HARDY FRAME SHEAR WALL SYSTEM MiTek

Hardy Frame® Panels Limit States Design

Table 1 - Installation on Concrete [1, 2, 9]

Model Number	Net Height	HD Bolt Dia and Grade [3]	Seismic [4,5]						Wind [4,6]					
			Factored In-Plane Shear, V [7]		Drift at V [7]		Factored Uplift at V [8]		Factored In-Plane Shear, V [7]		Drift at V [7]		Factored Uplift at V [8]	
			(lbs)	(kN)	(in)	(mm)	(lbs)	(kN)	(lbs)	(kN)	(in)	(mm)	(lbs)	(kN)
HFX-9x79.5	79-1/2" (2,019 mm)	1 1/8" STD	1,530	6.81	0.314	7.97	23,175	103.13	1,450	6.45	0.297	7.54	21,245	94.54
HFX-12x78	78" (1,981 mm)	1 1/8" STD	2,490	11.08	0.276	7.00	23,630	105.15	2,490	11.08	0.275	6.99	23,630	105.15
		1 1/8" HS	3,105	13.82	0.345	8.76	32,530	144.76	2,625	11.68	0.291	7.40	25,390	112.99
HFX-15x78		1 1/8" STD	3,110	13.84	0.324	8.23	23,440	104.31	2,795	12.44	0.291	7.40	20,560	91.49
		1 1/8" HS	3,670	16.33	0.382	9.71	28,965	128.89	2,795	12.44	0.291	7.40	20,560	91.49
HFX-18x78		1 1/8" STD	3,975	17.69	0.241	6.12	23,170	103.11	4,020	17.89	0.243	6.17	23,500	104.58
		1 1/8" HS	6,070	27.01	0.369	9.37	39,590	176.18	4,795	21.34	0.291	7.40	29,060	129.32
HFX-21x78		1 1/8" STD	4,920	21.89	0.256	6.50	23,480	104.49	4,920	21.89	0.256	6.50	23,480	104.49
		1 1/8" HS	7,275	32.37	0.382	9.71	37,480	166.79	5,545	24.68	0.291	7.40	26,940	119.88
HFX-24x78		1 1/8" STD	4,990	22.21	0.160	4.07	19,790	88.07	5,780	25.72	0.186	4.72	23,275	103.57
		1 1/8" HS	9,110	40.54	0.296	7.51	39,540	175.95	8,990	40.01	0.291	7.40	38,910	173.15
HFX-9x8	93-3/4" (2,381 mm)	1 1/8" STD	1,300	5.79	0.436	11.08	23,175	103.13	1,040	4.63	0.350	8.89	16,840	74.94
HFX-12x8	92-1/4" (2,343 mm)	1 1/8" STD	2,105	9.37	0.318	8.07	23,630	105.15	2,105	9.37	0.318	8.09	23,630	105.15
		1 1/8" HS	2,625	11.68	0.399	10.14	32,530	144.76	2,265	10.08	0.344	8.75	26,160	116.41
HFX-15x8		1 1/8" STD	2,630	11.70	0.399	10.13	23,440	104.31	2,270	10.10	0.344	8.75	19,605	87.24
		1 1/8" HS	2,980	13.26	0.452	11.48	27,480	122.29	2,270	10.10	0.344	8.75	19,605	87.24
HFX-18x8		1 1/8" STD	3,405	15.15	0.283	7.19	23,550	104.80	3,415	15.20	0.283	7.20	23,600	105.02
		1 1/8" HS	5,410	24.07	0.452	11.48	42,680	189.93	4,115	18.31	0.344	8.75	29,595	131.70
HFX-21x8		1 1/8" STD	4,195	18.67	0.318	8.07	23,710	105.51	4,200	18.69	0.318	8.07	23,710	105.51
		1 1/8" HS	5,915	26.32	0.452	11.48	35,670	158.73	4,510	20.07	0.344	8.75	25,740	114.54
HFX-24x8		1 1/8" STD	4,455	19.82	0.197	5.00	21,015	93.52	4,960	22.07	0.220	5.58	23,670	105.33
		1 1/8" HS	7,700	34.27	0.343	8.70	39,540	175.95	7,720	34.35	0.344	8.75	39,675	176.55
HFX-12x9	104-1/4" (2,648 mm)	1 1/8" STD	1,865	8.30	0.354	8.99	23,675	105.35	1,860	8.28	0.354	8.98	23,630	105.15
		1 1/8" HS	2,190	9.75	0.418	10.62	29,665	132.01	2,040	9.08	0.389	9.89	26,745	119.02
HFX-15x9		1 1/8" STD	2,330	10.37	0.464	11.79	23,435	104.29	1,950	8.68	0.389	9.89	18,940	84.28
		1 1/8" HS	2,560	11.39	0.511	12.97	26,455	117.72	1,950	8.68	0.389	9.89	18,940	84.28
HFX-18x9		1 1/8" STD	3,005	13.37	0.316	8.04	23,455	104.37	3,020	13.44	0.318	8.07	23,595	105.00
		1 1/8" HS	4,840	21.54	0.511	12.97	43,330	192.82	3,680	16.38	0.389	9.89	30,015	133.57
HFX-21x9		1 1/8" STD	3,695	16.44	0.368	9.34	23,585	104.95	3,685	16.40	0.366	9.30	23,480	104.49
		1 1/8" HS	5,085	22.63	0.511	12.97	34,415	153.15	3,875	17.24	0.389	9.89	24,895	110.78
HFX-24x9		1 1/8" STD	4,090	18.20	0.228	5.79	21,885	97.39	4,375	19.47	0.245	6.21	23,565	104.86
		1 1/8" HS	6,815	30.33	0.383	9.73	39,540	175.95	6,925	30.82	0.389	9.89	40,320	179.42
HFX-12x10	116-1/4" (2,953 mm)	1 1/8" STD	1,545	6.88	0.360	9.13	21,340	94.96	1,670	7.43	0.389	9.88	23,625	105.13
		1 1/8" HS	1,760	7.83	0.412	10.46	25,355	112.83	1,855	8.25	0.434	11.02	27,280	121.40
HFX-15x10		1 1/8" STD	2,105	9.37	0.536	13.61	23,695	105.44	1,705	7.59	0.434	11.02	18,370	81.75
		1 1/8" HS	2,240	9.97	0.570	14.47	25,585	113.85	1,705	7.59	0.434	11.02	18,370	81.75
HFX-18x10		1 1/8" STD	2,710	12.06	0.350	8.88	23,615	105.09	2,710	12.06	0.349	8.88	23,595	105.00
		1 1/8" HS	4,385	19.51	0.570	14.47	43,980	195.71	3,340	14.86	0.434	11.02	30,440	135.46
HFX-21x10		1 1/8" STD	3,315	14.75	0.421	10.69	23,585	104.95	3,315	14.75	0.421	10.69	23,600	105.02
		1 1/8" HS	4,445	19.78	0.570	14.47	33,335	148.34	3,385	15.06	0.434	11.02	24,165	107.53
HFX-24x10		1 1/8" STD	3,780	16.82	0.259	6.59	22,615	100.64	3,945	17.56	0.270	6.87	23,720	105.55
		1 1/8" HS	6,110	27.19	0.423	10.76	39,520	175.86	6,275	27.92	0.434	11.02	40,845	181.76

For SI: 1 inch = 25.4 mm, 1 lb = 4.45 N, 1 psi = 0.00689 MPa

Notes:

1) Table values are based on Limit States Design (LSD) methodology and pertain to the National Building Code of Canada (NBC 2010) for installation on 3,000 psi (20 MPa) concrete.
2) For installation on nut and washers with 5,000 psi (35 MPa) minimum non-shrink grout, table values must be multiplied by 0.80.
3) STD indicates bolts complying with ASTM F1554 Grade 36. HS rods include, but are not limited to ASTM F1554 Grade 105, ASTM A193 Grade B7, or ASTM A354 Grade BD.
4) Factored In-Plane Shear, Drift, and Factored Uplift values may be linearly interpolated for intermediate heights.
5) Factored In-Plane Shear loads for Seismic design are limited to an effective drift ratio of 0.025h for buildings of Normal Importance, per NBC 2010 Sentence 4.1.8.13.(3), and use response modification factors Rd = 3.0 and Ro = 1.7.
6) Factored In-Plane Shear loads for Wind design are limited to an effective drift ratio of h/500 (at service load), per NBC 2010 Sentence 4.1.3.5.(3). Table values are for buildings of Normal Importance occupancy category.
7) Factored In-Plane Shear loads and corresponding Drifts assume a factored axial load of 7,500 lbs (33.4 kN). Axial load must be applied within the middle 1/3 of the Panel width or uniformly distributed across the entire Panel width.
8) The Factored Uplift values listed exclude any additional axial load. To determine anchor tension loads at design shear values, and including the effect of axial load, use the equations on the backside of this sheet.
9) The design of anchorage to foundation is the responsibility of EOR.

HARDY FRAME
SHEAR WALL SYSTEM
MiTek

Hardy Frame® Panels
Limit States Design

Table 2 - Hardy Frame® Product Listing

Model Number	Width		Net Height		Depth		Anchor Bolt Diameter [1]		Top Screw Qty [2]
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	DF-L / S-P-F
HFX-9x79.5	9	229	79-1/2	2,019	3-1/2	89	1-1/8	28.58	5
HFX-12x78	12	305	78	1,981					6
HFX-15x78	15	381							8
HFX-18x78	18	457							10
HFX-21x78	21	533							12
HFX-24x78	24	610							14
HFX-9x8	9	229	93-3/4	2,331					5
HFX-12x8	12	305	92-1/4	2,343					6
HFX-15x8	15	381							8
HFX-18x8	18	457							10
HFX-21x8	21	533							12
HFX-24x8	24	610							14
HFX-12x9	12	305	104-1/4	2,648					6
HFX-15x9	15	381							8
HFX-18x9	18	457							10
HFX-21x9	21	533							12
HFX-24x9	24	610							14
HFX-12x10	12	305	116-1/4	2,953					6
HFX-15x10	15	381							8
HFX-18x10	18	457							10
HFX-21x10	21	533							12
HFX-24x10	24	610							14

For SI: 1 inch = 25.4 mm, 1 lb = 4.45 N, 1 psi = 0.00689 MPa

Notes:

1) HD anchors can be Standard (STD) or High Strength (HS). STD indicates bolts complying with ASTM F 1554 Grade 36. HS rods include, but are not limited to ASTM F1554 Grade 105, ASTM A193 Grade B7, or ASTM A354 Grade BD.

2) Screws at the top connection are 1/4" diameter USP WS wood screws. Use 3" long (WS3) when attaching directly to the collector, and 4-1/2" long (WS45) when installing with a 2x wood filler.

Equation for factored tension uplift with added factored axial load

The expressions listed below may be used to determine factored uplift tension (T) with additional factored axial load P_{add}

HFX-9x: $T=14.02\,f'_c - \sqrt{196.55f'^2_c - 1.93f'_c(5.5\,P_{add} + 2VH)} - P_{add}$

HFX-12x: $T=19.82\,f'_c - \sqrt{392.87\,f'^2_c - 1.93f'_c(8.5\,P_{add} + 2VH)} - P_{add}$

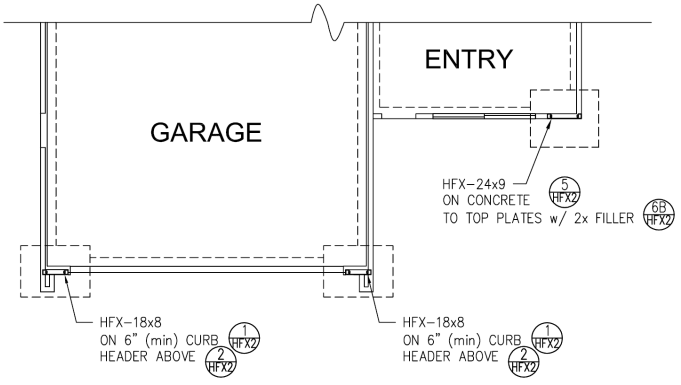
HFX-15x: $T=23.93\,f'_c - \sqrt{572.65f'^2_c - 1.93f'_c(9.75\,P_{add} + 2VH)} - P_{add}$

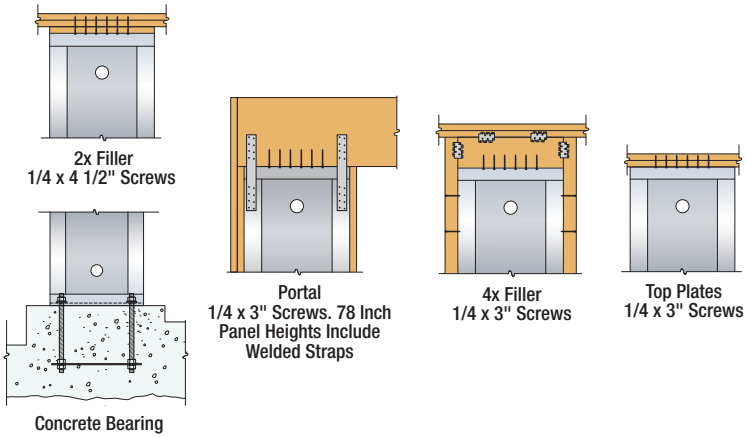
HFX-18x: $T=29.73\,f'_c - \sqrt{883.96f'^2_c - 1.93f'_c(12.75\,P_{add} + 2VH)} - P_{add}$

HFX-21x: $T=35.53\,f'_c - \sqrt{1262.57f'^2_c - 1.93f'_c(15.75\,P_{add} + 2VH)} - P_{add}$

HFX-24x: $T=41.33\,f'_c - \sqrt{1708.49f'^2_c - 1.93f'_c(18.75\,P_{add} + 2VH)} - P_{add}$

Variable	Description (Unit)
T	Factored Uplift Tension (lb)
f'_c	Compressive Strength of Concrete (psi)
V	Factored In-Plane Shear (lbs)
H	Panel Height (in)
P_{add}	Factored Vertical Load (lbs)





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