

FMS Isolator/Restraint Selection Information

The purpose of this section is to provide enough data to allow the reader to make a preliminary FMS Isolator/Restraint selection for your application. The final selection should be made with the help of Kinetics Noise Control Engineering. Since the FMS is a seismic device, a detailed analysis must be performed to ensure that the proper restraint and/or isolator model has been chosen for your application based on your building code, specification, geographical location, and geotechnical data.

Table P2.4-1 lists the various FMS models, and some of the basic application data.

Table P2.4-1; General Comparison of FMS Isolator/Restraint Models

FMS RESTRAINT MODEL	SUBMITTAL DRAWING NUMBER	MAXIMUM ¹ COMBINED RESTRAINT CAPACITY (² STEEL) (LB)	MAXIMUM ¹ COMBINED RESTRAINT CAPACITY (³ CONCRETE) (LB)	MAXIMUM ISOLATION RATING (LB)	APPROXIMATE RESTRAINT WEIGHT (LB)
FMSAA	S-10-40.100	615	410	805	9.0
FMSA	S-10-40.800	1,520	905	2,500	11.6
FMSB	S-10-40.200	3,175	1,040	3,000	18.4
FMSC	S-10-40.300	5,900	2,160	6,500	49.3
FMSD	S-10-40.400	9,565	3,045	10,000	86.7
FMSE	S-10-40.500	14,470	4,840	21,000	189.7
FMSF	S-10-40.600	26,100	9,875	24,000	268.0
FMSG	S-10-40.700	40,500	23,500	24,000	437.0

¹ Maximum restraint values for a load having equal horizontal and vertical components without isolation.

² Bolted or welded to structural steel.

³ Anchored to 3,000 psi minimum compressive strength steel reinforced concrete using post installed wedge type anchors.

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Figure P2.4-1 shows the restraint capacity envelopes for the entire FMS family if the restraint is attached to structural steel. These curves are for non-isolated restraints. The FMS family is unique in that isolation will change the restraint capacities of the unit, and quite often for the better. However, these curves will allow the reader to select one or two FMS models that may fit their application. Figure P2.4-2 presents the restraint capacity envelopes for the entire FMS family if the restraint is to be attached to 3,000 psi minimum compressive strength steel reinforced concrete. Again, these curves are for non-isolated restraints. The restraint capacities are affected, normally in a positive manner, by the addition of isolation to the system.

Tables P2.4-2 through P2.4-9 give the restraint capacities for the FMS family with various isolation loads applied to the restraints. These values will allow the reader to make a reasonable estimate as to whether a given isolator/restraint combination will work for the application under consideration. When a tentative selection has been made a plot of the appropriate capacity envelope should be constructed for the isolator/restraint combination being used, see the appropriate submittal sheets for the selected FMS, and the actual load points plotted on the capacity envelope chart. If the actual load points fall inside the capacity envelope, the selected FMS is adequate. If they do not fall inside the capacity envelope, select the next largest FMS.

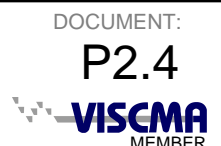
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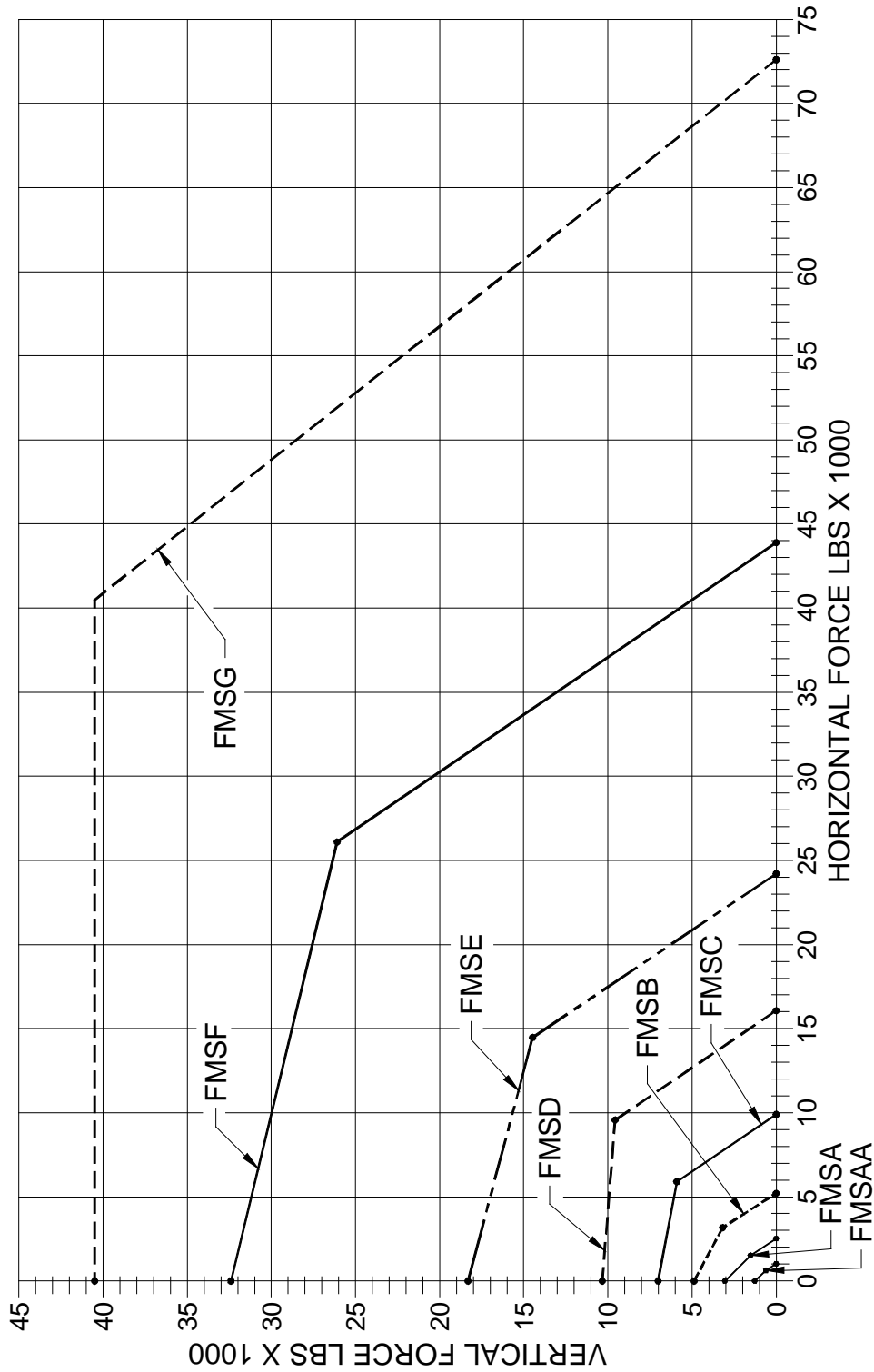
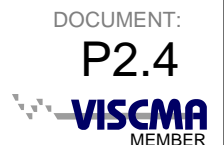


Figure P2.4-2; FMS Restraint Capacity Envelopes for Steel Attachment.

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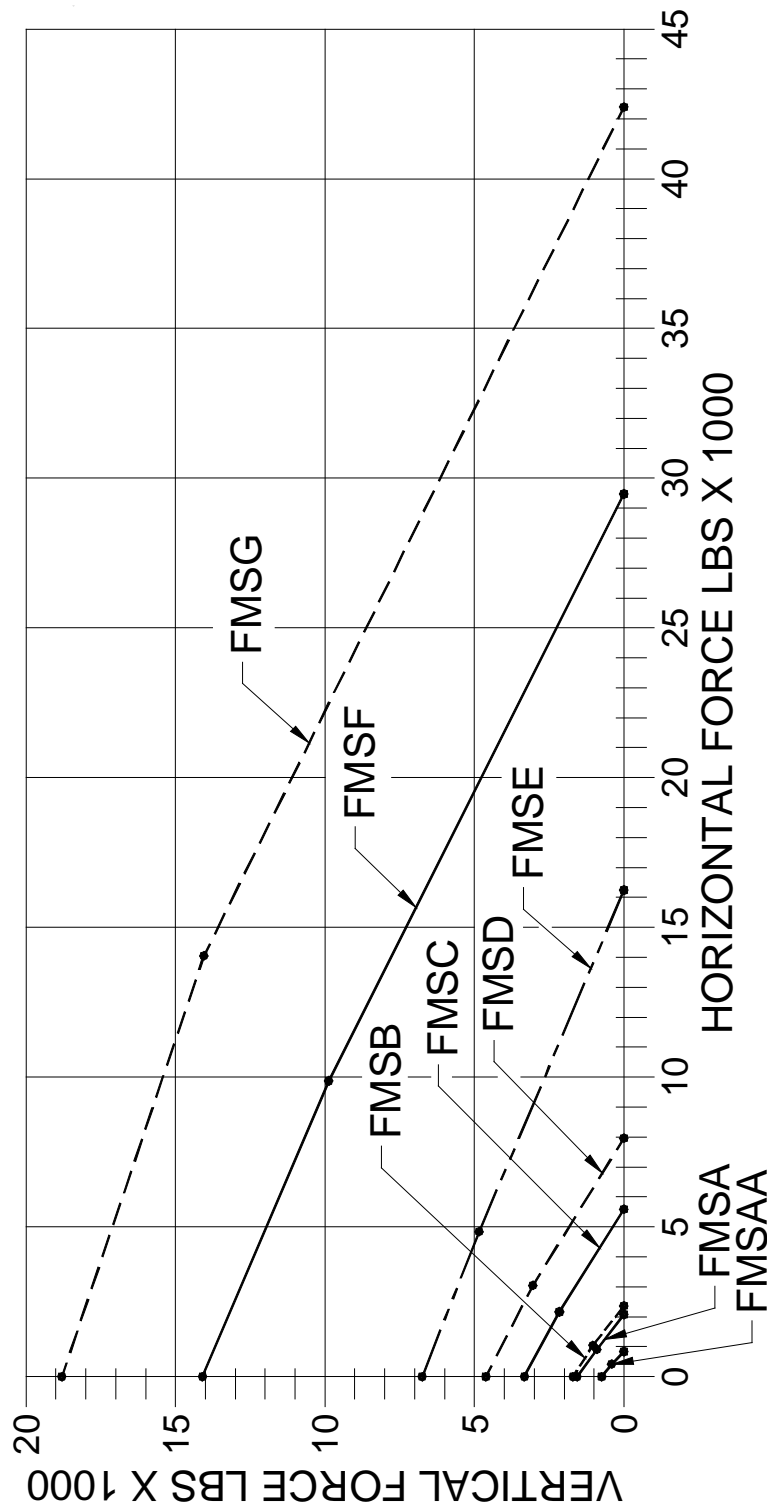


Figure P2.4-1; FMS Restraint Capacity Envelopes for Concrete Attachment.

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Table P2.4-2; FMSAA Restraint Capacities at Various Isolator Loads.

ISOLATOR LOAD (LB)	HORIZ. CAPACITY (² STEEL) (LB)	VERT. CAPACITY (² STEEL) (LB)	¹ COMB. CAPACITY (² STEEL) (LB)	HORIZ. CAPACITY (³ CONCRETE) (LB)	VERT. CAPACITY (³ CONCRETE) (LB)	¹ COMB. CAPACITY (³ CONCRETE) (LB)
0	1,015	1,275	615	835	745	410
100	1,070	1,375	655	910	845	465
200	1,120	1,285	700	975	945	520
300	1,170	1,185	740	1,030	1,045	570
400	1,220	1,085	780	1,060	1,085	625
500	1,265	985	820	1,065	985	675
600	1,275	885	850	1,065	885	725
700	1,275	885	755	1,065	785	755
805	1,275	685	660	1,065	685	660

¹ Maximum restraint values for a load having equal horizontal and vertical components without isolation.

² Bolted or welded to structural steel.

³ Anchored to 3,000 psi minimum compressive strength steel reinforced concrete using post installed wedge type anchors.

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Table P2.4-3; FMSA Restraint Capacities at Various Isolator Loads.

ISOLATOR LOAD (LB)	HORIZ. CAPACITY (² STEEL) (LB)	VERT. CAPACITY (² STEEL) (LB)	¹ COMB. CAPACITY (² STEEL) (LB)	HORIZ. CAPACITY (³ CONCRETE) (LB)	VERT. CAPACITY (³ CONCRETE) (LB)	¹ COMB. CAPACITY (³ CONCRETE) (LB)
0	2,520	3,050	1,520	2,075	1,570	905
250	2,655	3,300	1,630	2,310	1,820	1,055
500	2,790	3,255	1,740	2,505	2,070	1,205
750	2,915	3,005	1,845	2,655	2,320	1,355
1,000	3,040	2,755	1,950	2,720	2,570	1,495
1,250	3,115	2,505	2,050	2,720	2,505	1,635
1,500	3,115	2,255	2,130	2,720	2,255	1,775
1,750	3,115	2,005	1,900	2,720	2,005	1,905
2,000	3,115	1,755	1,665	2,720	1,755	1,665
2,250	3,115	1,505	1,425	2,720	1,505	1,425
2,500	3,115	1,255	1,190	2,720	1,255	1,190
3,000	3,115	755	740	2,720	755	715
3,500	3,035	255	240	2,720	255	240

¹ Maximum restraint values for a load having equal horizontal and vertical components without isolation.

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Table P2.4-4; FMSB Restraint Capacities at Various Isolator Loads.

ISOLATOR LOAD (LB)	HORIZ. CAPACITY (²STEEL) (LB)	VERT. CAPACITY (²STEEL) (LB)	¹COMB. CAPACITY (²STEEL) (LB)	HORIZ. CAPACITY (³CONCRETE) (LB)	VERT. CAPACITY (³CONCRETE) (LB)	¹COMB. CAPACITY (³CONCRETE) (LB)
0	5,210	4,880	3,175	2,355	1,700	1,040
250	5,345	5,130	3,285	2,575	1,950	1,195
500	5,475	5,380	3,395	2,755	2,200	1,345
750	5,605	5,630	3,500	2,890	2,450	1,490
1,000	5,730	5,880	3,605	2,945	2,700	1,635
1,250	5,850	5,715	3,710	2,945	2,950	1,775
1,500	5,970	5,465	3,815	2,945	3,200	1,915
1,750	6,090	5,215	3,915	2,945	3,450	2,045
2,000	6,210	4,965	4,015	2,945	3,700	2,175
2,250	6,230	4,715	4,070	2,945	3,950	2,300
2,500	6,230	4,465	3,855	2,945	4,200	2,425
3,000	6,230	3,965	3,425	2,945	3,965	2,650
3,500	6,230	3,465	2,995	2,945	3,450	2,845
4,000	6,230	2,965	2,560	2,945	2,950	2,560

¹ Maximum restraint values for a load having equal horizontal and vertical components without isolation.

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Table P2.4-5; FMSC Restraint Capacities at Various Isolator Loads.

ISOLATOR LOAD (LB)	HORIZ. CAPACITY (² STEEL) (LB)	VERT. CAPACITY (² STEEL) (LB)	¹ COMB. CAPACITY (² STEEL) (LB)	HORIZ. CAPACITY (³ CONCRETE) (LB)	VERT. CAPACITY (³ CONCRETE) (LB)	¹ COMB. CAPACITY (³ CONCRETE) (LB)
0	9,900	7,010	5,900	5,585	3,330	2,160
1,000	10,460	8,010	6,390	6,515	4,330	2,830
2,000	10,980	9,010	6,825	6,825	5,330	3,480
3,000	11,400	10,000	7,250	6,825	6,330	4,100
4,000	11,400	11,010	7,665	6,825	7,330	4,700
5,000	11,400	11,175	8,070	6,825	8,330	5,265
6,000	11,400	10,175	8,460	6,825	9,330	5,800
6,500	11,400	9,660	8,655	6,825	9,815	6,050

¹ Maximum restraint values for a load having equal horizontal and vertical components without isolation.

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Table P2.4-6; FMSD Restraint Capacities at Various Isolator Loads.

ISOLATOR LOAD (LB)	HORIZ. CAPACITY (² STEEL) (LB)	VERT. CAPACITY (² STEEL) (LB)	¹ COMB. CAPACITY (² STEEL) (LB)	HORIZ. CAPACITY (³ CONCRETE) (LB)	VERT. CAPACITY (³ CONCRETE) (LB)	¹ COMB. CAPACITY (³ CONCRETE) (LB)
0	16,075	10,330	9,565	7,960	4,620	3,045
1,000	16,625	11,330	10,025	8,885	5,620	3,715
2,000	17,160	12,330	10,475	9,370	6,620	4,395
3,000	17,685	13,330	10,915	9,370	7,620	5,030
4,000	18,170	14,330	11,350	9,370	8,620	5,660
5,000	18,170	15,330	11,750	9,370	9,620	6,275
6,000	18,170	16,210	12,195	9,370	10,620	6,875
7,000	18,170	15,210	12,605	9,370	11,620	7,445
8,000	18,170	14,210	13,010	9,370	12,620	7,980
9,000	18,170	13,210	12,310	9,370	13,210	8,480
10,000	18,170	12,210	11,375	9,370	12,210	8,910

¹ Maximum restraint values for a load having equal horizontal and vertical components without isolation.

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Table P2.4-7; FMSE Restraint Capacities at Various Isolator Loads.

ISOLATOR LOAD (LB)	HORIZ. CAPACITY (² STEEL) (LB)	VERT. CAPACITY (² STEEL) (LB)	¹ COMB. CAPACITY (² STEEL) (LB)	HORIZ. CAPACITY (³ CONCRETE) (LB)	VERT. CAPACITY (³ CONCRETE) (LB)	¹ COMB. CAPACITY (³ CONCRETE) (LB)
0	24,205	18,315	14,470	16,245	6,750	4,840
2,000	25,285	20,315	15,380	19,075	8,750	6,335
4,000	26,325	22,315	16,270	20,390	10,750	7,840
6,000	26,850	24,315	17,135	20,390	12,750	9,295
8,000	26,850	26,315	17,980	20,390	14,750	10,720
10,000	26,850	26,465	18,805	20,390	16,750	12,115
12,000	26,850	24,465	19,615	20,390	18,750	13,480
14,000	26,850	22,465	20,405	20,390	20,750	14,805
16,000	26,850	20,465	19,145	20,390	20,470	16,090
18,000	26,850	18,465	17,275	20,390	18,465	17,275
21,000	26,850	15,465	14,470	20,390	15,465	14,470

¹ Maximum restraint values for a load having equal horizontal and vertical components without isolation.

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Table P2.4-8; FMSF Restraint Capacities at Various Isolator Loads.

ISOLATOR LOAD (LB)	HORIZ. CAPACITY (² STEEL) (LB)	VERT. CAPACITY (² STEEL) (LB)	¹ COMB. CAPACITY (² STEEL) (LB)	HORIZ. CAPACITY (³ CONCRETE) (LB)	VERT. CAPACITY (³ CONCRETE) (LB)	¹ COMB. CAPACITY (³ CONCRETE) (LB)
0	43,900	32,400	26,100	29,475	14,100	9,875
2,000	45,025	34,400	26,300	31,825	16,100	11,350
4,000	46,100	36,400	24,600	33,575	18,100	12,810
6,000	47,150	38,400	22,800	34,500	20,100	14,245
8,000	48,200	40,400	20,900	34,500	22,100	15,660
10,000	48,200	42,400	19,100	34,500	24,100	17,060
12,000	48,200	44,400	17,300	34,500	26,100	17,300
14,000	48,200	46,400	15,500	34,500	28,100	15,500
16,000	48,200	48,300	13,700	34,500	30,100	13,700
18,000	48,200	46,300	11,900	34,500	32,100	11,900
20,000	48,200	44,300	10,000	34,500	34,100	10,000
22,000	48,200	42,300	8,200	34,500	36,100	8,200
24,000	48,200	40,300	6,400	34,500	38,100	6,400

¹ Maximum restraint values for a load having equal horizontal and vertical components without isolation.

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Table P2.4-9; FMSG Restraint Capacities at Various Isolator Loads.

ISOLATOR LOAD (LB)	HORIZ. CAPACITY (²STEEL) (LB)	VERT. CAPACITY (²STEEL) (LB)	¹COMB. CAPACITY (²STEEL) (LB)	HORIZ. CAPACITY (³CONCRETE) (LB)	VERT. CAPACITY (³CONCRETE) (LB)	¹COMB. CAPACITY (³CONCRETE) (LB)
0	72,600	40,500	40,500	42,400	18,800	14,050
5,000	75,350	45,500	36,500	45,950	23,800	17,880
10,000	77,500	50,500	32,000	46,000	28,800	21,570
15,000	77,500	55,500	27,400	46,000	33,800	25,150
20,000	77,500	60,500	22,500	46,000	38,800	22,500
24,000	77,500	64,000	19,400	46,000	42,300	19,500

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