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ROOFING SOLUTIONS

DESIGN GUIDE

SPRING CURVED CUSTOM ORB

STRO232

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DESIGN GUIDE

INTRODUCTION

Spring or drape curving is the name given to the roof installation process whereby straight sheets of roofing are fastened to a curved structure without prior curving of the sheets.

This guide has information designed primarily for convex spring curving over an apex. However much of the information can be applied to pitched-curved roof sections and concave spring curving.

OBJECTIVE

This design guide gives advice on design and installation of sprung-curved roofing over an apex using Steel & Tube **Custom Orb** corrugated roofing.

Note: *Due to varying dimensions and tolerances between manufacturers, in no way should the advice contained in this publication be taken as applicable to generic brands of corrugate roofing.*

FUNCTIONAL REQUIREMENTS

To meet the objective, the roofing installation must meet the performance requirements of the Building Act in terms of External Moisture, Strength, and Durability. Other design issues particular to this type of construction that should also be considered include: aesthetics, ventilation, sheet-end details and warranties.

PERFORMANCE

EXTERNAL MOISTURE

Maximum radius is determined by the ability of the roof section to discharge rainwater without flooding of the side lap. Greater radii result in longer regions of low-pitched roofing about the apex. This gives greater potential for water levels to rise above lap-join height. Maximum recommended radius is 35 metres.

Where pitch is less than 8˚ laps should be sealed with Trimseal self-adhesive closed cell tape. This provides a barrier to water, as well as ensuring an effective capillary gap is present. Penetrations should be avoided where pitch <5˚.

STRENGTH

Bearing in mind traffic density is higher on the flat areas of the roof, as are the consequences of damage, it is recommended internal purlin spacings be reduced where pitch is less than 5˚. Details are shown on the accompanying *Spring Curved Custom Orb Material Selection Guide*.

As tension forces from the roof sheeting will impose greater load on fasteners, screws are required rather than driven fasteners. Purlin-to-rafter connections should also be designed to accommodate these additional forces, particularly at the sheet ends. Edge purlin-to-rafter fixing capacity's to be increased by up to .6kN/m for .40mm and .9 kN/m for .55mm material.

DURABILITY

Normally, Zincalume and Colorsteel products are only warrantable where pitch is a minimum of 3˚. Where **Custom Orb** roofing is curved over an apex, this warranty will be extended to include the flat portions of roofing, provided that there are no obstructions to the free flow of water over the flat area, and the radius does not exceed 35 metres.

End laps should be avoided wherever possible and must not occur where pitch is less than 5˚. In all cases, end laps should be sealed with neutral-cure-silicon sealant or lap-seal tape at both ends.

OTHER DESIGN CONSIDERATIONS

AESTHETICS

Different material thicknesses and tensile strengths have different propensities for spring curving without distortion. As this is difficult to accurately predict in all cases, side laps should face away from the line of sight where practical. Purlin top edges should be in line with roof plane.

Minimum radii for different gauges and material strengths are shown in the chart below. For radii less than 9 metres, roll curving in .55mm G300 material is required.

UNWASHED AREAS

These are created when spring-curved corrugate roofs are installed over outriggers at the gable ends and eaves, leaving the underneath of the roof exposed. Regular maintenance is a requirement to achieve durability in these areas.
It is recommended that when installed over outriggers, particularly in a severe or very severe marine environment, or in any area where access for maintenance is difficult, the exposed underneath surface is protected with a suitable material.

SHEET ENDS

Sheet ends must be designed with sufficient fall to prevent water run back at the lower end and leakage or entrapment causing corrosion, at the top end.

Sheet lower ends occurring at less than 8˚ pitch should be drip formed to prevent run back and should not occur at less than 5˚. Exposed ends should have profiled foam fitted under the roof to prevent wind-borne moisture ingress.

Sheet upper end should not terminate at less than 3˚ pitch. Consideration should be given to head-flashing detail at low pitches and exposed sites with greater coverage and/or profiled foam required in severe conditions.

VENTILATION

Internal moisture and thermal noise problems can ensue with spring-curved design for a dwelling when the ceiling line is above the rafter and insulation is placed directly below the roofing. Ventilation requirements need to be addressed.

Where attic space is minimal a vapour barrier should be placed between the ceiling and the insulation. Insulation should be overlaid with roof underlay, and a gap of at least 25mm should be present between the insulation and the roof underlay. The roof must be allowed to breathe, profiled foam sealant under sheet ends should be avoided where possible, and vents should be considered at the apex of gable end soffits.

Any concentrated moisture sources from inside the building – such as produced by cooking, bathing, or gas heating activities – should be ventilated directly to the outside of the building envelope.

SPRING CURVED CUSTOM ORB MATERIAL SELECTION GUIDE

GAUGE	GRADE	MINIMUM RADIUS	MAXIMUM RADIUS	INTERNAL SPAN PITCH <5˚	END SPAN PITCH <5˚	OVERHANG (STIFFENED)
.40mm	G550	12 metres	35 metres	.900	.800	.150 (.250)
.55mm	G300*	9 metres	35 metres	1.000	.900	.200 (.300)
.55mm	G550	10 metres	35 metres	1.200	1.000	.250 (.400)

* Use G300 material only when required by design.

FLASHINGS

The need to curve barges affects their design. Metal barges may be sectional, crimp-curved or lock-seamed PVC-slotted waste pipe can also be used. Your local Steel & Tube branch representative will make recommendations for barge details available in your area.

Curved apron flashings are normally manufactured by lock-seaming.

WARRANTIES

Provided the advice contained herein is adhered to and the roof is designed, installed and maintained in accordance with good trade practice and the manufacturer's published literature, the normal warranties available for the building type, material, and exposure condition will apply.

See *Steel & Tube Roofing Solutions Product Guide* for further details.

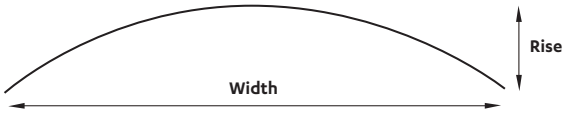
FORMULAE

For determining the radius (r) of a curve:

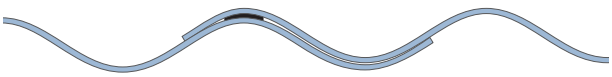
$r = (width^2 + (4 \times rise^2)) \div (8 \times rise)$

For determining length of seal (s) to where pitch > 8° :

$s = 0.035 \times r \times 8.$



LAP-TAPE PLACEMENT



INSTALLERS

A list of local installers for your area is available from our website or your local Steel & Tube branch. www.steelandtube.co.nz.

DISCLAIMER

The information contained in this brochure is correct to the best of our knowledge at time of printing and is based on experience with 'typical' spring-curved applications. It is designed as a general design guide and is not intended as a blueprint for suitability for any specific installation.

Note:

Trademarks apply to the following products presented in this publication: Custom Orb, Colorsteel, Zincalume.

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