REPLACEMENT CONSERVATORY ROOF

STRUCTURAL CALCULATIONS

(to Eurocodes)

SupaLite
TILED ROOF SYSTEM

INTRODUCTION

The design objective is to provide an alternative or replacement roof to existing glazed conservatory roofs.

Having experienced the wide variation of temperatures during the summer and winter months of the year occupiers are requesting changes to the roof structure to make the climatic conditions more bearable within. The extremes of cold winter evenings and the hot summer days make the internal conditions usually un-bearable and the conservatory a room to avoid.

By changing the roof construction from glazed to a solid surface and including insulation this provides the conditions for a more habitable building.

The selected use of lightweight materials such as profiled steel tiling and aluminium rafters has kept the weight of the structure to that not much more than a twin wall plastic cladding and less than a double glazed system.

The aluminium eaves beam can be built off the existing conservatory wall mullions. If the existing are not suitable then additional reinforced posts are added to accommodate the structure. The rafter and hip beams are then built off the ring beams and covered with a plywood decking fixed through to the rafters thus providing lateral stability to the structure against normal roof loadings. A breathable membrain and timber battens to which the ExtraLight cladding is fixed. Insulation is fixed between the rafters and across the underside before underlining with membrain and plasterboard finish. The roof construction can be trimmed out to accept rooflights. The suitability of the existing and or any new supporting mullions should be checked out or specified by a suitably qualified person with the approval of the Local Building Control.

ExtraLight Shingle comes in a choice of natural weathered tones to recreate the visual appeal of a clay tiled roof, carefully selected to match most traditional roofs. The fascia, soffit and gutters can also be matched to the customers requirements.

With the addition of this construction the conservatory may now be classified as a sun room and then require Building Regulation approval for the conversion. A porch classification may be exempt but should be qualified by the Local Authority Building Control for comfirmation.

Suitability of existing construction and foundations should be confirmed by a structural engineer for the change of loadings and the results and recommendations forwarded to and approved by the Local Authority.

Completely new buildings will be built off suitable foundations of concrete strip, reinforced concrete raft or proprietry piled system.

The walls will match the existing house to the satisfaction of local planning requirements and be within the requirements of current Building Regulations. All glazing will be double glazed sealed units meeting the requirements of the Building Regulations regarding thermal values, have resistance to solar rays and have self cleaning coating. The roof structure will be supported off reinforced structural mullions within the framework construction and securely supported and fixed to the masonry walls or foundations. The floor construction will be to the clients requirements and will comply with current Building Regulations and practises.

In the event of the new building being used as a habitable room i.e. no seperating door in an opening between it and the existing property, there may be a need to increase insulation levels within the existing property in order to maintain or improve the existing thermal values.
Our representitive or engineer will advise accordingly to satisfy the legislation.

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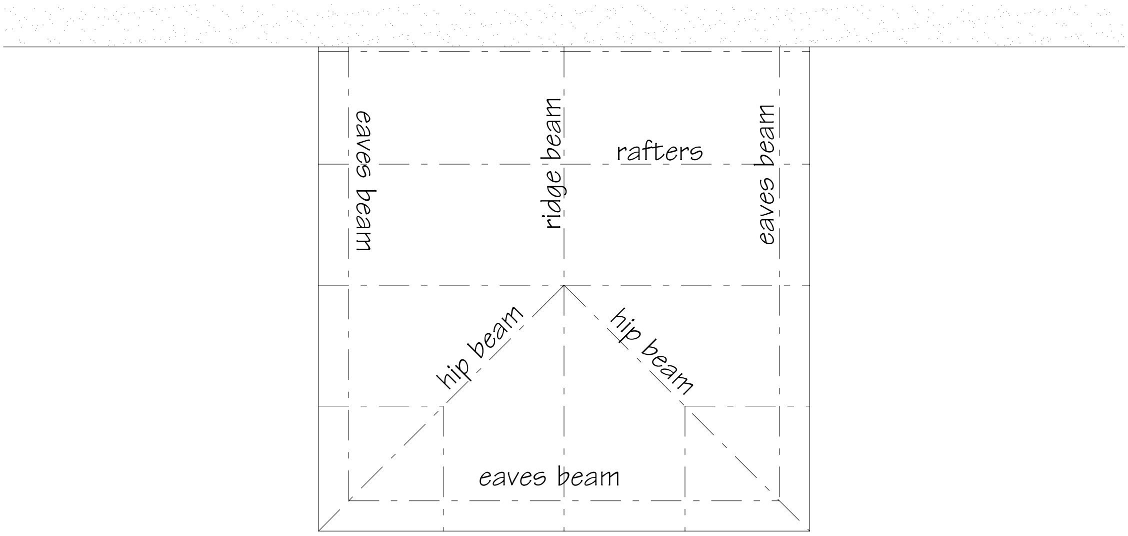
SUPALITE ROOF SYSTEM

Drawn by PGR
Scale @ A4

Roof Plan



Roof Plan

Rafters - SAPA profile 205982
Ridge beam - SAPA profile 205980
Hip beam - SAPA profile 208929
Eaves beam - SAPA profile 206959

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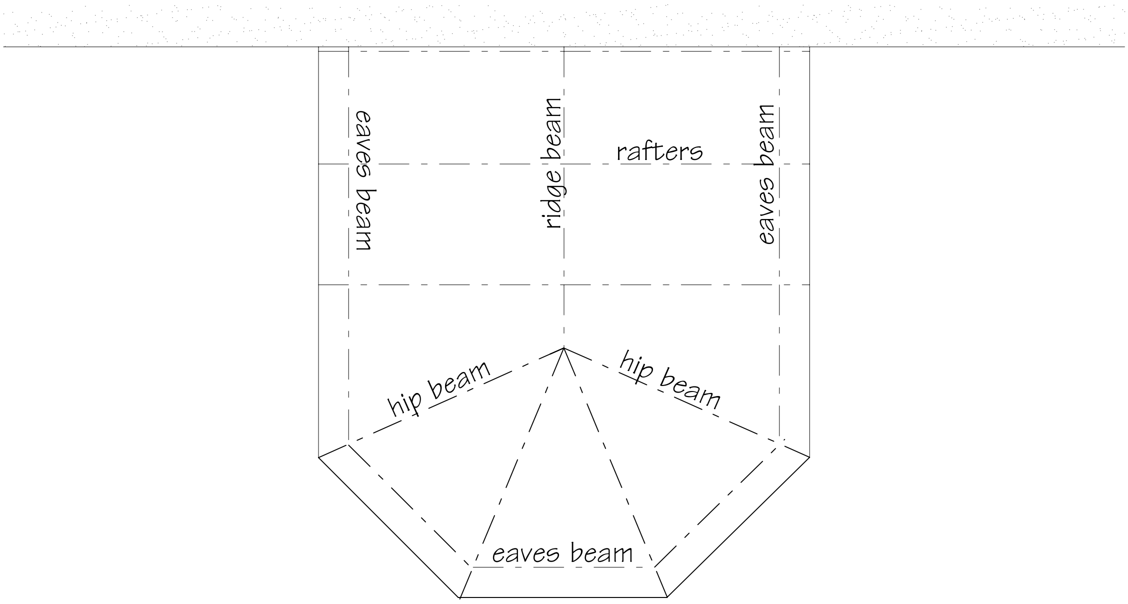
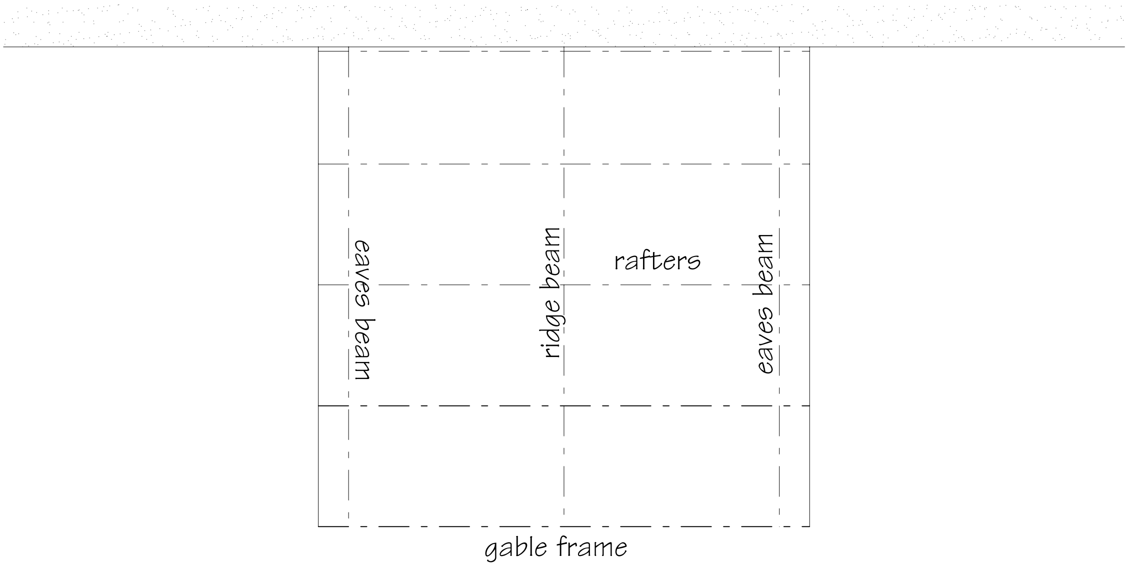
SUPALITE ROOF SYSTEM

Drawn by PGR
Scale @ A4
Drg No C11-165- 1



Roof Plan



Roof Plan

Rafters - SAPA profile 205982
Ridge beam - SAPA profile 205980
Hip beam - SAPA profile 208929
Eaves beam - SAPA profile 206959

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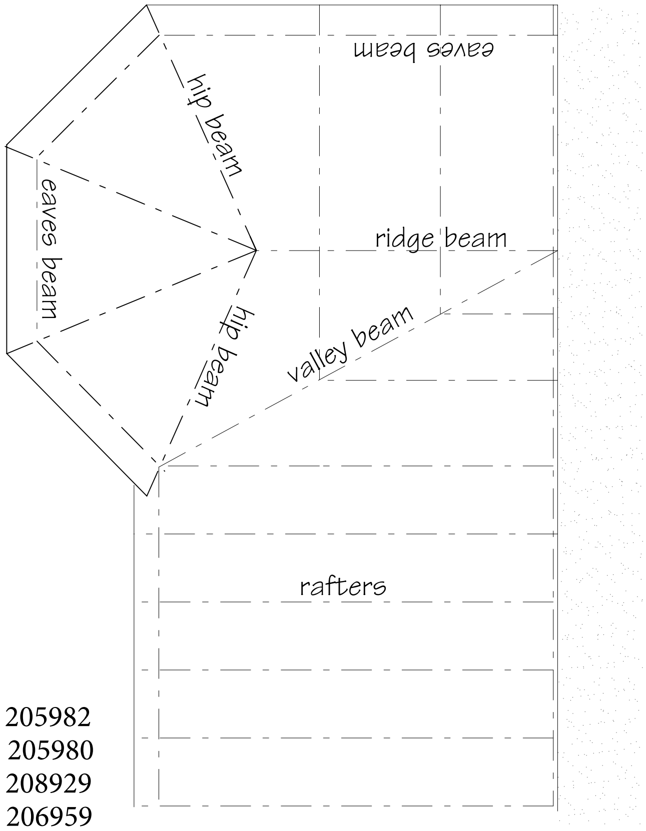
SupaLite TILED ROOF SYSTEM

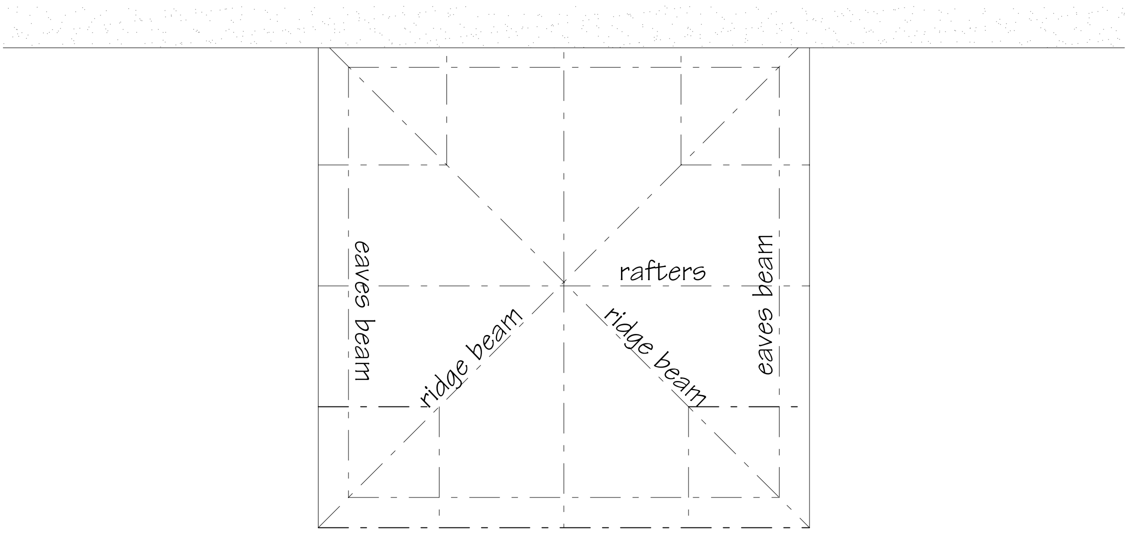
SUPALITE ROOF SYSTEM

Drawn by PGR	
Scale @ A4	
Drg No	C11-165- 2



Rafters - SAPA profile 205982
Ridge beam - SAPA profile 205980
Hip beam - SAPA profile 208929
Eaves beam - SAPA profile 206959
Valley beam - SAPA profile 205982 (2 Rafters Together)

Roof Plan



Rafters - SAPA profile 205982
Ridge beam - SAPA profile 205980
Eaves beam - SAPA profile 206959

Roof Plan

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Scale @ A4	
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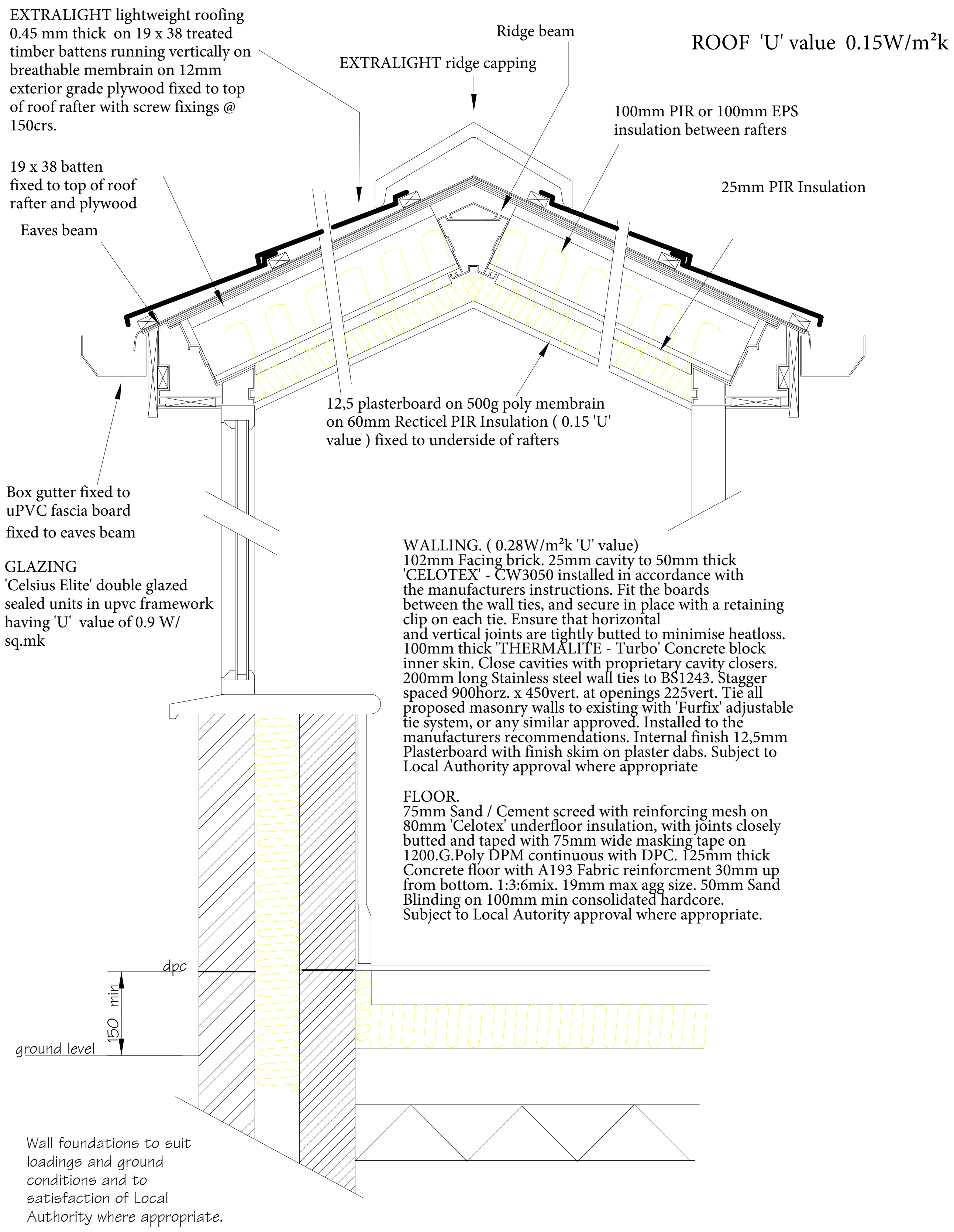

Sections Showing New Wall and Roof Construction

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SUPALITE ROOF SYSTEM

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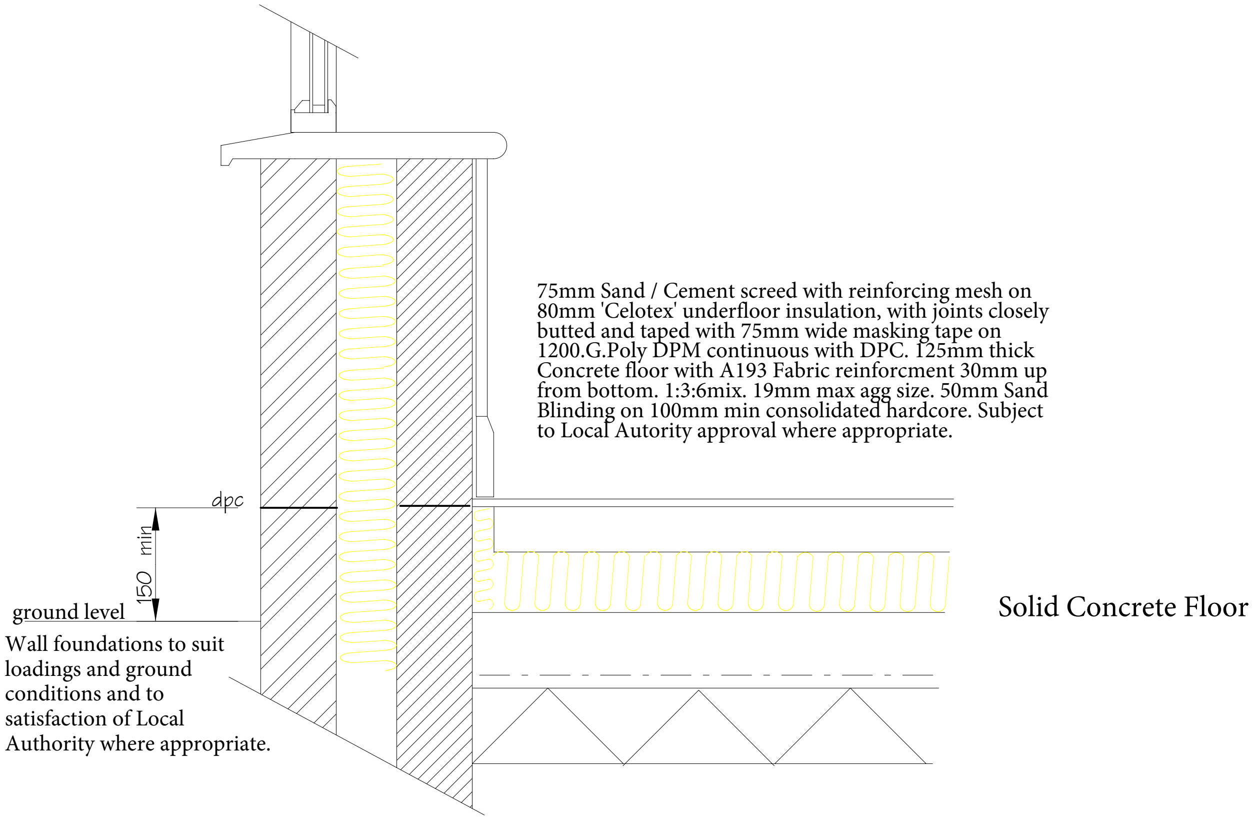
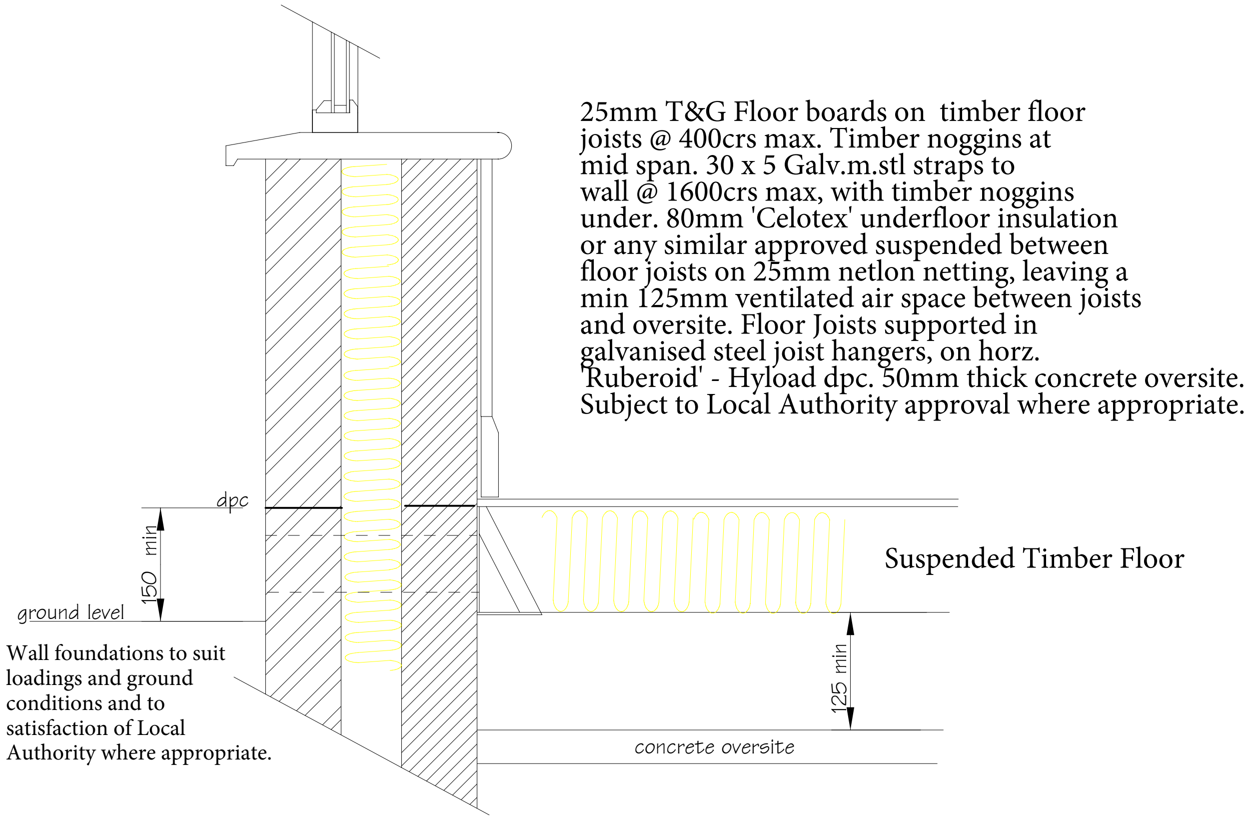
Scale @ A4 1:20

Drg No C11-165- 5





Sections Showing Alternative New Floor Constructions

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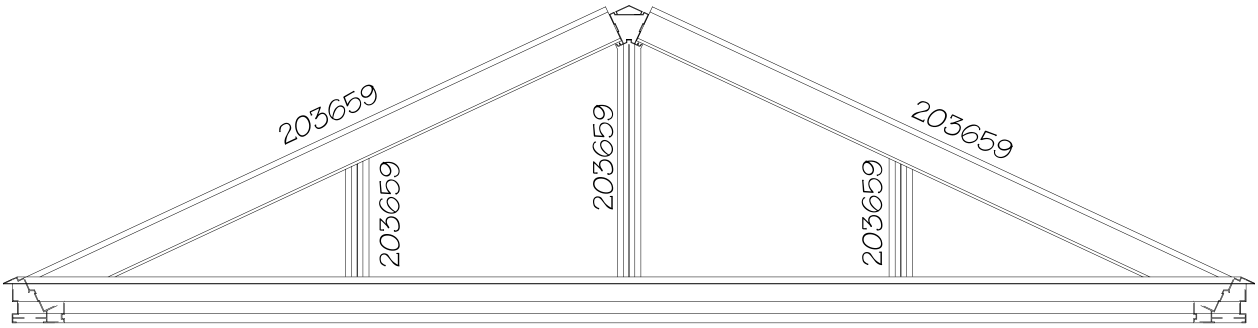

Gable Frame

The gable framework is constructed and insulated similar to the roof slope with the outer cladding material to the satisfaction of the client

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SupaLite TILED ROOF SYSTEM

SUPALITE ROOF SYSTEM

Drawn by PGR

Scale @ A4 1:20

Drg No C11-165- 7

Rafter Span Tables
Profile 203659

Roof Rafter Centres (ideal - 600 mm)	ExtraLight Rafter Span	Redland Cambrian Slate Rafter Span	Slates Rafter Span	Concrete Interlocking tiles Rafter Span
450mm	3200mm	3100mm	3100mm	2900mm
600mm	2850mm	2850mm	2800mm	2600mm
750mm	2700mm	2600mm	2600mm	2450mm
800mm	2650mm	2600mm	2550mm	2400mm
900mm	2550mm	2550mm	2450mm	2300mm

The maximum length of rafter is governed by the permitted deflection (1/300 of span).
The max. permitted bending stress is 160 n/sq.mm. (proof stress for 6063-T6 = 160 n/sq.mm)

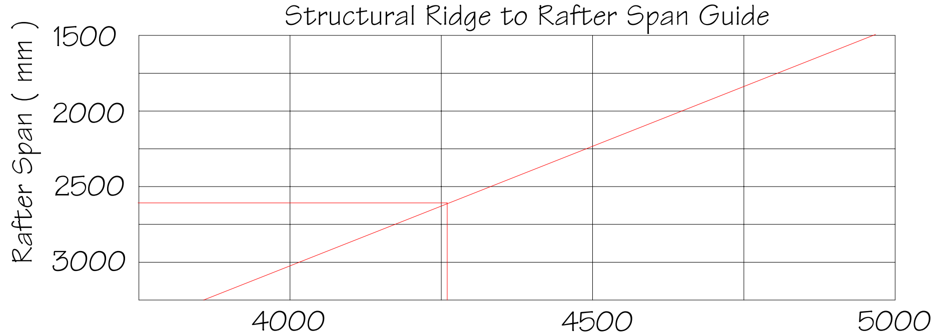
Eaves Beam Maximum Clear Span
Profile 206959

2400mm

eg : over double doors

Hip Beam Maximum Span - 4900mm
Profile 205980

Structural Ridge to Rafter Span Guide



Note - With duo pitch roofs having a ridge span of more than 4900mm a steel supporting beam will be required and to be designed by a suitably qualified person.

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SUPALITE ROOF SYSTEM

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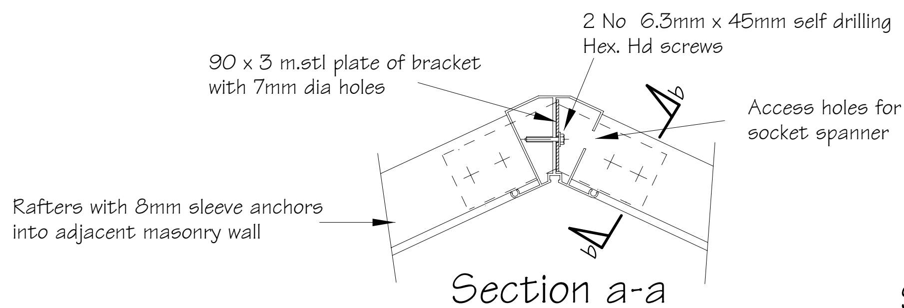
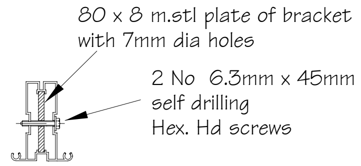
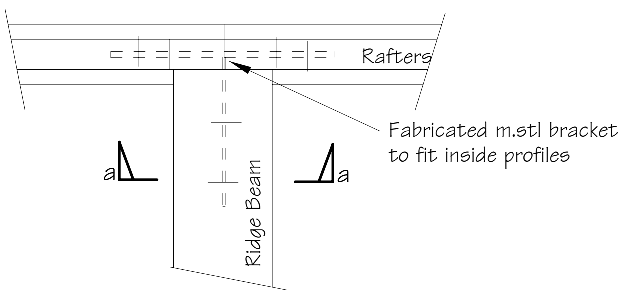
Scale @ A4
Drg No C11-165-8B



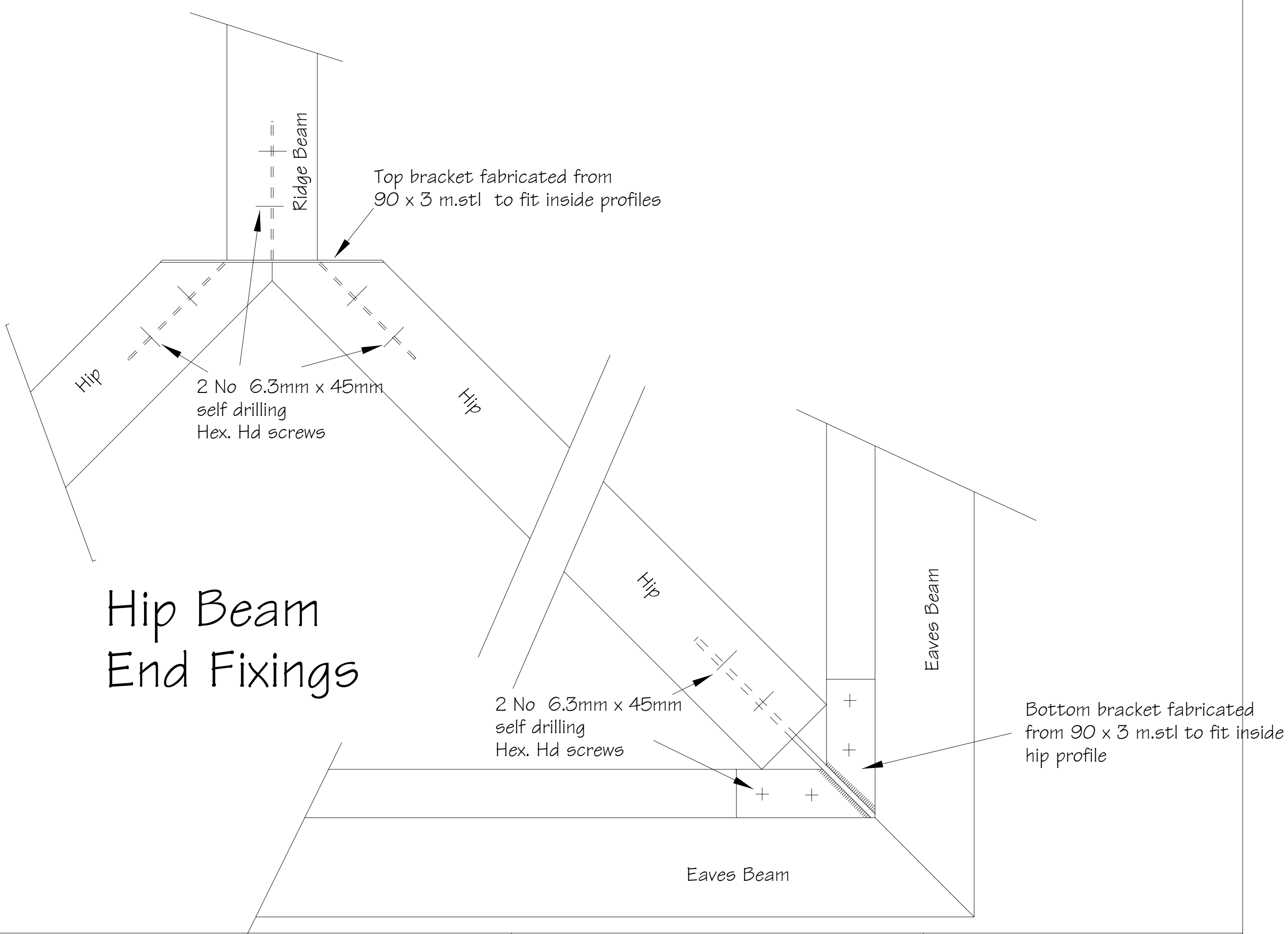
Section a-a



Section b-b



End Fixing of Structural Ridge Beam to Rafters



Hip Beam End Fixings

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SupaLite TILED ROOF SYSTEM

SUPALITE ROOF SYSTEM

Drawn by PGR	
Scale @ A4 1:20	
Drg No	C11-165- 9

ENGINEERING and BUILDING DESIGN

PETER G REDDING I ENG. MIET.(MECH)

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Thornton-Cleveleys
Lancs FY5 3JR
tel (01253) 859867
email. peter.redding@virgin.net

Description of Work	SUPALITE Profiled Roof for Conservatories
at	
for	Supalite Tiled Roof Systems Ltd 180-181 Brad Kirk Place, Preston PR5 8AJ
date	October 2011
DATA drawing No	
safe ground pressure	
Eurocodes	EN 1999 - 1 - 1; Euro Codes EN 1999 - 1 - 4; EN 1991 - 1 - 4;
(to be used in the manufacture and site installation)	

Loadings

Roof

Dead

ExtraLight profile	- 6 kgs/sq.M
Timber battens	- 6 kgs/sq.M
Plywood decking	- 10 kgs/sq.M
Rafters	- 3 kgs/sq.M
Insulation	- 3 kgs/sq.M
Plasterboard	- 20 kgs/sq.M
total	- 48 kgs/sq.M = 0.47 kN/sq.M

Imposed - 0.6 kN/sq.M - (0.55 on slope)

Roof load to be onto reinforced mullions. Existing mullions to be checked by a Structural Engineer or suitably qualified person. In the absence of unsuitable mullions additional mullions can be installed.

Wind Assessment to BS EN 1991-1- 4

Data Entry:-

Site Altitude	**30.000 m**	**Reference Height (Z)**			**Size Effect Dimension (b + h)**			
$V_{b,map}$	**25.000 m/s**	**Roof**	**4.000**	**m**	**Roof**	**5.000**	**m**
Seasonal Factor (C,season)	**1.000**	**Side Walls**	**2.300**	**m**	**Side Walls**	**8.000**	**m**
Probability Factor (C,prob)	**1.000**	**Gables**	**4.000**	**m**	**Gables**	**8.000**	**m**
Site ID							

Dynamic Pressure Results

Wind Direction (deg)		**0**	**30**	**60**	**90**	**120**	**150**	**180**	**210**	**240**	**270**	**300**	**330**
Direction Factor C,dir		**0.78**	**0.73**	**0.73**	**0.74**	**0.73**	**0.80**	**0.85**	**0.93**	**1.00**	**0.99**	**0.91**	**0.82**
Orography Factor Co		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Effective Height (h-hdis) m	**Roof**	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
	Sides	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300
	Gable	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
Altitude Factor C,alt	**Roof**	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030
	Sides	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030
	Gable	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030
Roughness Factor Cr	**Roof**	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978
	Sides	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865
	Gable	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978
Exposure Factor Ce	**Roof**	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313
	Sides	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942
	Gable	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313
Vb,0 (m/s)	**Roof**	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750
	Sides	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750
	Gable	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750	25.750
Vb (m/s)	**Roof**	20.085	18.798	18.798	19.055	18.798	20.600	21.888	23.948	25.750	25.493	23.433	21.115
	Sides	20.085	18.798	18.798	19.055	18.798	20.600	21.888	23.948	25.750	25.493	23.433	21.115
	Gable	20.085	18.798	18.798	19.055	18.798	20.600	21.888	23.948	25.750	25.493	23.433	21.115
Vm (m/s)	**Roof**	19.648	18.388	18.388	18.640	18.388	20.151	21.411	23.426	25.189	24.937	22.922	20.655
	Sides	17.367	16.253	16.253	16.476	16.253	17.812	18.925	20.706	22.265	22.042	20.261	18.257
	Gable	19.648	18.388	18.388	18.640	18.388	20.151	21.411	23.426	25.189	24.937	22.922	20.655
Turbulence Intensity Iv	**Roof**	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
	Sides	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183
	Gable	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
Peak Velocity Pressure qp (kN/m^2)	**Roof**	0.538	0.471	0.471	0.484	0.471	0.566	0.639	0.765	0.884	0.867	0.732	0.595
	Sides	0.444	0.389	0.389	0.399	0.389	0.467	0.527	0.631	0.729	0.715	0.604	0.490
	Gable	0.538	0.471	0.471	0.484	0.471	0.566	0.639	0.765	0.884	0.867	0.732	0.595
Size Effect Factor Cs	**Roof**	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960
	Sides	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948
	Gable	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948

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General Wind Loading (Town terrain)

For locations with high wind exposure , wind loading calculations to be undertaken on the proposed roof by a suitably qualified person

Assumed building size - 4,0M x 4,0M x 4,0M high
Wind load (taken from wind assessment results) - 0.9 kn/sq.M

Wind lateral loading on fixings
0.9 kn/sq.M x 2.1M x 0.5 = 0.95 kn/M run

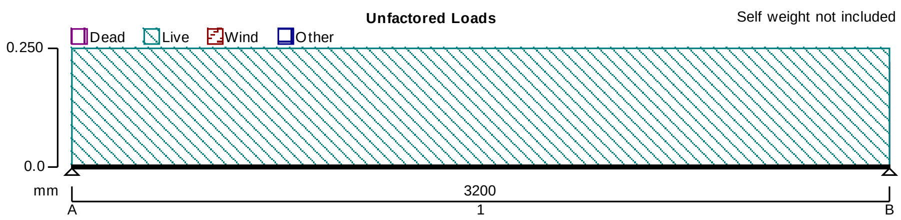
using Powerline frame screws 7.5dia x 102 long (permitted shear = 0.8 kn)
No required = 0.95 / 0.8 = 2 No fixings per M run to resist lateral wind loading.

Wind uplift on roof = 0.95 kn/sq.M x 1.4 = 1.33 kn/sq.M
Roof dead load resisting uplift = 0.47 kn/sq.M x 0.9 = 0.43 kn/sq.M
Uplift per M run = 1.33 - 0.43 x 2.0M = 1.8 kn/M
Assuming eaves beam to mullion fixing at 1,0M crs max uplift per fixing = 1.8kn max
Tensile stress in each fixing = 1.8 / 2 = 0.9 kn < 1.2 kn permitted
Use 2 No Powerline frame screws at each fixing point ie rafters to ridge,
rafters to eaves beam, eaves beam to mullions

Vertical roof loading (dead + imp) = 0.47 + 0.6 = 1.07 kn/sq.M

Load on wallplate / eaves beam = 1.07 x 2.0M = 2.14 kn/M run

Wind loading on roof structure.
Uplift on leeward roof panel = 0.9 x (-0.6) = -0.54 kn/sq.M
Factored dead load of roof = 0.47 kn/sq.M x 0.9 = 0.43 kn/sq.M
Reversal loading = -0.54 + 0.43 = -0.11 kn/sq.M



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Free"**

Support B Vertically **"Restrained"** Rotationally **"Free"**

Span Definitions:

Span 1 Length = **3200** mm Cross-sectional area = **900** mm^2 Moment of inertia = **1.28×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 UDL Dead load **0.2** kN/m

Load 2 UDL Live load **0.3** kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live + 1×Wind

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-0.4**	**-0.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-0.4**	**-0.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A Max react = **-1.1** kN Min react = **-1.1** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Support B Max react = **-1.1** kN Min react = **-1.1** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **1.1** kN Minimum shear F_{min} = **-1.1** kN

Maximum moment = **0.9** kNm Minimum moment = **0.0** kNm

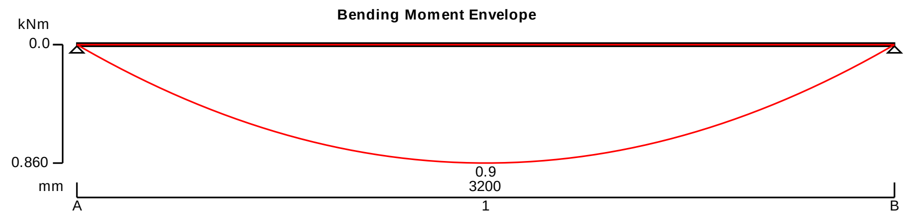
Maximum deflection = **10.3** mm Minimum deflection = **0.0** mm

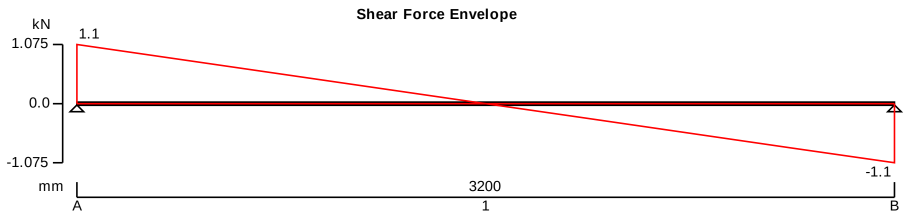
Span Max/Min results - Combination Summary

Span 1 Maximum shear = **1.1** kN at **0.000** m Minimum shear = **-1.1** kN at **3.200** m

Maximum moment = **0.9** kNm at **1.600** m Minimum moment = **0.0** kNm at **0.000** m

Maximum deflection = **10.3** mm at **1.600** m Minimum deflection = **0.0** mm at **3.200** m

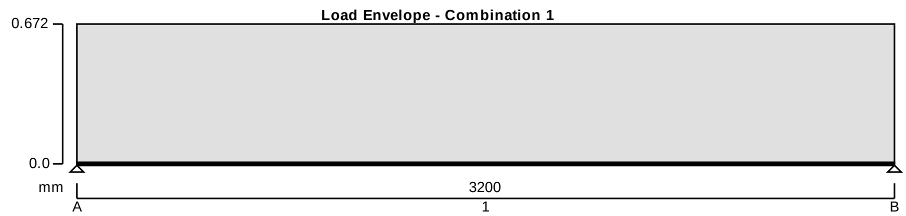




SPAN RESULTS - SPAN 1

x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	0.00	1.08	0.00	0.0	0.0
0.640	0.55	0.00	0.65	0.00	6.1	0.0
1.280	0.83	0.00	0.22	0.00	9.8	0.0
1.600	0.86	0.00	0.00	0.00	10.3	0.0
1.600	0.86	0.00	0.00	0.00	10.3	0.0
1.920	0.83	0.00	0.00	-0.22	9.8	0.0
2.560	0.55	0.00	0.00	-0.65	6.1	0.0
3.200	0.00	0.00	0.00	-1.08	0.0	0.0

RESULTS FOR COMBINATION 1



Beam Max/Min results - Combination 1 :

Maximum shear = **1.1** kN — Minimum shear = **-1.1** kN

Maximum moment = **0.9** kNm — Minimum moment = **0.0** kNm

Maximum deflection = **10.3** mm — Minimum deflection = **0.0** mm

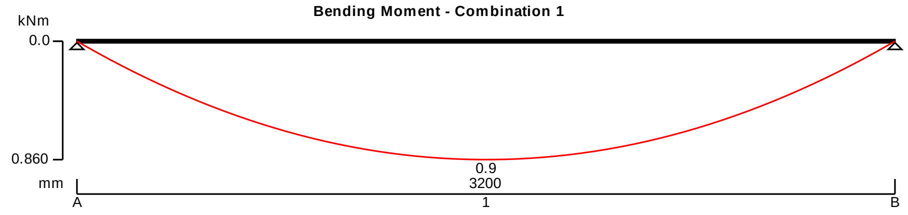
Span Max/Min results - Combination 1 :

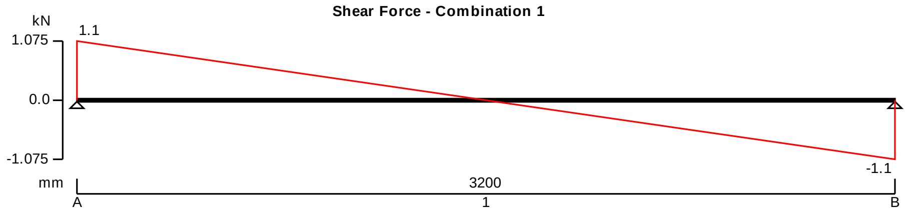
Span 1

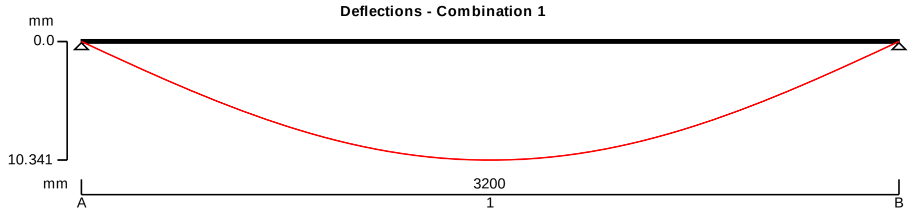
Maximum shear = **1.1** kN at **0.000** m — Minimum shear = **-1.1** kN at **3.200** m

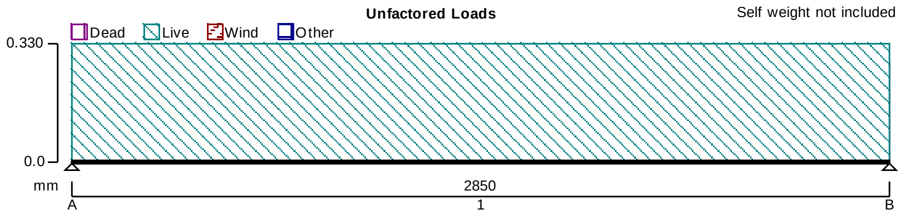
Maximum moment = **0.9** kNm at **1.600** m — Minimum moment = **0.0** kNm at **0.000** m

Maximum deflection = **10.3** mm at **1.600** m   Minimum deflection = **0.0** mm at **3.200** m









CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Free"**

Support B Vertically **"Restrained"** Rotationally **"Free"**

Span Definitions:

Span 1 Length = **2850** mm Cross-sectional area = **900** mm^2 Moment of inertia = **1.28×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 UDL Dead load **0.3** kN/m

Load 2 UDL Live load **0.3** kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-0.4**	**-0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-0.4**	**-0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A Max react = **-1.2** kN Min react = **-1.2** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Support B Max react = **-1.2** kN Min react = **-1.2** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **1.2** kN Minimum shear F_{min} = **-1.2** kN

Maximum moment = **0.9** kNm Minimum moment = **0.0** kNm

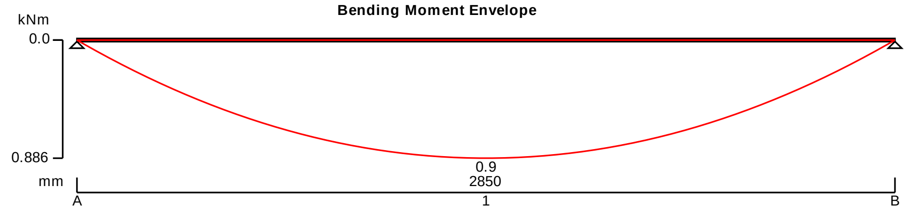
Maximum deflection = **8.5** mm Minimum deflection = **0.0** mm

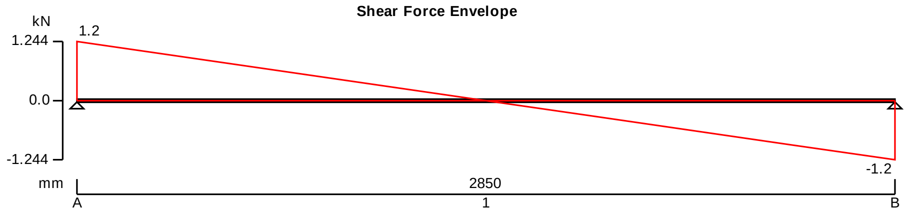
Span Max/Min results - Combination Summary

Span 1 Maximum shear = **1.2** kN at **0.000** m Minimum shear = **-1.2** kN at **2.850** m

Maximum moment = **0.9** kNm at **1.425** m Minimum moment = **0.0** kNm at **2.850** m

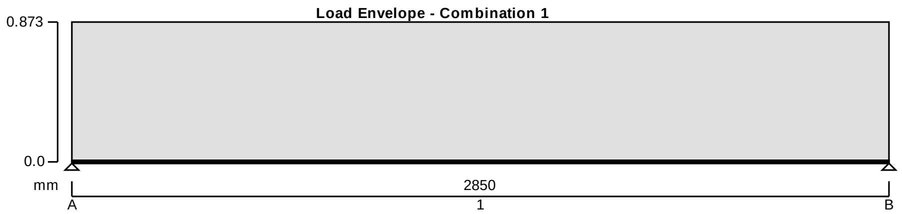
Maximum deflection = **8.5** mm at **1.425** m Minimum deflection = **0.0** mm at **2.850** m

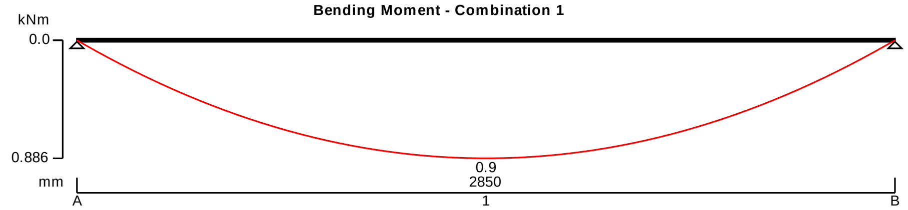


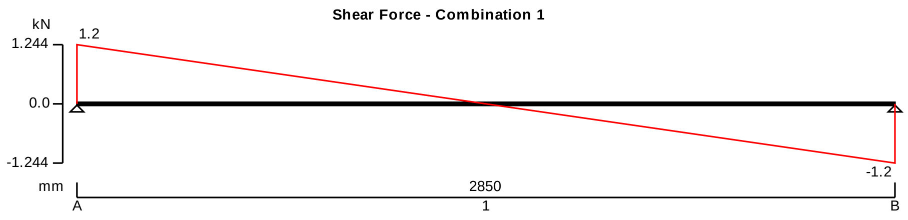


SPAN RESULTS - SPAN 1

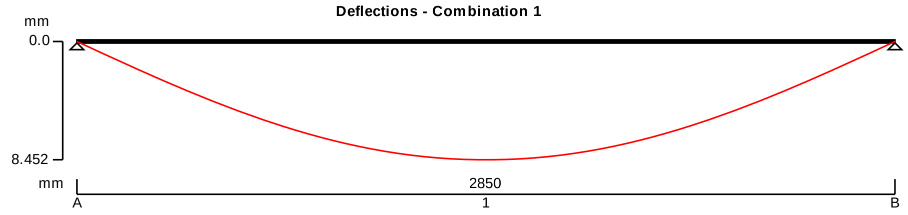
x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	0.00	1.24	0.00	0.0	0.0
0.570	0.57	0.00	0.75	0.00	5.0	0.0
1.140	0.85	0.00	0.25	0.00	8.0	0.0
1.425	0.89	0.00	0.00	0.00	8.5	0.0
1.425	0.89	0.00	0.00	0.00	8.5	0.0
1.710	0.85	0.00	0.00	-0.25	8.0	0.0
2.280	0.57	0.00	0.00	-0.75	5.0	0.0
2.850	0.00	0.00	0.00	-1.24	0.0	0.0



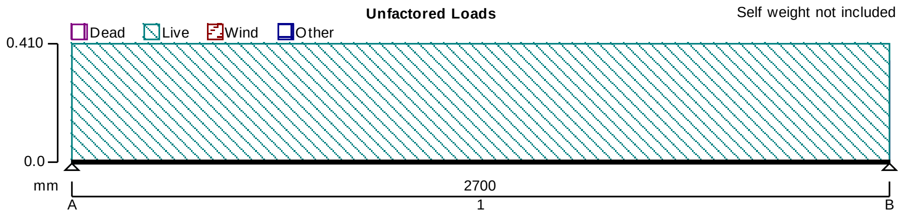




Shear Force - Combination 1
kN
1.244
0.0
-1.244
1.2
-1.2
mm
2850
A
1
B



Deflections - Combination 1
mm
0.0
8.452
mm
2850
A
1
B



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Free"**

Support B Vertically **"Restrained"** Rotationally **"Free"**

Span Definitions:

Span 1 Length = **2700** mm Cross-sectional area = **900** mm^2 Moment of inertia = **1.28×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 UDL Dead load **0.4** kN/m

Load 2 UDL Live load **0.4** kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-0.5**	**-0.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-0.5**	**-0.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A Max react = **-1.5** kN Min react = **-1.5** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Support B Max react = **-1.5** kN Min react = **-1.5** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **1.5** kN Minimum shear F_{min} = **-1.5** kN

Maximum moment = **1.0** kNm Minimum moment = **0.0** kNm

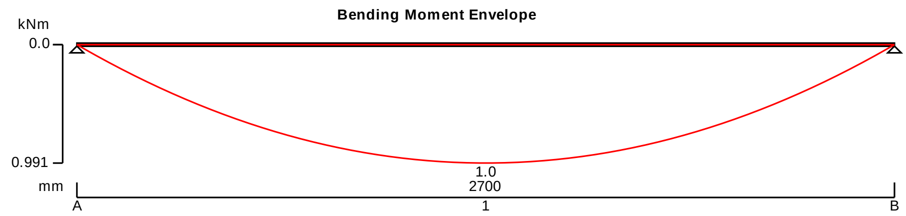
Maximum deflection = **8.5** mm Minimum deflection = **0.0** mm

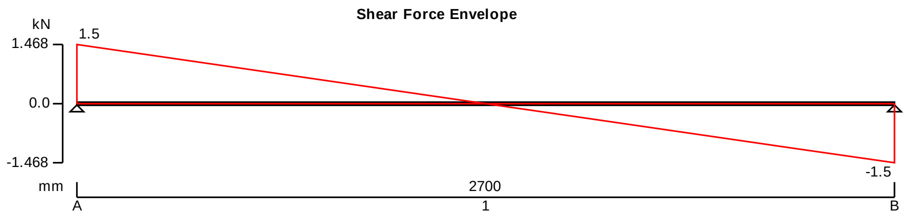
Span Max/Min results - Combination Summary

Span 1 Maximum shear = **1.5** kN at **0.000** m Minimum shear = **-1.5** kN at **2.700** m

Maximum moment = **1.0** kNm at **1.350** m Minimum moment = **0.0** kNm at **0.000** m

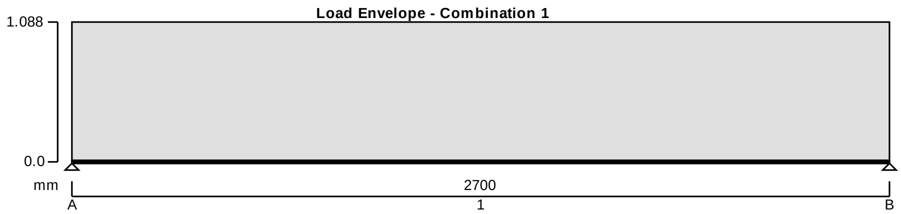
Maximum deflection = **8.5** mm at **1.350** m Minimum deflection = **0.0** mm at **2.700** m

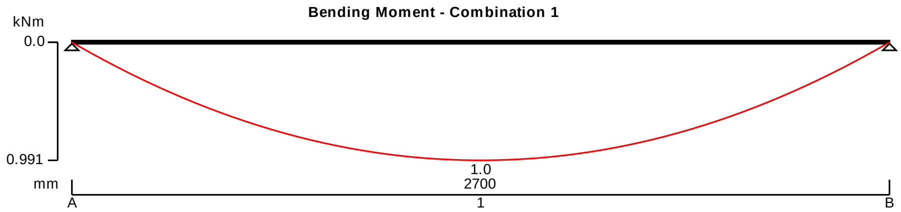


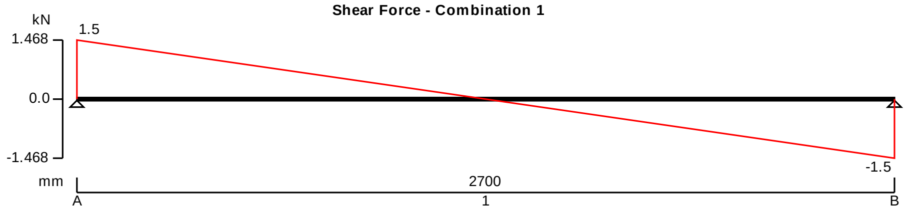


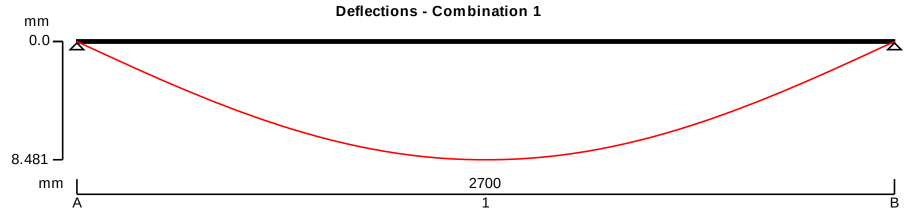
SPAN RESULTS - SPAN 1

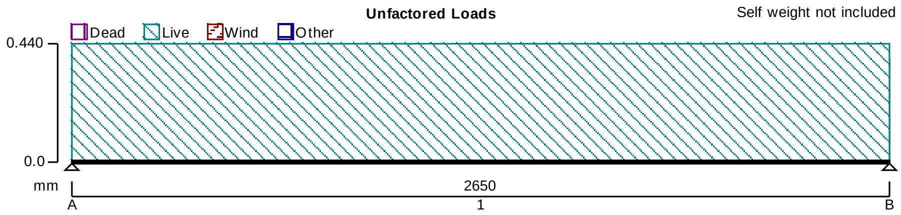
x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	0.00	1.47	0.00	0.0	0.0
0.540	0.63	0.00	0.88	0.00	5.0	0.0
1.080	0.95	0.00	0.29	0.00	8.1	0.0
1.350	0.99	0.00	0.00	0.00	8.5	0.0
1.350	0.99	0.00	0.00	0.00	8.5	0.0
1.620	0.95	0.00	0.00	-0.29	8.1	0.0
2.160	0.63	0.00	0.00	-0.88	5.0	0.0
2.700	0.00	0.00	0.00	-1.47	0.0	0.0






Shear Force - Combination 1
kN
1.468
0.0
-1.468
1.5
-1.5
mm
2700
A
1
B


Deflections - Combination 1
mm
0.0
8.481
mm
2700
A
1
B



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Free"**

Support B Vertically **"Restrained"** Rotationally **"Free"**

Span Definitions:

Span 1 Length = **2650** mm Cross-sectional area = **900** mm^2 Moment of inertia = **1.28×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 UDL Dead load **0.4** kN/m

Load 2 UDL Live load **0.4** kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-0.5**	**-0.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-0.5**	**-0.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A Max react = **-1.6** kN Min react = **-1.6** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Support B Max react = **-1.6** kN Min react = **-1.6** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **1.6** kN Minimum shear F_{min} = **-1.6** kN

Maximum moment = **1.0** kNm Minimum moment = **0.0** kNm

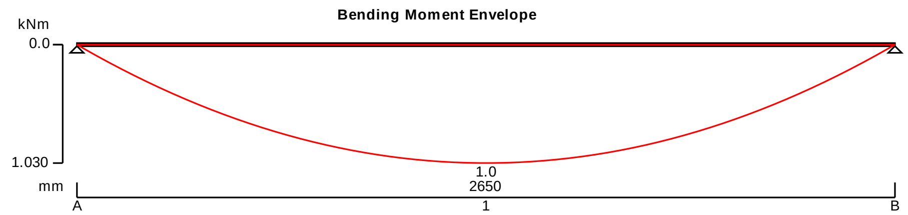
Maximum deflection = **8.5** mm Minimum deflection = **0.0** mm

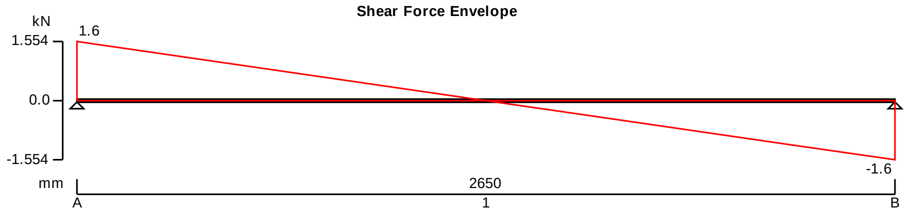
Span Max/Min results - Combination Summary

Span 1 Maximum shear = **1.6** kN at **0.000** m Minimum shear = **-1.6** kN at **2.650** m

Maximum moment = **1.0** kNm at **1.325** m Minimum moment = **0.0** kNm at **0.000** m

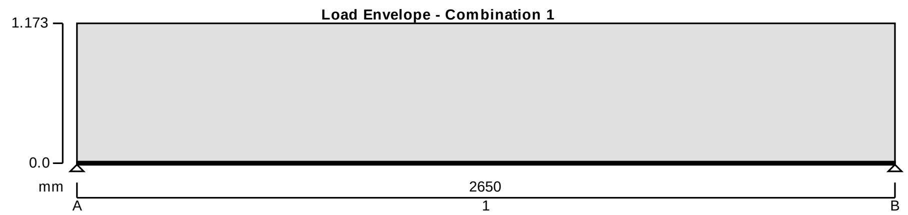
Maximum deflection = **8.5** mm at **1.325** m Minimum deflection = **0.0** mm at **2.650** m

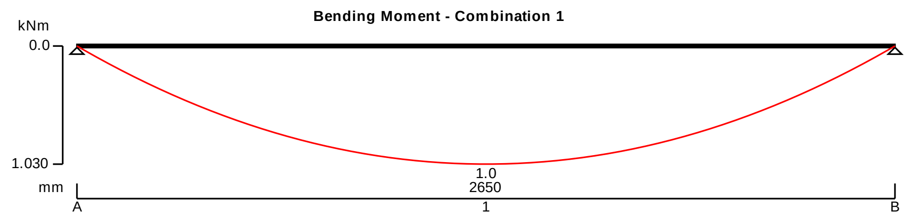


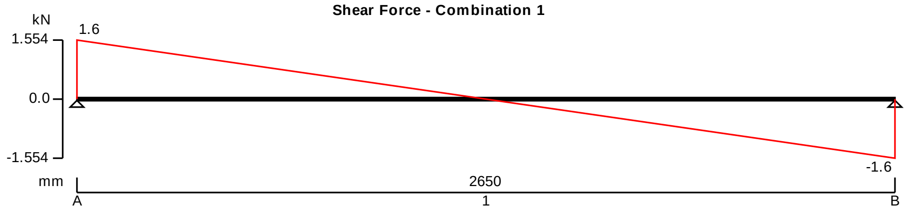


SPAN RESULTS - SPAN 1

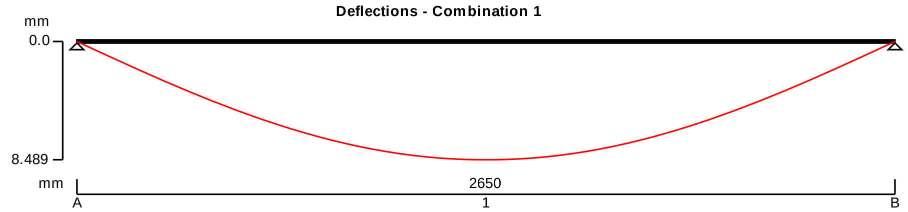
x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	0.00	1.55	0.00	0.0	0.0
0.530	0.66	0.00	0.93	0.00	5.0	0.0
1.060	0.99	0.00	0.31	0.00	8.1	0.0
1.325	1.03	0.00	0.00	0.00	8.5	0.0
1.325	1.03	0.00	0.00	0.00	8.5	0.0
1.325	1.03	0.00	0.00	0.00	8.5	0.0
1.590	0.99	0.00	0.00	-0.31	8.1	0.0
2.120	0.66	0.00	0.00	-0.93	5.0	0.0
2.650	0.00	0.00	0.00	-1.55	0.0	0.0





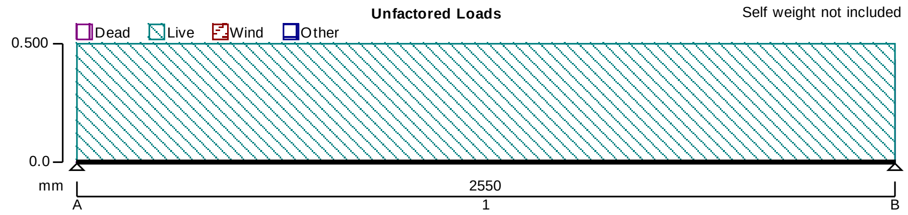


Shear Force - Combination 1
kN
1.554
0.0
-1.554
1.6
-1.6
mm
2650
A
1
B



Deflections - Combination 1
mm
0.0
8.489
mm
2650
A
1
B

CSC TEDDS Engineering and Building Design 41 Maitland Avenue Thornton-Cleveleys FY5 3JR tel 01253 859867	Project Supalite Tiled Roof Systems Ltd - Supalite Roof				Job Ref. C11-165	
	Section Roof Rafters @ 900crs				Sheet no./rev. 1	
	Calc. by PGR	Date 25/09/2013	Chk'd by	Date	App'd by	Date



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Free"**

Support B Vertically **"Restrained"** Rotationally **"Free"**

Span Definitions:

Span 1 Length = **2550** mm Cross-sectional area = **900** mm^2 Moment of inertia = **1.28×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 UDL Dead load **0.4** kN/m

Load 2 UDL Live load **0.5** kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-0.5**	**-0.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-0.5**	**-0.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A Max react = **-1.7** kN Min react = **-1.7** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Support B Max react = **-1.7** kN Min react = **-1.7** kN Max mom = **0.0** kNm Min mom = **0.0** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **1.7** kN Minimum shear F_{min} = **-1.7** kN

Maximum moment = **1.1** kNm Minimum moment = **0.0** kNm

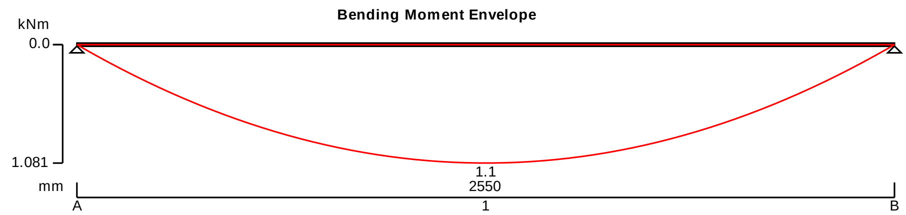
Maximum deflection = **8.3** mm Minimum deflection = **0.0** mm

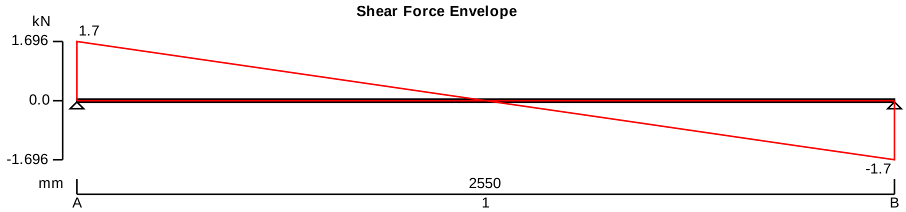
Span Max/Min results - Combination Summary

Span 1 Maximum shear = **1.7** kN at **0.000** m Minimum shear = **-1.7** kN at **2.550** m

Maximum moment = **1.1** kNm at **1.275** m Minimum moment = **0.0** kNm at **0.000** m

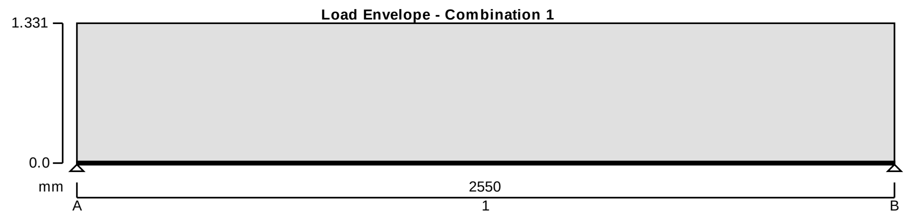
Maximum deflection = **8.3** mm at **1.275** m Minimum deflection = **0.0** mm at **0.000** m

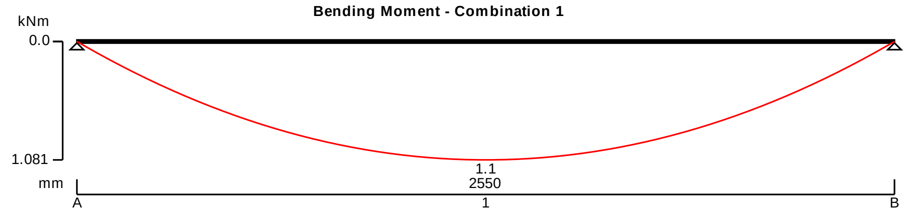


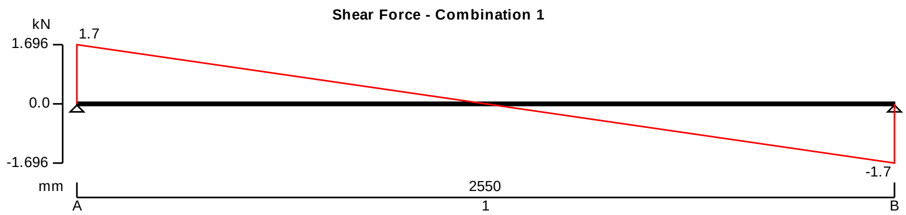


SPAN RESULTS - SPAN 1

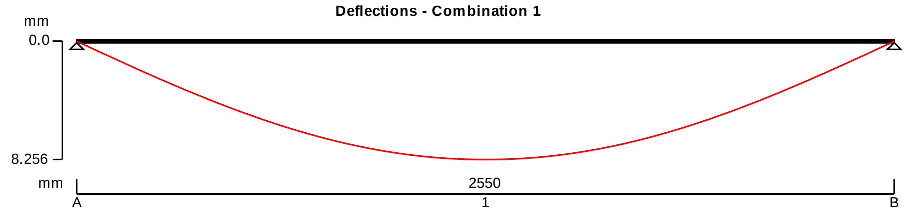
x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	0.00	1.70	0.00	0.0	0.0
0.510	0.69	0.00	1.02	0.00	4.9	0.0
1.020	1.04	0.00	0.34	0.00	7.9	0.0
1.275	1.08	0.00	0.00	0.00	8.3	0.0
1.530	1.04	0.00	0.00	-0.34	7.9	0.0
2.040	0.69	0.00	0.00	-1.02	4.9	0.0
2.550	0.00	0.00	0.00	-1.70	0.0	0.0



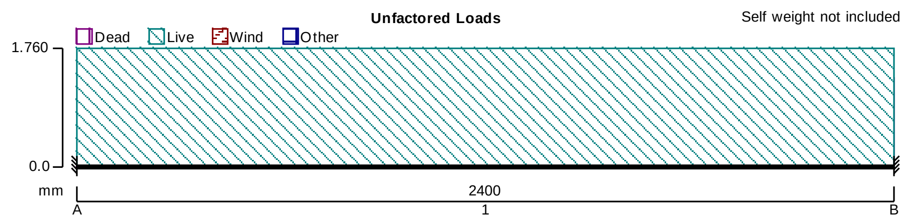




Shear Force - Combination 1
kN
1.696
0.0
-1.696
1.7
-1.7
mm
2550
A
1
B



Deflections - Combination 1
mm
0.0
8.256
mm
2550
A
1
B



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **3** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Restrained"**

Support B Vertically **"Restrained"** Rotationally **"Restrained"**

Span Definitions:

Span 1 Length = **2400** mm Cross-sectional area = **1600** mm^2 Moment of inertia = **4.44×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 UDL Dead load **1.3** kN/m

Load 2 UDL Live load **1.8** kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-1.6**	**-2.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-1.6**	**-2.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A Max react = **-5.3** kN Min react = **-5.3** kN Max mom = **-2.1** kNm Min mom = **-2.1** kNm

Support B Max react = **-5.3** kN Min react = **-5.3** kN Max mom = **2.1** kNm Min mom = **2.1** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **5.3** kN Minimum shear F_{min} = **-5.3** kN

Maximum moment = **1.1** kNm Minimum moment = **-2.1** kNm

Maximum deflection = **1.2** mm Minimum deflection = **0.0** mm

Span Max/Min results - Combination Summary

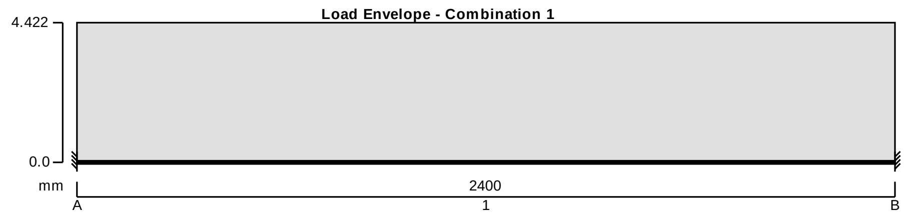
Span 1 Maximum shear = **5.3** kN at **0.000** m Minimum shear = **-5.3** kN at **2.400** m

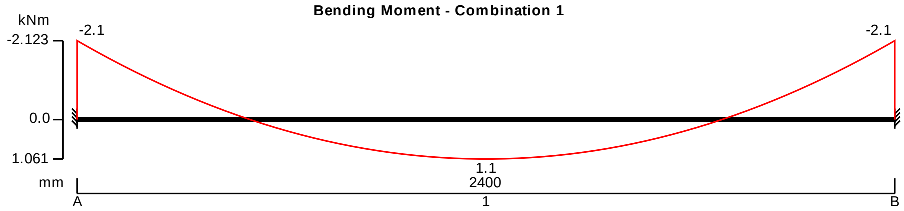
Maximum moment = **1.1** kNm at **1.200** m Minimum moment = **-2.1** kNm at **0.000** m

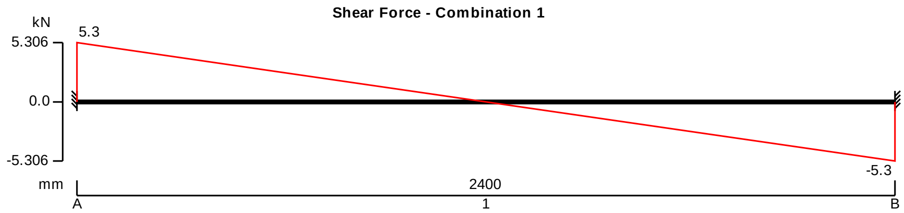
Maximum deflection = **1.2** mm at **1.200** m Minimum deflection = **0.0** mm at **0.000** m

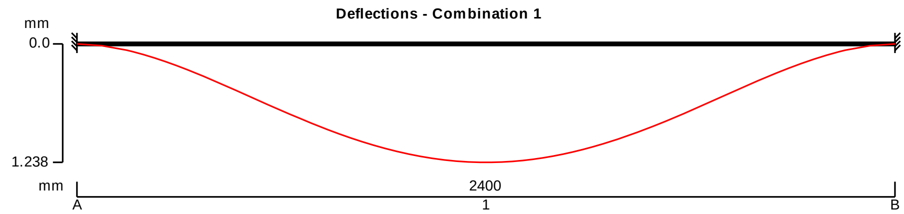
SPAN RESULTS - SPAN 1

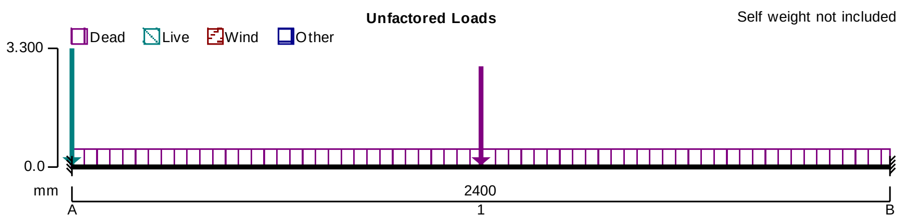
x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	-2.12	5.31	0.00	0.0	0.0
0.480	0.00	-0.08	3.18	0.00	0.5	0.0
0.960	0.93	0.00	1.06	0.00	1.1	0.0
1.200	1.06	0.00	0.00	0.00	1.2	0.0
1.200	1.06	0.00	0.00	0.00	1.2	0.0
1.200	1.06	0.00	0.00	0.00	1.2	0.0
1.440	0.93	0.00	0.00	-1.06	1.1	0.0
1.920	0.00	-0.08	0.00	-3.18	0.5	0.0
2.400	0.00	-2.12	0.00	-5.31	0.0	0.0











CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Restrained"**

Support B Vertically **"Restrained"** Rotationally **"Restrained"**

Span Definitions:

Span 1 Length = **2400** mm Cross-sectional area = **2127** mm^2 Moment of inertia = **4.44×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 UDL Dead load **0.5** kN/m

Load 2 Point Dead load **2.8** kN at **1.200** m

Load 3 Point Live load **3.3** kN at **0.000** m

Support A loads:

Load 3 Beam pointLive Load 3.3 kN

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

Support A 1×Dead + 1×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-2.0**	**-3.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-2.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A Max react = **-6.0** kN Min react = **-6.0** kN Max mom = **-1.5** kNm Min mom = **-1.5** kNm

Support B Max react = **-2.7** kN Min react = **-2.7** kN Max mom = **1.5** kNm Min mom = **1.5** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **2.7** kN Minimum shear F_{min} = **-2.7** kN

Maximum moment = **1.3** kNm Minimum moment = **-1.5** kNm

Maximum deflection = **1.1** mm Minimum deflection = **0.0** mm

Span Max/Min results - Combination Summary

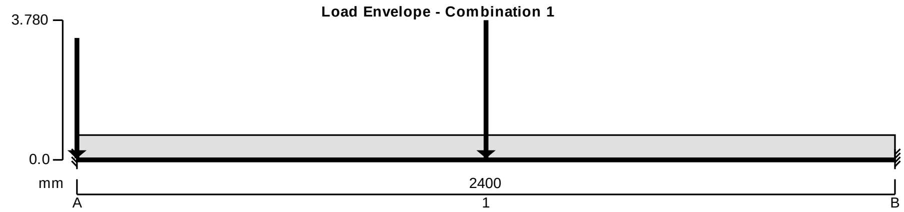
Span 1 Maximum shear = **2.7** kN at **0.000** m Minimum shear = **-2.7** kN at **2.400** m

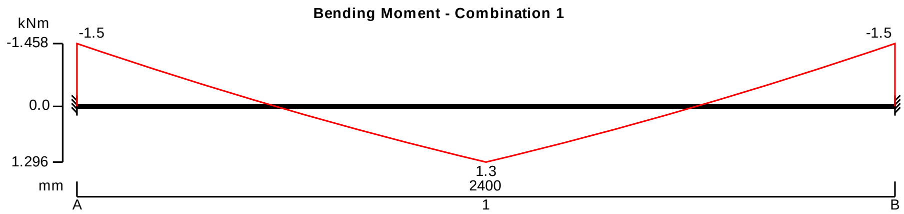
Maximum moment = **1.3** kNm at **1.200** m Minimum moment = **-1.5** kNm at **2.400** m

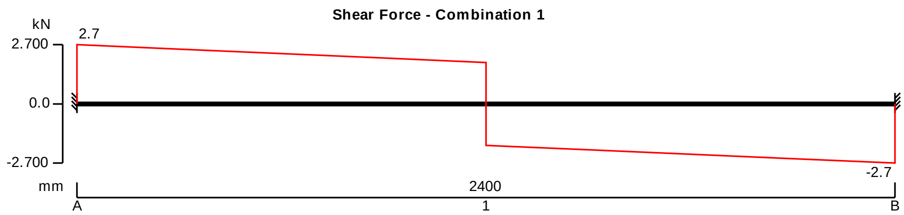
Maximum deflection = **1.1** mm at **1.200** m Minimum deflection = **0.0** mm at **0.000** m

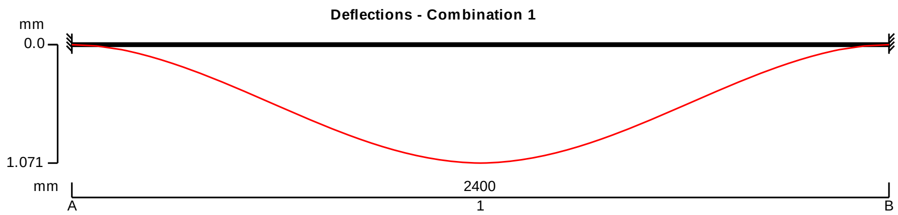
SPAN RESULTS - SPAN 1

x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	-1.46	2.70	0.00	0.0	0.0
0.480	0.00	-0.24	2.38	0.00	0.4	0.0
0.960	0.82	0.00	2.05	0.00	1.0	0.0
1.200	1.30	0.00	1.89	-1.89	1.1	0.0
1.200	1.30	0.00	0.00	-1.89	1.1	0.0
1.440	0.82	0.00	0.00	-2.05	1.0	0.0
1.920	0.00	-0.24	0.00	-2.38	0.4	0.0
2.400	0.00	-1.46	0.00	-2.70	0.0	0.0
2.400	0.00	-1.46	0.00	-2.70	0.0	0.0

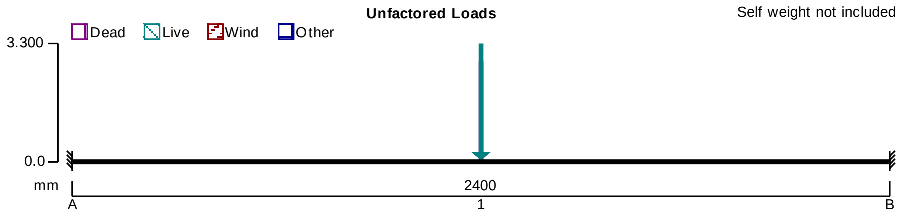








Deflections - Combination 1
mm
0.0
1.071
mm
2400
A
1
B



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A   Vertically **"Restrained"**   Rotationally **"Restrained"**

Support B   Vertically **"Restrained"**   Rotationally **"Restrained"**

Span Definitions:

Span 1   Length = **2400** mm   Cross-sectional area = **2127** mm^2 Moment of inertia = **4.44**×**10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1   Point Dead load **2.8** kN at **1.200** m

Load 2   Point Live load **3.3** kN at **1.200** m

LOAD COMBINATIONS

Load combination 1

Span 1   1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-1.4**	**-1.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-1.4**	**-1.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A   Max react = **-4.4** kN   Min react = **-4.4** kN   Max mom = **-2.6** kNm   Min mom = **-2.6** kNm

Support B   Max react = **-4.4** kN   Min react = **-4.4** kN   Max mom = **2.6** kNm   Min mom = **2.6** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **4.4** kN   Minimum shear F_{min} = **-4.4** kN

Maximum moment = **2.6** kNm   Minimum moment = **-2.6** kNm

Maximum deflection = **2.0** mm   Minimum deflection = **0.0** mm

Span Max/Min results - Combination Summary

Span 1   Maximum shear = **4.4** kN at **0.000** m   Minimum shear = **-4.4** kN at **2.400** m

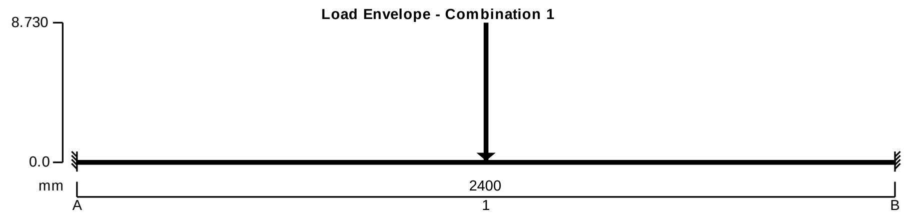
Maximum moment = **2.6** kNm at **1.200** m   Minimum moment = **-2.6** kNm at **0.000** m

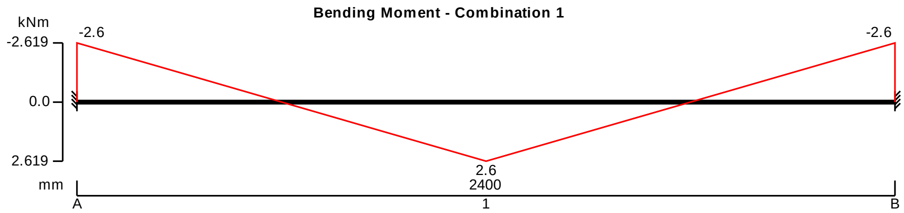
Maximum deflection = **2.0** mm at **1.200** m   Minimum deflection = **0.0** mm at **0.000** m

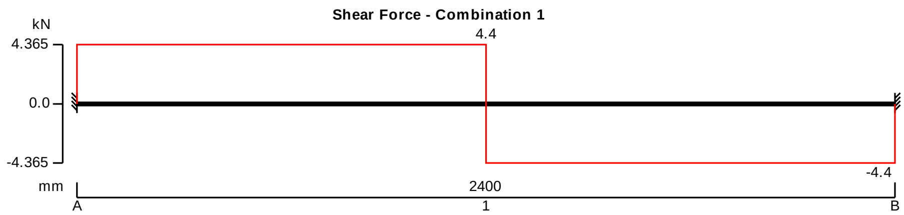
CSC TEDDS	Project				Job Ref.	
Engineering and Building Design 41 Maitland Avenue Thornton-Cleveleys FY5 3JR tel 01253 859867	Supalite Tiled Roof Systems Ltd - Supalite Roof				C11-165	
	Section				Sheet no./rev.	
	Eaves Beam - with Point Loads				2	
	Calc. by PGR	Date 25/09/2013	Chk'd by	Date	App'd by	Date

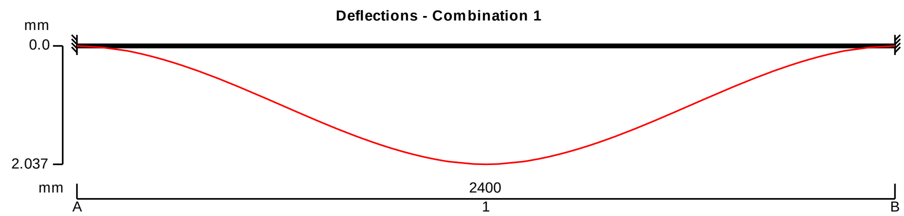
SPAN RESULTS - SPAN 1

x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	-2.62	4.37	0.00	0.0	0.0
0.480	0.00	-0.52	4.37	0.00	0.7	0.0
0.960	1.57	0.00	4.37	0.00	1.8	0.0
1.200	2.62	0.00	4.37	-4.36	2.0	0.0
1.200	2.62	0.00	0.00	-4.36	2.0	0.0
1.440	1.57	0.00	0.00	-4.36	1.8	0.0
1.920	0.00	-0.52	0.00	-4.36	0.7	0.0
2.400	0.00	-2.62	0.00	-4.36	0.0	0.0
2.400	0.00	-2.62	0.00	-4.36	0.0	0.0

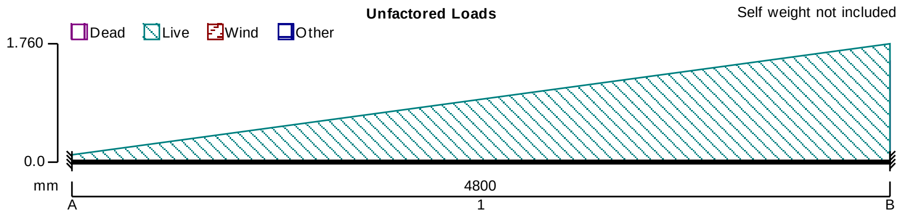








CSC TEDDS Engineering and Building Design 41 Maitland Avenue Thornton-Cleveleys . Lancs FY5 3JR 01253 859867	Project Supalite Tiled Roof Systems Ltd - Supalite Roof			Job Ref. C11-165	
	Section Hip Beam - UDL			Sheet no./rev. 1	
	Calc. by PGR	Date 25/09/2013	Chk'd by	Date	App'd by	Date



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Restrained"**

Support B Vertically **"Restrained"** Rotationally **"Restrained"**

Span Definitions:

Span 1 Length = **4800** mm Cross-sectional area = **1580** mm^2 Moment of inertia = **3.14**×**10**^{6} mm^4

LOADING DETAILS

Beam Loads:

Load 1 VDL Dead load **0.1** kN/m to **1.5** kN/m

Load 2 VDL Live load **0.1** kN/m to **1.8** kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Support Reactions - Combination Summary

Support A Max react = **-3.9** kN Min react = **-3.9** kN Max mom = **-3.9** kNm Min mom = **-3.9** kNm

Support B Max react = **-8.1** kN Min react = **-8.1** kN Max mom = **5.6** kNm Min mom = **5.6** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **3.9** kN Minimum shear F_{min} = **-8.1** kN

Maximum moment = **2.4** kNm Minimum moment = **-5.6** kNm

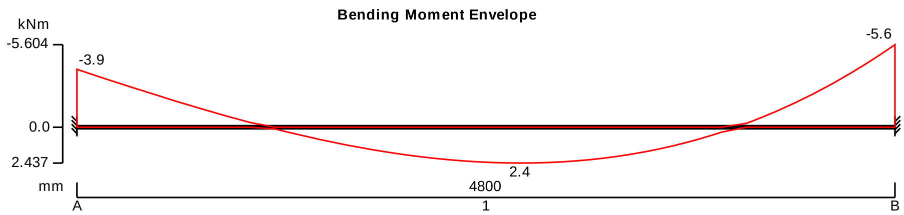
Maximum deflection = **15.8** mm Minimum deflection = **0.0** mm

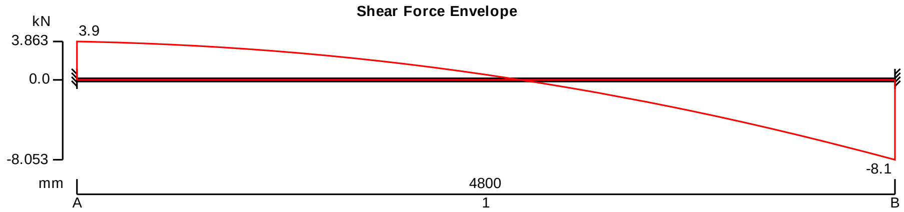
Span Max/Min results - Combination Summary

Span 1 Maximum shear = **3.9** kN at **0.000** m Minimum shear = **-8.1** kN at **4.800** m

Maximum moment = **2.4** kNm at **2.603** m Minimum moment = **-5.6** kNm at **4.800** m

Maximum deflection = **15.8** mm at **2.505** m Minimum deflection = **0.0** mm at **0.000** m

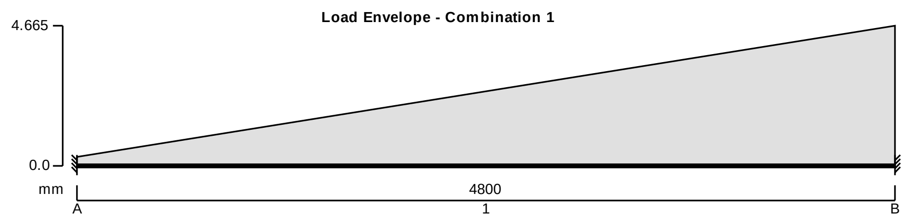




SPAN RESULTS - SPAN 1

x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	-3.93	3.86	0.00	0.0	0.0
0.600	0.00	-1.70	3.52	0.00	2.6	0.0
1.200	0.23	0.00	2.85	0.00	8.1	0.0
1.800	1.65	0.00	1.85	0.00	13.2	0.0
2.400	2.38	0.00	0.52	0.00	15.7	0.0
2.504	2.42	0.00	0.26	0.00	15.8	0.0
2.505	2.42	0.00	0.26	0.00	15.8	0.0
2.505	2.42	0.00	0.26	0.00	15.8	0.0
2.603	2.44	0.00	0.00	0.00	15.7	0.0
2.603	2.44	0.00	0.00	0.00	15.7	0.0
2.604	2.44	0.00	0.00	0.00	15.7	0.0
3.000	2.22	0.00	0.00	-1.13	14.4	0.0
3.600	0.96	0.00	0.00	-3.11	9.6	0.0
4.200	0.00	-1.58	0.00	-5.42	3.4	0.0
4.800	0.00	-5.60	0.00	-8.05	0.0	0.0

RESULTS FOR COMBINATION 1



Support Reactions and Deflections - Combination 1 :

Support A Reaction = **-3.9** kN Moment = **-3.9** kNm Deflection = **0.0** mm Rotation = **0.00** deg

Support B Reaction = **-8.1** kN Moment = **5.6** kNm Deflection = **0.0** mm Rotation = **0.00** deg

Beam Max/Min results - Combination 1 :

Maximum shear = **3.9** kN Minimum shear = **-8.1** kN

Maximum moment = **2.4** kNm Minimum moment = **-5.6** kNm

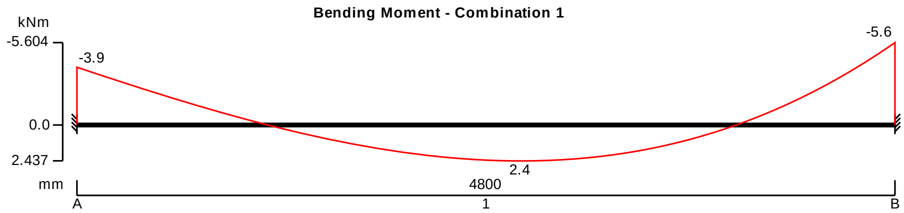
Maximum deflection = **15.8** mm Minimum deflection = **0.0** mm

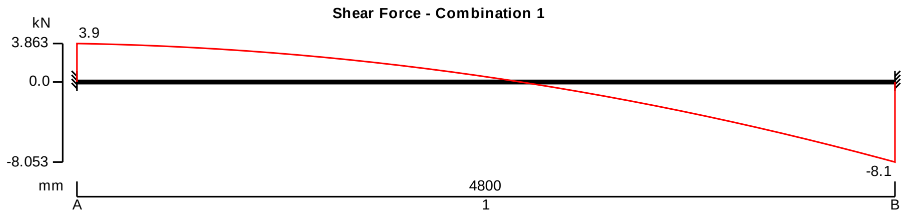
Span Max/Min results - Combination 1 :

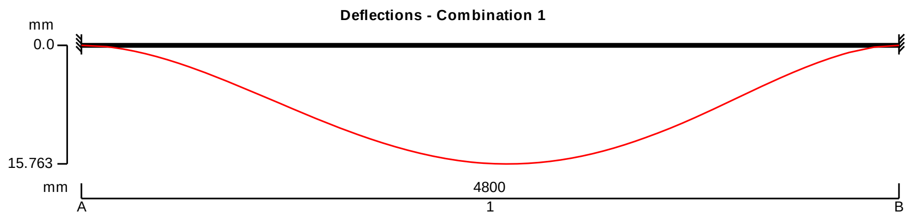
Span 1 Maximum shear = **3.9** kN at **0.000** m Minimum shear = **-8.1** kN at **4.800** m

Maximum moment = **2.4** kNm at **2.603** m Minimum moment = **-5.6** kNm at **4.800** m

Maximum deflection = **15.8** mm at **2.505** m Minimum deflection = **0.0** mm at **0.000** m

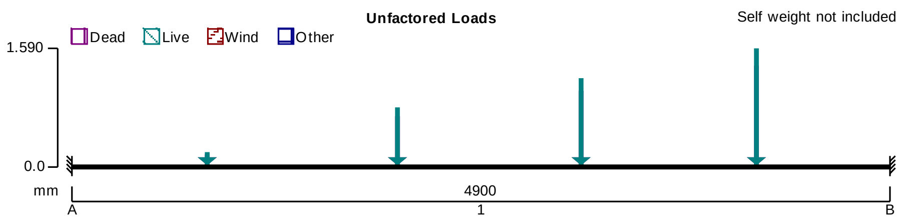






Span Results - Span 1 - Combination

x (m)	F_{left} (kN)	F_{right} (kN)	M (kNm)	δ (mm)
0.000	3.86		-3.93	0.0
1.200	2.85		0.23	8.1
2.400	0.52		2.38	15.7
3.600	-3.11		0.96	9.6
4.800	-8.05		-5.60	0.0



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Restrained"**

Support B Vertically **"Restrained"** Rotationally **"Restrained"**

Span Definitions:

Span 1 Length = **4900** mm Cross-sectional area = **1580** mm^2 Moment of inertia = **3.14×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 Point Dead load **0.2** kN at **0.810** m

Load 2 Point Live load **0.2** kN at **0.810** m

Load 3 Point Dead load **0.7** kN at **1.950** m

Load 4 Point Live load **0.8** kN at **1.950** m

Load 5 Point Dead load **1.0** kN at **3.050** m

Load 6 Point Live load **1.2** kN at **3.050** m

Load 7 Point Dead load **1.4** kN at **4.100** m

Load 8 Point Live load **1.6** kN at **4.100** m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Support Reactions - Combination Summary

Support A Max react = **-3.2** kN Min react = **-3.2** kN Max mom = **-3.6** kNm Min mom = **-3.6** kNm

Support B Max react = **-6.8** kN Min react = **-6.8** kN Max mom = **5.7** kNm Min mom = **5.7** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **3.2** kN Minimum shear F_{min} = **-6.8** kN

Maximum moment = **2.6** kNm Minimum moment = **-5.7** kNm

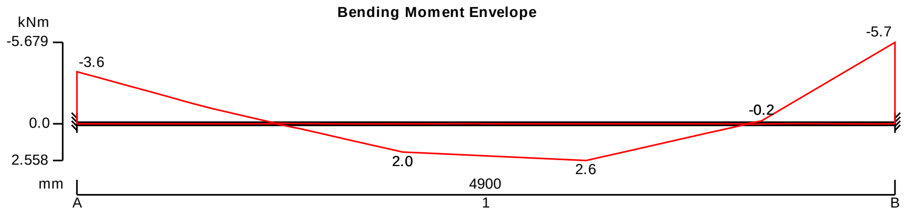
Maximum deflection = **16.3** mm Minimum deflection = **0.0** mm

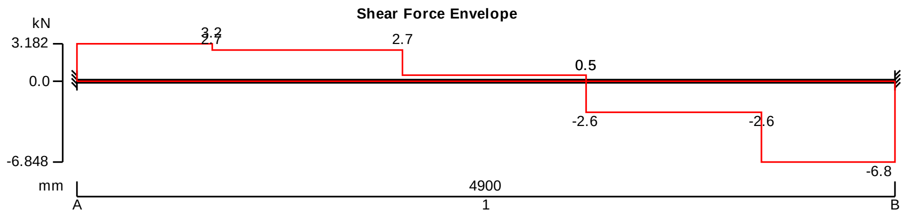
Span Max/Min results - Combination Summary

Span 1 Maximum shear = **3.2** kN at **0.000** m Minimum shear = **-6.8** kN at **4.900** m

Maximum moment = **2.6** kNm at **3.050** m Minimum moment = **-5.7** kNm at **4.900** m

Maximum deflection = **16.3** mm at **2.593** m Minimum deflection = **0.0** mm at **4.900** m

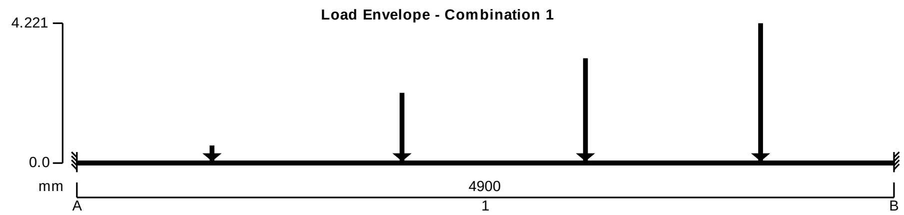




SPAN RESULTS - SPAN 1

x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	-3.63	3.18	0.00	0.0	0.0
0.613	0.00	-1.68	3.18	0.00	2.6	0.0
0.810	0.00	-1.05	3.18	0.00	4.2	0.0
1.225	0.05	0.00	2.65	0.00	8.0	0.0
1.838	1.67	0.00	2.65	0.00	13.4	0.0
1.950	1.97	0.00	2.65	0.00	14.2	0.0
2.450	2.24	0.00	0.53	0.00	16.2	0.0
2.592	2.31	0.00	0.53	0.00	16.3	0.0
2.593	2.31	0.00	0.53	0.00	16.3	0.0
2.593	2.31	0.00	0.53	0.00	16.3	0.0
3.050	2.56	0.00	0.53	-2.63	15.1	0.0
3.063	2.53	0.00	0.00	-2.63	15.1	0.0
3.675	0.92	0.00	0.00	-2.63	10.1	0.0
4.100	0.00	-0.20	0.00	-6.85	5.6	0.0
4.288	0.00	-1.48	0.00	-6.85	3.7	0.0
4.900	0.00	-5.68	0.00	-6.85	0.0	0.0

RESULTS FOR COMBINATION 1



Support Reactions and Deflections - Combination 1 :

Support A Reaction = **-3.2** kN Moment = **-3.6** kNm Deflection = **0.0** mm Rotation = **0.00** deg

Support B Reaction = **-6.8** kN Moment = **5.7** kNm Deflection = **0.0** mm Rotation = **0.00** deg

Beam Max/Min results - Combination 1 :

Maximum shear = **3.2** kN Minimum shear = **-6.8** kN

Maximum moment = **2.6** kNm Minimum moment = **-5.7** kNm

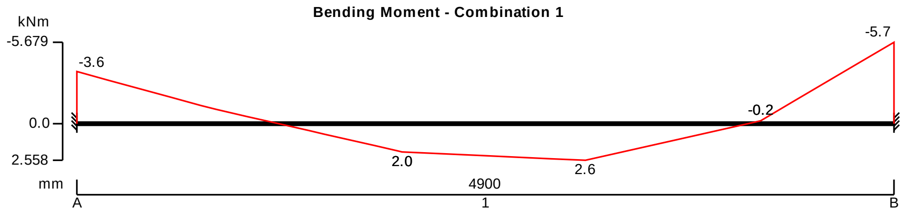
Maximum deflection = **16.3** mm Minimum deflection = **0.0** mm

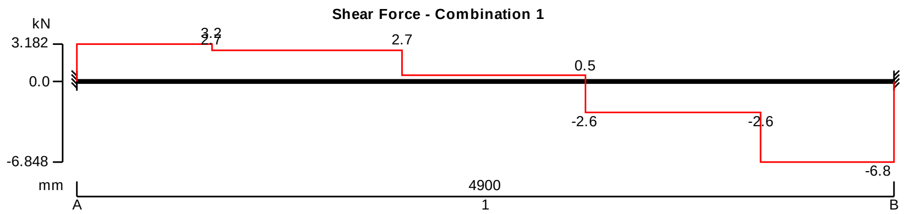
Span Max/Min results - Combination 1 :

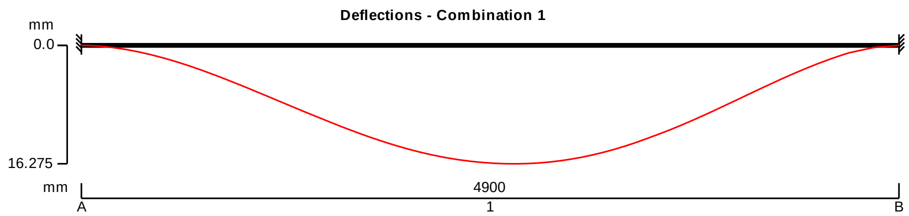
Span 1 Maximum shear = **3.2** kN at **0.000** m Minimum shear = **-6.8** kN at **4.900** m

Maximum moment = **2.6** kNm at **3.050** m Minimum moment = **-5.7** kNm at **4.900** m

Maximum deflection = **16.3** mm at **2.593** m Minimum deflection = **0.0** mm at **4.900** m

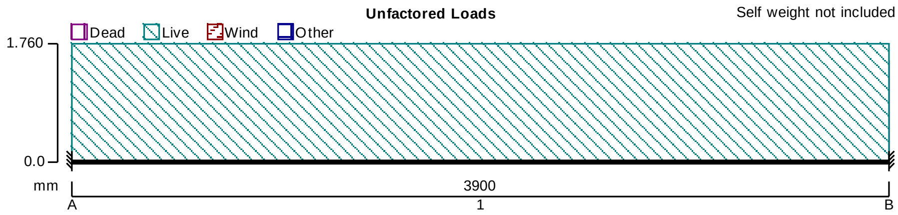






Span Results - Span 1 - Combination

x (m)	F_{left} (kN)	F_{right} (kN)	M (kNm)	δ (mm)
0.000	3.18		-3.63	0.0
0.810	3.18	2.65	-1.05	4.2
1.225	2.65		0.05	8.0
1.950	2.65	0.53	1.97	14.2
2.450	0.53		2.24	16.2
3.050	0.53	-2.63	2.56	15.1
3.675	-2.63		0.92	10.1
4.100	-2.63	-6.85	-0.20	5.6
4.900	-6.85		-5.68	0.0



CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"**   Rotationally **"Restrained"**

Support B Vertically **"Restrained"**   Rotationally **"Restrained"**

Span Definitions:

Span 1 Length = **3900** mm   Cross-sectional area = **1580** mm^2 Moment of inertia = **3.14×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 UDL Dead load **1.5** kN/m

Load 2 UDL Live load **1.8** kN/m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Unfactored support reactions

	Dead (kN)	Live (kN)	Wind (kN)	Other (kN)				
Support A	**-2.9**	**-3.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Support B	**-2.9**	**-3.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Support Reactions - Combination Summary

Support A Max react = **-9.1** kN   Min react = **-9.1** kN   Max mom = **-5.9** kNm   Min mom = **-5.9** kNm

Support B Max react = **-9.1** kN   Min react = **-9.1** kN   Max mom = **5.9** kNm   Min mom = **5.9** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **9.1** kN   Minimum shear F_{min} = **-9.1** kN

Maximum moment = **3.0** kNm   Minimum moment = **-5.9** kNm

Maximum deflection = **12.9** mm   Minimum deflection = **0.0** mm

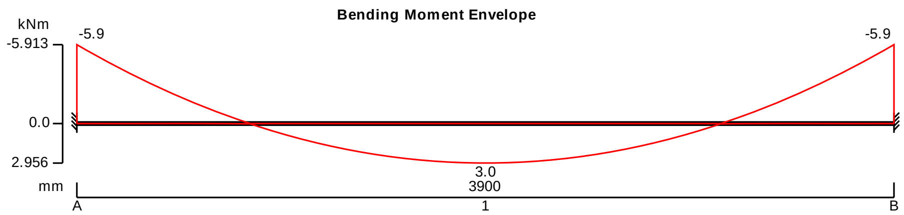
Span Max/Min results - Combination Summary

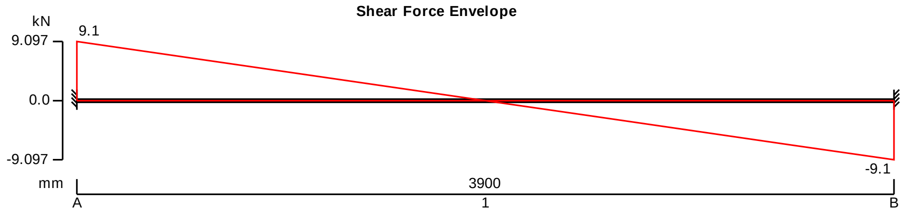
Span 1 Maximum shear = **9.1** kN at **0.000** m   Minimum shear = **-9.1** kN at **3.900** m

Maximum moment = **3.0** kNm at **1.950** m   Minimum moment = **-5.9** kNm at **3.900** m

Maximum deflection = **12.9** mm at **1.950** m   Minimum deflection = **0.0** mm at **0.000** m

CSC TEDDS	Project			Job Ref.	
Engineering and Building Design 41 Maitland Avenue Thornton-Cleveleys . Lancs FY5 3JR 01253 859867	Supalite Tiled Roof Systems Ltd - Supalite Roof			C11-165	
	Section			Sheet no./rev.	
	Ridge Beam UDL load - 3200 rafters			2	
	Calc. by PGR	Date 25/09/2013	Chk'd by	Date	App'd by	Date

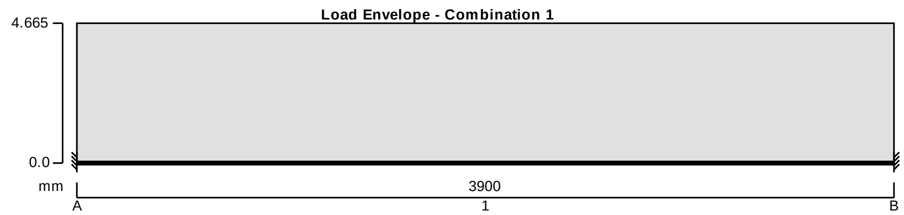




SPAN RESULTS - SPAN 1

x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	-5.91	9.10	0.00	0.0	0.0
0.780	0.00	-0.24	5.46	0.00	5.3	0.0
1.560	2.60	0.00	1.82	0.00	11.9	0.0
1.950	2.96	0.00	0.00	0.00	12.9	0.0
2.340	2.60	0.00	0.00	-1.82	11.9	0.0
3.120	0.00	-0.24	0.00	-5.46	5.3	0.0
3.900	0.00	-5.91	0.00	-9.10	0.0	0.0

RESULTS FOR COMBINATION 1



Support Reactions and Deflections - Combination 1 :

Support A Reaction = **-9.1** kN Moment = **-5.9** kNm Deflection = **0.0** mm Rotation = **0.00** deg

Support B Reaction = **-9.1** kN Moment = **5.9** kNm Deflection = **0.0** mm Rotation = **0.00** deg

Beam Max/Min results - Combination 1 :

Maximum shear = **9.1** kN Minimum shear = **-9.1** kN

Maximum moment = **3.0** kNm Minimum moment = **-5.9** kNm

Maximum deflection = **12.9** mm Minimum deflection = **0.0** mm

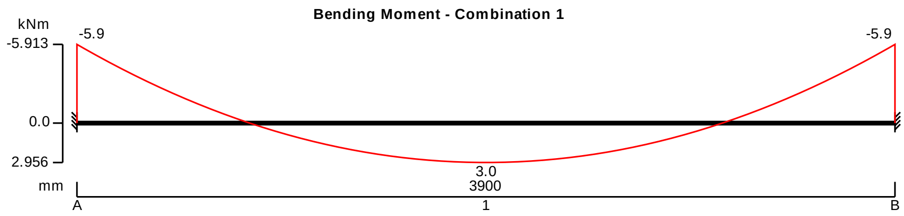
Span Max/Min results - Combination 1 :

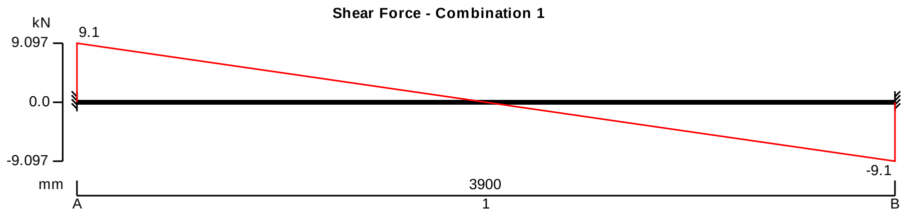
Span 1 Maximum shear = **9.1** kN at **0.000** m Minimum shear = **-9.1** kN at **3.900** m

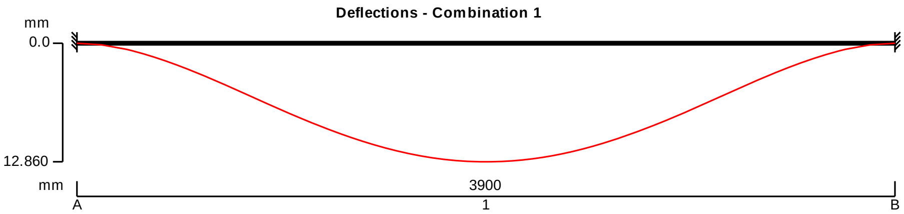
CSC TEDDS Engineering and Building Design 41 Maitland Avenue Thornton-Cleveleys . Lancs FY5 3JR 01253 859867	Project Supalite Tiled Roof Systems Ltd - Supalite Roof				Job Ref. C11-165	
	Section Ridge Beam UDL load - 3200 rafters				Sheet no./rev. 3	
	Calc. by PGR	Date 25/09/2013	Chk'd by	Date	App'd by	Date

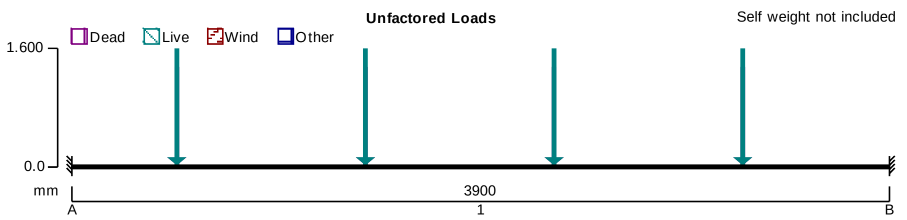
Maximum moment = **3.0** kNm at **1.950** m Minimum moment = **-5.9** kNm at **3.900** m

Maximum deflection = **12.9** mm at **1.950** m Minimum deflection = **0.0** mm at **0.000** m









CONTINUOUS BEAM ANALYSIS - INPUT

BEAM DETAILS

Number of spans = **1**

Material Properties:

Modulus of elasticity = **70** kN/mm^2 Material density = **2700** kg/m^3

Support Conditions:

Support A Vertically **"Restrained"** Rotationally **"Restrained"**

Support B Vertically **"Restrained"** Rotationally **"Restrained"**

Span Definitions:

Span 1 Length = **3900** mm Cross-sectional area = **1580** mm^2 Moment of inertia = **3.14×10^6** mm^4

LOADING DETAILS

Beam Loads:

Load 1 Point Dead load **1.4** kN at **0.500** m

Load 2 Point Dead load **1.4** kN at **1.400** m

Load 3 Point Dead load **1.4** kN at **2.300** m

Load 4 Point Dead load **1.4** kN at **3.200** m

Load 5 Point Live load **1.6** kN at **0.500** m

Load 6 Point Live load **1.6** kN at **1.400** m

Load 7 Point Live load **1.6** kN at **2.300** m

Load 8 Point Live load **1.6** kN at **3.200** m

LOAD COMBINATIONS

Load combination 1

Span 1 1.35×Dead + 1.5×Live

CONTINUOUS BEAM ANALYSIS - RESULTS

Support Reactions - Combination Summary

Support A Max react = **-8.9** kN Min react = **-8.9** kN Max mom = **-6.1** kNm Min mom = **-6.1** kNm

Support B Max react = **-8.0** kN Min react = **-8.0** kN Max mom = **5.9** kNm Min mom = **5.9** kNm

Beam Max/Min results - Combination Summary

Maximum shear = **8.9** kN Minimum shear F_{min} = **-8.0** kN

Maximum moment = **3.0** kNm Minimum moment = **-6.1** kNm

Maximum deflection = **13.0** mm Minimum deflection = **0.0** mm

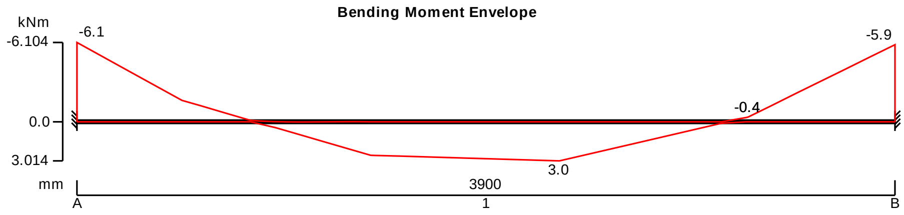
Span Max/Min results - Combination Summary

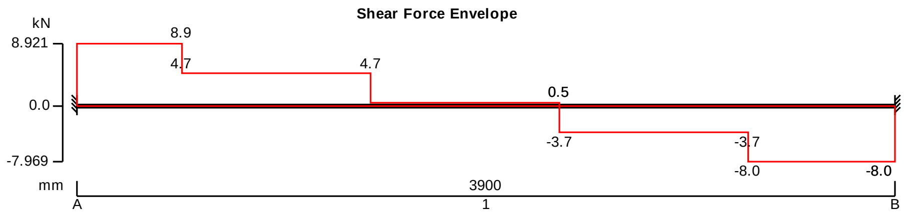
Span 1 Maximum shear = **8.9** kN at **0.000** m Minimum shear = **-8.0** kN at **3.900** m

Maximum moment = **3.0** kNm at **2.300** m Minimum moment = **-6.1** kNm at **0.000** m

Maximum deflection = **13.0** mm at **1.956** m Minimum deflection = **0.0** mm at **0.000** m

CSC TEDDS Engineering and Building Design 41 Maitland Avenue Thornton-Cleveleys . Lancs FY5 3JR 01253 859867	Project Supalite Tiled Roof Systems Ltd - Supalite Roof				Job Ref. C11-165	
	Section Ridge Beam - 900 point loads				Sheet no./rev. 2	
	Calc. by PGR	Date 25/09/2013	Chk'd by	Date	App'd by	Date

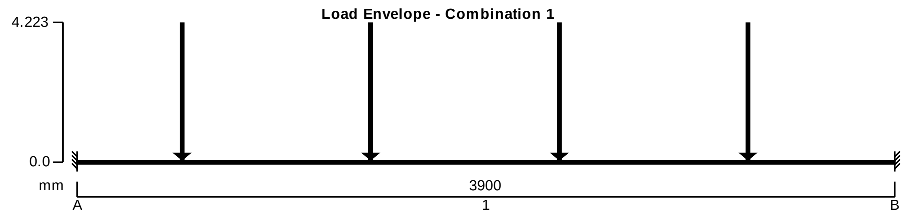




SPAN RESULTS - SPAN 1

x (m)	M_{max}(kNm)	M_{min}(kNm)	F_{max} (kN)	F_{min} (kN)	δ_{max} (mm)	δ_{min} (mm)
0.000	0.00	-6.10	8.92	0.00	0.0	0.0
0.488	0.00	-1.75	8.92	0.00	2.5	0.0
0.500	0.00	-1.64	8.92	0.00	2.6	0.0
0.975	0.59	0.00	4.70	0.00	7.3	0.0
1.400	2.59	0.00	4.70	0.00	11.0	0.0
1.463	2.62	0.00	0.48	0.00	11.5	0.0
1.950	2.85	0.00	0.48	0.00	13.0	0.0
1.956	2.85	0.00	0.48	0.00	13.0	0.0
2.300	3.01	0.00	0.48	-3.75	12.2	0.0
2.438	2.50	0.00	0.00	-3.75	11.5	0.0
2.925	0.67	0.00	0.00	-3.75	7.3	0.0
3.200	0.00	-0.36	0.00	-7.97	4.6	0.0
3.412	0.00	-2.05	0.00	-7.97	2.5	0.0
3.900	0.00	-5.94	0.00	-7.97	0.0	0.0

RESULTS FOR COMBINATION 1



Support Reactions and Deflections - Combination 1 :

Support A Reaction = **-8.9** kN Moment = **-6.1** kNm Deflection = **0.0** mm Rotation = **0.00** deg

Support B Reaction = **-8.0** kN Moment = **5.9** kNm Deflection = **0.0** mm Rotation = **0.00** deg

Beam Max/Min results - Combination 1 :

Maximum shear = **8.9** kN Minimum shear = **-8.0** kN

Maximum moment = **3.0** kNm Minimum moment = **-6.1** kNm

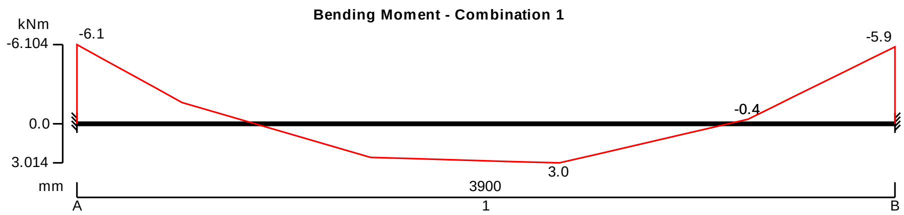
Maximum deflection = **13.0** mm Minimum deflection = **0.0** mm

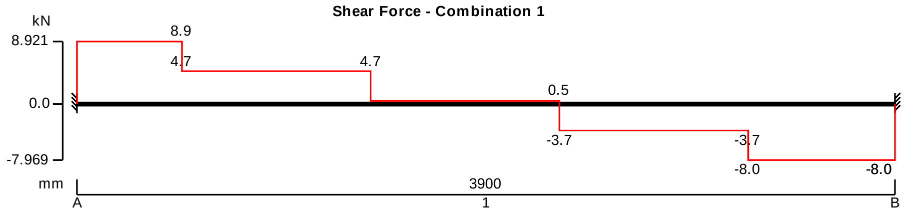
Span Max/Min results - Combination 1 :

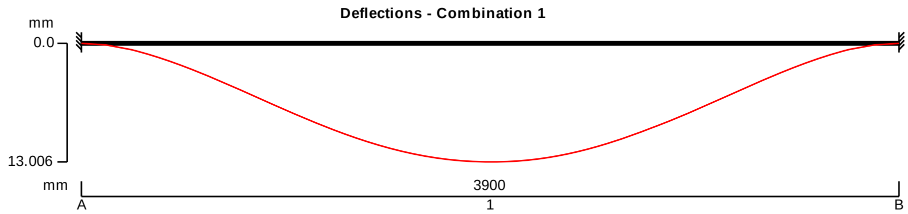
Span 1 Maximum shear = **8.9** kN at **0.000** m Minimum shear = **-8.0** kN at **3.900** m

Maximum moment = **3.0** kNm at **2.300** m Minimum moment = **-6.1** kNm at **0.000** m

Maximum deflection = **13.0** mm at **1.956** m Minimum deflection = **0.0** mm at **0.000** m







Span Results - Span 1 - Combination

x (m)	F_{left} (kN)	F_{right} (kN)	M (kNm)	δ (mm)
0.000	8.92		-6.10	0.0
0.500	8.92	4.70	-1.64	2.6
0.975	4.70		0.59	7.3
1.400	4.70	0.48	2.59	11.0
1.950	0.48		2.85	13.0
2.300	0.48	-3.75	3.01	12.2
2.925	-3.75		0.67	7.3
3.200	-3.75	-7.97	-0.36	4.6

x (m)	F_{left} (kN)	F_{right} (kN)	M (kNm)	δ (mm)
3.900	-7.97		-5.94	0.0

Aluminium Alloy // Commercial Alloy // 6063 - T6

Aluminium Alloy 6063
Aluminium alloy 6063 is a medium strength alloy commonly referred to as an architectural alloy. It is normally used in intricate extrusions.
It has a good surface finish, high corrosion resistance, is readily suited to welding and can be easily anodised. Most commonly available as T6 temper, in the T4 condition it has good formability.

Applications
6063 is typically used in:
Architectural applications
Extrusions
Window frames
Doors
Shop fittings
Irrigation tubing
In balustrading the rails and posts are normally in the T6 temper and formed elbows and bends are T4. T4 temper 6063 aluminium is also finding applications in hydroformed tube for chassis.

Aluminium Alloy 6063A
Aluminium alloy 6063A is a variation of 6063 with greater strength but retains the same good surface finish qualities and affinity for anodising.

Applications
6063A is used in the same applications as 6063. It is also used in:
Road transport
Rail transport
Extreme sports equipment

ALLOY DESIGNATIONS

Aluminium alloy 6063/6063A also corresponds to the following standard designations and specifications:

AA6063

Al Mg0.7Si

GS10

AlMgSi0.5

A-GS

Download PDF version

Chemical Element	% Present
Manganese (Mn)	0.0 - 0.10
Iron (Fe)	0.0 - 0.35
Magnesium (Mg)	0.45 - 0.90
Silicon (Si)	0.20 - 0.60
Zinc (Zn)	0.0 - 0.10
Titanium (Ti)	0.0 - 0.10
Chromium (Cr)	0.0 - 0.10
Copper (Cu)	0.0 - 0.10
Aluminium (Al)	Balance

Physical Property	Value
Density	2.70 Kg/m³
Melting Point	600 °C
Thermal Expansion	23.5 x10^-6 /K
Modulus of Elasticity	69.5 GPa
Thermal Conductivity	200 W/m.K
Electrical Resistivity	0.035 x10^-6 Ω .m

Mechanical Property	Value
Proof Stress	160 Min MPa
Tensile Strength	195 Min MPa
Elongation	14 %
Shear Strength	150 MPa
Hardness Vickers	80 HV

Properties above are for material in the T6 condition

Ballytherm Limited
Annagh Industrial Park, Ballyconnell, Co. Cavan, Ireland

Tel: +353 (0) 4995 27000 Fax: +353 (0) 4995 27002
Web: http://www.ballytherm.ie Email: info@ballytherm.ie

Project Information

Reference
Date 8 January 2014
Client Tyne Insulation Ltd. Project Ref. Alan Waters- Supalite tiled roof systems Ltd

Construction Type

Element : Pitched roof, ceiling at rafter line - Uvalue Element 1
Warm pitched roof
Internal surface emissivity : High External surface emissivity : High
Light steel-frame construction - Cold frame or Hybrid type:-
Stud depth, d : 150.0 mm Stud spacing, s (mm) : 600.0 mm
Flange width : not exceeding 80mm p : 0.388
Correction for mechanical fasteners :-
Alpha : 1.6 per m Thermal conductivity of fastener : 17.00 W/mK
Fasteners per square metre : 6.00 off Fasteners cross-sectional area : 12.50 mm²

Construction	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)
Outside surface resistance	-	-	0.040	-	-
Metal tiles /Battens	30.0	0.167	0.180	-	2.50
Breather membrane (BS5250)	-	-	-	-	0.50
Softwood, dry	12.0	0.125	0.096	100.00	1.20
Cavity bridged by Aluminium frame at 1.7mm @ 600mm centres.	25.0	-	0.454	-	0.13
Ballytherm Polyisocyanurate between aluminium frame at 1.7mm @ 600mm centres	100.0	0.022	4.500	450.00	100.00
Cavity Bridged by aluminium frame at 1.7mm @ 600mm centres.	30.0	-	0.454	-	0.16
Polythene, 500 gauge (0.12mm) (BS5250)	-	-	-	-	250.00
Ballytherm Polyisocyanurate (BS5250)	82.5	0.022	3.750	450.00	37.13
Plaster, gypsum (BS5250)	12.5	0.190	0.066	50.00	0.63
Plaster, lightweight (BS5250)	2.0	0.020	0.100	30.00	0.06
Inside surface resistance	-	-	0.100	-	-

U-value - 0.15W/m²K

U-value, Combined Method : 0.15 W/m²K (upper/lower limit 9.706 / 4.946 m²K/W, dUf 0.0075, dUg 0.0000, dUp0.0000, dUr0.00 dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.008W/m²K)
(Correction for air gaps, Delta Ug = 0.000W/m²K)

(Based on the combined method for determining U-values of structures containing repeating thermal bridges.)

Admittance : 0.95 W/m²K Decrement : 9.29 factor Decrement dalay : 0.00 hours

Detailed U-value Calculation Results

Construction includes 3 bridged layers.

Non-bridged layers	
Outside surface resistance	0.040 m²K/W
Metal tiles /Battens	0.180 m²K/W
Softwood, dry	0.096 m²K/W
Ballytherm Polyisocyanurate (BS5250)	3.750 m²K/W
Plaster, gypsum (BS5250)	0.066 m²K/W
Plaster, lightweight (BS5250)	0.100 m²K/W
Inside surface resistance	0.100 m²K/W
Resistance of non-bridged layers, R_{NB} =	4.332 m²K/W

Bridged layers

Cavity bridged by Aluminium frame at 1.7mm @ 600mm centres. (L1) bridged by Aluminium frame (B1)
Ballytherm Polyisocyanurate between aluminium frame at 1.7mm @ 600mm centres (L2) bridged by Aluminium frame
Cavity Bridged by aluminium frame at 1.7mm @ 600mm centres. (L3) bridged by Aluminium frame (B3)

Path 1 - Cavity bridged by Aluminium frame at 1.7mm @ 600mm centres. / Ballytherm Polyisocyanurate between alu
Path 2 - Aluminium frame / Aluminium frame / Aluminium frame

Resistance and fraction of heat flow paths

$R_{P1} = R_{NB} + R_{L1} = 4.332 + 5.408 = 9.740$ m²K/W $F_{P1} = 99.717\%$
$R_{P2} = R_{NB} + R_{L2} = 4.332 + 0.002 = 4.334$ m²K/W $F_{P2} = 0.283\%$

Upper resistance limit

$R_{upper} = 1 / ((F_{P1}/R_{P1}) + (F_{P2}/R_{P2}))$
$R_{upper} = 1 / ((0.997/9.740) + (0.003/4.334)) = 9.706$m²K/W

Lower resistance limit

$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1}))$
$R_{lower} = 4.332 + 1 / ((0.997/5.408) + (0.003/0.002)) = 4.946$m²K/W

Total resistance of roof

Light steel-frame construction - Cold frame or Hybrid type
Stud depth, d : 150.0 mm Stud spacing, s : 600.0 mm
Flange width : not exceeding 80mm p : 0.388
$R_T = (p \times R_{upper} + (1 - p) \times R_{lower}) = (0.388 \times 9.706 + (1 - 0.388) \times 4.946) = 6.79$ m²K/W

Correction for mechanical fasteners, Delta Uf = 0.008W/m²K. Correction for air gaps, Delta Ug = 0.000W/m²K

U = (1 / Rt) + (Delta Uf + Delta Ug + Delta Up + Delta Ur + Delta Urc) = (1/7.3260) + 0.0075 + 0.0000 + 0.0000 + 0.000
W/m²K

Structure element : Pitched roof, ceiling at rafter line
Description : Warm pitched roof
Condensation calculations performed in accordance with BS5250:2002

Condensation is occuring at the following layers interfaces:-

Month	Int (C°)	Int (%RH)	Ext (C°)	Ext (%RH)
Jan	20.00	59.30	3.80	83.00
Feb	20.00	58.70	3.90	81.00
Mar	20.00	57.20	5.70	76.50
Apr	20.00	56.80	7.90	74.00
May	20.00	57.50	11.30	71.50
Jun	20.00	62.00	14.20	73.50
Jul	20.00	66.00	15.80	75.50
Aug	20.00	66.60	15.70	76.50
Sep	20.00	64.30	13.50	78.50
Oct	20.00	62.20	10.60	81.00
Nov	20.00	59.80	6.30	82.50
Dec	20.00	59.60	4.50	83.50

Gc = Monthly moisture accumulation per area at an interface
Ma = Accumulated moisture content per area at an interface

Peak accumulated moisture content per area at interface (Ma) = 0.00000 Kg/m²

Annual moisture accumulation = 0.00000 Kg/m²

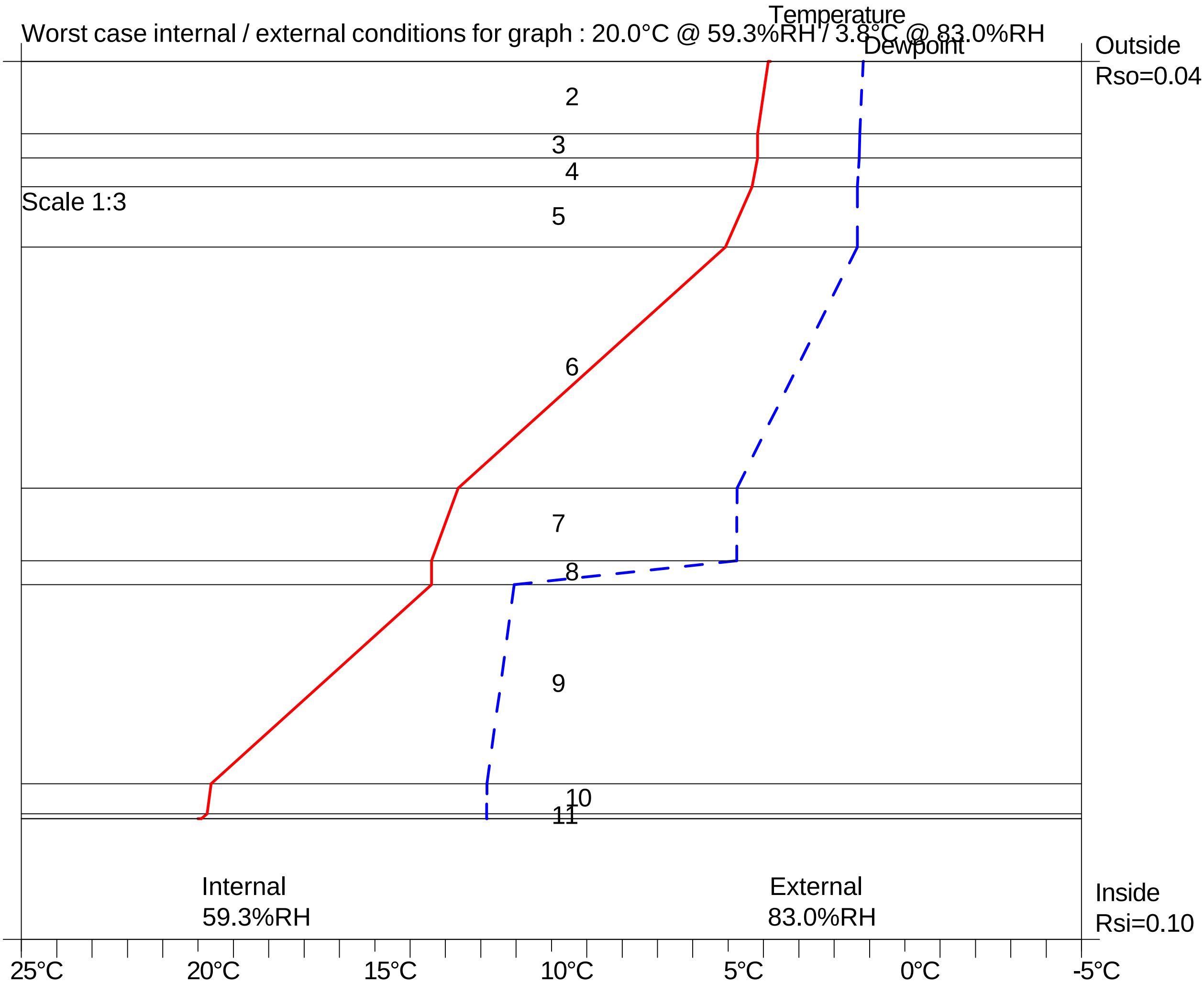
Condensation Risk Analysis (no account taken of thermal bridges)

3 - Dwellings with low occupancy

Jan (worst)	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20.0C 59.3%	20.0C 58.7%	20.0C 57.2%	20.0C 56.8%	20.0C 57.5%	20.0C 62.0%	20.0C 66.0%	20.0C 66.6%	20.0C 64.3%	20.0C 62.2%	20.0C 59.8%	20.0C 59.
3.8C 83.0%	3.9C 81.0%	5.7C 76.5%	7.9C 74.0%	11.3C 71.5%	14.2C 73.5%	15.8C 75.5%	15.7C 76.5%	13.5C 78.5%	10.6C 81.0%	6.3C 82.5%	4.5C 83.5

	Interface Temp. ºC	Dewpoint Temp. ºC	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m²)	Peak Buildup (g/m²)	Conden sation
1 Outside surface resistance	3.9	1.2	0.67	0.81			No
2 Metal tiles /Battens	4.2	1.3	0.67	0.82			No
3 Breather membrane (BS5250)	4.2	1.3	0.67	0.82			No
4 Softwood, dry	4.3	1.3	0.67	0.83			No
5 Cavity bridged by Aluminium frame at 1.7mm @ 600mm centres.	5.1	1.3	0.67	0.88			No
6 Ballytherm Polyisocyanurate between aluminium frame at 1.7mm @ 600mm centres	12.6	4.8	0.86	1.46			No
7 Cavity Bridged by aluminium frame at 1.7mm @ 600mm centres.	13.4	4.8	0.86	1.54			No
8 Polythene, 500 gauge (0.12mm) (BS5250)	13.4	11.1	1.32	1.54			No
9 Ballytherm Polyisocyanurate (BS5250)	19.6	11.8	1.38	2.28			No
10 Plaster, gypsum (BS5250)	19.7	11.8	1.39	2.30			No
11 Plaster, lightweight (BS5250)	19.9	11.8	1.39	2.32			No
12 Inside surface resistance							

Worst case internal / external conditions for graph : 20.0°C @ 59.3%RH / 3.8°C @ 83.0%RH



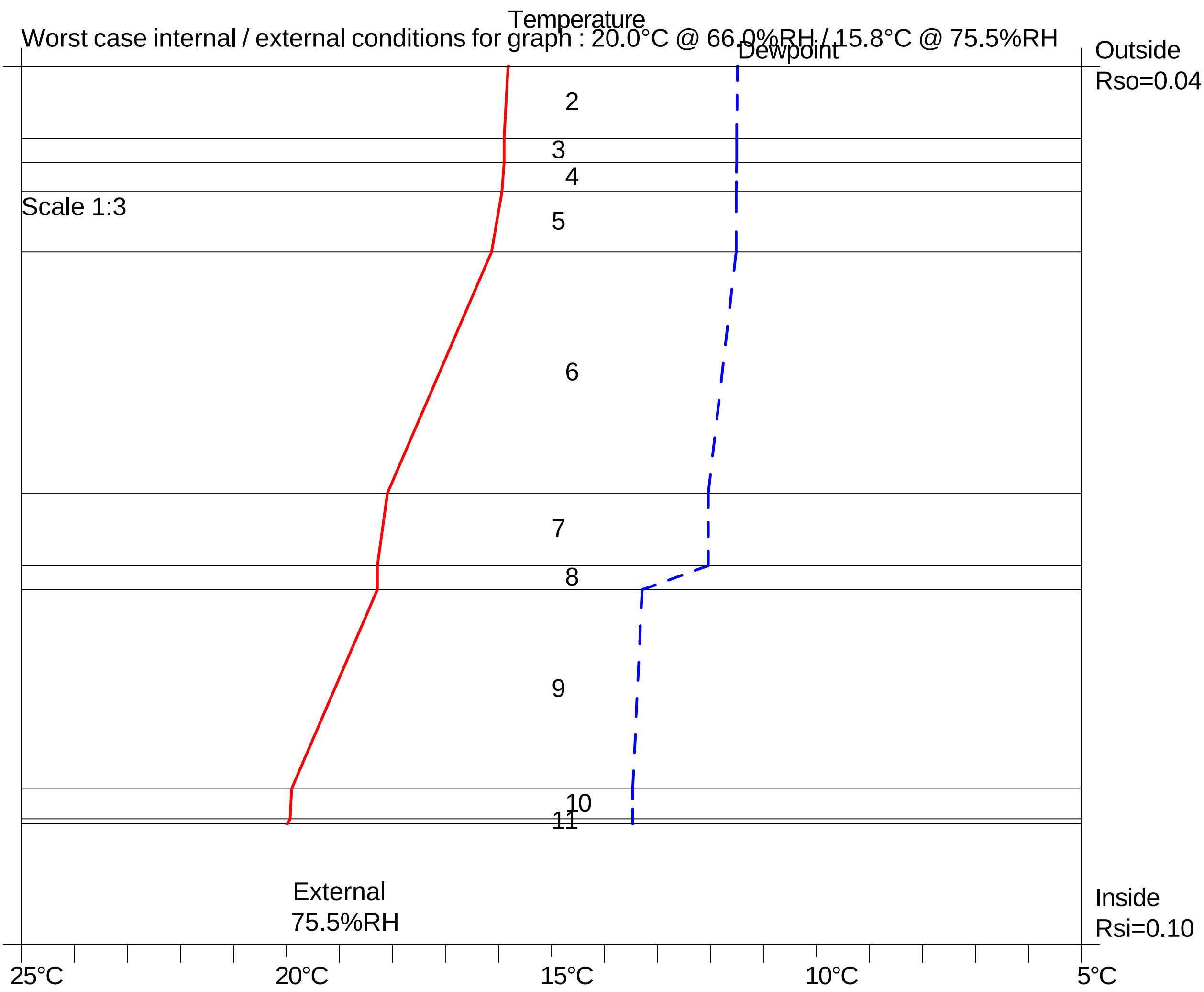
Condensation Risk Analysis (no account taken of thermal bridges)

3 - Dwellings with low occupancy

Jan (worst)	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20.0C 59.3%	20.0C 58.7%	20.0C 57.2%	20.0C 56.8%	20.0C 57.5%	20.0C 62.0%	20.0C 66.0%	20.0C 66.6%	20.0C 64.3%	20.0C 62.2%	20.0C 59.8%	20.0C 59.
3.8C 83.0%	3.9C 81.0%	5.7C 76.5%	7.9C 74.0%	11.3C 71.5%	14.2C 73.5%	15.8C 75.5%	15.7C 76.5%	13.5C 78.5%	10.6C 81.0%	6.3C 82.5%	4.5C 83.5

	Interface Temp. ºC	Dewpoint Temp. ºC	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m²)	Peak Buildup (g/m²)	Conden sation
1 Outside surface resistance							
2 Metal tiles /Battens	15.8	11.5	1.35	1.80			No
3 Breather membrane (BS5250)	15.9	11.5	1.36	1.81			No
4 Softwood, dry	15.9	11.5	1.36	1.81			No
5 Cavity bridged by Aluminium frame at 1.7mm @ 600mm centres.	15.9	11.5	1.36	1.81			No
6 Ballytherm Polyisocyanurate between aluminium frame at 1.7mm @ 600mm centres	16.1	11.5	1.36	1.83			No
7 Cavity Bridged by aluminium frame at 1.7mm @ 600mm centres.	18.1	12.0	1.40	2.07			No
8 Polythene, 500 gauge (0.12mm) (BS5250)	18.3	12.0	1.40	2.10			No
9 Ballytherm Polyisocyanurate (BS5250)	18.3	13.3	1.52	2.10			No
10 Plaster, gypsum (BS5250)	19.9	13.5	1.54	2.32			No
11 Plaster, lightweight (BS5250)	19.9	13.5	1.54	2.33			No
12 Inside surface resistance	20.0	13.5	1.54	2.33			No

Worst case internal / external conditions for graph : 20.0°C @ 66.0%RH / 15.8°C @ 75.5%RH

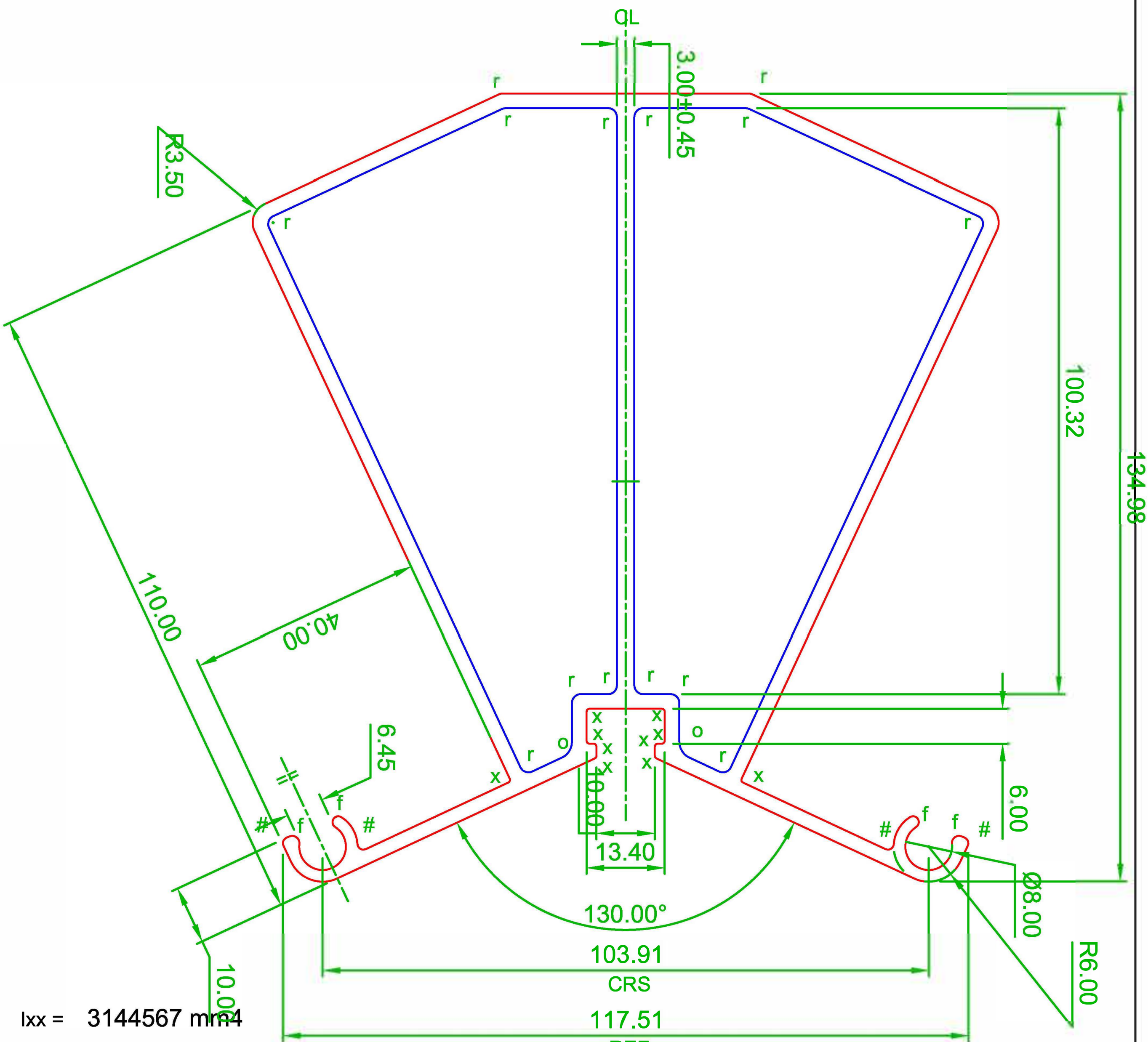


Customer	Cust.Drwg.No.	Extrusion No.
SUPALITE TILED ROOF SYSTEMS		205980

No.	Change	Date	End Use
			CONSERVATORY ROOFS
			IF IN DOUBT - ASK! DO NOT SCALE

QUOTE REF - Q55,644

THIS SECTION TO BE SYMMETRICAL ABOUT CENTRE LINE



Ixx = 3144567 mm4

Iyy = 1883862 mm4

TOLERANCES UNLESS OTHERWISE STATED TO BE: EN755 - 9

Wall thickness not shown mm. 2.50

sapa: Sapa Profiles Limited

Tibshelf Tel No. 01773 872761 & Fax No 01773 874389

Cheltenham Tel No. 01242 699200 & Fax No 01242 513304

Visible Surface = ----

Radius not shown

#= 1.00 o= 3.00

r= 1.50 x= 0.50

s= Sharp f= Full Rad

Backer	Die	Holes	Billet	Ratio	Theor Area	Scale
PORT	350*240	1	9	8	1579.267	1:1

Bol	Ins	Leadplate	Ratio	Ratio	Theor Kg/m	Date
523			9 26	7	4.28	14/02/13

Backer	Die	Holes	Billet	Ratio	Perimeter Values	Drawn
				8	626 586	D.F

Alloy	Bol	Ins	Leadplate	Ratio	Ratio	Finish
6063				9	7	C

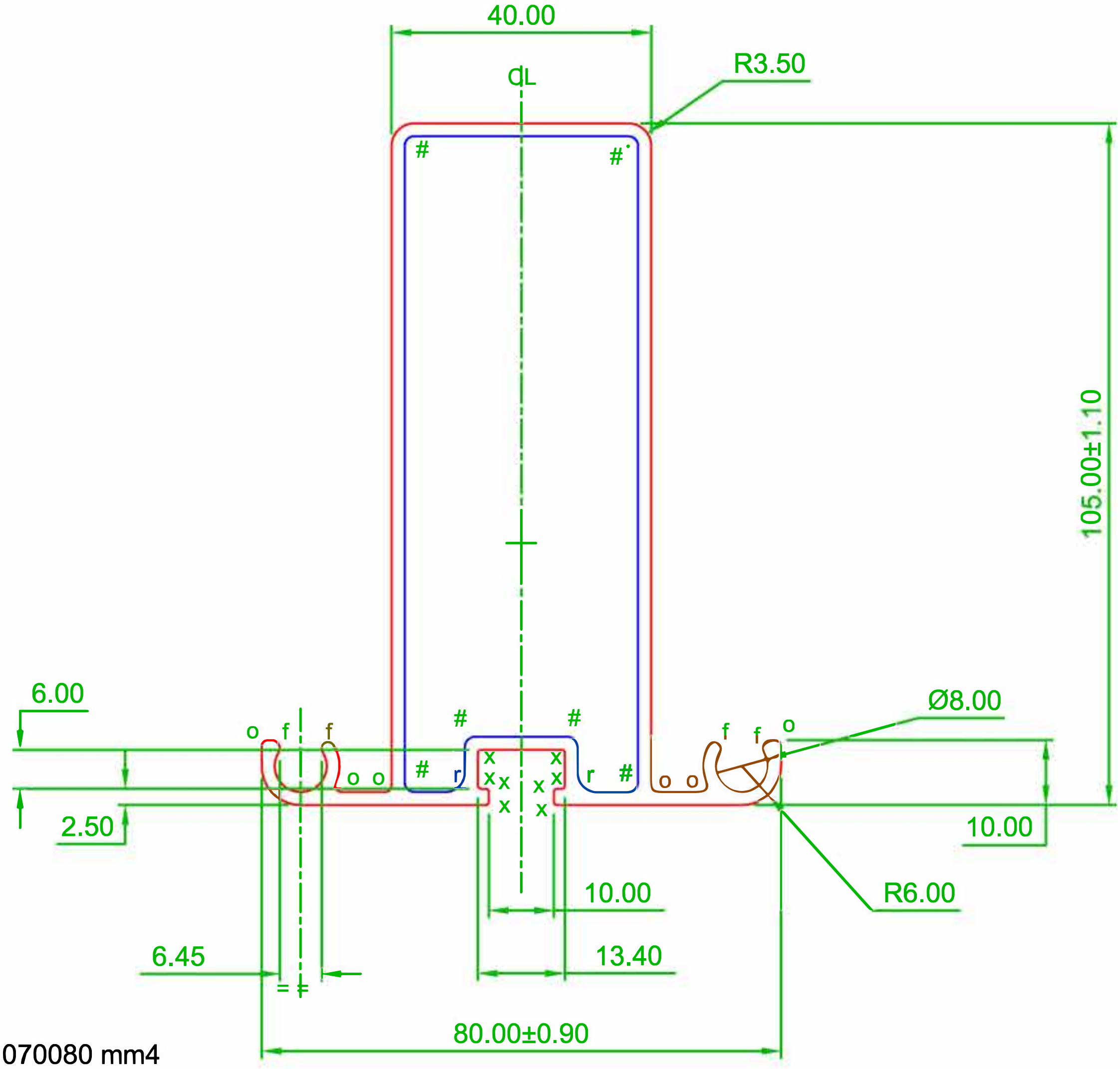
205980

Customer	Cust.Drwg.No.	Extrusion No.
SUPALITE TILED ROOF SYSTEMS		205982

No.	Change	Date	End Use
			CONSERVATORY ROOFS

IF IN DOUBT - ASK! DO NOT SCALE

QUOTE REF - Q55,644



Ixx = 1070080 mm4

Iyy = 312548 mm4

THIS SECTION TO BE SYMMETRICAL ABOUT CENTRE LINE

TOLERANCES UNLESS OTHERWISE STATED TO BE: EN755 - 9

Wall thickness not shown mm. 2.00

sapa: Sapa Profiles Limited

Tibshelf Tel No. 01773 872761 & Fax No 01773 874389

Cheltenham Tel No. 01242 699200 & Fax No 01242 513304

Visible Surface = ----

Radius not shown

#= 1.50 o= 1.00

r= 3.00 x= 0.50

s= Sharp f= Full Rad

Backer	Die	Holes	Billet	Ratio	Theor Area	Scale
PORT	280*170	1	9	8	747.337	1:1
Bol 564 / Ins	Leadplate	Ratio 9 55		Ratio 7	Theor Kg/m 2.025	Date 14/02/13
Backer	Die	Holes	Billet	Ratio 8	Perimeter Values 438 285	Drawn D.F

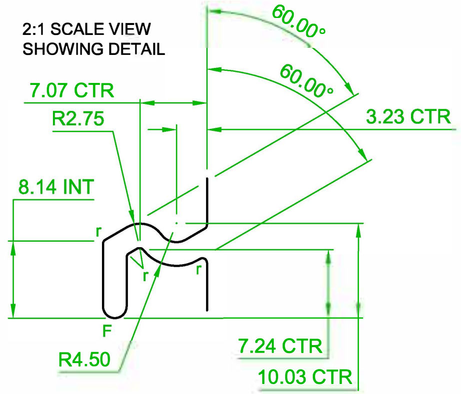
Alloy	Bol	Ins	Leadplate	Ratio	Ratio	Finish
6063				9	7	C

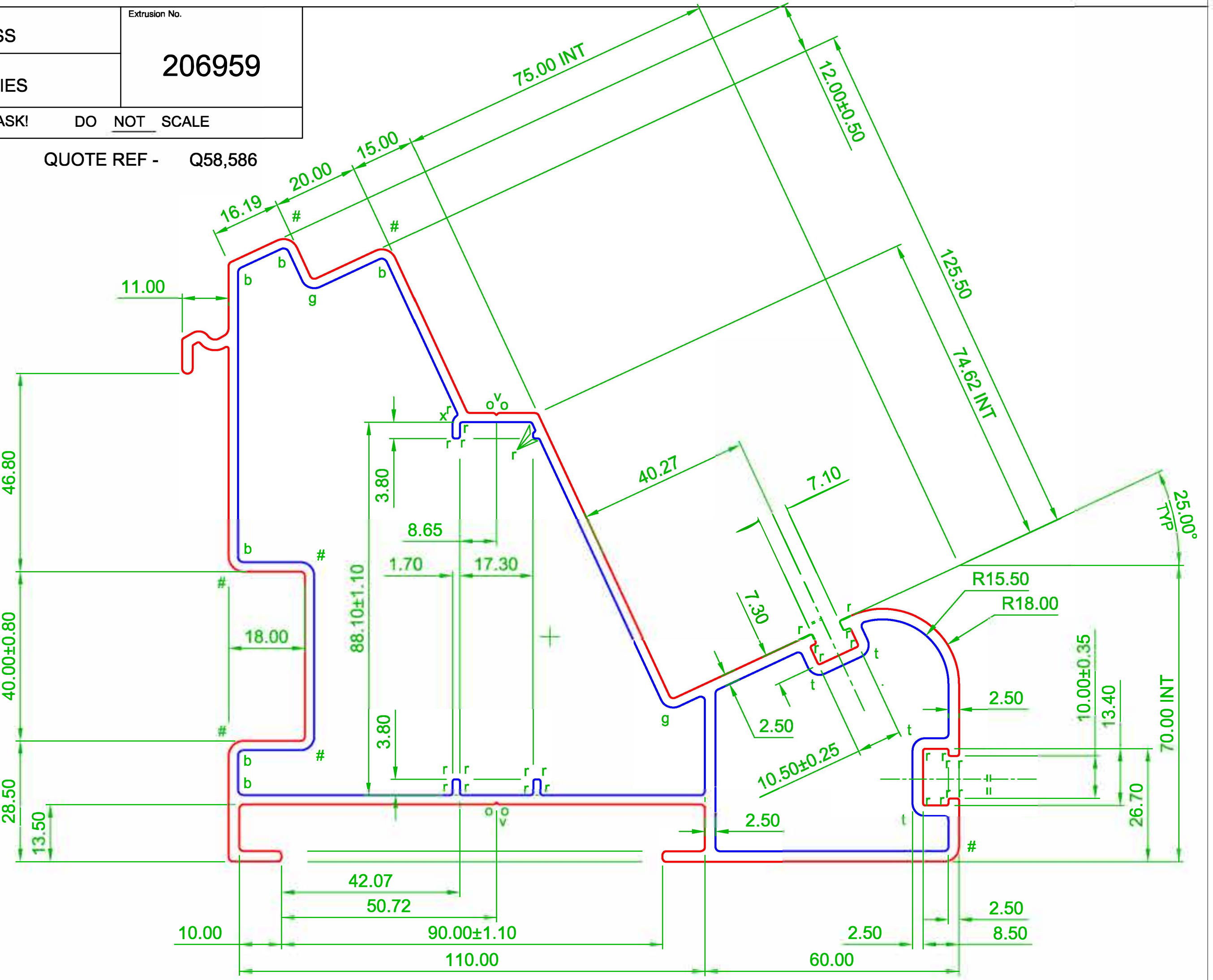
205982

Customer	Cust.Drwg.No.	Extrusion No.
SUPALITE TILED ROOF SYSTEMS	LEGLESS	206959

No.	Change	Date	End Use
1	MANDREL MODS	7-11-14	CONSERVATORIES
			IF IN DOUBT - ASK! DO NOT SCALE

QUOTE REF - Q58,586





V DENOTES VEE GROOVE 0.5MM X 90 DEG
t = 3.00mm RAD
b = 1.30mm RAD
g = 3.20mm RAD

Ixx = 3533363 mm4 X Axis
Iyy = 6289528 mm4 Y Axis

TOLERANCES UNLESS OTHERWISE STATED TO BE: EN755 - 9
Wall thickness not shown mm2.2O

sapa:
Sapa Profiles Limited

Tibshelf Tel No. 01773 872761 & Fax No 01773 874389
Cheltenham Tel No. 01242 699200 & Fax No 01242 513304

Visible Surface = ----
Radius not shown 1.00
#= 3.50 o= 0.25
r= 0.50 x= 2.00
s= Sharp f= Full Rad

Backer	Die	Holes	Billet	Ratio	Theor Area	Scale
206959	460*333	1	9	8	1767.031	1:1
Bol 1187	Leadplate		Ratio 9 21	Ratio 7	Theor Kg/m 4.789	Date 03/12/13
Backer	Die	Holes	Billet	Ratio 8	Perimeter Values 788 721	Drawn K.C
Bol	Leadplate		Ratio 9	Ratio 7	Finish C	

Alloy 6063

206959

Guidelines for *powerline* concrete frame screws

Product summary

powerline concrete frame screws are a medium duty self tapping fixing suitable for the through fixing of wood, metal and UPVC frames to masonry.

Also suitable for securing wooden battens, brackets, signs, channel supports, electrical and plumbing fittings.

The screw will cut its own thread into the masonry once a pilot hole has been pre-drilled. There is no need for any additional plugs.

They are particularly useful in close to the edge fixing situations and were the fixing points are to be grouped closely together.

They are removable, reusable, fast and versatile.

The head is self-countersinking and has a Torx-30 drive to reduce the risk of cam out.

A T-30 bit is included free of charge within each box.

Recommended loads vary with substrate type, quality and consistency.

Hole diameter and embedment is also critical. The screw length should equal the fixture thickness + minimum embedment** + 13mm.

Technical recommendations

Diameter	Length (mm)	Min hole** Depth (mm) (embedment)	Drill size * (mm)	Drive bit	Recommended loads (Kn) C20/25 concrete **		Solid brick**	
					Tensile	Shear	Tensile	Shear
7.5mm	42	30	6	T30	1.2	0.8	0.8	0.5
7.5mm	62	30	6	T30	1.2	0.8	0.8	0.5
7.5mm	82	30	6	T30	1.2	0.8	0.8	0.5
7.5mm	102	30	6	T30	1.2	0.8	0.8	0.5
7.5mm	122	30	6	T30	1.2	0.8	0.8	0.5
7.5mm	152	30	6	T30	1.2	0.8	0.8	0.5
7.5mm	182	30	6	T30	1.2	0.8	0.8	0.5

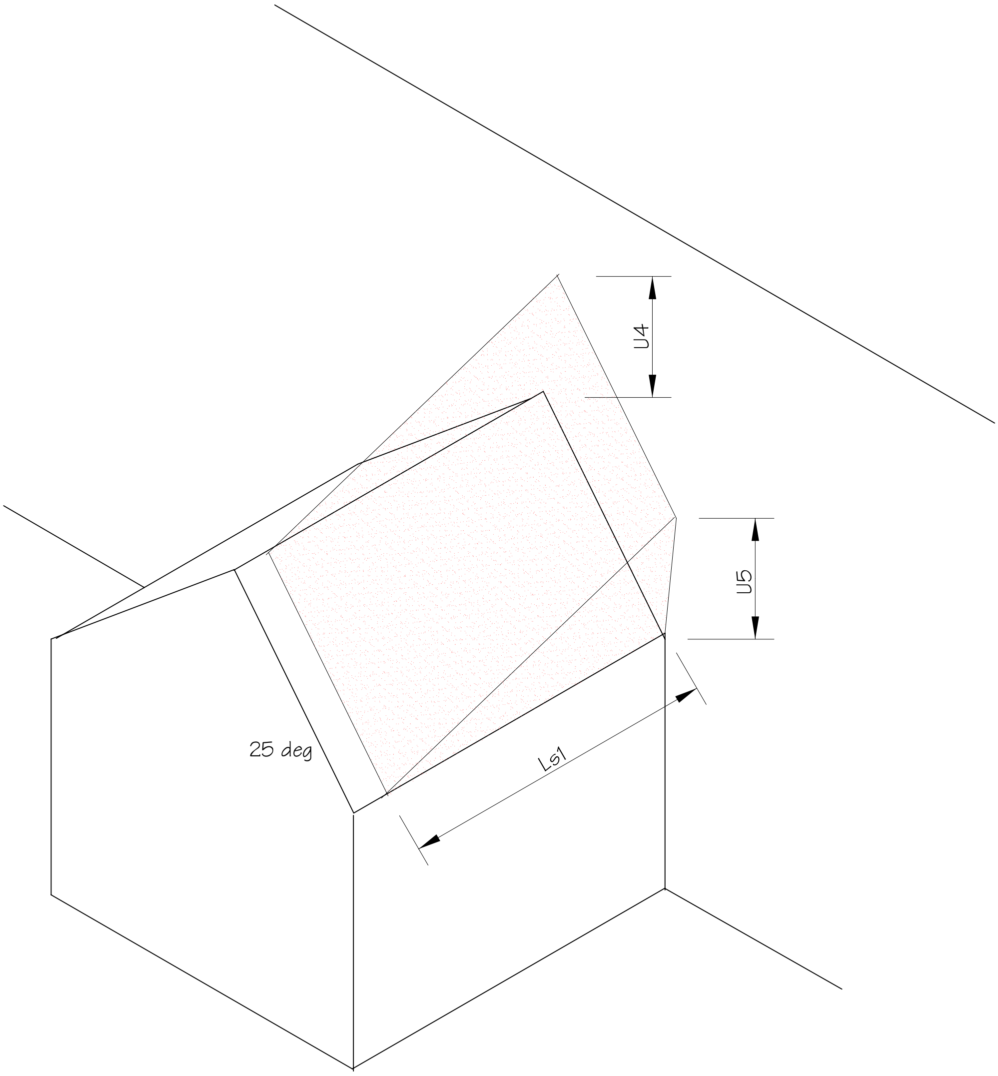
* the drill diameter may change depending on the substrate , 6.5mm is recommended for very dense concrete or brick.

** the min embedment increases depending on the substrate . 30mm in concrete, 40mm in solid brick , 60mm in aerated concrete or hollow brick.

Installation advice

- Eye protection and gloves should be worn
- Drill hole to the correct diameter and depth
- Clean out the hole
- Position the screw in the hole through the part to be fixed
- Tighten until the head of the screw is flush within the fixture, (a 6.5 mm clearance hole can be pre-drilled in to the fixture to facilitate this)

November 2005 release 2



Snow Drifting Abutting Taller Structures

www.supaliteroof.co.uk
SupaLite TILED ROOF SYSTEM
Email: sales@supaliteroof.co.uk
Tel: 01772 82 80 60 | Fax: 01772 627 813
180-181 Bradkirk Place | Walton Summit | Bamber Bridge | Preston | PR5 8AJ

SUPALITE ROOF SYSTEM

Drawn by PGR
Scale @ A4 1:20

Drg No C11-165- 10

ENGINEERING and BUILDING DESIGN

Peter G Redding I ENG MIET

41 Maitland Avenue
Thornton-Cleveleys
Lancs FY5 3JR

tel : (01253) 859867
fax : (01253) 858967
email : peter.redding@hotmail.co.uk

‘SUPALITE’ roof snow drifting

Sk = snow on ground = 0.6 kn/sq.M (average)
U3 = 4
U1 = 1.33
U2 = 4
Drifted snow = 4 x 0.6 = 2.4 kn/sq.M

Using rafters @ 450crs.

Mono pitched roofs with rafters at 90 degrees to abutment - snow drifting variable along rafter.
Pitched roofs with rafters parallel to abutment - snow load constant.

Maximum rafter span (between supports) - Dead + snow-see calculation sheets

Mono roofs— 3600mm
Pitched roofs—3000mm

'SUPALITE' ROOF.
ANGLE STEEL LINTEL OVER DOOR.

SPAN – 3900
ROOF LOAD – DEAD – $0.47 \times 3.2 = 1.5$ kn/m.
IMP – $0.6 \times 3.2 = 1.9$ kn/m.

BENDING STRESS.
LOAD PER M. = 3.4 kn
UDL = $3.4 \times 3.9 = 13.3$ kn
$MB = \frac{13.3 \times 3.9}{8} = 6.5$ knm.
Z_{xx} REQUD = $\frac{6.5 \times 10^3}{165} = 39.4\ cm^3$.

TRY 150x75x10 MS ANGLE,
$Z_{xx} = 51.8$; $I_{xx} = 501$

STRESS = $\frac{39.4 \times 10^2}{51.8} = 76\ n/mm^2 < 165$ ∴ o/k

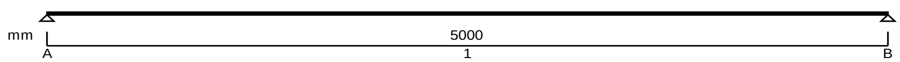
defl. = $\frac{5}{384} \times \frac{3.9 \times 1.9}{2100} \times \frac{390^3}{501} = 5.5$ mm (1/709)
∴ o/k

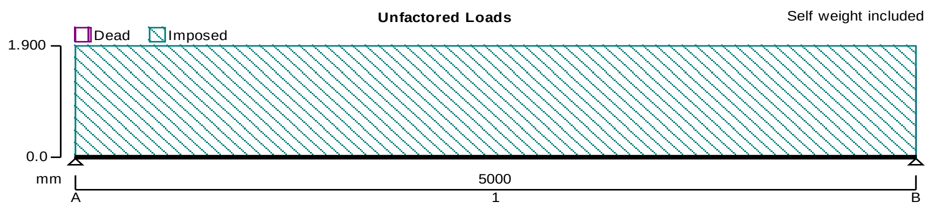
CSC TEDDS	Project				Job Ref.	
Engineering and Building Design 41 Maitland Avenue Thornton Cleveleys Lancs FY5 3JR 01253 859867	Supalite door Lintel					
	Section 5000 span				Sheet no./rev. 1	
	Calc. by PGR	Date 08/03/2019	Chk'd by	Date	App'd by	Date

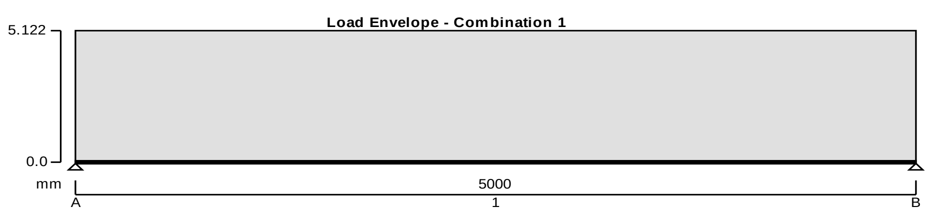
STEEL BEAM ANALYSIS & DESIGN (EN1993-1)

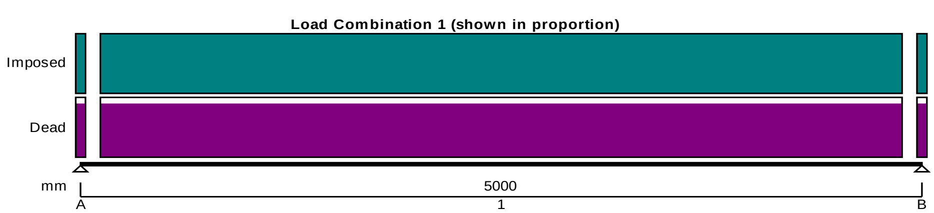
In accordance with UK national annex

TEDDS calculation version 1.0.05

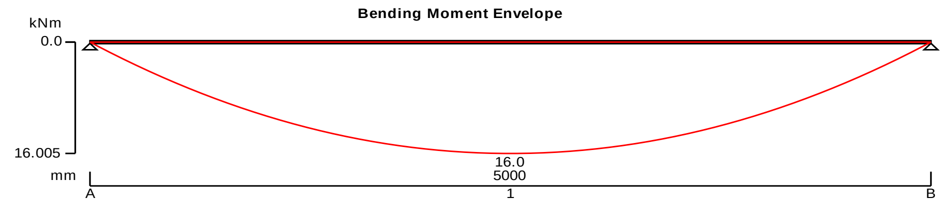


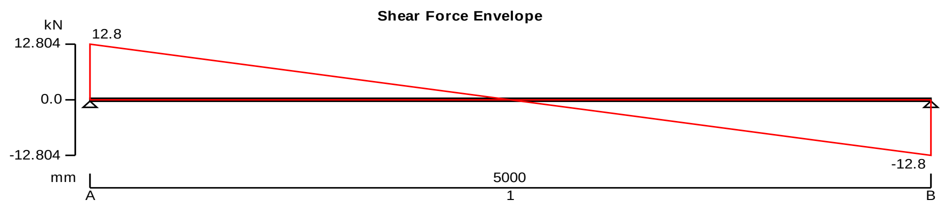






CSC TEDDS Engineering and Building Design 41 Maitland Avenue Thornton Cleveleys Lancs FY5 3JR 01253 859867	Project Supalite door Lintel	Job Ref.
	Section 5000 span	Sheet no./rev. 2
	Calc. by: PGR · Date: 08/03/2019 · Chk'd by: · Date:	App'd by: · Date:





Support conditions

Support A	Vertically restrained Rotationally free
Support B	Vertically restrained Rotationally free

Applied loading

Beam loads

	Dead self weight of beam × 1
roof	Dead full UDL 1.5 kN/m
roof	Imposed full UDL 1.9 kN/m

Load combinations

Load combination 1	Support A	Dead × 1.35 Imposed × 1.50
	Span 1	Dead × 1.35 Imposed × 1.50
	Support B	Dead × 1.35 Imposed × 1.50

Analysis results

Maximum moment	M_{max} = **16** kNm	M_{min} = **0** kNm
Maximum moment span1	M_{s1_max} = **16** kNm	M_{s1_min} = **0** kNm
Maximum shear	V_{max} = **12.8** kN	V_{min} = **-12.8** kN
Maximum shear span1	V_{s1_max} = **12.8** kN	V_{s1_min} = **-12.8** kN
Deflection span1	δ_{s1_max} = **10** mm	δ_{s1_min} = $\mathbf{2.6\times10^{-16}}$ mm
Reactions at support A	R_{A_max} = **12.8** kN	R_{A_min} = **12.8** kN
Unfactored dead load reaction at support A	R_{A_Dead} = **4.2** kN	
Unfactored imposed load reaction at support A	$R_{A\_Imposed}$ = **4.8** kN	
Reactions at support B	R_{B_max} = **12.8** kN	R_{B_min} = **12.8** kN
Unfactored dead load reaction at support B	R_{B_Dead} = **4.2** kN	

Unfactored imposed load reaction at support B $R_{B\_Imposed}$ = **4.8** kN

Section details

Section type **RHS 150x100x5.0**

Steel grade **S275H**

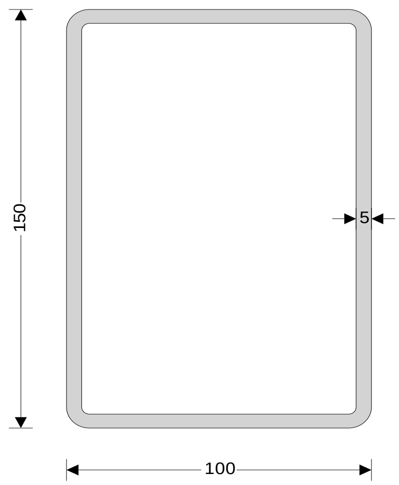
From table 3.1: Nominal values of yield strength f_y and ultimate tensile strength f_u for hot rolled structural steel

Nominal thickness of element t = **5.0** mm

Nominal yield strength f_y = **275** N/mm^2

Nominal ultimate tensile strength f_u = **430** N/mm^2

Modulus of elasticity E = **210000** N/mm^2



Partial factors - Section 6.1

Resistance of cross-sections γ_{M0} = **1.00**

Resistance of members to instability γ_{M1} = **1.00**

Resistance of tensile members to fracture γ_{M2} = **1.10**

Lateral restraint

Span 1 has full lateral restraint

Effective length factors

Effective length factor in major axis K_y = **1.000**

Effective length factor in minor axis K_z = **1.000**

Effective length factor for torsion $K_{LT.A}$ = **1.000**

$K_{LT.B}$ = **1.000**

Classification of cross sections - Section 5.5

$\varepsilon = \sqrt{[235\ \text{N/mm}^2 / f_y]}$ = **0.92**

Internal compression parts - Table 5.2 (sheet 1 of 3)

Width of section c = h - 3 × t = **135** mm

c / t = 29.2 × ε <= 72 × ε Class 1

Section is class 1

Check shear - Section 6.2.6

Design shear force V_{Ed} = max(abs(V_{max}), abs(V_{min})) = **12.8** kN

Height of web h_w = h - 2 × t = **140** mm

Shear area factor η = **1.000**

$h_w / t < 72 \times \varepsilon / \eta$

Shear buckling resistance can be ignored

Shear area - cl 6.2.6(3) $A_v = A \times h / (b + h)$ = **1424** mm^2

Design shear resistance - cl 6.2.6(2) $V_{c,Rd} = V_{pl,Rd} = A_v \times f_y / (\sqrt{[3]} \times \gamma_{M0})$ = **226.1** kN

PASS - Design shear resistance exceeds design shear force

Check bending moment - Section 6.2.5

Design bending moment $M_{Ed} = \max(\text{abs}(M_{s1\_max}), \text{abs}(M_{s1\_min}))$ = **16** kNm

Design resistance for bending - Section 6.2.5(2)

Design bending resistance moment - eq 6.13 $M_{c,Rd} = M_{pl,Rd} = W_{pl.y} \times f_y / \gamma_{M0}$ = **32.8** kNm

PASS - Design bending resistance moment exceeds design bending moment

Check vertical deflection - Section 7.2.1

Consider deflection due to imposed loads

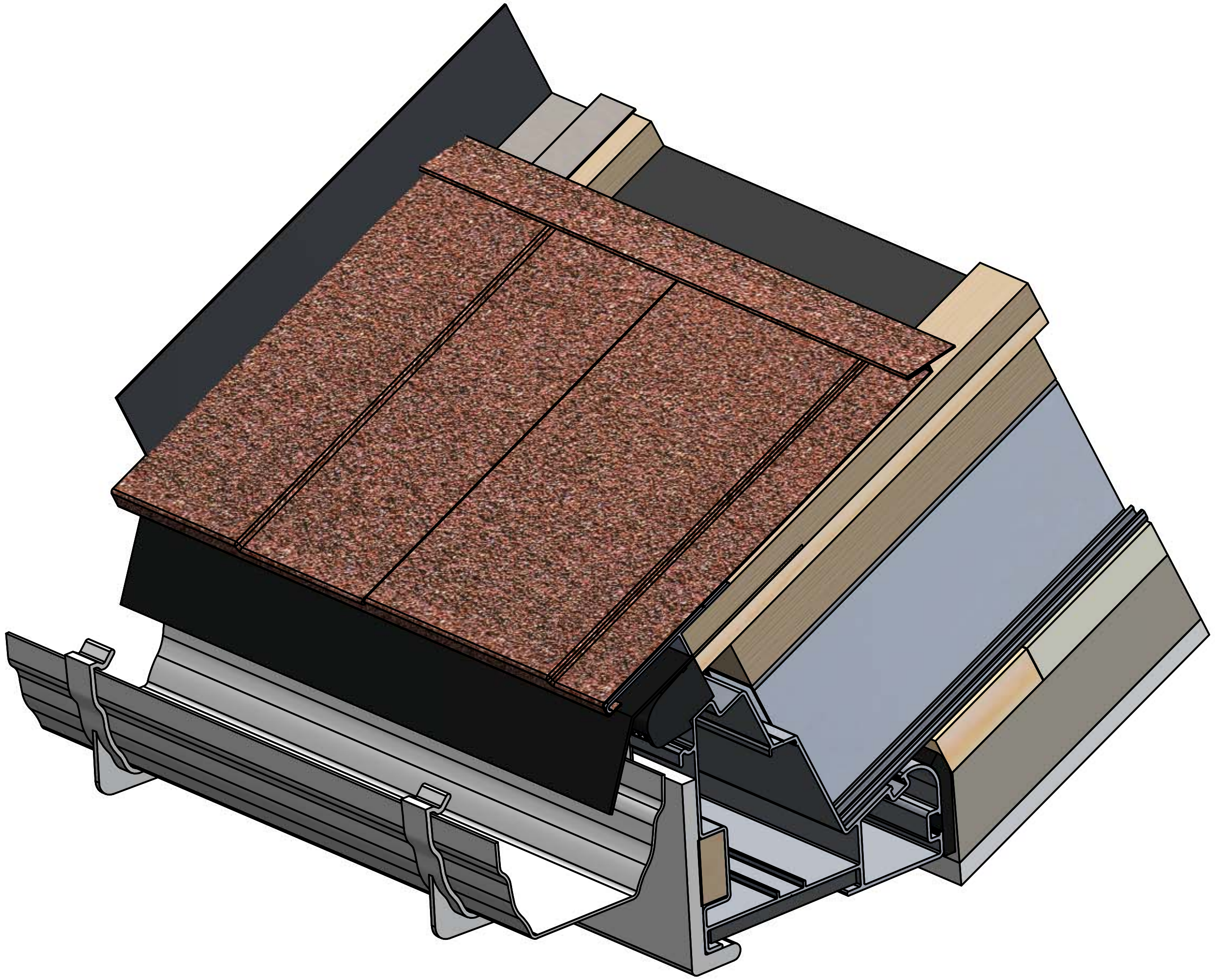
Limiting deflection $\delta_{lim} = L_{s1} / 360$ = **13.9** mm

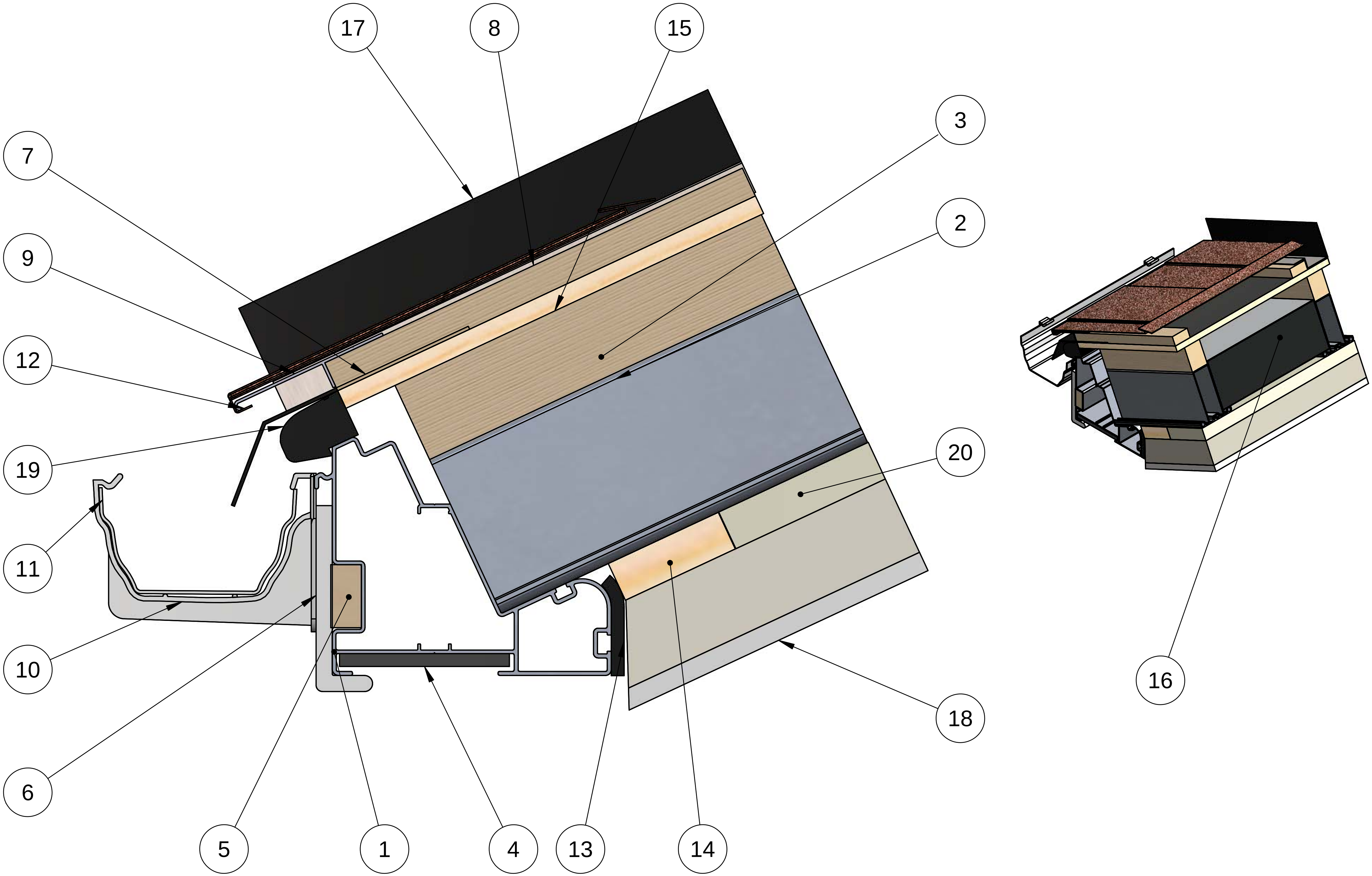
Maximum deflection span 1 $\delta = \max(\text{abs}(\delta_{max}), \text{abs}(\delta_{min}))$ = **9.967** mm

PASS - Maximum deflection does not exceed deflection limit

NO.	DESCRIPTION.	QTY.
1	EAVES BEAM	1
2	RAFTER	2
3	BATTEN 39 x 50	2
4	SOFFIT BOARD	1
5	BATTEN 39 x 19	1
6	FASCIA BOARD	1
7	EAVE PROTECTOR	1
8	BATTEN 39 x 19	1
9	TILE STARTER CLEAT	1
10	GUTTER BRACKET	2
11	LENGTH OF GUTTER	1
12	EXTRALIGHT TILE	1
13	EAVES BEAM FOAM	1
14	BATTEN 75 x 19	1
15	12MM PLY	1
16	100MM EPS INSULATION	1
17	WALL SOAKER	1
18	62.5 PIR INSULATED BOARD	1
19	EAVES VENT	1
20	25MM INSULATION	1

SCOTTISH SPEC

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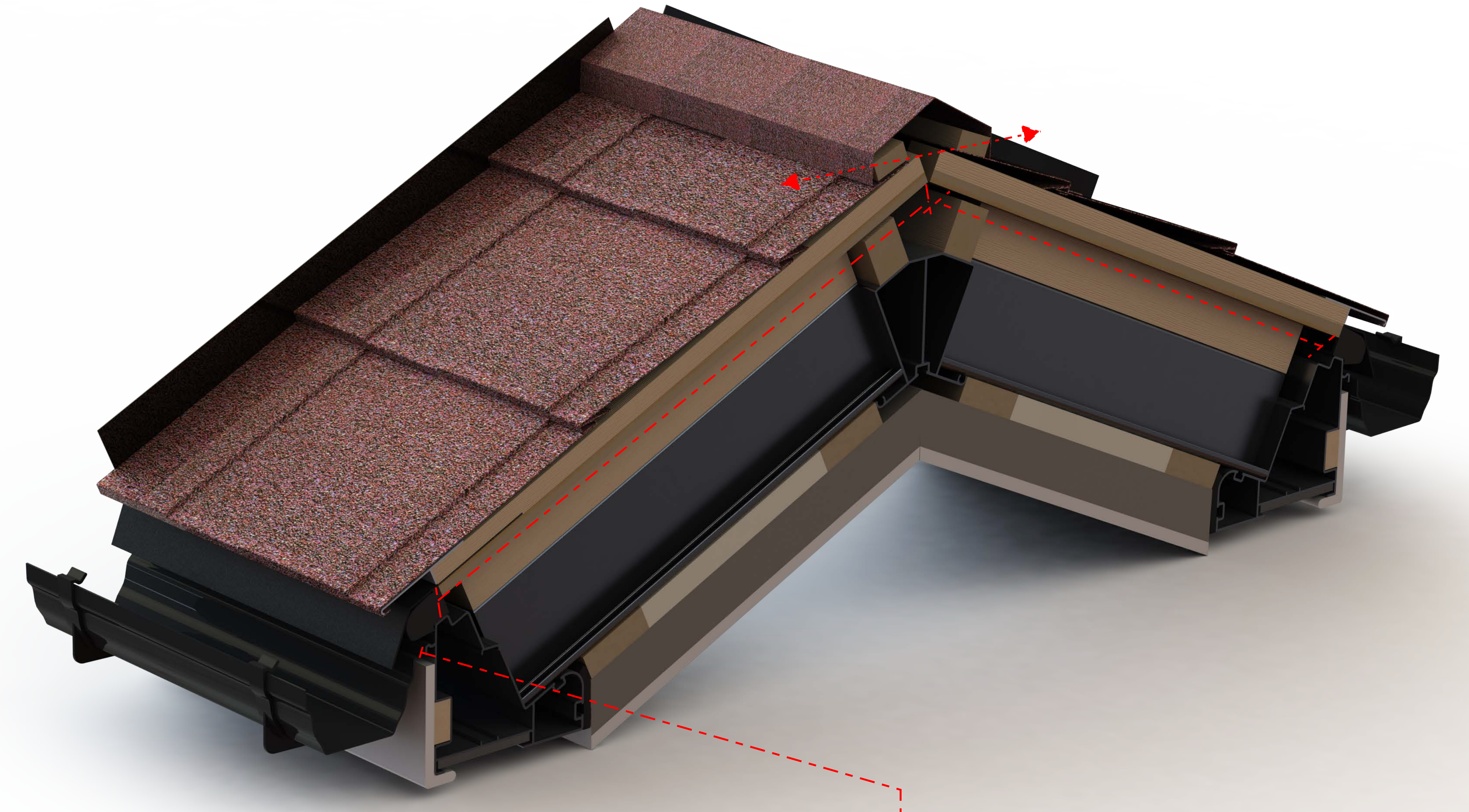

AIR FLOW THROUGH THE
EAVES VENTILATION UP
INTO THE ROOF SYSTEM

ENGINEERING and BUILDING DESIGN

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Thornton-Cleveleys
Lancs
FY5 3JR

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Peter G. Redding I Eng MIET

Structural Calculations

JOB . Supalite replacement roof for conservatories
NAME : Celtic Vista
SITE ADDRESS : North Scotland
DATE : November 2017

Loadings - Snow and Wind

British Standards and Codes of Practice

EN 1990; EN 1991;EN 1992; EN 1993; EN 1995; EN 1996; EN 1999; BS 449 ; BS 5950; BS 5268;

Beam spans for these calculations are based on the clear span between supports. For the total beam length add the appropriate end support lengths.

These calculations are for the SUPALITE roof only and do not undertake any check of existing side wall mullions or foundations which should be undertaken by a suitably qualified engineer before commencement of work and appointed by the client or contractor.

The following wind and snow calculations are based on average forces experienced by most of the United Kingdom. In extreme areas affected by strong winds and high snow falls ie the North of England and Scotland the calculations should be undertaken by a suitably qualified engineer to check all the structural aspects of roof members, wall mullions and foundations.

Wind loading.

Peak velocity pressure (max) - uplift on roof = -1.192 kn/sq.M
On walls = 0.832 kn/sq.M

Max uplift on roof (Cpe + Cpi) = -1.336 kn/sq.M
Roof dead load = 0.47 kn/sq.M and Roof imposed load = 0.6 kn/sq.M
Wind + dead = -1.336 + (0.47 x 0.9) = -0.9kn/sq.M uplift.
Dead + imposed = 0.47 + 0.6 = 1.07 kn/sq.M
Roof members designed for Dead + Imposed > Wind + Dead therefore o'k

Using Powerline frame screws 7.5 dia x 102 long (permitted shear = 0.8kn)
No required per sq.M = 0.9 / 0.8 = 2 No fixings per sq.M to resist wind uplift.

Factored wind on roof = -1.333 x 1.4 = -1.9 kn/sq.M
Factored dead load of roof = 0.47 x 0.9 = 0.43 kn/sq.M
Factored uplift of roof due to wind = -1.9 + 0.43 = 1.47 kn/sq.M

Permitted tensile for Powerline screws = 1.2 kn
Therefore minimum No of screws to resist uplift = 1.47 / 1.2 = 2 No screws.

Uplift per M run of eaves = 1.47x 2.0M = 2.94 kn
Assuming mullion fixing at 1.0M crs max uplift per fixing = 2.94 kn
Using Powerline screws 7.5 dia No of screws required = 2.94 / 1.2 = 3 to each fixing point at rafters to ridge, rafters to eaves beam, eaves beam to mullion.

Loadings (contd)

Snow Loading

It will be assumed that with snow on the roof no access would be required on the roof and so imposed will be disregarded.

Assuming zone 3 and altitude of 175M - Ground snow load (Sk) = 0.74kn/sq.M
Snow drifting coefficient (U1) = 0.8 + 0.4(25-15)/15 = 1.07
Therefore drifted snow load = 0.93 x 1.07 = 1.0 kn/sq.M (average)

Drifted snow load + roof dead load = 1.47 kn/sq.M
Therefore use 2 No rafters ie double up rafters.

Wind Assessment to BS EN 1991-1- 4

Data Entry:-

Site Altitude	175.000m	**Reference Height (Z)**			**Size Effect Dimension (b + h)**		
$V_{b,map}$	27.500 m/s	**Roof**	4.000	m	**Roof**	5.000	m
Seasonal Factor (C,season)	1.000	**Side Walls**	2.300	m	**Side Walls**	8.000	m
Probability Factor (C,prob)	1.000	**Gables**	4.000	m	**Gables**	8.000	m
Site ID							

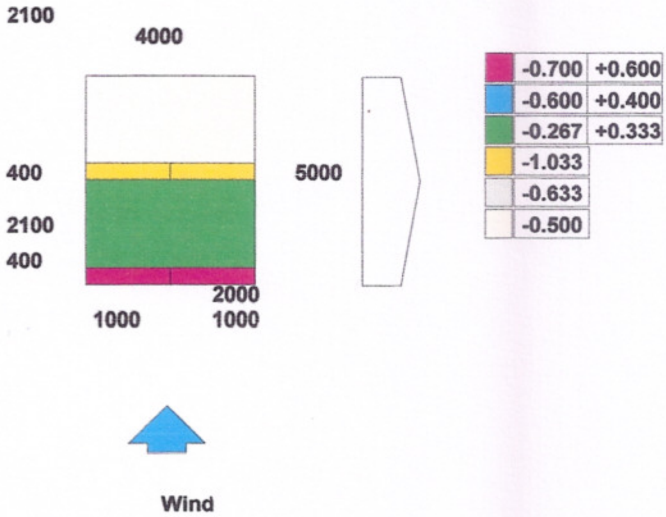
Dynamic Pressure Results

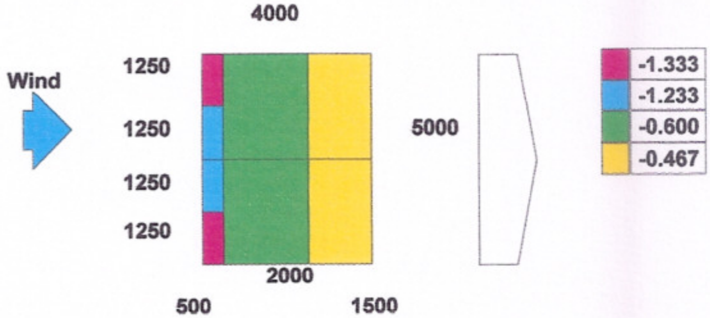
Wind Direction (deg)		0	30	60	90	120	150	180	210	240	270	300	330
Direction Factor C,dir		0.78	0.73	0.73	0.74	0.73	0.80	0.85	0.93	1.00	0.99	0.91	0.82
Orography Factor Co		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Effective Height (h-hdis) m	Roof	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
	Sides	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300
	Gable	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
Altitude Factor C,alt	Roof	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175
	Sides	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175
	Gable	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175	1.175
Roughness Factor Cr	Roof	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978
	Sides	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865	0.865
	Gable	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978
Exposure Factor Ce	Roof	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313
	Sides	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942	1.942
	Gable	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313	2.313
Vb,0 (m/s)	Roof	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313
	Sides	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313
	Gable	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313	32.313
Vb (m/s)	Roof	25.204	23.588	23.588	23.911	23.588	25.850	27.466	30.051	32.313	31.989	29.404	26.496
	Sides	25.204	23.588	23.588	23.911	23.588	25.850	27.466	30.051	32.313	31.989	29.404	26.496
	Gable	25.204	23.588	23.588	23.911	23.588	25.850	27.466	30.051	32.313	31.989	29.404	26.496
Vm (m/s)	Roof	24.655	23.075	23.075	23.391	23.075	25.287	26.868	29.396	31.609	31.293	28.764	25.919
	Sides	21.793	20.396	20.396	20.675	20.396	22.351	23.748	25.983	27.939	27.660	25.425	22.910
	Gable	24.655	23.075	23.075	23.391	23.075	25.287	26.868	29.396	31.609	31.293	28.764	25.919
Turbulence Intensity Iv	Roof	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
	Sides	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183
	Gable	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169	0.169
Peak Velocity Pressure qp (kN/m²)	Roof	0.847	0.742	0.742	0.763	0.742	0.891	1.006	1.204	1.393	1.365	1.153	0.936
	Sides	0.699	0.612	0.612	0.629	0.612	0.735	0.830	0.993	1.148	1.125	0.951	0.772
	Gable	0.847	0.742	0.742	0.763	0.742	0.891	1.006	1.204	1.393	1.365	1.153	0.936
Size Effect Factor Cs	Roof	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960
	Sides	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948

Wind Analysis to BS EN 1991-1-4 - Cpe Results for Roofs

DATA ENTRY:-

Width of Bay	5.000 m	**Reference Height**	4.000m
Length of Bay	4.000 m	**Roof Pitch**	25.000 deg.
Roof Type	Ridged Duopitch roof		
Bay type	Single bay building		

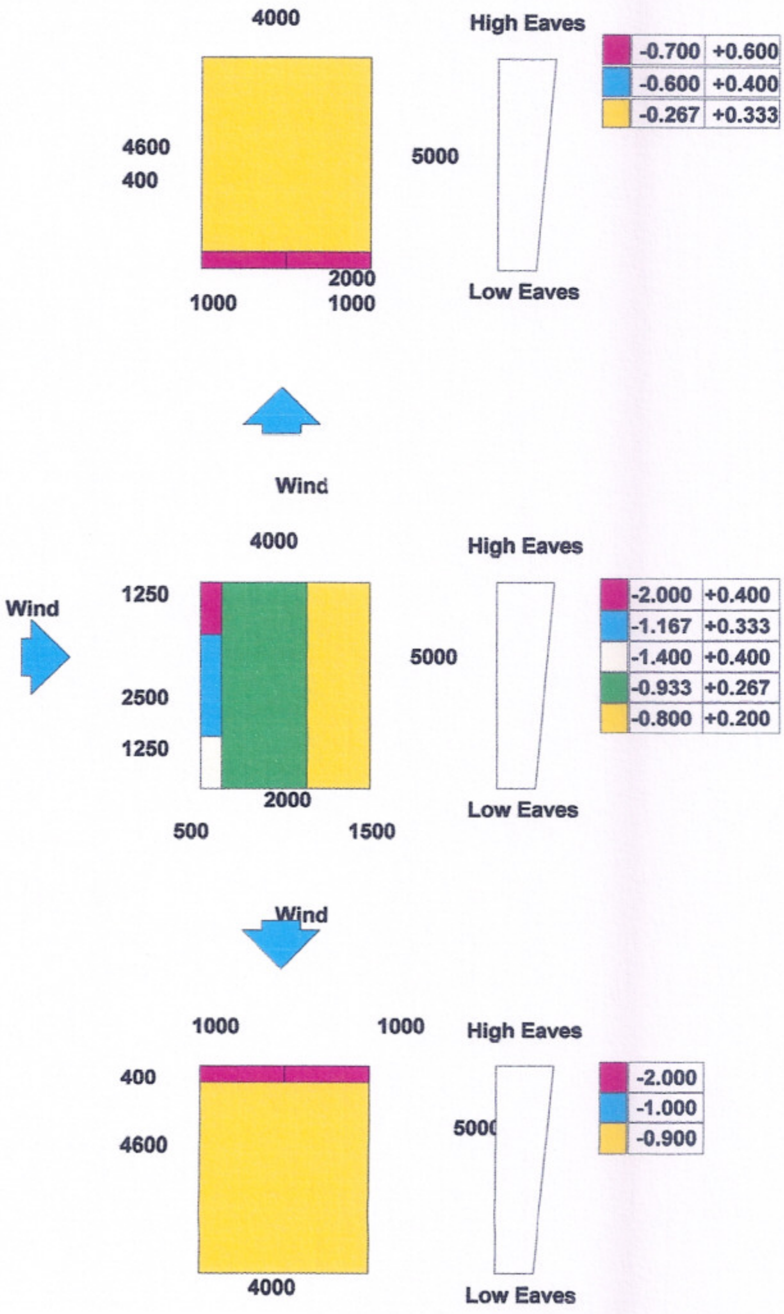




Wind Analysis to BS EN 1991-1-4 - Cpe Results for Roofs

DATA ENTRY:-

Width of Bay	5.000 m	**Reference Height**	4.000m
Length of Bay	4.000 m	**Roof Pitch**	25.000 deg.
Roof Type	Monopitch roof		
Bay type	Single bay building		



CSC TEDDS Engineering and Building Design 41 Maitland Avenue Thornton-Cleveleys . Lancs FY5 3JR 01253 859867	Project Supalite Roof			Job Ref. C11-165	
	Section Roof Snow Loading (Scotland)			Sheet no./rev. 1	
	Calc. by PGR	Date 17/12/2017	Chk'd by	Date	App'd by	Date

SNOW LOADING TO BS6399:PART 3:1988

TEDDS calculation version 1.0.01

Site location

Location of site — **Aberdeen**

Site altitude — $A = \mathbf{175}$ m

Calculate site snow load

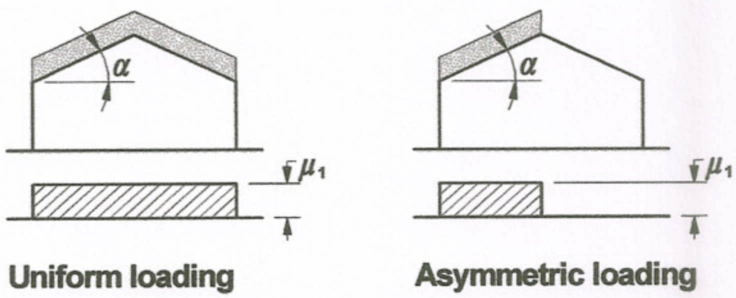
From BS6399:Part 3: 1988 - Figure 1. Basic snow load on the ground

Basic snow load — $s_b = \mathbf{0.80}$ kN/m^2

$s_{alt} = 0.1 \times s_b + (0.09 \text{ kN/m}^2) = \mathbf{0.17}$ kN/m^2

Site snow load — $s_0 = s_b + s_{alt} \times (A - (100 \text{ m})) / 100 \text{ m} = \mathbf{0.93}$ kN/m^2

BS6399:Part3:1988 Cl.6.2



Roof geometry

Roof type — **Pitched**

Distance on plan from gutter to ridge — $b = \mathbf{1.000}$ m

Angle of pitch of roof — $\alpha = \mathbf{25.0}$ deg

Calculate uniform snow load

From BS6399:Part 3: 1988 - Figure 3. Snow load shape coefficients for pitched roofs

Snow load shape coefficient — $\mu_1 = \mathbf{0.80}$

Uniform roof snow load — $s_{d1} = \mu_1 \times s_0 = \mathbf{0.74}$ kN/m^2

BS6399:Part3:1988 Cl.5

Calculate asymmetric snow load

From BS6399:Part 3: 1988 - Figure 3. Snow load shape coefficients for pitched roofs

Snow load shape coefficient — $\mu_1 = 0.8 + 0.4 \times [(\alpha - 15 \text{ deg}) / 15 \text{ deg}] = \mathbf{1.07}$

Asymmetric roof snow load — $s_{d1} = \mu_1 \times s_0 = \mathbf{0.99}$ kN/m^2

BS6399:Part3:1988 Cl.5

Snow sliding down roof

Maximum uniform snow load on roof — $s_{d\_max} = \mathbf{0.99}$ kN/m^2

Force from sliding snow load — $F_s = s_{d\_max} \times b \times \sin(\alpha) = \mathbf{0.42}$ kN/m

BS6399:Part3:1988 Cl.8