

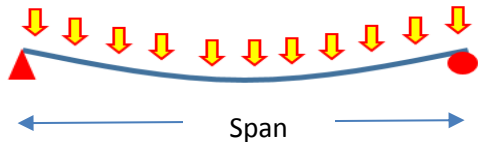
Designing for Distributed Loading

Symonite FR Ultra

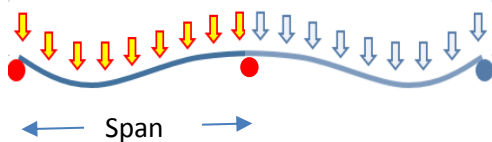
The following graphical and tabulated data enables accurate and quick determination of maximum deflections of spans of Symonite panelling resulting from uniformly distributed loading such as wind loading, gravity loading or combinations of same.

Support Conditions

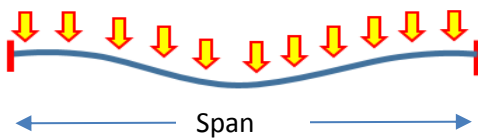
1. Opposite edges simply supported. Supported edges free to rotate. No bending moment at the supports.



2. One edge simply supported, free to rotate having no bending moment. Opposite edge fixed, applied bending moment from the support prevents rotation. This case is typical of a centrally supported panel.



3. Opposite edges fixed and not free to rotate. The applied bending moment from the supports to both supported edges prevents rotation.



Spans

Maximum deflections are given for the range of spans 400 mm to 1200 mm in 10 mm increments.

Uniformly Distributed Load

The uniformly distributed load is expressed as a pressure in kPa, with maximum deflections given for the range 0.5 kPa to 6.0 kPa in increments of 0.5 kPa.

Aluminium Skin Stress

Maximum deflections are given only for those combinations of span length, support conditions and uniformly distributed loading that result in stress in the aluminium alloy skin less than or equal to 71 MPa.

Limiting the aluminium skin stress to 71MPa achieves a safety factor of at least 1.5 on that bending moment that would initiate yielding (permanent bending) of the panel.

WARNING – ACCEPTABLE STRESSES AND DEFLECTIONS

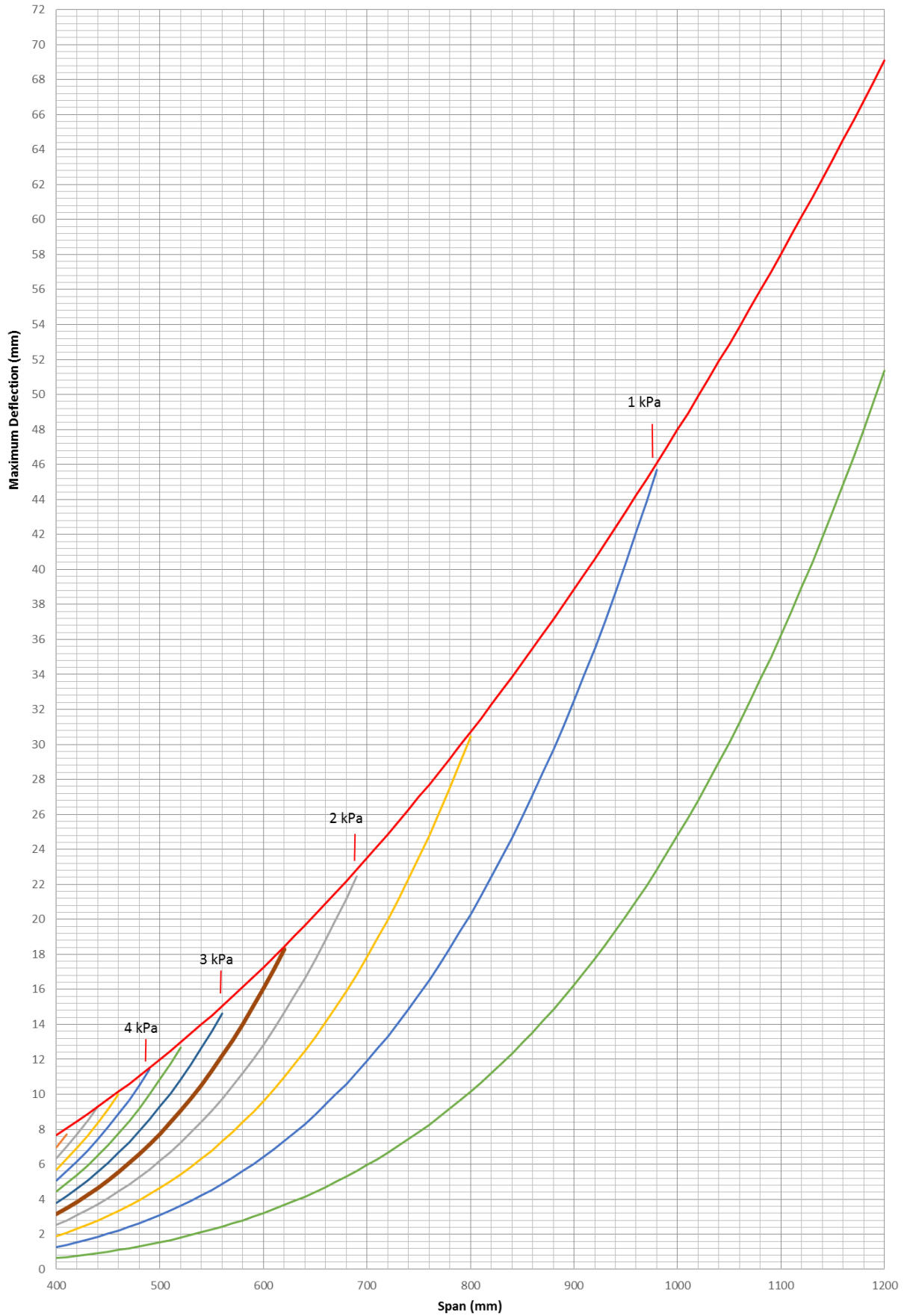
Please note that the following graphical and tabular data is given for guidance only, it is the designer's responsibility to ensure that the design satisfies the requirements of the regulatory authorities.

Consultant:

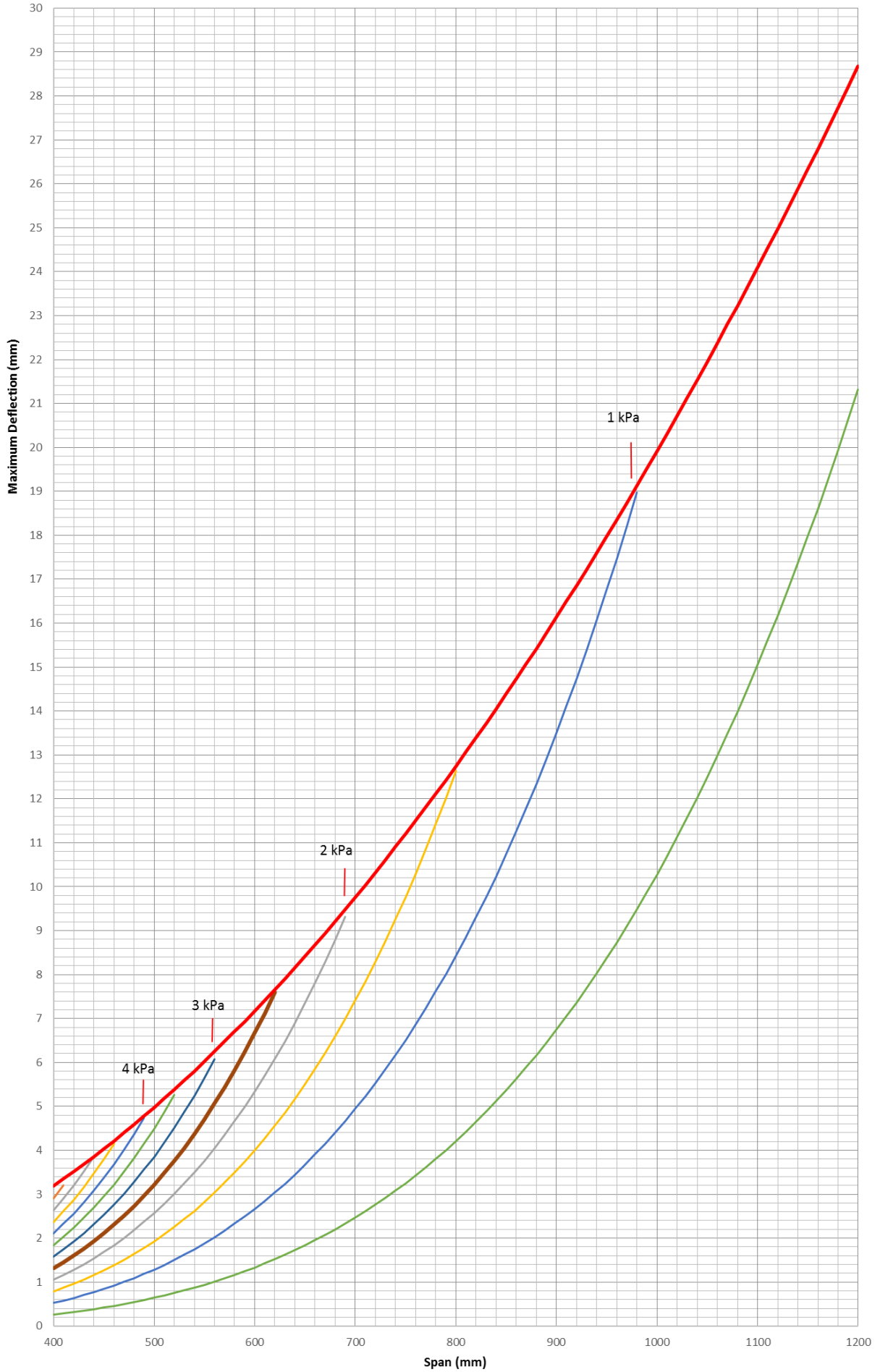
The following graphical and tabular data has been produced by, and is based on laboratory testing carried out by, Hugh Stark BSc PhD FIMechE CEng FIEAust CPEng RPEQ.

For detailed wind load and stress reports please contact Symonite.

Nominal: 4 mm Symonite FR Ultra with 0.5 mm thick aluminium skins
 Single span: simple support / simple support



Nominal: 4 mm Symonite FR Ultra with 0.5 mm thick aluminium skins
 Single span: simple support / fixed support



4	mm	Nominal thickness	FR ULTRA PANEL				Single span: fixed support / fixed support						
	Panel thickness ≥	3.988	mm	Measured plate stiffness 'D' = 262,825 Nmm						Aluminium			
				Aluminium permissible stress = 71 MPa						E = 68,900 MPa		Poisson's Ratio = 0.33	
				Maximum deflection (mm)								Defln.	
Span (mm)				Pressure (kPa)								at max. stress	
	6	5.5	5	4.5	4	3.5	3	2.5	2	1.5	1	0.5	
400	1.52	1.40	1.27	1.14	1.01	0.89	0.76	0.63	0.51	0.38	0.25	0.13	2.30
410	1.68	1.54	1.40	1.26	1.12	0.98	0.84	0.70	0.56	0.42	0.28	0.14	2.42
420	1.85	1.70	1.54	1.39	1.23	1.08	0.92	0.77	0.62	0.46	0.31	0.15	2.54
430	2.03	1.86	1.69	1.52	1.35	1.19	1.02	0.85	0.68	0.51	0.34	0.17	2.66
440	2.23	2.04	1.86	1.67	1.49	1.30	1.11	0.93	0.74	0.56	0.37	0.19	2.79
450	2.44	2.23	2.03	1.83	1.63	1.42	1.22	1.02	0.81	0.61	0.41	0.20	2.91
460	2.66	2.44	2.22	2.00	1.77	1.55	1.33	1.11	0.89	0.67	0.44	0.22	3.05
470	2.90	2.66	2.42	2.18	1.93	1.69	1.45	1.21	0.97	0.73	0.48	0.24	3.18
480	3.16	2.89	2.63	2.37	2.10	1.84	1.58	1.31	1.05	0.79	0.53	0.26	3.32
490	3.43	3.14	2.86	2.57	2.28	2.00	1.71	1.43	1.14	0.86	0.57	0.29	3.46
500		3.41	3.10	2.79	2.48	2.17	1.86	1.55	1.24	0.93	0.62	0.31	3.60
510		3.69	3.35	3.02	2.68	2.35	2.01	1.68	1.34	1.01	0.67	0.34	3.74
520			3.62	3.26	2.90	2.54	2.17	1.81	1.45	1.09	0.72	0.36	3.89
530			3.91	3.52	3.13	2.74	2.35	1.95	1.56	1.17	0.78	0.39	4.04
540				3.79	3.37	2.95	2.53	2.11	1.69	1.26	0.84	0.42	4.20
550				4.08	3.63	3.17	2.72	2.27	1.81	1.36	0.91	0.45	4.35
560				4.38	3.90	3.41	2.92	2.44	1.95	1.46	0.97	0.49	4.51
570					4.18	3.66	3.14	2.61	2.09	1.57	1.05	0.52	4.68
580					4.49	3.92	3.36	2.80	2.24	1.68	1.12	0.56	4.84
590					4.80	4.20	3.60	3.00	2.40	1.80	1.20	0.60	5.01
600					5.14	4.49	3.85	3.21	2.57	1.93	1.28	0.64	5.18
610						4.80	4.12	3.43	2.74	2.06	1.37	0.69	5.35
620						5.12	4.39	3.66	2.93	2.20	1.46	0.73	5.53
630						5.46	4.68	3.90	3.12	2.34	1.56	0.78	5.71
640						5.82	4.99	4.16	3.32	2.49	1.66	0.83	5.89
650							5.31	4.42	3.54	2.65	1.77	0.88	6.08
660							5.64	4.70	3.76	2.82	1.88	0.94	6.27
670							5.99	4.99	3.99	2.99	2.00	1.00	6.46
680							6.36	5.30	4.24	3.18	2.12	1.06	6.65
690							6.74	5.61	4.49	3.37	2.25	1.12	6.85
700							7.12	5.95	4.76	3.57	2.38	1.19	7.05
710							7.50	6.29	5.04	3.78	2.52	1.26	7.25
720							7.88	6.66	5.33	3.99	2.66	1.33	7.46
730							8.26	7.03	5.63	4.22	2.81	1.41	7.67
740							8.64	7.43	5.94	4.46	2.97	1.49	7.88
750							9.02	7.84	6.27	4.70	3.14	1.57	8.09
760							9.40	8.26	6.61	4.96	3.31	1.65	8.31
770							9.78	8.64	6.97	5.22	3.48	1.74	8.53
780							10.16	9.02	7.34	5.50	3.67	1.83	8.76
790							10.54	9.40	7.72	5.79	3.86	1.93	8.98
800							10.92	9.82	8.12	6.09	4.06	2.03	9.21
810							11.30	10.24	8.53	6.40	4.27	2.13	9.44
820							11.68	10.66	8.96	6.72	4.48	2.24	9.68
830							12.06	11.08	9.40	7.05	4.70	2.35	9.91
840							12.44	11.50	9.87	7.40	4.93	2.47	10.15
850							12.82	11.92	10.34	7.76	5.17	2.59	10.40
860							13.20	12.34	10.78	8.13	5.42	2.71	10.64
870							13.58	12.76	11.16	8.51	5.68	2.84	10.89
880							13.96	13.18	11.54	8.91	5.94	2.97	11.14
890							14.34	13.60	11.92	9.33	6.22	3.11	11.40
900							14.72	14.02	12.30	9.75	6.50	3.25	11.66
910							15.10	14.44	12.68	10.19	6.79	3.40	11.92
920							15.48	14.86	13.06	10.65	7.10	3.55	12.18
930							15.86	15.28	13.44	11.12	7.41	3.71	12.45
940							16.24	15.70	13.82	11.60	7.74	3.87	12.72
950							16.62	16.12	14.20	12.11	8.07	4.04	12.99
960							17.00	16.54	14.58	12.62	8.42	4.21	13.26
970							17.38	16.96	14.96	13.16	8.77	4.39	13.54
980							17.76	17.38	15.34	13.71	9.14	4.57	13.82
990							18.14	17.80	15.72	14.25	9.52	4.76	14.10
1000							18.52	18.22	16.10	14.79	9.91	4.95	14.39
1010							18.90	18.64	16.48	15.31	10.31	5.16	14.68
1020							19.28	19.06	16.86	15.83	10.73	5.36	14.97
1030							19.66	19.48	17.24	16.35	11.15	5.58	15.27
1040							20.04	19.90	17.62	16.87	11.59	5.80	15.57
1050							20.42	20.32	18.00	17.39	12.04	6.02	15.87
1060							20.80	20.74	18.38	17.91	12.51	6.25	16.17
1070							21.18	21.16	18.76	18.43	12.99	6.49	16.48
1080							21.56	21.58	19.14	18.95	13.48	6.74	16.79
1090							21.94	22.00	19.52	19.47	13.99	6.99	17.10
1100							22.32	22.42	19.90	20.00	14.51	7.25	17.41
1110							22.70	22.84	20.28	20.52	15.04	7.52	17.73
1120							23.08	23.26	20.66	21.04	15.59	7.80	18.05
1130							23.46	23.68	21.04	21.56	16.16	8.08	18.38
1140							23.84	24.10	21.42	22.08	16.73	8.37	18.70
1150							24.22	24.52	21.80	22.60	17.33	8.66	19.03
1160							24.60	24.94	22.18	23.12	17.94	8.97	19.36
1170							24.98	25.36	22.56	23.64	18.57	9.28	19.70
1180							25.36	25.78	22.94	24.16	19.21	9.61	20.04
1190							25.74	26.20	23.32	24.68	19.87	9.93	20.38
1200							26.12	26.62	23.70	25.20	20.55	10.27	20.72

Nominal: 4 mm Symonite FR Ultra with 0.5 mm thick aluminium skins
 Single span: fixed support / fixed support

