

Everbright E610 polycarbonate light panels

Barrel Vault Static Calculations

Static calculations are essential to determine the ability of a proposed supporting structure to resist the thrust of an Everlite barrel vault under imposed load.

Horizontal thrust = $w (S)^2 / 8h$
(this refers to the lateral panel movement)

Vertical thrust = $w S / 2$
(this refers to the lift of the panel)

Resultant thrust = $H (\cos x^0) + V (\sin x^0)$
(this is a combination of the horizontal and vertical thrust)

W = imposed load in KN/m²
S = span in metres
h = rise of curve at midspan in metres
x⁰ = springing angle of curve

For example:

Everlite is required to span 6.00 metres in Sydney, NSW. For the given span E610 can span 6.30 metres with plastics locking bars in every joint (lock system 1) provided it is thermoformed with a springing angle of 35⁰.

Horizontal thrust	$= w (S)^2 / 8h$ $= 1.078 (6.00)^2 / 8 \times 0.946$ $= \mathbf{5.13 \text{ kN/m}}$
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Vertical thrust	$= w S / 2$ $= 1.078 \times 6.00 / 2$ $= \mathbf{3.23 \text{ kN/m}}$
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Resultant thrust	$= H (\cos x^0) + V (\sin x^0)$ $= 5.13 (\cos 35^0) + 3.23 (\sin 35^0)$ $= \mathbf{6.05 \text{ kN/m}}$
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