3 METAL AND PLASTIC ROOFING

3.1 GENERAL

3.1.1 Scope

1 This Part specifies requirements for use of metal and plastic roofing systems for buildings and structures.

2 Related Sections are as follows:

Section 15 Thermal Insulation of buildings
Section 18 Carpentry, Joinery and Ironmongery

3.1.2 References

1 The following standards are referred to in this Part:

BS 1210.....Wood Screws

BS 1474.....Wrought aluminium and aluminium alloys for general engineering purposes.
Bars, extruded round tube and sections

BS 1494.....Fixing accessories for building purposes

BS 3083.....Hot-dip zinc coated and hot-dip aluminium/zinc coated corrugated steel sheets for general purposes

BS 3416.....Bitumen based coatings for cold application, suitable for use in contact with potable water

BS 4154.....Corrugated plastic translucent sheets made from thermo-setting polyester
resins (glass fibre reinforced)

BS 4868.....Profiled aluminium sheet for building

EN 485 .....Aluminium and aluminium alloys - Plate, sheet and strip

3.2 FITTINGS AND ACCESSORIES

3.2.1 Fittings for Rigid Sheet Roofing

1 Fittings are to match the profile of the specified sheet and shall be supplied by the same manufacturer.

3.2.2 Fixing Accessories

1 Screws for fixing aluminium roof edging, aprons, and the like are to be stainless steel to BS 1210, minimum 50 mm long.

2 Hook bolts and nuts shall comply with BS 1494, Part 1 and be 8 mm diameter cadmium or zinc coated steel with plastic sleeves or applied plastic coating, shaped to suit the sheets and roof members and complete with plastic washers.

3 Seam bolts and nuts for aluminium sheets are to be aluminium and to galvanized sheets to be galvanized steel, 6 mm diameter and 40 mm long complete with plastic washers.

4 Filler pieces at ridges and eaves are to be approved pre-moulded cellular plastic or rubber bitumen units to fit exactly the contours of the corrugations.

5 Sealant strip are to be approved flexible expanded polyurethane foam strip impregnated with waxes and/or resins having an elastic recovery of 98% minimum and a density of not less than 145 kg/m^3.

3.3 ALUMINIUM SHEET FLASHING AND APRONS

3.3.1 Materials Description

1 Aluminium sheet flashings, aprons, etc., are to be fabricated from 99.8 % aluminium sheet and strip to EN 485, material designated 1080A, 0.9 mm thick.

2 Aluminium roof edging is to be fabricated form materials 6063-TB or 6063-TF complying with BS 1474 to profiles to suit the verges and roof covering material.

3 Black bitumen coating solution shall comply with BS 3416, Type 1.

3.3.2 Installation of Aluminium Flashings and Aprons

1 Flashings, aprons, and the like, are to be formed from sheets not more than 1800 mm long and to be lapped a minimum of 75 mm at intersections.

2 After folding and dressing, two coats of black bitumen coating solution are to be applied to all areas, which will come into contact with materials containing cement. Repeated folding and dressing should be avoided to prevent work hardening.

3 The top edge of flashings are to be provided with a 13 mm turn-back to act as a waterstop and recessed a minimum of 25 mm into the wall. The flashing are to be fixed with 20 x 20 mm strips of aluminium folded into a wedge shape, covered with two coats of bitumen solution and driven into the full depth of the recess at 400 mm centres. Upon completion of fixing the recess are to be pointed in Class M6 cement mortar in accordance with Part 2 of Section 13, Masonry.

4 Materials containing steel, copper, brass or bronze should not be allowed to come into contact with aluminium.

3.4 CORRUGATED METAL SHEETS

3.4.1 Profiled Aluminium Sheets

1 Profiled aluminium sheets shall comply with BS 4868 and be manufactured from aluminium alloy to EN 485, material designation 3103-H8, with a minimum tensile strength of 175 N/mm^2. Unless otherwise specified, Profile S, with a minimum thickness of 0.9 mm shall be installed.

3.4.2 Hop-Dip Zinc Coated Corrugated Steel Sheets

1 Hop-Dip zinc coated corrugated steel sheets shall comply with BS 3083 and shall have a sheet thickness of 0.9 mm and minimum 450 g/m^2 zinc coating.

3.4.3 Installation of Corrugated and Troughed Roof Coverings

1 The sheeting is to be laid with the open joint of side laps away from the prevailing wind. The Contractor is to obtain the approval of the Engineer as to which end of the structure the laying is to commence before beginning sheeting work.

2 The eaves course are to be laid first and subsequent sheets laid in tiers up to the roof from eaves to ridge, aligning sheets on both slopes on double pitched roofs.

3 Corrugations or troughs are to be in line from eaves to ridge and eaves and verges are to maintain proper alignment.

4 Sheets are to be cut to clean, true lines with no distortion. All burrs, drilling swarf or dust and any other foreign matter to be removed before positioning sealing strips, filler pieces and washers.

5 Openings for outlets, vent pipes, etc., are to be cut to the minimum size necessary. Vent pipes and the like should always pass through the centre line of the crown and are to be offset below roof level if necessary.

6 Holes through the sheets are to be drilled 2 mm larger than the diameter of the bolt and always through the crown of the profile. No hole should be nearer than 40 mm to the end of the sheet. All fixings are to be of the specified type and size and be in the correct position true to line and secure.

7 Fittings are to be fixed, where possible, by the same bolts that secure the sheeting.

8 Filler pieces shall be installed between the corrugations or troughs and flat surfaces or supports at the end of sheet runs wherever necessary to ensure airtightness of the structure.

9 A movement joint shall be provided in all lengths over 45 m. The joint is to be formed by installing an approved proprietary movement joint cover in a suitably sized space between the sheet.

3.4.4 Fixing Profiled Aluminium Sheets

1 Corrugated or troughened sheets are to be laid to comply with the requirements of with Tables 3.1 and 3.2.

Table 3.1
Minimum Laps for Roof Sheeting

Material	Slope	End Lap	Side Lap
		mm	Corrugations
Corrugated aluminium sheet	more than 15° less than 15° vertical	150 230 100	1½ 1½ 1
Troughed aluminium sheet	less than 15° more than 15° vertical	150 230 100	1 1 1
Corrugated Galvanized Sheet	more than 15° less than 15°	150 230	1½ 1½

Table 3.2
Maximum Permissible Dimensions for Roof Sheeting

Sheet Material	Maximum Purlin Spacing (mm)	Maximum Rail Spacing (mm)	Maximum Unsupported Overhang (mm)
Corrugated aluminium	1350	1500	150
Corrugated galvanized steel	2200	2400	350

2 The centre line of end laps to coincide as nearly as possible with the centre line of supports, or the back of angle purlins. All end laps to be fully supported.

3 Roofing sheets are to be fixed to metal purlins by hook bolts. Each bolt is to be fitted with a metal washer shaped to the profile of the sheet and placed on the outer face together with a plastic, or similar approved material, sealing washer, positioned between the metal washer and sheet so that the bolt hole is sealed when the bolt is tightened. The bolt should be tightened only sufficiently to seat the washer and so as to permit slight movement between the structural frame and the sheeting.

4 Each sheet is to be fixed at every purlin or rail by at least two bolts situated at the side laps or edges together with intermediate fastenings at maximum 375 mm centres.

5 In addition to purlin or rail fixings, side laps are to be secured by means of bolts or rivets passing through the crown of the profile at the following maximum centres:

(a) roofs more than 15° pitch 375 to 450 mm centres
(b) roofs less than 15° pitch 300 to 375 mm centres
(c) vertical sheeting 450 mm centres.

6 Ridge cappings are, where possible, to be secured to the roof by the same bolts that secure the sheeting or, if the ridge purlin in not sufficiently near the ridge to permit this, the capping should be secured to the sheeting on each side by seam bolts or rivets at maximum 450 mm centres. The lap of the capping along the ridge should not be less than 150 mm with the open joint away form the prevailing wind.

3.4.5 Fixing Galvanized Corrugated Sheets

1 Galvanised corrugated sheets are to be installed as described in Clause 3.4.3.

3.5 CORRUGATED TRANSLUCENT SHEETS

3.5.1 Materials Description

1 This Section covers pre-formed plastic panels or corrugated translucent sheets made from thermosetting polyester resins to comply with BS 4154 and are to match the profile of the adjoining metal sheets.

2 The colour of plastic panels shall be as designated in the Project Documentation unless otherwise approved by the Engineer.

3.5.2 Submittals

1 Shop drawings for plastic panels shall show details of construction and installation, including profiles, fastener types and flashing details.

2 Plastic panel samples, 750 mm square, shall be submitted for each colour or varying texture finish used.

3.5.3 Fixing Corrugated Translucent Sheets

1 The sheets are to be laid with the same minimum side and end laps as the adjoining sheets. Sealing strips be used where the end lap is less than 300 mm on roof pitches below 15°.

2 Pre-moulded filler strips and clear mastic shall be used to seal laps.

3 Fixing accessories and holes are to be the same as used for the adjoining sheets.

4 Each sheet should be fixed at every purlin or rail by at least two bolts situated at the side laps and three intermediate fastenings for use with galvanized or aluminium corrugated profiles.

5 In addition to purlin or rail fixings, side laps are to be secured by means of seam bolts at maximum 300 mm centres. The use of self-tapping screws or blind rivets are not permitted.

6 Provide neoprene washers under bolt heads. If other fastenings are recommended by plastic sheet manufacturer, install in accordance with manufacturer's recommendations.

END OF PART