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AUGUST 1991 \_\_\_\_\_

# CURVED SHEETING MANUAL

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**MCRMA Technical Paper No. 2**



## Introduction

Curved sheeting is most generally manufactured by pressing cross profiles into the sheet, the cross profiles causing the sheet to curve. The radius of curve is determined by the spacing and depth of these cross profiles.

Smooth curve sheeting, which is manufactured by a process not involving cross profiling, is also available. The design and installation considerations are basically the same, however, the radii available and choice of curves is more limited with smooth curves, therefore these details should be checked with the manufacturers concerned prior to design.

Standing seam curves and large radius curves are not within the scope of this manual.

This manual contains generally accurate information. However, there will be variability of detail between different manufacturers. The curved sheeting design should thus be checked with manufacturer before placing an order.

## CAUTIONS

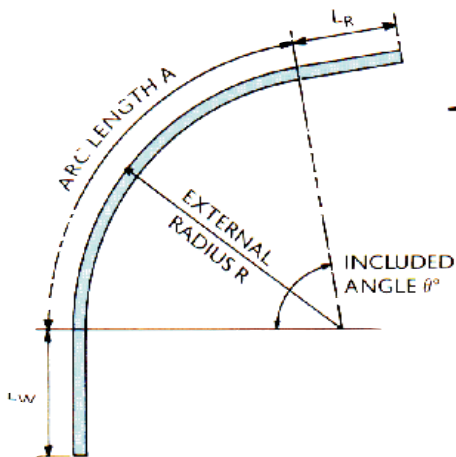
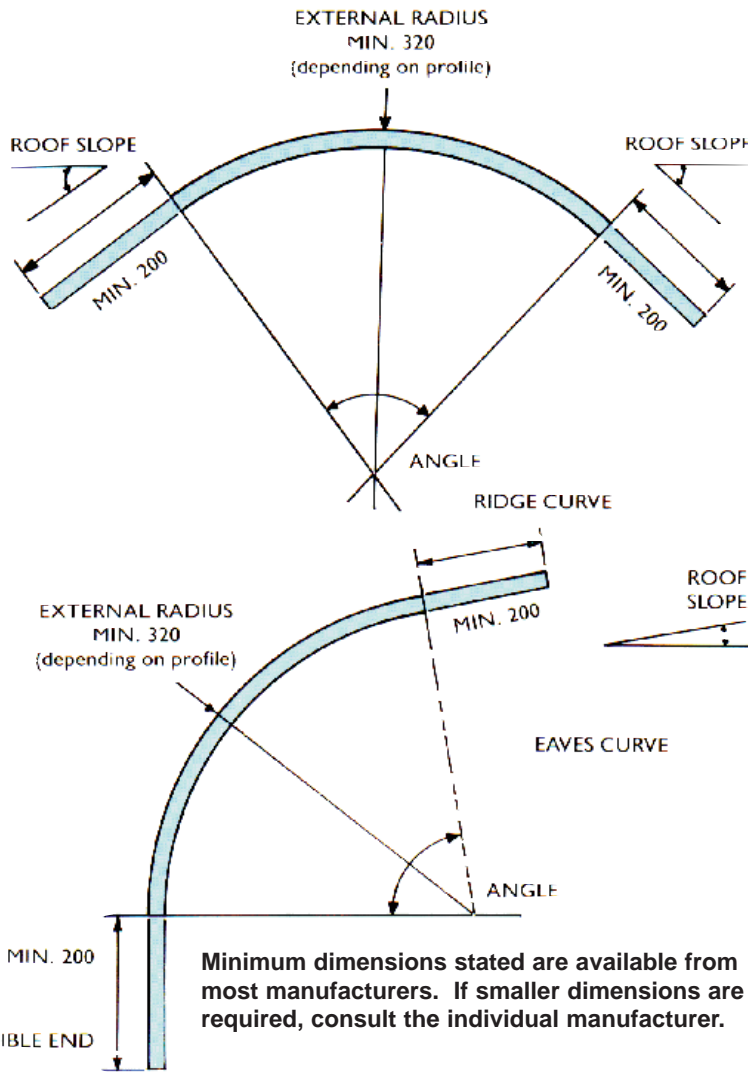
- 1.** Curved sheets are much stiffer than plain sheets and cannot be "bunched" or "stretched" in the same way when fitting. For this reason, designing this type of cladding to a module or fixed grid dimensions is not advisable as building and manufacturing tolerances cannot be compensated.
- 2.** Double curves require even tighter tolerances than single curves. For this reason it may be easier to use single curves and lap joint on site.
- 3.** Metallic paint finishes - special consideration should be given to the grain effect when using metallic paint finishes like PVF<sub>2</sub> metallic silver. Mitred corner units in particular need to be prepared with grain directions similar to the adjacent sheeting.
- 4.** Consideration is required to ensure particular sections can be produced and transported. In general the maximum starting sheet length should be kept to 6 metres or less. Double curves or forward and return angles use more material and handling needs to be carefully considered; if in doubt consult manufacturer.
- 5.** Most profiles include a full rib under lap making it essential to identify to the manufacturer whether the under lap is to be on the left or right of the finished sheet. (See point vii on ordering details).

# Ordering Details

When ordering curved sheet the following information, accompanied by a fully dimensioned drawing will be required.

- (i) Profile
- (ii) Material, finish and colour
- (iii) External radius of curve\*
- (iv) Angle
- (v) Length of straight legs
- (vi) Quantity
- (vii) Handing (*viewed from colourside*)
- (viii) Visible end
- (ix) Total sheet length or external arc length

\* NOTE! Some manufacturers require internal radius.



## USEFUL FORMULAE



$$\text{Arc length } A = \frac{\pi \times R \times \theta^\circ}{180}$$

$$\text{Sheet length} = A + L_W + L_R$$

$$\theta^\circ = 90^\circ - S^\circ$$

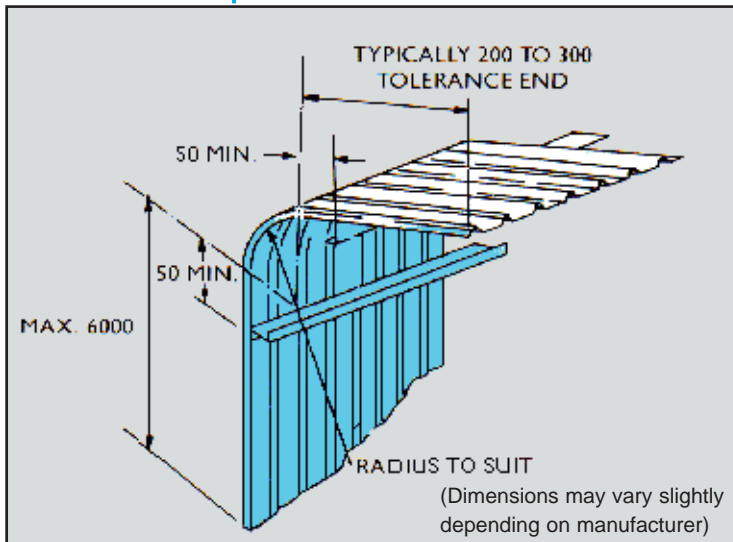
**NOTE:** When calculating outer sheet on an insulated system, R must include insulation void plus profile height.

## NOTES

In order to safeguard the coating, curved sheeting is often supplied with the protection of low-tack strippable plastic film which should be removed immediately after fixing the sheets (stucco embossed aluminium does not require protective film). Most manufacturers have special ordering forms for curved sheets.

## Design details

Curved panels are particularly rigid throughout their section. The dimensional limitations shown here and on page 1 must be borne in mind when detailing. The curved sheet must be designed accordingly, allowing the panels to be laid to fit - not to a specific module, such as required for large areas of rooflights or intermittent windows to cladding.



### END LAPS

**Ridge sheet.** It is recommended that the ridge sheet is lapped on the first purlin down the slope.

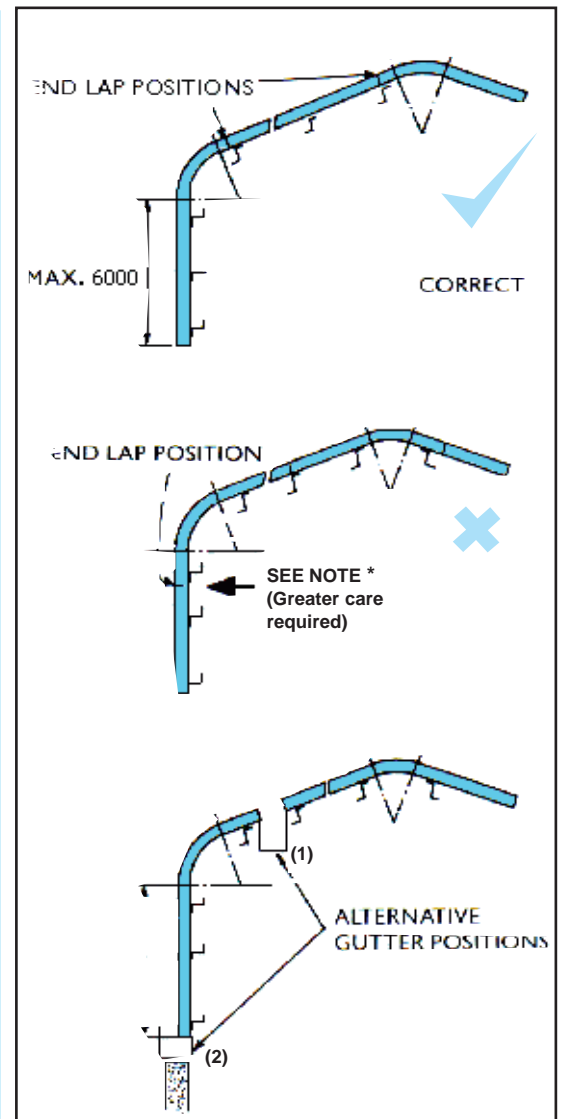
**Eaves sheet.** It is recommended that the eaves sheet ends on the first purlin up the roof slope and extends down the vertical face to at least the second rail down.

\* **Greater care is required** in fixing if the eaves sheet ends at the first rail down; unless the sheets are correctly pushed up the roof, it will cause actual or optical bulging at the eaves line.

### GUTTER POSITION

**(1) Secret eaves gutter.** This minimises water flow down the wall cladding and reduced long term streaking. This gutter position also means that wall and roof sheets can be fixed independently which is an advantage if a curved ridge is used. However, an effective overflow system is essential, as are regular maintenance checks.

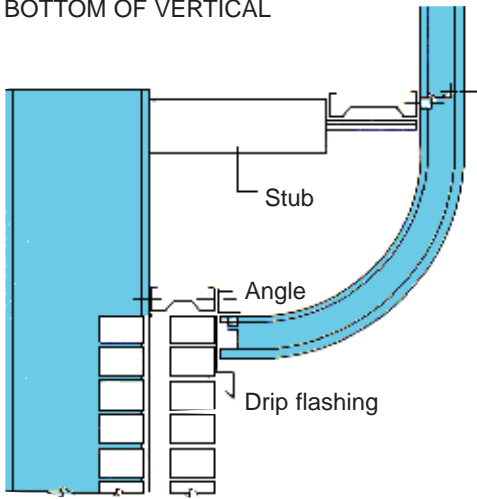
**(2) Base of wall cladding.** This places the gutter outside the building envelope which simplifies anti-condensation and anti-leakage design and detailing.



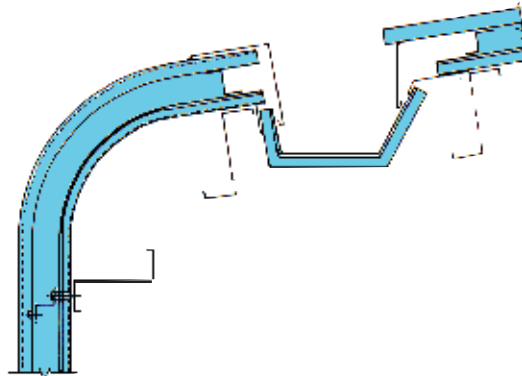
### STEELWORK TOLERANCES

The supporting structure must be plumb and square.  
Purlin and rail tolerance: alignment  $\pm 5\text{mm}$   
roof slope  $\pm 0.5^\circ$

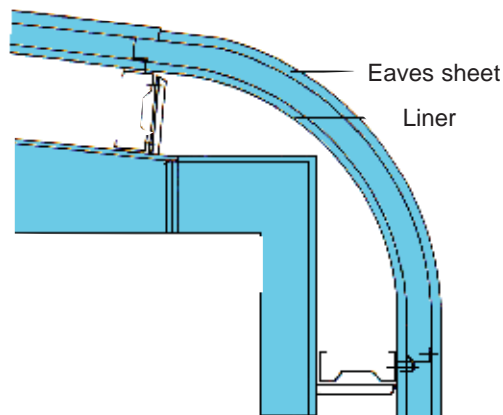
RETURN CURVE/  
BOTTOM OF VERTICAL



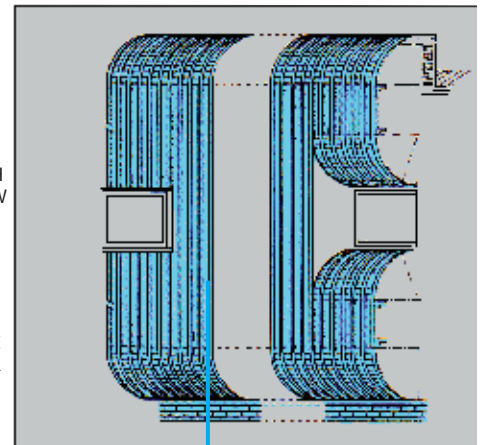
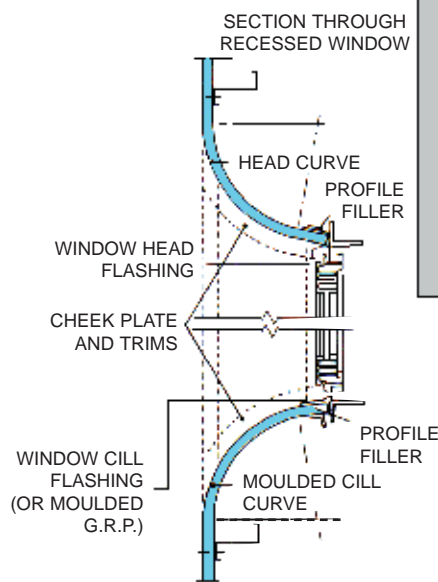
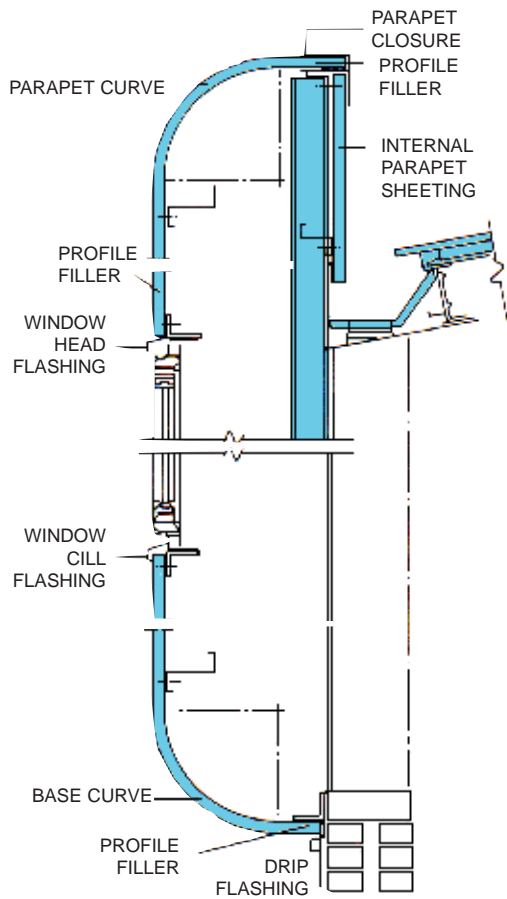
CURVED EAVES GUTTER



EAVES WITHOUT GUTTER



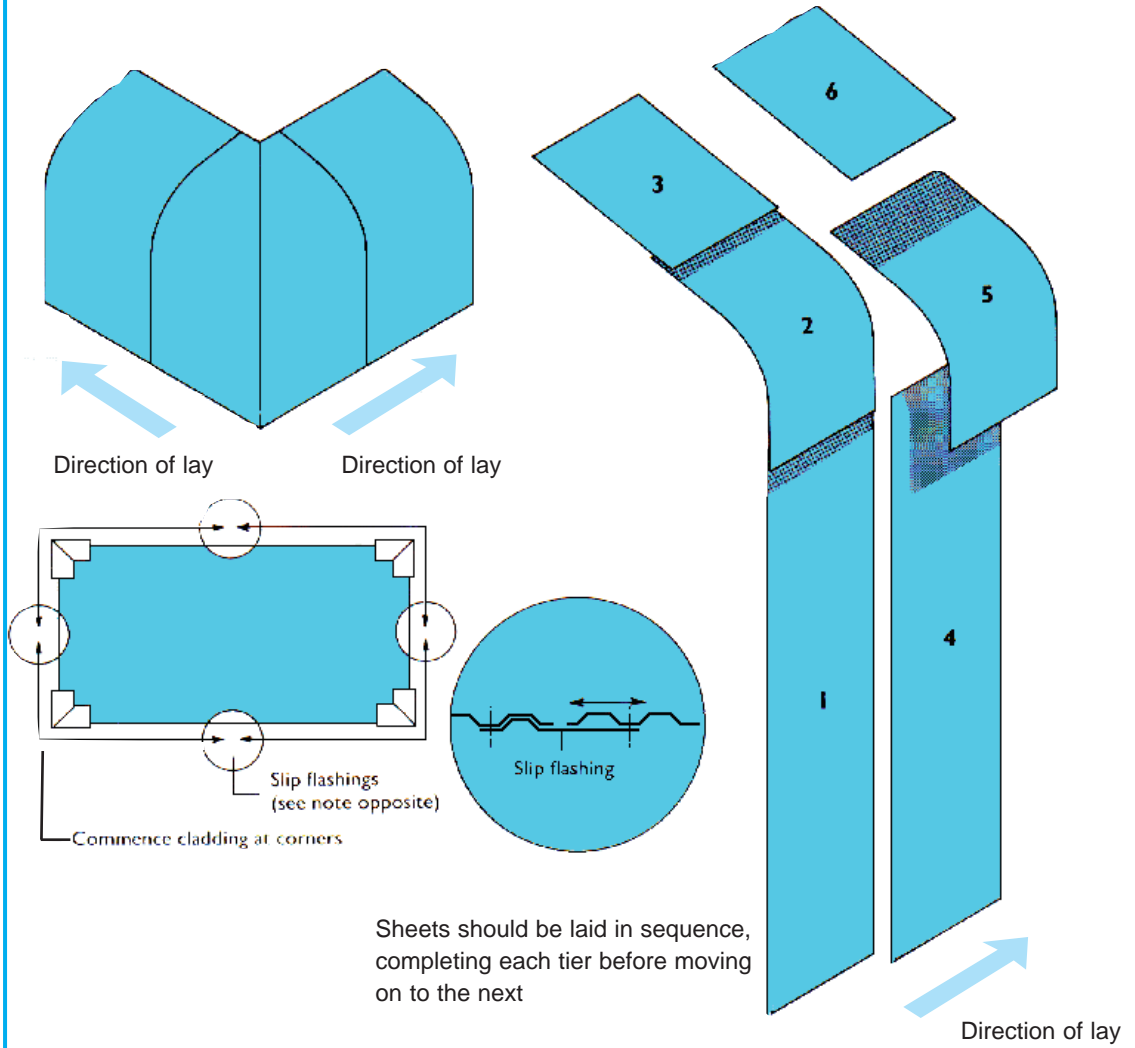
PARAPET AND VERTICAL DETAILS



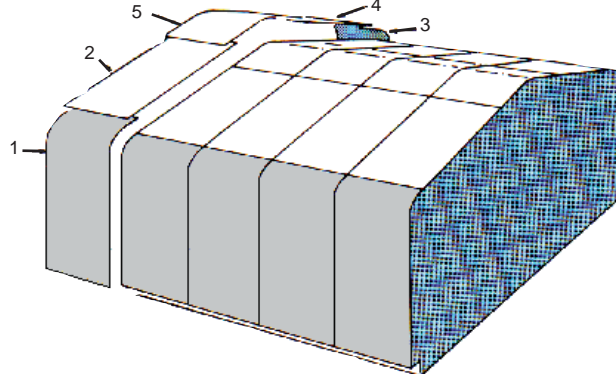
# Installation

Sheets should be laid away from mitred corners.

Sequence where curved ridge is not required.



Sequence of laying where curved ridge is required, and secret eaves gutter is not required



1. For ease of fixing it is recommended that curved sheets have one straight leg not exceeding 1 metre.
2. Preferably the longer leg should be arranged on the vertical wall, the short leg under lapping the roof sheet. However, should circumstances dictate, the long leg may be arranged on the roof slope, but care is required (see design details).
3. Sheets should be fixed one tier at a time. When curved ridges are employed, both slopes on the building should be laid simultaneously. If a curved ridge is required it is much easier to provide a secret gutter at the eaves (gutter position 1), which means that wall and roof sheets can be fixed independently.
4. The first sheet should be loose fixed, ensuring that vertical and horizontal alignment is precise. The side lap should be left free to allow the second tier of sheets to be fitted. Ensure that the datum edge of the sheets is precisely aligned at the lap and secure with a rivet.
5. The curved side laps should then be fitted so that the indentations match. The curved side lap should then be riveted before fixing the sheets to the structure. The procedure should be continued for successive tiers of sheets.
6. Curved sheets are rigid and will not spread or shrink. It is therefore necessary to manipulate the loose ends of the sheet for adjustment of cover width, if required.
7. Corners at eaves are most suitably arranged with pre-engineered corners. As fixing will be effected from the corners of rectangular buildings, in order to accommodate manufacturing and structural tolerances, it may be necessary to incorporate slip flashings on vertical walls.
8. When plain quarter and plain curved flashings are employed at vertical corners, slip flashings are not necessary as the sheets may be site cut to suit.

### SLIP FLASHINGS

Where mitred corner units are incorporated there is a need for a slip flashing detail. The diagram illustrates the slip flashing placed centrally on each elevation and this is in order to ensure building symmetry. However, some designers prefer to place the slip-flashing near the mitred corner unit where it will encounter the hip line; this keeps the slip flashing as short as possible which facilitates reliable installation.

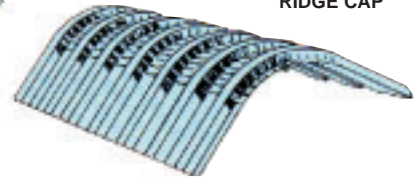
### ACUTE ANGLE



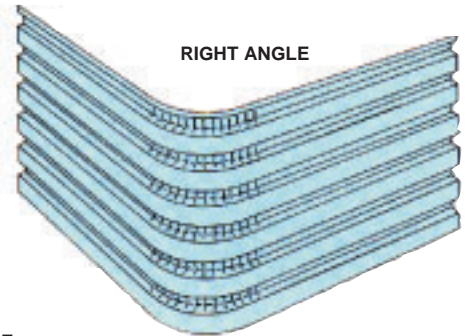
### OBTUSE ANGLE



### RIDGE CAP



### RIGHT ANGLE



### PROFILES CAN BE USED IN THE VERTICAL OR HORIZONTAL PLACE

### MITRED CORNER

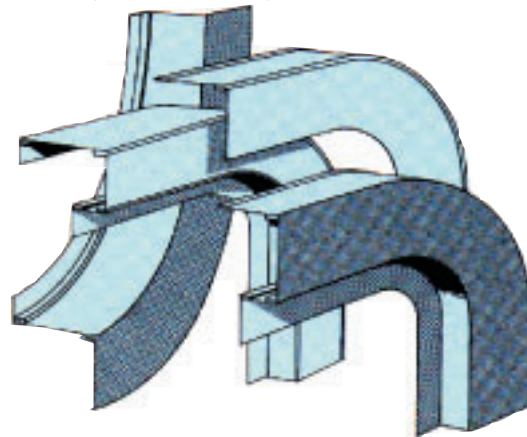


### EXTERNAL WALL TO ROOF ANGLE (RETURN ANGLE)



### FLASHING PROFILES

Illustrated is a typical range of curved flashings which are fabricated to provide edge closers to sheeting.





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