they shall be placed such that they are totally enclosed by the grout.

4.7.5.3 *Bedding and grouting up of structures*

No grouting shall be carried out until a sufficient portion of the structure (for multistorey buildings, a sufficient number of bottom lengths of stanchions) has been aligned, levelled, plumbed and adequately braced by other structural components which have been levelled and are securely held by their permanent connections.

Immediately before grouting, the space under the steel shall be clear of all debris and free water.

4.8 Erection tolerances

4.8.1 General

Where erection tolerances are not stated on the drawings or in the design documents, the tolerances specified in **4.8.2** to **4.8.6** shall be applied.

NOTE Attention is drawn to the need to consider the cumulative effect of all permitted deviations being at their maximum values concurrently.

4.8.2 Connection to concrete elements

4.8.2.1 *Position*

The position of the centre of any bolt at the point where it connects to the steelwork shall not deviate by more than ± 3 mm from its specified position for bolts rigidly cast-in, nor by more than ± 5 mm for bolts in sleeves. The position of the other end of the bolt shall be set such that any resulting slope of the bolt is not so large as to cause difficulties in fitting the connection to the structural frame.

4.8.2.2 *Projection of bolt end*

The projection of the end of the bolt shall not deviate from that specified by more than + 25 mm or – 5 mm.

4.8.2.3 *Movement tolerance for bolts in sleeves*

It shall be possible to move the bolt to the full extent of the sleeve as provided.

4.8.3 Column bases

4.8.3.1 *Position in plan*

The position in plan of a steel column at the base shall not deviate from the specified position relative to the site gridlines by more than 10 mm along either of the principal setting-out axes.

4.8.3.2 *Level*

The level of the underside of a steel base plate shall not deviate from the specified level by more than ± 10 mm.

4.8.4 Plumbing and alignment of columns

4.8.4.1 *Single-storey columns*

The deviation of the top of a column from its specified position relative to the base shall not exceed the greater of 5 mm or 1/600 of the height base to cap in any direction, except in the case of the deviation of the tops of the columns of a portal frame measured in the plane of the frame.

4.8.4.2 *Multistorey columns*

The deviations of the columns at any level shall not exceed the greater of 5 mm or 1/600 of the storey height over the actual positions of the columns at the level immediately below.

The deviations of the columns at the topmost storey relative to required positions at the foundations shall not exceed 5 mm/storey.

4.8.5 Position in plan of members

Members other than columns shall not deviate from their specified position relative to the columns to which they are connected by more than 5 mm.

4.8.6 Levels

The level of the top of the steelwork at any storey shall be within ± 10 mm of the specified level, and shall not deviate by more than ± 5 mm within any distance of 5 m measured at that storey level.

4.9 Protective treatment

All preliminary and protective treatments shall be carried out as stated on the drawings or in the design documents.

Where the thickness of the material is less than 4 mm, all steel parts shall receive protective treatment before they leave the fabricating works, sufficient at least to resist environments likely to be met in the period of transport, storage on site and initial erection.

NOTE BS 5493 and DD 24 give guidance on protective treatments. Reference may also be made to PD 6484.

Areas of steel which are not to be treated or coated, or are to be clean and free from loose rust, loose scale, oil, dirt or paint, shall be clearly indicated on the drawings.

Surfaces in contact but inaccessible after assembly (other than the interiors of sealed hollow members) shall receive their specified protective treatment before assembly.

Welds and adjacent parent metal shall not be painted prior to deslagging, inspection and approval.

Section 5. Manufacturing and fabrication tolerances

5.1 General

The tolerances set out in this section shall be considered as representative of those which have been assumed in designs carried out in accordance with Parts 4, 5 and 6 of this standard.

NOTE 1 It may be necessary to specify other tolerances to suit particular applications.
NOTE 2 For complex sections the tolerances should be agreed with the manufacturer.

Notwithstanding the specified tolerances on individual components the structure shall be fabricated in such a way that it can be erected within the specified erection tolerances (see **4.8**).

NOTE 3 The tolerances on cold formed sections apply only to open section. Tolerances for cold formed structural hollow sections are given in BS 6363.

5.2 Dimensional tolerances: cold formed open sections

5.2.1 Position of measurement

Cross-sectional dimensions, other than thickness, shall be measured at points not less than 200 mm from the ends of the member.

5.2.2 Thickness

The thickness tolerances shall be as given in the relevant British Standard for the steel used in the manufacture of the cold formed section.

5.2.3 External dimensions

In open sections, the tolerances on external dimensions of internal elements bounded by two corner radii as shown in Figure 1 shall be given in Table 1.

Table 1 — Internal elements of open sections

Wall thickness	Permitted deviations for nominal plate dimensions *B*			
	≤ 50	> 50 ≤ 100	> 100 ≤ 200	> 200
mm	mm	mm	mm	mm
< 3	± 0.75	± 1.0	± 1.25	± 2.0
≥ 3 < 6	± 1.0	± 1.25	± 1.5	± 2.5
≥ 6 < 8	± 1.25	± 1.5	± 1.75	± 3.0

NOTE In a range of proprietary sections having varying thicknesses, manufacturers usually quote nominal dimensions. Because of rolling techniques the exact measurements vary with the thickness and should be ascertained when checking dimensional tolerances.

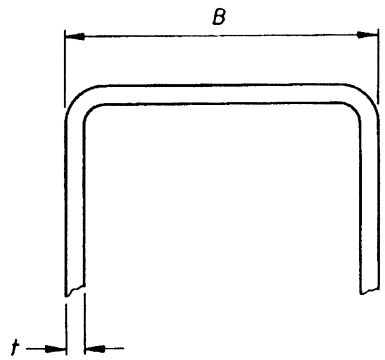


Figure 1 — Internal element of open section

The tolerances on external dimensions of outstand elements bounded by a corner radius and a free end, as shown in Figure 2, shall be given in Table 2.

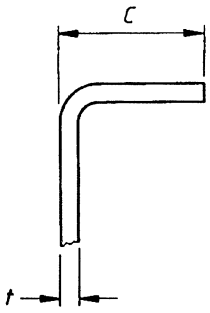


Figure 2 — Outstand element

Table 2 — Outstand elements

Condition	Thickness	Nominal plate dimensions *C*	Permitted deviation
	mm	mm	mm
Milled edge	< 3	≤ 110	± 2.0
	≥ 3 < 8	≤ 110	± 3.0
Sheared edge	< 3	≤ 110	± 1.0
	≥ 3 < 8	≤ 110	± 1.75

NOTE In a range of proprietary sections having varying thicknesses, manufacturers usually quote nominal dimensions. Because of rolling techniques, the exact measurements vary with the thickness and should be ascertained when checking dimensional tolerances.

5.2.4 Length

The length of a member shall not deviate from its specified length by more than ± 3 mm.

5.2.5 Angular tolerances

The angle between adjacent elements of a section shall not deviate from the specified angle by more than ± 1°.

5.2.6 Straightness

The deviation e of a member from straightness (or its intended shape) shall not exceed 3 mm or $L/500$, whichever is more (see Figure 3).

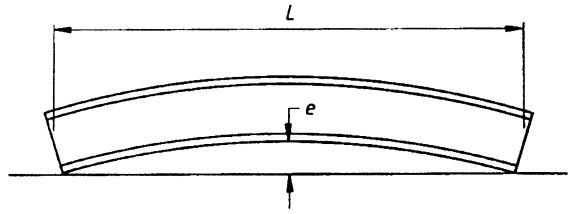


Figure 3 — Deviation from straightness for cold formed sections

In the case of complex cross sections, such as markedly asymmetric sections, the permitted deviations from straightness shall be agreed between the designer and the manufacturer.

5.2.7 Angle of twist

The angle of twist shall not exceed 1°/m of length.

In the case of complex cross sections the permissible angle of twist shall be agreed at the time of enquiry and order.

5.2.8 Compound members

Dimensional tolerances for compound members made up from two or more sections and built-up structural elements, such as lattice girders, shall be agreed between the designer and the fabricator or manufacturer.

5.3 Dimensional tolerances: profiled sheets

5.3.1 Thickness

The thickness tolerances shall be as given in the relevant British Standard for the steel used in the manufacture of the profiled sheet.

5.3.2 Length

The length of a sheet shall not deviate from its intended length by more than ± 5 mm, except where different tolerances are agreed in advance between the designer and the manufacturer.

NOTE 1 Where sheets are situated between adjacent components, it may be necessary to specify zero positive tolerances.

NOTE 2 For very long sheets larger tolerances may be appropriate.

5.3.3 Out-of-squareness

The deviation e of a profiled sheet from squareness, measured at the orthogonal projection of a transverse end onto a longitudinal edge (see Figure 4), shall not exceed 3 mm.

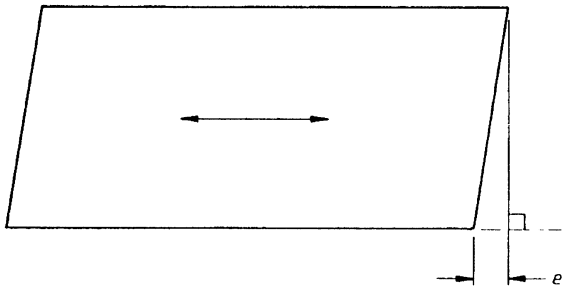


Figure 4 — Deviation from squareness

5.3.4 Straightness

The deviation from straightness e, including any parallel bulging (see Figure 5) of the longitudinal edges of a profiled sheet shall not exceed 2 mm/m of length up to a maximum of 10 mm.

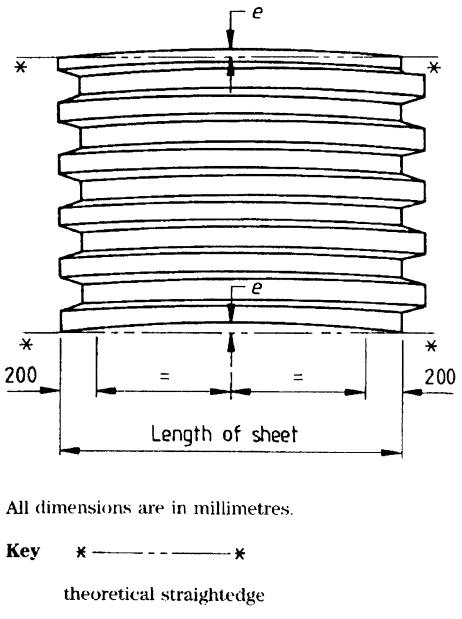


Figure 5 — Deviation from straightness for profiled sheets

5.3.5 Bulging or contraction

The contraction or bulging e (see Figure 6) over the length of a profiled sheet shall not exceed 10.0 mm for profiles not exceeding 55 mm in depth, and 12.5 mm for profiles greater than 55 mm in depth.

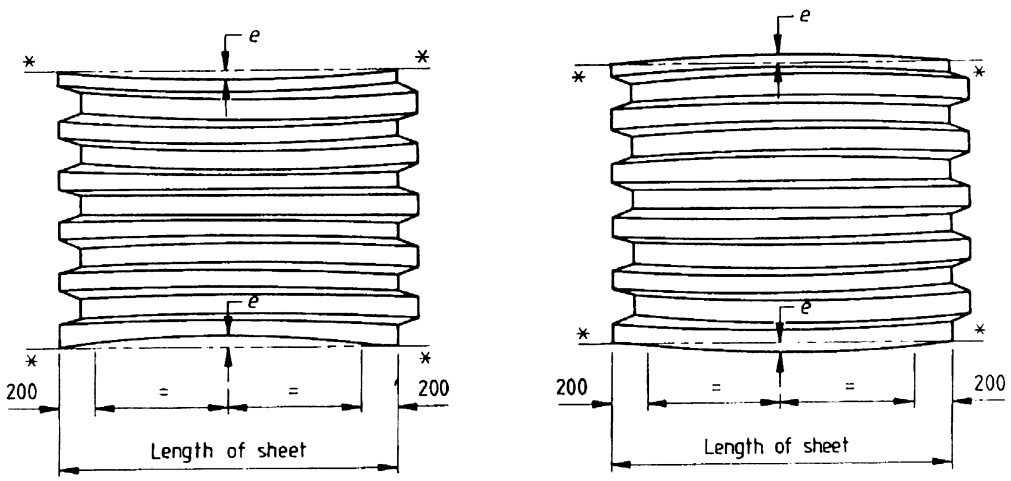
5.3.6 Dimensions of profiled sheets

For sheets with a nominal thickness of 0.35 mm to 1.2 mm, the deviations of the profile dimensions given in Figure 7 shall not exceed the permitted deviations given in Table 3, except where different tolerances are agreed in advance between the designer and the manufacturer.

Table 3 — Profiled sheets

Profile dimension	Permitted deviation
Cover width *W*	± 5 mm
Profile depth *D*	+ 2 mm or – 1 mm
Flange width *B*	± 2 mm

Tolerances for material outside this range of thickness shall be agreed between the designer and the manufacturer.



(a) contraction

(b) bulging

All dimensions are in millimetres.

Key * —— – – – – —*

theoretical straightedge

Figure 6 — Bulging and contraction of a profiled sheet

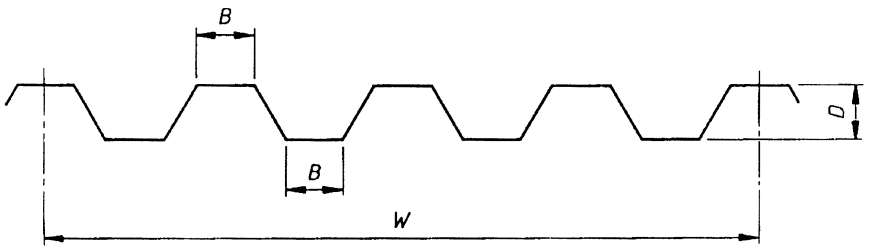


Figure 7 — Profiled sheet

Appendix A General recommendations for steelwork tenders and contracts

Reference should be made to appendix A of BS 5950-2:1985 which gives recommendations for general information. When drawing up a contract those points relevant to structures in cold formed sections and profiled sheets should be considered.

If the use of a special cold formed section or profiled sheet is being considered the manufacturer should be consulted to determine optimum ordering quantities.

Publication(s) referred to

BS 639, *Specification for covered carbon and carbon manganese steel electrodes for manual metal-arc welding.*

BS 641, *Dimensions of small rivets for general purposes (obsolescent).*

BS 1140, *Specification for resistance spot welding of uncoated and coated low carbon steel.*

BS 1449, *Steel plate, sheet and strip.*

BS 1449-1, *Carbon and carbon-manganese plate, sheet and strip.*

BS 2901, *Specification for filler rods and wires for gas-shielded arc welding.*

BS 2901-1, *Ferritic steels.*

BS 2989, *Specification for continuously hot-dip zinc coated and iron-zinc alloy coated steel of structural qualities: wide strip, sheet/plate and slit wide strip.*

BS 3692, *Specification for ISO metric precision hexagon bolts, screws and nuts. Metric units.*

BS 4174, *Specification for self-tapping screws and metallic drive screws.*

BS 4190, *Specification for ISO metric black hexagon bolts, screws and nuts.*

BS 4320, *Specification for metal washers for general engineering purposes. Metric series.*

BS 4395, *Specification for high strength friction grip bolts and associated nuts and washers for structural engineering.*

BS 4604, *Specification for the use of high strength friction grip bolts in structural steelwork. Metric series.*

BS 4620, *Specification for rivets for general engineering purposes.*

BS 4933, *Specification for ISO metric black cup and countersunk head bolts and screws with hexagon nuts.*

BS 5135, *Specification for welding of carbon and carbon manganese steels.*

BS 5427, *Code of practice for performance and loading criteria for profiled sheeting in building.*

BS 5493, *Code of practice for protective coating of iron and steel structures against corrosion.*

BS 5531, *Code of practice for safety in erecting structural frames.*

BS 5950, *Structural use of steelwork in building.*

BS 5950-1, *Code of practice for design in simple and continuous construction: hot rolled sections*[4)].

BS 5950-2, *Specification for materials, fabrication and erection: hot rolled sections.*

BS 5950-3, *Design in composite construction.*

BS 5950-3.1, Code of practice for design of simple and continuous composite beams.

BS 5950-4, *Code of practice for design of floors with profiled steel sheeting.*

BS 5950-5, *Code of practice for design of cold formed sections.*

BS 5950-6, *Code of practice for design of light gauge profiled sheeting.*

BS 5950-8, *Code of practice for fire resistant design*[4)].

BS 6084, *Method of test for comparison of prefabrication primers by porosity rating in arc welding.*

BS 6363, *Specification for welded cold formed steel structural hollow sections.*

BS 6830, *Specification for continuously hot-dip aluminium/zinc alloy coated cold rolled carbon steel flat products.*

BS EN 10002-1, *Tensile testing of metallic materials.*

BS EN 10002-1, *Method of test at ambient temperature.*

BS EN 10025, *Specification for hot rolled products of non-alloy structural steels and their technical delivery conditions.*

BS EN 10130, *Specification for cold rolled low carbon steel flat products for cold forming: technical delivery conditions.*

BS EN 10142, *Specification for continuous hot-dip zinc coated low carbon steel sheet and strip for cold forming: technical delivery conditions.*

DD 24, *Recommendations for methods of protection against corrosion on light section steel used in building.*

PD 6484, *Commentary on corrosion at bimetallic contacts and its alleviation.*

[4)] Mentioned in the foreword only.

GS 28, *Safe errection of structures. HSE Guidance Note 28. The Health and Safety Executive. HMSO publication*[5)].

GS 28-1, *Initial design and planning.*

GS 28-2, *Site management and procedures.*

GS 28-3, *Working places and access.*

GS 28-4, *Legislation and training.*

ECCS 41, *European Recommendations for Steel Construction: Good practice in steel cladding and roofing. Published by the European Convention for Constructional Steelwork. Available from the Steel Construction Institute, Silwood Park, Buckhurst Road, Ascot, Berkshire SL5 7QN.*

[5)] Available from HMSO, 49 High Holborn, London WC1V 6HB (for personal callers) or by post from HMSO Publications Centre, PO 276, London SW18 5DT.

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