Latchways® **Constant Force post**
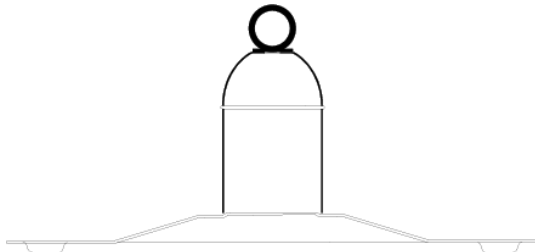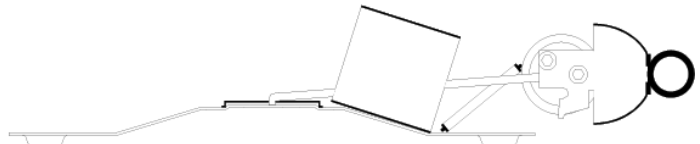
Technical datasheet

Typical reaction on the fixings attaching the Constant Force post (CFp) to the roof structure
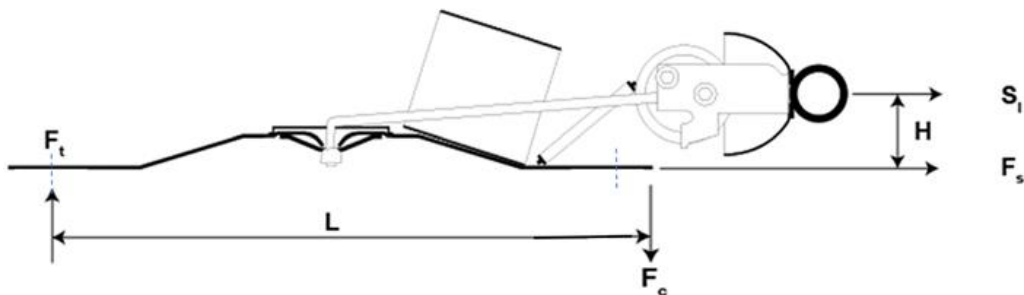

Constant Force post undeployed condition

Constant Force post deployed condition

Reaction direction and nomenclature

Free body diagram of a deployed Constant Force post when attach directly onto a metal deck roofing system.

Tension force on fixings due to applied service load;

$$F_t = \frac{S_l \times H}{L}$$

And

$$F_t = F_c$$

Where;

H = Deployment height of the CFp = 35 mm (1 $^3/_8$")

L = Distance between the rear fixings and the leading edge of the baseplate (mm or in)

S_l = Service load = Type 1 CFp 10 kN (2248lb), Type 2 CFp 6.5 kN (1461lb)

F_t = Tension force on fixings (kN or lb)

F_c = Compression force on fixings (kN or lb)

F_s = Shear force on fixings (kN or lb)

B_n = Quantity of fixings through the baseplate into the roof system

CFp's using stitching screw/rivet, fixings

Calculated reactions for the stitching screw/rivets used with Type 1 and Type 2 CFp's installed directly onto a metal deck roofing system using 16 fixings (4 fixings at each corner of the baseplate).

Type 1 Constant Force Post reactions on fixings														
Fixing centres	H		L		B_n	S_l		F_t		F_t per fixing		F_s per fixing	
	mm	in	mm	in		kN	lb	kN	lb	kN	lb	kN	lb
300	35	1.38	312	12.3	16	10	2248	1.1	247.3	0.14	31.5	0.63	141
333			345	13.6				1.0	224.8	0.13	29.2		
380			392	15.4				0.9	202.3	0.11	24.7		
400			412	16.2				0.8	179.8	0.1	22.5		
456			468	18.4				0.75	168.6	0.09	20.2		
500			512	20.2				0.7	157.4	0.08	18.0		

Type 2 Constant Force Post reactions on fixings														
Fixing centres	H		L		B_n	S_l		F_t		F_t per fixing		F_s per fixing	
	mm	in	mm	in		kN	lb	kN	lb	kN	lb	kN	lb
300	35	1.38	312	12.3	16	6.5	1461	0.73	164.1	0.09	22.5	0.41	92
333			345	13.6				0.66	148.4	0.08	18.0		
380			392	15.4				0.58	130.4	0.073	16.4		
400			412	16.2				0.55	123.6	0.07	15.7		
456			468	18.4				0.5	112.4	0.06	13.5		
500			512	20.2				0.45	101.2	0.055	12.4		

CFp's using clamps onto standing seam roofing

Calculated reactions for the load applied at the top of the clamp used when Type 1 and Type 2 CFp's are installed onto a standing seam roofing system using 4 clamps (1 clamp at each corner of the baseplate).

Where;

H = Deployment height of the CFp = 35 mm (1 $^3/_8$")

L = Distance between the centrelines of each clamp (mm or in)

S_l = Service load = Type 1 CFp 10 kN (2248lb), Type 2 CFp 6.5 kN (1461lb)

F_t = Tension force on clamps (kN or lb)

F_c = Compression force on clamps (kN or lb)

F_s = Shear force across clamps (kN or lb)

B_n = Quantity of clamps fitted through the baseplate into the roof system

### Type 1 Constant Force Post reactions on clamps

Standing seam centres	H		L		B_n	S_l		F_t		F_t per fixing		F_s per fixing	
	mm	in	mm	in		kN	lb	kN	lb	kN	lb	kN	lb
300 mm			300	11.8				1.17	263.0	0.58	130.4		
333 mm			333	13.1				1.05	236.0	0.53	119.1		
400 mm	35	1.38	400	15.7	4	10	2248	0.88	197.8	0.44	98.9	2.5	562.0
500 mm			500	19.7				0.7	157.4	0.35	78.7		
537 mm			537	21.1				0.65	146.1	0.33	74.2		
600 mm			600	23.6				0.58	130.4	0.29	65.2		

Type 2 Constant Force Post reactions on clamps

Standing seam centres	H		L		B_n	S_l		F_t		F_t per fixing		F_s per fixing	
	mm	in	mm	in		kN	lb	kN	lb	kN	lb	kN	lb
300 mm			300	11.8				0.76	170.9	0.38	85.4		
333 mm			333	13.1				0.68	152.9	0.34	76.4		
400 mm			400	15.7				0.57	128.1	0.28	62.9		
429 mm			429	16.9				0.53	119.1	0.27	60.7		
434 mm	35	1.38	434	17.1	4	6.5	1461	0.52	116.9	0.26	58.5	1.6	365.3
444 mm			444	17.5				0.51	114.7	0.25	56.2		
500 mm			500	19.7				0.45	101.2	0.23	51.7		
537 mm			537	21.1				0.42	94.4	0.21	47.2		
600 mm			600	23.6				0.38	85.4	0.19	42.7		

Reaction direction and nomenclature for warm flat roofing

Free body diagram of a deployed Constant Force post using toggle bolts, threaded expanded anchors and resin fixed anchors through insulation.
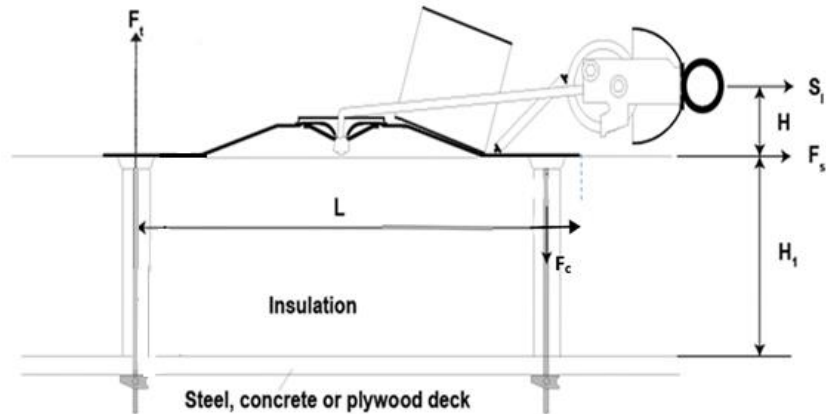
Tension force on fixings due to applied service load considering the thickness of insulation between the baseplate and the fixing into the structure;

$$F_t = \frac{S_l \times (H + H_1)}{L}$$

Where:

F_t = Tension force on fixings (kN or lb)

F_c = Compression force on fixings (kN or lb)
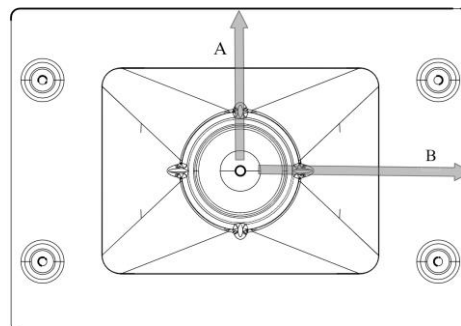
F_s = Shear force on fixings (kN or lb)

S_l = Service load = Type 1 CFp 10 kN (2248lb), Type 2 CFp 6.5 kN (1461lb)

H = Deployment height of the CFp = 35 mm (1 $^3/_8$")

H_i = Insulation depth between the baseplate and the fixing surface

L = Distance between the rear fixings and the leading edge of the baseplate (mm or in)

Considered loading on fixings when CFp is deployed in direction A and B

CFp's using toggle bolt fixings

Calculated reactions for the bolts used with CFp's installed through insulation onto metal, concrete or plywood deck roofing systems.

Type 1 Constant Force Post reactions on fixings													
Direction	H		Hi		B_n	L		S_l		F_s per fixing		F_t per fixing	
	mm	in	mm	in		mm	in	kN	lb	kN	lb	kN	lb
A	35	1.4	50	2	4	293	8	10	2248	2.5	562	1.45	326
B						496	18					0.86	193
A			100	4		293	8					2.30	517
B						496	18					1.36	306
A			150	6		293	8					3.16	710
B						496	18					1.86	418
A			200	8		293	8					4.01	901
B						496	18					2.37	533
A			250	10		293	8					4.86	1092
B						496	18					2.87	645

Type 2 Constant Force Post reactions on fixings													
Direction	H		Hi		B_n	L		S_l		F_s per fixing		F_t per fixing	
	mm	in	mm	in		mm	in	kN	lb	kN	lb	kN	lb
A	35	1.4	50	2	4	293	8	6.5	1461	1.6	366	0.94	211
B						496	18					0.56	126
A			100	4		293	8					1.50	337
B						496	18					0.88	198
A			150	6		293	8					2.05	461
B						496	18					1.21	272
A			200	8		293	8					2.61	587
B						496	18					1.54	346
A			250	10		293	8					3.16	710
B						496	18					1.87	420

Note: For combined reactions consult a suitably qualified engineer

Revision history

Reference	Date issued	Revision	Engineer
RFEA4070	Jan 2022	04	AW