

Aluminum Extrusion Types and Parts Selection

Aluminum Extrusion Tolerance Data

Aluminum Extrusion Types and Characteristics

	HFS Series	HFSL Series	EFS Series	NFS (NEFS, NFSL) Series	GFS Series	SLF Series
Photo						
Material	A6N01SS-T5	A6N01SS-T5	A6N01SS-T5	A6063S-T5	A6061SS-T6 Equivalent	A6063SS-T5
Features	Standard cross section shape.	Lightweight and economical extrusions. Suitable for use when light weight and economical price are given priority over strength.	Have rigidity equivalent to HFS Series yet lighter and more economical.	Material change to A6063S-T5 led to significant price reduction. The Cross Section Shape and Cross Sectional Moment of Inertia are the same as those of HFS, HFSL and EFS Series. Stress and tensile strength decrease due to material change. The color may vary slightly.*	These thick extrusions offer high rigidity and are suitable for use in high load.	Has 4 slotless flat enclosures. Excels in sanitary control since dust is not collected in slots. Various accessories for aluminum extrusions can be utilized by combining with Slot Type (SLFT6-4040, etc.)
Surface Treatment	Clear Anodize (HFS) Black Anodize (HFSB) Clear Coating (CAF) Baked Paint (Yellow) (HFSY)	Clear Anodize Black Anodize	Clear Anodize (EFS) Black Anodize (EFSB)	Clear Anodize Black Anodize	Clear Anodize	Clear Anodize
Representative Product	HFS8-4040	HFSL8-4040	EFS8-4040	NFS5-2020 (Different Material of HFS5-2020) NFS8-4040 (Different Material of EFS8-4040) NFSL6-3030 (Different Material of HFSL6-3030)	GFS8-100100	SLF6-4040 (No Slot Type) SLFC6-4040 (1 Slot Type)

* Aluminum extrusion colors may slightly vary depending on the materials.

Aluminum Extrusions Connection Method

Connection Method	Bracket Connection	Blind Joint Connection	Blind Brackets Connection	Screw Connection	SLF Series Connection
Connection Examples					
Features	The standard and economical connection method. Cover plates can be mounted by adding taps on the brackets.	A connection method that produces clean corners. Suitable for sections where equipment is loaded and unloaded or doors are to be mounted. Note that alterations are required to the extrusions, and available for limited extrusion models only. For applicable extrusions, see each product page. P551, 601, 659, 705	Brackets are hidden inside of slots producing clean corners. Alterations are not required. However, allowable load is smaller than that of bracket connections.	Connections only with screws can be achieved by applying tapping and counterbore alterations on the extrusions.	• Connection with dedicated joints • Screw Connection See "Features of SLF Series" for details. P725
Representative Product	HBLFNS6, HBLTS6, etc.	HCJ6, HMJ6, etc.	HBLBS6, HABLBS6, etc.	-	-

Selection of Related Parts

Numbers of applicable related parts are decided at the time of selecting aluminum extrusions. When selecting related parts, see No. as reference.

(Ex.) When assembling with HFS6-3030 aluminum extrusions of 6 series

Brackets HBLFNS6 HBLTS6 or Others	Blind Brackets Blind Joint HBLBS6 HSJ6 or Others	Nut HNTT6-Tapped Hole Dia. HNTAT6-Tapped Hole Dia. or Others
Extrusion End Caps and Covers HFC6-3030-Color HSCA6-Color or Others	Casters and Leveling Mounts HAJPS6 HCFT6-60 or Others	Door Parts HHPSN6 HMGN6 or Others
	Other Accessories HFCC6 LCSA6-Shaft Hole Dia. or Others	

Many products can be used for both 8 series and 8-45 series.

Pre-Assembly Insertion Nut HNTT8-8

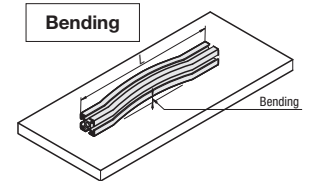
- It can be used with 8 series.
- It can be used with 8-45 series.

Various related parts can be installed to the aluminum extrusion structure according to the usage.

Aluminum Extrusion JIS Standards

Bend Tolerance (Special Grade)

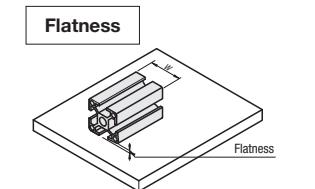
Diameter of Circumscribed Circle mm	Unit: mm		
	Minimum Thickness mm	Per Arbitrary Section of 300mm Length	per Full Length (L) mm
38 or less	2.4 or less	1.3 or less	$1.3 \times \frac{L}{300}$ or Less
	Over 2.4	0.3 or less	$0.3 \times \frac{L}{300}$ or Less
Over 38 to 300 or less	-	0.3 or less	$0.3 \times \frac{L}{300}$ or Less
Over 300	-	0.5 or less	$0.5 \times \frac{L}{300}$ or Less



Note: * Given values are for extrusions placed on flat surfaces with minimized bends by own weight.
* When the overall length is not an integral multiple of 300mm, determine the tolerance by rounding up the remainder length to 300mm.

Flatness Tolerance

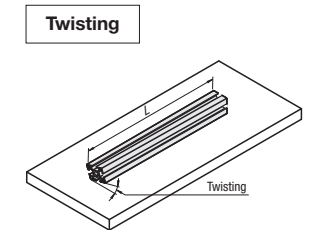
Shape Type	Unit: mm		
	General Shape	Hollow Shape	
Minimum Thickness of Measurement Point Width	-	4.7mm or Less	Over 4.7mm
25mm or Less	0.10 or less	0.15 or less	0.10 or less
Over 25mm	0.004xW or Less	0.006xW or Less	0.004xW or Less
Per Arbitrary Section of 25mm Width	0.10 or less	0.15 or less	0.10 or less



Note: Not Applicable to the plane including open section.

Twist Tolerance

Diameter of Circumscribed Circle mm	Unit: degree	
	Per Arbitrary Section of 300mm Length	per Full Length (L) mm
38 or less	1 or less	$1 \times \frac{L}{300}$ or Less; However, Max. Value is 7
Over 38 to 76 or less	1/2 or less	$\frac{1}{2} \times \frac{L}{300}$ or Less; However, Max. Value 5
Over 76	1/4 or less	$\frac{1}{4} \times \frac{L}{300}$ or Less; However, Max. Value 3



Reference: Tolerance of Outer Dimension (JIS)



Outer Dimension Tolerance (JIS)	Unit: mm		
	A Dimension	A Dimension	B Dimension
HFS5-2020	±0.41	±0.41	±0.54
HFS5-4040	±0.54	±0.54	±0.86
HFS6-3030	±0.86	±0.60	±0.86
HFS6-6060	±0.86	±0.60	±0.86
HFS8-4040	±0.54	±0.60	±0.86
HFS8-8080	±0.86	±0.60	±0.86
HFS8-4545	±0.60	±0.60	±0.86
HFS8-9090	±0.86	±0.60	±0.86

*MISUMI Aluminum Extrusions are within JIS dimension tolerance above.

Mechanical Properties of Aluminum Extrusions

Series	JIS Standard (Reference)		Actual Measurement	JIS Standard (Reference)
	HFS Series	GFS Series		
Material (JIS Symbol)	A6N01SS-T5	A6061SS-T6 Equivalent		A6063S-T5
Tensile Strength (N/mm ²)	245 or more	265 or more	278	155 or more
Proof Stress (N/mm ²)	205 or more	245 or more	247	110 or more
Longitudinal Elastic Modulus (N/mm ²)	69972	69972	69972	69972
Brinell Hardness (HB)	88	88	88	88
Surface Treatment	Anodize 9µm or more	Anodize 9µm or more	Anodize 9µm or more	Anodize 9µm or more

Extrusion Load Capacity Calculations

Deflection Calculations

The following pages assist in optimum extrusion type selections by providing a quick Load vs. Deflection Chart (below) and calculation formulas (right-hand page). In general, load calculations are typically based on beam's both ends supported for structural safety.

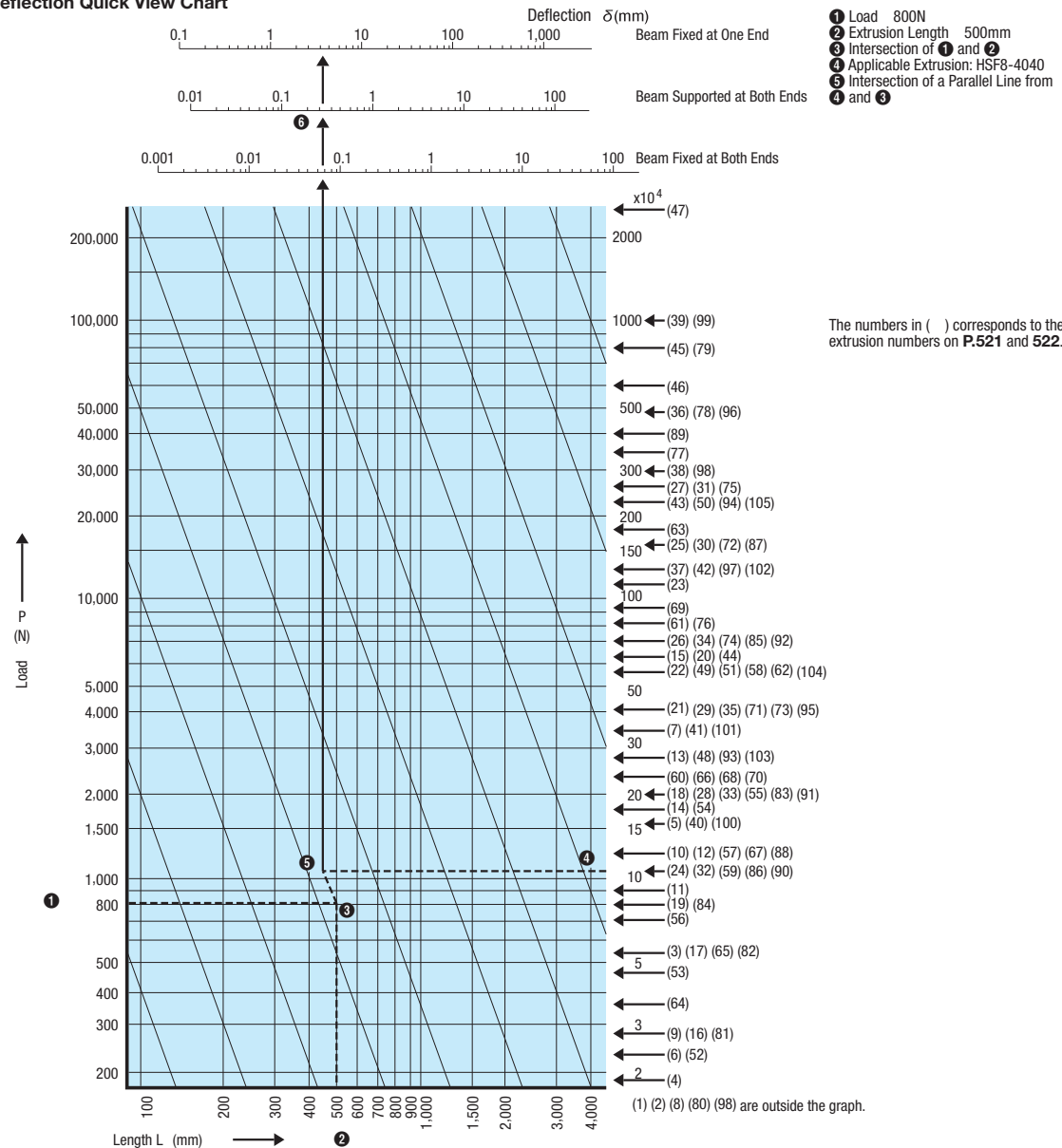
Selection Example	Values used for this example
	Load 800N
	Extrusion HFS8-4040
	Length 500 mm

- Step**
- (1) Find a point ① on the Y (Load) axis for the applied load P (Unit: N)⁻¹.
 - (2) Find a point ② on the X (Length) axis for the extrusion length.
 - (3) Draw a horizontal line from ① and a vertical line from ②, and name the intersection of the two as ③.
 - (4) Find a point ④ on the right hand Y axis for the Cross Sectional Moment of Inertia of the extrusion used.
 - (5) Draw a horizontal line from ④, and draw a parallel line to the graph's diagonal lines from ③.
 - (6) Name the intersection of the lines from (5) as ⑤.
 - (7) Draw a line UP from ⑤ and locate an intersection ⑥ corresponding to the extrusion support method used.
- Result: According to the example values used and the calculation based on the values, the deflection amount would be 0.3mm when the extrusion is supported at both ends.

*1. Conversion: 1kgf=9.80665N (Ex.) 81.6kgf=800N

• MISUMI defines the Load Capacity (Max Allowable Load) to be a deflection 1/1000 of the extrusion length.

Deflection Quick View Chart



(1) (2) (8) (80) (98) are outside the graph.

Deflection Calculations

	1	2	3
Cantilever			
Deflection δ	$\delta = \frac{P \cdot L^3}{3E \cdot I}$	$\delta = \frac{P \cdot a^3}{3E \cdot I}$	$\delta = \frac{P \cdot L^3}{8E \cdot I}$

▨ means that the load is equally distributed.

	4	5	6	7
Both Ends Supported				
Deflection δ	$\delta = \frac{P \cdot L^3}{48E \cdot I}$	$\delta = \frac{P \cdot L^3}{(48 + \frac{29m}{L}) \cdot E \cdot I}$	$\delta = \frac{5P \cdot L^3}{384E \cdot I}$	$\delta = \frac{P \cdot a^2 \cdot b^2}{3E \cdot I \cdot L}$

Example of No.4 as "Beam Supported on Both Ends"

P (N)	Load	800x500 ³
L (mm)	Extrusion Length	48x69,972x10.4x10 ⁴
E (N/mm ²)	Young's Modulus	69,972N/mm ²
I (mm ⁴)	Cross Sectional Moment of Inertia	≈0.29 (mm)
δ (mm)	Deflection	

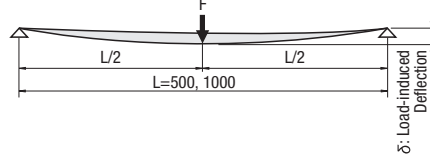
When the selection is calculated as "Beam Supported on Both Ends"

	8	9
Both Ends Fixed		
Deflection v	$\delta = \frac{P \cdot L^3}{192E \cdot I}$	$\delta = \frac{P \cdot L^3}{384E \cdot I}$

Aluminum Extrusions Load Capacity Guideline

Load Capacity Calculations

1. Calculation Conditions: Calculations are based on centralized loads on both ends supported extrusions.
2. The load capacities (allowable loads) are defined as: Load that generates a deflection amount 1/1000 of the extrusion length. These loads are the allowed maximum. Use within the given capacities.



Part Number		Height x Width (mm)	Section Modulus x 10 ³ (mm ³)	Cross Sectional Moment of Inertia x 10 ⁴ (mm ⁴)	For 500mm Extrusion Length		For 1000mm Extrusion Length		
Type	Extrusion				Allowable Load (N)	Allowable Load (kgf)	Allowable Load (N)	Allowable Load (kgf)	
HFS5 NFS5	2020	(1)	20x 20	0.74	0.74	99	10	24	2
		(2)	20x 40	1.35	1.35	182	18	45	4
	2040	(3)	40x 20	2.55	5.11	687	70	171	17
		(4)	20x 60	1.97	1.97	264	26	66	6
	2060	(5)	60x 20	5.32	15.96	2144	218	536	54
		(6)	20x 80	2.58	2.58	347	35	86	8
	2080	(7)	80x 20	9.02	36.11	4851	494	1212	123
		(8)	25x 25	1.36	1.71	229	23	57	5
	2550	(9)	25x 50	2.37	2.96	398	40	99	10
		(10)	50x 25	5.09	12.74	1711	174	427	43
	4040	(11)	40x 40	4.45	8.9	1196	122	299	30
		(12)	40x 60	6.3	12.62	1695	172	423	43
	4060	(13)	60x 40	9	27	3627	369	906	92
		(14)	40x 80	9.18	18.38	2469	251	617	62
	4080	(15)	80x 40	15.87	63.49	8529	869	2132	217
HFS6 NFS6		3030	(16)	30x 30	1.89	2.83	381	38	95
	(17)		30x 60	3.55	5.33	716	73	179	18
	3060	(18)	60x 30	6.84	20.53	2758	281	689	70
		(19)	30x 90	5.62	8.43	1133	115	283	28
	6060	(20)	90x 30	14.71	66.19	8892	906	2223	226
		(21)	60x 60	13.78	41.35	5555	566	1388	141
	6090	(22)	60x 90	17.53	52.59	7065	720	1766	180
		(23)	90x 60	24.77	111.5	14979	1527	3744	381
	30120	(24)	30x 120	7.52	11.29	1516	154	379	38
		(25)	120x 30	25.55	153.3	20595	2100	5148	525
	60120	(26)	60x 120	23.06	69.18	9294	947	2323	236
		(27)	120x 60	41.18	247.1	33196	3385	8299	846
	5050	(28)	50x 50	8.66	21.66	2909	296	727	74
		(29)	50x 100	16.98	42.44	5701	581	1425	145
	100100	(30)	100x 50	30.63	153.2	20581	2098	5145	524
		(31)	100x 100	53.08	265.4	35655	3635	8913	908
HFS8 NFS8	4040	(32)	40x 40	5.24	10.48	1407	143	351	35
		(33)	40x 80	9.95	19.91	2674	272	668	68
	4080	(34)	80x 40	18.07	72.26	9707	989	2426	247
		(35)	40x 160	19.36	38.72	5201	530	1300	132
	40160	(36)	160x 40	61.89	496.3	66676	6799	16669	1699
		(37)	80x 80	32.45	129.8	17438	1778	4359	444
	8080	(38)	80x 160	73.95	295.8	39739	4052	9934	1013
		(39)	160x 80	125.2	1002	134614	13726	33653	3431
	4545	(40)	45x 45	6.77	15.25	2048	208	512	52
		(41)	45x 90	14.44	32.5	4366	445	1091	111
	4590	(42)	90x 45	27.9	125.5	16860	1719	4215	429
		(43)	90x 90	46.78	210.5	28279	2883	7069	720
	45180	(44)	45x 180	27.14	61.05	8201	836	2050	209
		(45)	180x 45	89.87	808.8	108659	11080	27164	2770
	90180	(46)	90x 180	133.3	600	80607	8219	20151	2054
		(47)	180x 90	237.9	2141	287635	29330	71908	7332
5050	(48)	50x 50	10.91	27.28	3665	374	916	93	
	(49)	50x 100	20.66	51.67	6942	707	1735	177	
50100	(50)	100x 50	42.23	211.1	28383	2894	7093	723	
	(51)	60x 60	17.3	51.91	6973	711	1743	177	
HFSL6 NFSL6	3030	(52)	30x 30	1.78	2.68	360	36	90	9
		(53)	30x 60	3.24	4.87	654	66	163	16
	3060	(54)	60x 30	5.95	17.88	2402	244	600	61
		(55)	50x 50	7.51	18.79	2524	257	631	64
HFSL8 NFSL8	4040	(56)	40x 40	3.77	7.54	1013	103	253	25
		(57)	40x 80	6.71	13.43	1804	183	451	45
	4080	(58)	80x 80	13.25	52.98	7117	725	1779	181
		(59)	45x 45	5.21	11.73	1575	160	393	40
	4590	(60)	45x 90	10.15	22.85	3069	313	767	78
(61)		90x 45	19.26	86.68	11645	1187	2911	296	
HFSG6	6060	(62)	60x 60	18.09	54.28	7292	743	1823	185
HFSH8	8080	(63)	80x 80	45.83	183.3	24625	2511	6156	627

Part Number		Height x Width (mm)	Section Modulus x 10 ³ (mm ³)	Cross Sectional Moment of Inertia x 10 ⁴ (mm ⁴)	For 500mm Extrusion Length		For 1000mm Extrusion Length		
Type	Extrusion				Allowable Load (N)	Allowable Load (kgf)	Allowable Load (N)	Allowable Load (kgf)	
GFS6	3030	(64)	30x 30	2.32	3.47	466	48	117	12
		(65)	30x 60	3.96	5.9	792	81	199	20
	3060	(66)	60x 30	7.95	23.78	3194	326	798	81
		(67)	40x 40	6.83	13.76	1848	188	462	47
	4080	(68)	40x 80	12.56	25.21	3384	345	846	86
		(69)	80x 40	22.47	90.87	12208	1245	3052	311
	4545	(70)	45x 45	10.42	23.64	3172	323	793	81
		(71)	45x 90	18.87	42.99	5772	589	1443	147
	4590	(72)	90x 45	35.67	163.4	21792	2222	5448	556
		(73)	50x 50	15.23	38.16	5124	523	1281	131
GFS8	5050	(74)	50x 100	27.23	68.08	9147	932	2286	223
		(75)	100x 50	54.62	273.1	36706	3742	9173	935
	6060	(76)	60x 60	26.58	79.86	10728	1094	2682	273
		(77)	90x 90	71.17	320.2	43016	4386	10754	1097
	9090	(78)	100x 100	93.48	465.8	62576	6381	15644	1595
		(79)	100x 200	174.8	874.3	117507	11982	29365	2994
	100200	(80)	200x 100	317.7	3179	427334	43576	106791	10890
		(81)	30x 30	1.89	2.85	382	39	95	9
	3060	(82)	30x 60	3.66	5.48	736	75	184	19
		(83)	60x 30	6.86	20.46	2758	281	689	70
EFS6 NEFS6	3090	(84)	30x 90	5.86	8.8	1181	120	295	30
		(85)	90x 30	15.19	69	9185	2296	936	234
	30120	(86)	30x 120	7.65	11.48	1583	161	395	40
		(87)	120x 30	26.29	157.62	20628	2103	5157	525
	30300	(88)	30x 300	9.57	13.50	2079	272	519	53
		(89)	300x 30	35.4	375.5	51487	5259	12896	1317
	4040	(90)	40x 40	5.24	10.49	1409	144	352	35
		(91)	40x 80	9.96	19.93	2677	273	669	68
	4080	(92)	80x 40	18.13	72.55	9745	994	2436	248
		(93)	40x 120	14.5	29	3940	401	985	100
EFS8 NEFS8	40120	(94)	120x 40	37.03	223.51	29958	3054	7489	763
		(95)	40x 160	19.47	38.8	5203	530	1300	132
	40160	(96)	160x 40	63.17	506	67114	6843	16778	1710
		(97)	80x 80	32.55	130	17494	1783	4373	445
	80160	(98)	80x 160	75.85	304.4	40708	4151	10177	1037
		(99)	160x 80	125.86	1007	134584	13723	33646	3430
	4545	(100)	45x 45	6.85	15.42	2071	211	517	53
		(101)	45x 90	14.52	32.67	4389	448	1097	112
	4590	(102)	90x 45	27.84	125.3	16860	1719	4215	430
		(103)	50x 50	10.79	26.98	3665	374	916	93
50100	(104)	50x 100	21.2	53	7120	726	1780	182	
	(105)	100x 50	42.24	211.2	28385	2894	7094	723	

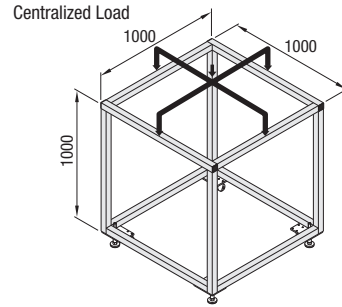
Aluminum Extrusions Load Capacity Guideline

Load Capacity Guideline for Extrusion Frame Units

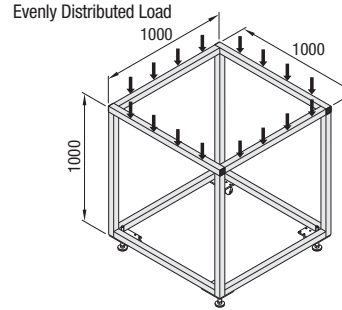
Condition: Calculated as: Loads causing 1mm deflection at the center of each extrusion of a 1000mm x 1000mm square frame.

Part Number	Type	Extrusion	Height x Width (mm)	Allowable Load			
				Centralized Load		Evenly Distributed Load	
			(N)	(kgf)	(N)	(kgf)	
HFS5 NFS5	2020	20x 20	20x 20	99	10	199	20
	2040	20x 40	20x 40	182	18	364	37
	2060	40x 20	40x 20	687	70	1375	140
		20x 60	20x 60	264	26	529	53
	2080	60x 20	60x 20	2144	218	4288	437
		20x 80	20x 80	347	35	694	70
	2525	80x 20	80x 20	4851	494	9702	989
		25x 25	25x 25	229	23	459	46
	2550	25x 50	25x 50	398	40	797	81
		50x 25	50x 25	1711	174	3423	349
	4040	40x 40	40x 40	1196	121	2393	244
		40x 60	40x 60	1695	172	3390	345
4060	60x 40	60x 40	3627	369	7254	739	
	40x 80	40x 80	2469	251	4938	503	
4080	80x 40	80x 40	8529	869	17059	1739	
	3030	30x 30	30x 30	380	38	762	77
HFS6 NFS6	3060	30x 60	30x 60	716	73	1433	146
	3090	60x 30	60x 30	2758	281	5516	562
		30x 90	30x 90	1133	115	2266	231
	6060	90x 30	90x 30	8892	906	17784	1813
		60x 60	60x 60	5555	566	11110	1132
	6090	60x 90	60x 90	7065	720	14130	1440
		90x 60	90x 60	14979	1527	29959	3054
	30120	30x 120	30x 120	1516	154	3033	309
		120x 30	120x 30	20594	2100	41190	4200
	60120	60x 120	60x 120	9293	947	18588	1895
		120x 60	120x 60	33196	3385	66393	6770
	5050	50x 50	50x 50	2909	296	5819	593
50x 100		50x 100	5701	581	11403	1162	
50100	100x 50	100x 50	20581	2098	41163	4197	
	100x 100	100x 100	35654	3635	71310	7271	
HFS8 NFS8	4040	40x 40	40x 40	1407	143	2815	287
	4080	40x 80	40x 80	2674	272	5349	545
		80x 40	80x 40	9707	989	19415	1979
	40160	40x 160	40x 160	5201	530	10403	1060
		160x 40	160x 40	66674	6798	133352	13598
	8080	80x 80	80x 80	17437	1778	34876	3556
		80x 160	80x 160	39738	4052	79479	8104
	80160	160x 80	160x 80	134611	13726	269229	27453
		4545	45x 45	2048	208	4097	417
	4590	45x 90	45x 90	4366	445	8732	890
		90x 45	90x 45	16859	1719	33720	3438
	9090	90x 90	90x 90	28279	2883	56559	5767
45180		45x 180	8201	836	16403	1672	
90180	180x 45	180x 45	108656	11079	217318	22160	
	90x 180	90x 180	80605	8219	161215	16439	
5050	180x 90	180x 90	287627	29329	575270	58661	
	50x 50	50x 50	3665	374	7330	747	
50100	50x 100	50x 100	6942	707	13883	1415	
	100x 50	100x 50	28383	2894	56721	5783	
6060	60x 60	60x 60	6973	711	13947	1422	
	3030	30x 30	30x 30	360	36	720	73
HFSL6 NFSL6	3060	30x 60	30x 60	654	66	1309	133
	5050	60x 30	60x 30	2402	244	4804	489
		50x 50	50x 50	2524	257	5048	514
HFSL8 NFSL8	4040	40x 40	40x 40	1013	103	2027	206
	4080	40x 80	40x 80	1804	183	3608	367
		80x 40	80x 40	7124	726	14235	1451
	4545	45x 45	45x 45	1575	160	3151	321
4590	45x 90	45x 90	3071	313	6139	626	
	90x 45	90x 45	11648	1187	23290	2374	
HFSG6	6060	60x 60	60x 60	7292	743	14584	1487
HFSH8	8080	80x 80	80x 80	24622	2510	49251	5022

Centralized Load: Concentrated load is applied at the center.

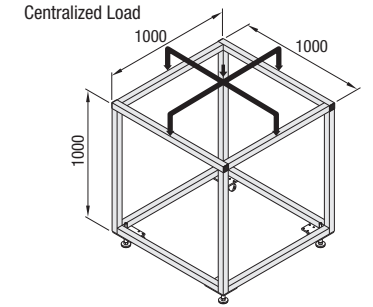


Evenly Distributed Load: When the load is evenly distributed over the extrusion.

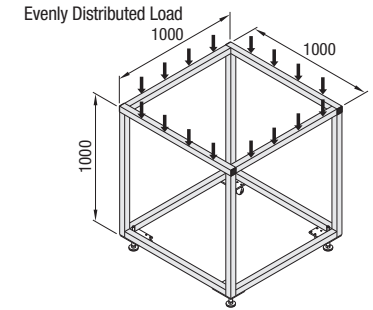


Part Number	Type	Extrusion	Height x Width (mm)	Allowable Load			
				Centralized Load		Evenly Distributed Load	
			(N)	(kgf)	(N)	(kgf)	
GFS6	3030	30x 30	30x 30	466	48	932	95
	3060	30x 60	30x 60	792	81	1585	162
		60x 30	60x 30	3194	326	6389	651
GFS8	4040	40x 40	40x 40	1848	188	3696	377
	4080	40x 80	40x 80	3384	345	6768	690
		80x 40	80x 40	12208	1245	24416	2490
	4545	45x 45	45x 45	3172	323	6344	647
	4590	45x 90	45x 90	5772	589	11544	1177
		90x 45	90x 45	21792	2222	43584	4444
	5050	50x 50	50x 50	5124	523	10248	1045
		50x 100	50x 100	9147	932	18292	1865
	50100	100x 50	100x 50	36706	3742	73380	7482
		6060	60x 60	10728	1094	21456	2188
EFS6 NEFS6	3030	30x 30	30x 30	382	39	765	78
	3060	30x 60	30x 60	736	75	1472	150
		60x 30	60x 30	2758	281	5516	562
	3090	30x 90	30x 90	1181	120	2362	240
		90x 30	90x 30	9185	2296	18371	1873
	30120	30x 120	30x 120	1583	161	3166	322
		120x 30	120x 30	20628	2103	41257	4207
	30300	30x 300	30x 300	2079	272	4158	548
		300x 30	300x 30	51487	5259	102974	10318
	EFS8 NEFS8	4040	40x 40	40x 40	1409	144	2818
4080		40x 80	40x 80	2677	273	5355	546
		80x 40	80x 40	9745	994	19493	1988
40120		40x 120	40x 120	3940	401	7881	803
		120x 40	120x 40	29958	3054	59916	6109
40160		40x 160	40x 160	5203	530	10407	1061
		160x 40	160x 40	67114	6843	134228	13687
8080		80x 80	80x 80	17494	1783	34988	3567
		80x 160	80x 160	40708	4151	81417	8302
80160		160x 80	160x 80	134584	13723	269168	27447
	4545	45x 45	2071	211	4143	422	
4590	45x 90	45x 90	4389	448	8778	895	
	90x 45	90x 45	16860	1719	33720	3438	
5050	50x 50	50x 50	3665	374	7330	747	
	50x 100	50x 100	7120	726	14240	1452	
50100	100x 50	100x 50	28385	2894	56748	5787	

Centralized Load: Concentrated load is applied at the center.



Evenly Distributed Load: When the load is evenly distributed over the extrusion.



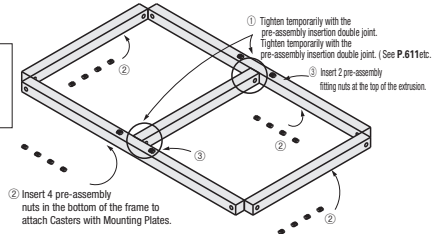
Prior to Beginning

1. Provide a large and flat work space for the assembly.
2. Sort the extrusions into parts and sizes.
3. Count and confirm the qty. of the nuts to be pre-inserted.

*Insert any Pre Assy. Nuts needed at this point if mounting a top plate and/or covers.
This assy. example also shows installation of Plate Type Adjusters and Casters.

1 Assembly of Single Joint Connected Type. Bottom Frame Assy.

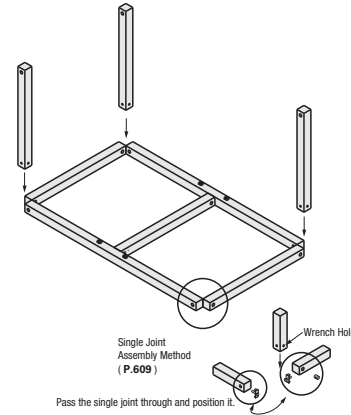
- (1) Begin assembling with the bottom extrusion.
- (2) Center joist is connected with Pre Assy. Ins. Double Joints.
- (3) Insert the nuts prior to assembly.



* Do not forget to insert the nuts.

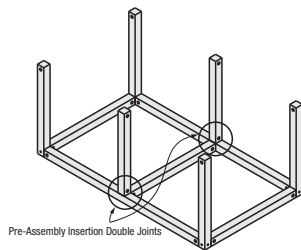
2 Mount the posts.

Connect the corners with Single Joints.



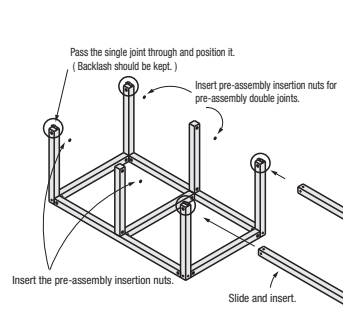
3 Mount the middle posts.

Connect the middle extrusions with Pre Assy. Ins. Double Joints.

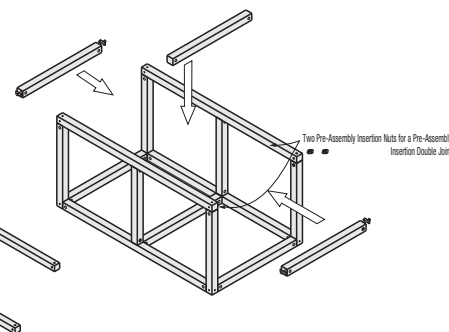


4 Top Frame Assy. (1)

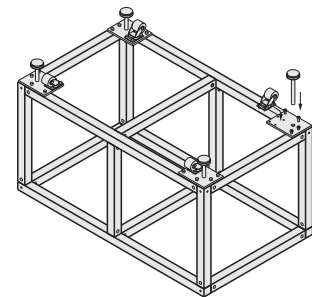
Pre-install Single Joints on the ends of four posts.



5 Top Frame Assy. (2)

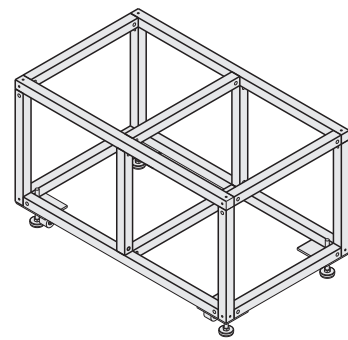


6 Adjuster and Caster Mounting



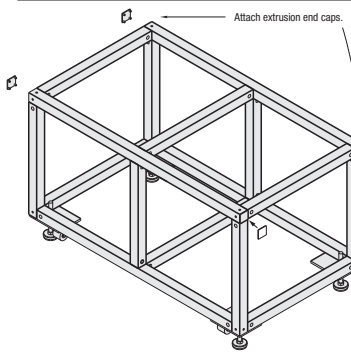
Invert the unit and mount the adjusters and casters. (Adjusters and Casters are sold separately on P.833.)

7 Final Tightening



Fully tighten while adjusting the extrusion positions.

8 Surface Cleaning



Wipe clean the surfaces with alcohol, etc. after the assy. work.

Aluminum Extrusion Q&A

Q. I want to size aluminum extrusions, what's a guideline?

- A. MISUMI Aluminum Extrusions are comprised of the following product series.
Slot Width 6: 5 Series (20, 40mm square) for small coverings, small part racks, etc.
Slot Width 8: 6 Series (30, 50, 60mm square) for medium coverings, conveyor frames, etc.
Slot Width 10: 8 Series (40, 80mm square), 8-45 Series (45, 90, 50, 100, 60mm square) for larger clean booths, equipment bases and structural material, etc.
Find the weight that will apply on the extrusion frame, and select the extrusions from the tables on P.521.

Q. I want to size some brackets, what's a guideline?

- A. Applicable brackets and load capacity guidelines for each extrusion type are separately listed on bracket product pages.
• If brackets interfere with panels and others, use Blind Brackets (P.550, etc.) Simple Joints (P.604, etc.), Tapping Joints (P.552, etc.), Screw Joints (P.552, etc.), Single Joints (P.609, etc.), Center Joints (P.553, etc.), Post Assy. Insertion Double joints (P.554, etc.) and Pre Assy. Insertion Double Joints (P.611, etc.).

Q. What is the aluminum material used?

- A. A6N01SS-T5 (JIS Symbol) is used for HFS, HFSL and EFS Series. A6063S-T5 (JIS Symbol) is used for NFS Series.
The High Rigidity Type is made with A6061SS-T6 Equivalent with more strength.
For detailed data for this material, see Alum. Extrusion Material Data on P.514.

Q. What is cutting tolerance?

- A. Within ± 0.5 mm of customer specified length.

Q. What are the surface treatment methods used for?

- A. The extrusion surfaces are anodized (9 μ m or more). Cut surfaces are not anodized.
* Glossy clear coated aluminum extrusions are pre-anodized (9 μ m or more), then clear-coated (7 μ m).

Q. How are the extrusions cut?

- A. The extrusions are cut with carbide tipped saws for soft steel material. Use the Extrusion End Caps (P.567, etc.) to cover the open cut ends after assembly.

Q. What is the cut's perpendicularity?

- A. Since the extrusions do not have any datum, perpendicularity of cuts is not defined.

Q. Can JIS standard hex nuts and square nuts be used with the extrusions?

- A. No, they cannot be used. Our dedicated nuts are designed with larger seating areas to prevent aluminum from buckling under load.
* Flat Extrusions (P.743, 745) can be used with standard nuts.

Q. The nuts fall within extrusion slots when the extrusions are vertically positioned.

- A. Mount "Pre-Assembly Insertion Stopper (P.559, 619, 669, 715)" on Pre-Assembly Nut Insert them into the slot.
Post-Assembly Insertion Nut and Stopper Sets (P.562, 622, 672, 718) are also available.
When many nuts are required, Pre-Assembly Insertion Spring Nuts (P.560, 620, 670, 716) and Post Assembly Insertion Spring Nuts (P.563, 622, 672, 718) are more convenient to use.

Q. What are the proper tightening torques for the nuts and hex socket cap screws?

- A. See the tightening torque (N · m) references on each nut page.
Post-Assembly Insertion Easy Brackets \square P.544, 595, 652, Pre-Assembly Insertion Nuts \square P.559, 619, 669, 715, Post-Assembly Insertion Nuts \square P.562, 622, 672, 718, Long Nuts \square P.566, 626, 676, 722, Flanged Nuts \square P.565 - 625 - 675 - 721
* Conditions vary depending on bracket and washer uses. Use as approximated references.

Q. I want to mount resin panels on aluminum extrusion...

- A. There are following methods to mount resin panels. Select an applicable method specific to your application. (P.804)
(1) Mounting panels on brackets within the extrusions.
This method results in aesthetically good appearance, and makes for easy install/remove of the panels. Recommended for Safety Covers, etc.
(2) Fitting in the extrusion slots.
Requires no panel drilling or screws, and recommended for applications where designed appearance is of high priority.
(Some notching of the panels may be required depending on the type of brackets in use.)
(3) Mounting panels on the outside of the extrusions.
Pre-insert nuts with stoppers in the extrusion slots, and use Panel Mounting Screws (P.751, 754) to mount the panels.
Specify M5 tap for the nuts to be used (Ex. HNTT6-5)

Q. How can I mount doors on my extrusion frame?

- A. There are following methods to mount resin panels. Select an applicable method specific to your application.
Resin Plate Doors: See P.805-814 for Hinges, Handles, etc.
Extrusion Frame Doors: Use Cover Plates and HFS5-2020/HFS6-3030 extrusions to construct the doors.
* Extrusions for Doors HFTF Series (P.854) can be used in place for the HFS Series for even easier door creation.

Q. I want to mount adjusters and casters.

- A. Adjusters and Casters useable for each extrusion size are offered. (P.831-846)

Q. Any precautions on the assembly?

- A. • Provide a flat and ample space for the assembly work.
• For orthogonality checks and face leveling during the assembly, use plates (assembly fixture on P.846) for your convenience.
• We recommend that you purchase some Post Assy. Ins. Nuts prior to the assembly work as spares.
• Be sure to check for the screw torques after the assembly is complete.

Q. Is Express-T for extrusions free of charge?

- A. Yes, and we intend on keeping it free. If same day shipping is desired, simply specify as Express-T. There is no additional charge for the service. (Aluminum Extrusions for Brackets (P.742), Aluminum Extrusions (P.749, 750), Fence Extrusions (P.747) are not subject to free Express-T service.)

Q. What is Fixed Length Extrusion (Effective Length 4000mm)?

- A. It indicates the extrusion with 4000mm or more effective length. The actual length with extra lengths on ends is more than 4000mm (several tens of mm). Fixed Length Extrusions need to be cut by users thus the exact length cannot be specified.