

Purlin between frames 1 and 2 of course 2 on right roofing (Z200*2.0 S350GD Z275)

In the global building system, the extremities of the beam are located at coordinates [13.011, 0.045, 5.437] and [13.011, 6.365, 5.437]. The beam has a length of 6.32m.

Section	f_y (MPa)	f_{ya} (MPa)	f_u (MPa)	E (MPa)	ν	G (MPa)	λ_1	t_{nom} (mm)	t_{cor} (mm)
Z200*2.0 S350GD Z275	350	360.9	420	210000	0.3	80769	76.95	2	1.962

Dimensions (in mm)

h	b_1	b_2	c_1	c_2
200	65	59.5	22	22

Static values

Gross values																		
parameter	A_g	y_G	z_G	I_y	I_z	$W_{el,y,com}$	$W_{el,y,ten}$	$W_{el,z,com}$	$W_{el,z,ten}$	y_S	z_S	I_t	I_w	i_y	i_z	i_0	y_0	z_0
dimension	6.93	0.129	85.408	6155.90	40.24	41.50	8.44	9.59	0.198	71.009	3984.70	7.68	2.848	270.06	-1.13			
unit	cm ²	cm	cm	cm ⁴	cm ⁴	cm ³	cm ³	cm ³	cm ³	cm	cm	cm ⁴	cm ⁶	cm	cm	cm	cm	cm

Gross values of the flange				
parameter	A_f	I_{fz}	i_{fz}	W_{fz}
dimension	2.21	12.03	2.33	3.99
unit	cm ²	cm ⁴	cm	cm ³

Effective values									
parameter	A_{eff}	$y_{G,eff}$	$z_{G,eff}$	$I_{y,eff}$	$I_{z,eff}$	$W_{el,y,eff,com}$	$W_{el,y,eff,ten}$	$W_{el,z,eff}$	
dimension	4.69	-0.17	9.23	390.67	56.16	36.27	42.33	7.98	
unit	cm ²	cm	cm	cm ⁴	cm ⁴	cm ³	cm ³	cm ³	

See Annex A for more details about the section.

The purlin is isostatic over 2 supports on z-z axis (cleats) and 3 supports on y-y axis (cleats or antisagbars).

The beam is an intermediate support of the sheet.

Sheeting parameters: Nersup C42S perforé sur plage [4.42.1010] 88/100e

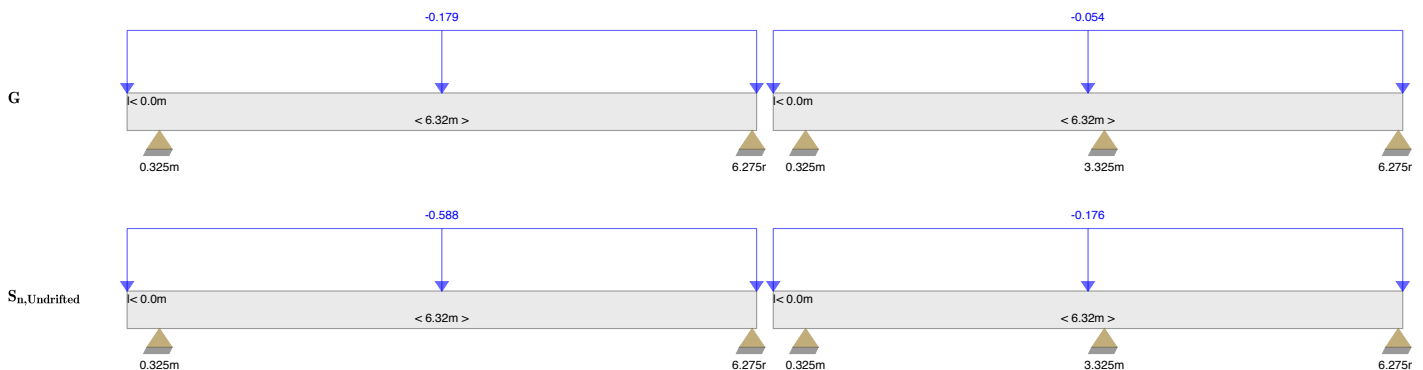
Structural class used is I (according to calculations, structural class can be considered at III at certain local points or combination). Narrow flange of the surface is on the beam. The surface is connected to the beam on every rib. The sheet is fastened on the trough. The sheet have a length of 7.987m.

Loadings (kN/m)

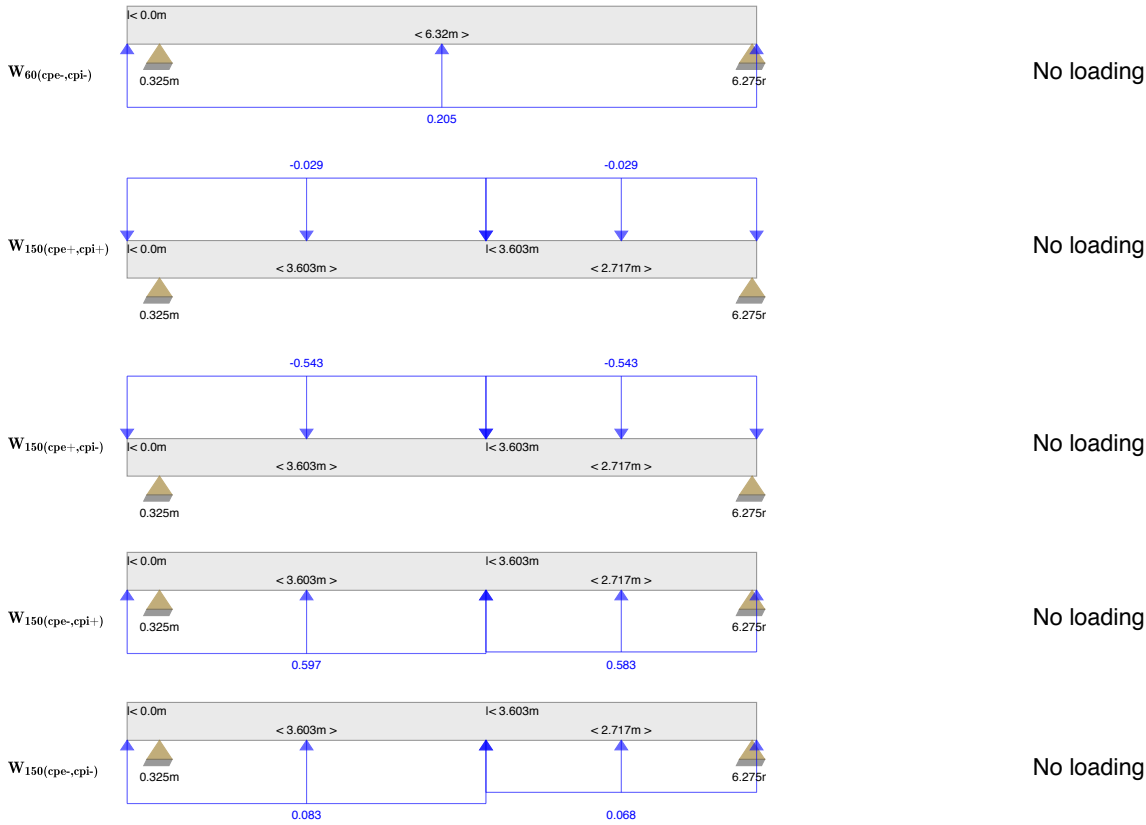
Load type

Loading diagrams on XZ

Loading diagrams on XY







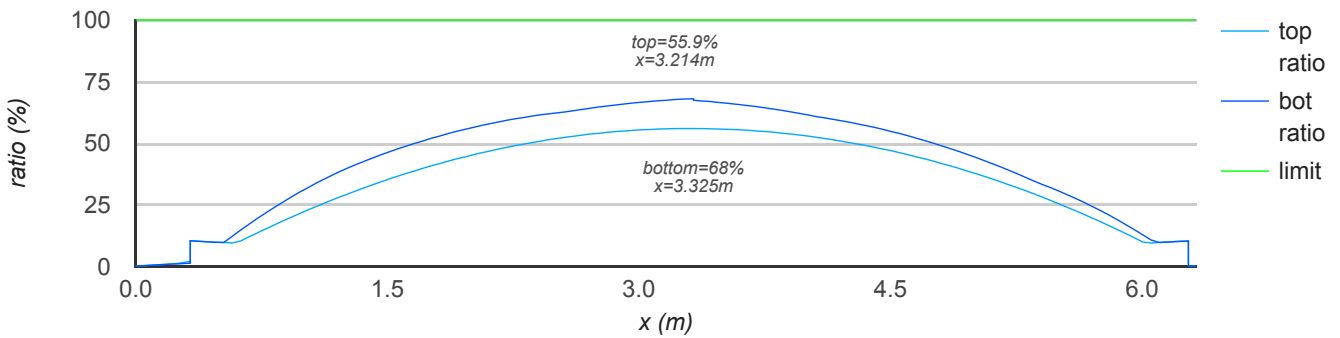
Note on wind loads:

The structural factor is used for the loads acting on the whole construction.

For the calculation of local loads, $c_{s,d}$ is taken as equal to 1, in accordance with EN 1991-1-4 § 6.2 (1).

Consequences class for partial factors calculation: CC2

Ultimate Limit States



Portion	Dir	Flange	Point (m)	Buckling	LT buckling	Ratios % ⓘ
1 - cantilever L = 0.325m from x = 0.000m to x = 0.325m No anti-sag bar	Pressure	Top	1.35*G + 1.5*S _{n,Undrifted} + 0.9*W _{150(cpe+,cpi-)} 0.325	No	No	1.9% (Mbiaxial)
		Bottom	1.35*G + 1.5*S _{n,Undrifted} + 0.9*W _{150(cpe+,cpi-)} 0.325	No	No	1.2% (Vb)
	Suction	Top	1.35*G + 1.5*W _{240(cpe+,cpi+)} + 0.75*S _{n,Undrifted} 0.325	No	No	1.3% (Mbiaxial)
		Bottom	G + 1.5*W _{240(cpe+,cpi+)} 0.325	No	No	1.2% (Vb)
2 - extremity span L = 6m from x = 0.325m to x = 6.320m One anti-sag bar	Suction	Top	1.35*G + 1.5*S _{n,Undrifted} + 0.9*W _{150(cpe+,cpi-)} 3.325	No	No	55.9% (My)
		Bottom	1.35*G + 1.5*S _{n,Undrifted} + 0.9*W _{150(cpe+,cpi-)} 3.325	No	No	66% (Mbiaxial)
	Pressure	Top	G + 1.5*W _{240(cpe+,cpi+)} 3.214	No	No	27.2% (My)
		Bottom	G + 1.5*W _{240(cpe+,cpi+)}			68% (LT+Mz)

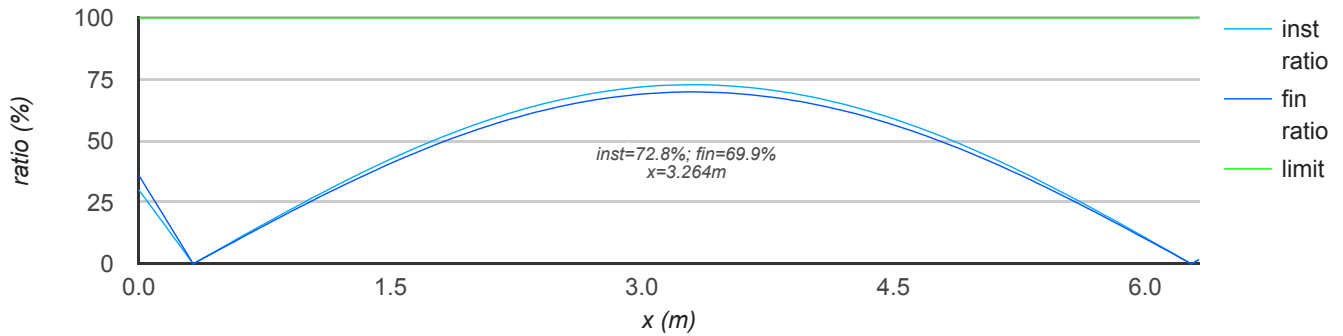
Portion	Flange	Point (m)	Buckling	LT buckling	Ratios %
		3.325	No	$\chi_{LT} = 0.483$ $L_{fi} = 2472$ mm	

Not taken into account in the calculations:

- impact of frame deflections on continuous or sleeved purlins

Windows and doors are only considered closed for the formation of combinations of actions relating to sustainable project situations.

Serviceability Limit States



Instantaneous SLS

Portion	Point (m)	Max displacement (mm)					Limit (mm)		Ratio %
		x	y	z	tot	combination	factor	w ₃	
1 - cantilever L = 0.325m	0	0	0.3	3	3	$S_{n,Undrifted} + 0.6*W_{150(cpe+,cpi-)}$	125	10	30.1
2 - span L = 6m	3.325	0	0	-17.5	17.5	$S_{n,Undrifted} + 0.6*W_{150(cpe+,cpi-)}$	250	24	72.8

Total SLS

Portion	Point (m)	Max displacement (mm)					Limit (mm)		Ratio %
		x	y	z	tot	combination	factor	w _{max}	
1 - cantilever L = 0.325m	0	0	0.3	3.6	3.6	$G + S_{n,Undrifted} + 0.6*W_{150(cpe+,cpi-)}$	100	10	36.1
2 - span L = 6m	3.325	0	0	-20.9	20.9	$G + S_{n,Undrifted} + 0.6*W_{150(cpe+,cpi-)}$	200	30	69.9

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