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MANUFACTURING TOLERANCES FOR PROFILED METAL ROOF AND WALL CLADDING



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For up to date information on metal roof and wall cladding, including downloadable construction details, visit www.mcrma.co.uk.

General

MCRMA members profile self supporting roof and wall cladding panels in accordance with the harmonised European Standard BS EN 14782 and BS EN 5081 series product standards.

In general, MCRMA profiling companies will purchase pre-coated coil with appropriate quality certification as recommended by the British Standards from international metal producers.

The tolerances relate to the profiler's nominal dimensions as measured at site on profiled sheets delivered in their original packaging before handling or fixing.

Secret fix sheet systems may require smaller tolerances to form a functional roof, details of which will be provided by the profiler. Secret fix sheets may be profiled on site to avoid problems of transporting long lengths; in such cases the dimensional tolerances should be no different from those of factory production.

The following tolerances are defined with methods of measurement:

- 1 Sheet length
- 2 Sheet cover width, contraction or bulge
- 3 Straightness
- 4 Squareness
- 5 Depth of profile
- 6 Radius and angle of curved sheets
- 7 Ripple of sheet side lap

Caution: The lifting of slings of bundles without edge protection and spreader beams across the sheet width may cause distortion of the profile and damage to the sheet side lap. Some variation in sheet cover width can be adjusted during installation.

Guidance is given on the thickness range of coated sheets to be expected on site, based on the appropriate British Standards. The metals included in the quoted British Standards are aluminium, copper, zinc, steel and stainless steel with or without decorative coatings.

Products manufactured in accordance with BS EN 14782 may be CE marked, although currently the United Kingdom has not adopted mandatory certification of construction products. CE marking does not confirm that a product will comply with the appropriate Building Regulations for England and Wales, Scotland or Northern Ireland. In particular, the national Building Regulations may require additional fire performance certification – MCRMA members will provide advice on request.

Methods for measuring dimensional tolerances

Any sheet to be measured shall be placed on at least three equally spaced supports which are on a rigid flat surface.

Unless otherwise stated, all measurements are to be made at least 200mm from the ends of the profiled sheet.

Where necessary, the measurement shall be corrected to 20°C for example, the length of long aluminium sheets using the thermal expansion data given in BS EN 14782.

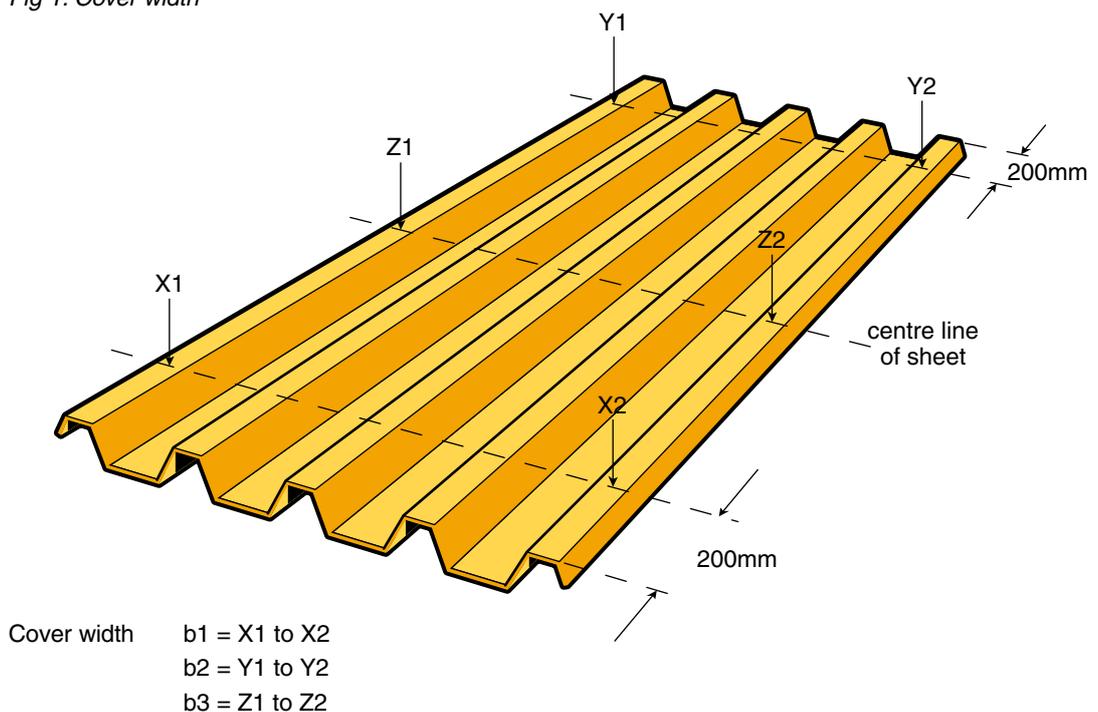
The stated tolerances apply to profile depths less than 65mm; deeper profiles which are normally designed for decking are generally more flexible and therefore have larger tolerances.

2.1 Sheet length

The length of a sheet (L) shall be measured along the central axis of the sheet:

L ≤ 3000mm	- 5mm
	+ 10mm
L > 3000mm	- 5mm
	+ 20mm

Fig 1: Cover width



Where sheets are to be fitted between other building components for example, horizontal cladding between columns, smaller tolerances may be agreed upon by the profiler and purchaser at the time of ordering.

2.2 Sheet cover width, contraction or bulge

The cover width b1 and b2 shall be measured at a distance from the sheet ends as shown in figure 1. Both measurements shall be within the stated tolerance.

Cover width b	- 5mm
	+ 5mm

A third measurement, of cover width b3, shall be made across the centre of the sheet to determine contraction or bulging of the profile. This b3 measurement shall be within the stated tolerance of the average b where $b = 0.5 \times (b1 + b2)$.

Measurements of b are made between the centre of the outermost crowns.

2.3 Straightness

The sheet straightness is measured as the deviation of the edge crown from a straight line between the two points X and Y shown in figure 1.

Maximum deviation 2.0mm per metre of sheet length not exceeding 10mm.

2.4 Squareness

The sheet squareness is defined as S in figure 2, where b is the nominal cover width.

$S \leq 0.5\%$ of b mm for example, 1000mm cover width sheet tolerance 'S' less than or equal to 5mm.

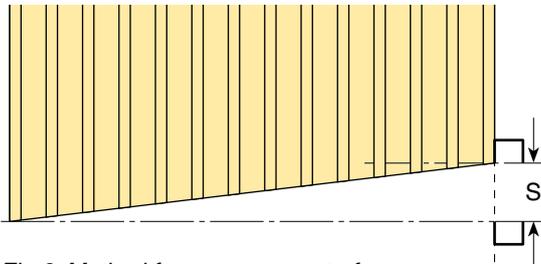


Fig 2: Method for measurement of squareness

2.5 Depth of profile

The depth of profile h is defined in figure 3, where the average depth of the profile is measured.

$$h = 0.5 \times (h_1 + h_2)$$

tolerance for profile depth h - 2mm
 + 2mm



Fig 3: Method for measurement of profile depth

2.6 Radius and angle of curved sheets

Curved profiled sheets with nominal radius R

Curves with radii larger than 1000mm tend to be more flexible and therefore both the radius and angle are too variable to be the subject of universal tolerances. The profiler will provide tolerances for a particular profile section and curve on request.

Radius includes depth of profile for ridge and eaves curves. For large radius curves for example, barrel vault roofs, consult manufacturer before ordering.

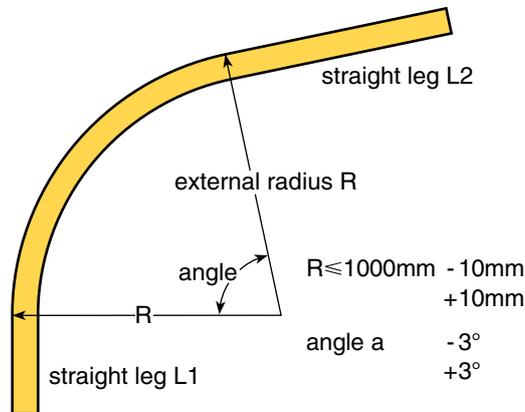


Fig 4: Curve dimensions

Tolerance on length of any exposed straight leg for example, down wall on curved eave should be agreed with the manufacturer before ordering.

2.7 Ripple of sheet side lap

The 2mm thick gauge should not penetrate the side lap to its full 5mm depth at any point more than 500mm from each end of the sheets.

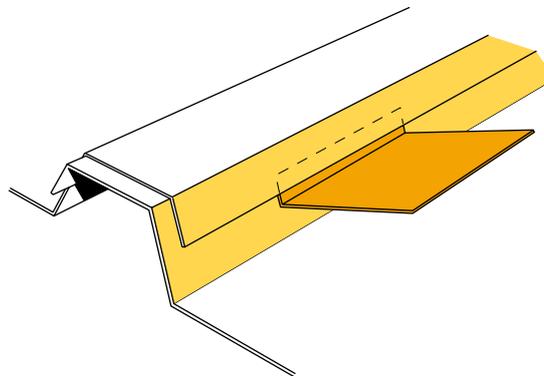


Fig 5: Method of checking edge ripple

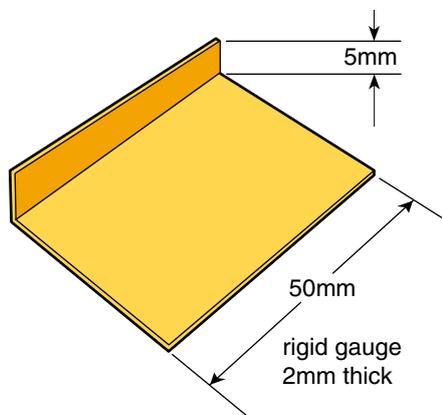


Fig 6: Gauge for checking edge ripple

Thickness of metal

Mill finish sheets for example, aluminium should have a thickness tolerance in accordance with the relevant British Standard for the metal coil. Coated metals, including steel, may have a protective coating and decorative finish to both sides, each with coating tolerances.

Unless otherwise agreed, the coil used for profiling shall be Class 1: full minus nominal tolerance according to BS EN 508 series and BS EN 10143.

3.1 Nominal coating thickness for common types of finish

Coating	Application	Tolerances on coating nominal thickness ²
200 µm plastisol	external embossed finish	minus 25 µm
25 µm PVDF	external smooth finish	minus 7 µm
25 µm polyester	external smooth finish	minus 7 µm
White liner finish	internal finish	minus 5 µm
100 micron plastisol	internal finish	minus 20 µm
Reverse side coating		minus 5 µm

Table 1

On a building site it is difficult to remove the coatings to measure the base metal thickness more than 40mm from the cut edge. Table 2 has been prepared as a guide to the expected thickness range for common nominal thickness products. This table can be used for checking the nominal thickness of flashings in addition to profiled sheets.

3.2 Nominal sheet thickness for common types of finish

Coating	Typical application	Total nominal thickness and minimum thickness
Hot dip zinc coated steel with backing coat		
0.7mm + 200 µm plastisol	roofing and flashings	nominal 0.92mm thicker than 0.785mm
0.55mm + 200 µm plastisol	wall cladding	nominal 0.75mm thicker than 0.645mm
0.55mm + 25 µm PVDF	wall cladding	nominal 0.57mm thicker than 0.488mm
0.4mm white liner sheet	internal ceilings, soffits and walls	nominal 0.42mm thicker than 0.348mm
Aluminium		
0.9mm mill finish	roofing and flashings	

Table 2

Reference documents

BS EN 14782: Self-supporting metal sheet for roofing, external cladding and internal lining – Product specification and requirements. *This document contains the requirements for CE marking of products manufactured to the following four standards:*

BS EN 508: Roofing products from metal sheet – Specification for self-supporting products of steel, aluminium or stainless steel sheet:-

Part 1: Steel

Part 2: Aluminium

Part 3: Stainless steel and

BS EN 506: Copper or zinc sheet.

BS 5427: Code of practice for the use of profiled sheet for roof and wall cladding on buildings – Part 1. Design. *This code of practice gives recommendations for use and expected durability of profiled sheeting in the UK environment.*

BS EN 10169 -1: Continuously organic coated (coil coated) steel flat products – Part 1: General information (definitions, materials, tolerances, test methods).

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

BS EN 10169 -3 Continuously organic coated (coil coated) steel flat products – Part 3: Products for building interior applications.

Currently there are no equivalent standards for coatings on metals other than steel.

Steel standards for grades of material:

BS EN 10326: 2004 has replaced BS EN 10147 and together with BS EN 10327 supersedes BS EN 10214 and BS EN 10215.

BS EN 10327: 2004 has replaced BS EN 10146 and together with BS EN 10326 supersedes BS EN 10214 and BS EN 10215.

MCRMA technical papers

- No 1 Recommended good practice for daylighting in metal clad buildings
- No 2 Curved sheeting manual
- No 3 Secret fix roofing design guide
- No 4 Fire and external steel-clad walls: guidance notes to the revised Building Regulations, 1992 (*out of print*)
- No 5 Metal wall systems design guide
- No 6 Profiled metal roofing design guide
- No 7 Fire design of steel-clad external walls for building: construction, performance standards and design
- No 8 Acoustic design guide for metal roof and wall cladding
- No 9 Composite roof and wall cladding panel design guide
- No 10 Profiled metal cladding for roof and walls: guidance notes on revised Building Regulations 1995 parts L & F (*out of print*)
- No 11 Flashings for metal roof and walls: design, detailing and installation guide
- No 12 Fasteners for metal roof and wall cladding: design, detailing and installation guide
- No 13 Composite slabs and beams using steel decking: best practice for design and construction
- No 14 Guidance for the design of metal roofing and cladding to comply with Approved Document L2: 2001
- No 15 New applications: composite construction
- No 16 Guidance for the effective sealing of end lap details in metal roofing constructions

Please note: Publications can be downloaded from the MCRMA web site at www.mcrma.co.uk

Liability

Whilst the information contained in this design guide is believed to be correct at the time of going to press, the Metal Cladding and Roofing Manufacturers Association Limited and its member companies cannot be held responsible for any errors or inaccuracies and, in particular, the specification for any application must be checked with the individual manufacturer concerned for a given installation.

The diagrams of typical constructions in this publication are illustrative only.



Metal Cladding & Roofing Manufacturers Association Ltd
106 Ruskin Avenue Rogerstone Newport South Wales NP10 0BD
01633 895633 | mcrma@compuserve.com | www.mcrma.co.uk