



E+I ENGINEERING GROUP

HIGH POWERBAR

COPPER UL857



PowerBar



E+I Engineering's High Powerbar (HPB) UL857 range is a 600 Volt totally encased, non-ventilated, low impedance busduct. The range is available from 800A - 5000A with multiple bar configurations to suit project requirements.

The busduct is housed in an aluminum casing which acts as a ground. Ingress protection ratings of IP55, IP65 and IP67 are available.

Features:

- Epoxy resin coated copper conductors with tin or silver coated finish
- Joint pack construction with double headed shear bolts for quick installation
- Up to 5 busplug points per 12ft length
- All busplugs have mechanical/ electrical interlocks with a 'ground first, break last' safety feature
- Pressed out tags for busplug connections

STANDARDS

Standards

The HPB range is UL857 listed and manufactured in a certified management system environment where Quality ISO 9001, Safety OHSAS 18001 and Environmental ISO 14001 standards are applied to all aspects of the manufacturing and installation processes. We meet the requirements of NEMA, CSA, IEEE, ANSI, IEC & CE.

UL Listed

- 8.2.1 Verification of Temperature Rise Limits
- 8.2.2 Verification of Dielectric Voltage Withstand Test
 - 8.2.2.2 Clamped Joint Test
 - 8.2.2.3 Reduced Insulation Thickness Test
- 8.2.3 Verification of Short Circuit Withstand
 - 8.2.3.1.1.2 Dielectric Test Withstand Tests
- 8.2.6 Verification of Insulation Resistance and Dielectric Withstand After Exposure to Rain
- 8.2.7.1 Verification of Bending Resistance
- 8.2.7.2 Verification of Impact Strength
- 8.2.7.3 Verification of Crushing Resistance
- 8.2.7.4 Verification of Resistance to Bus Bar Pull Out
- 8.2.8 Verification of Overload and Endurance of Non-Switching Plug-in Devices
- 8.2.9 Verification of Resistance to Aging
- 8.2.10 Verification of Metallic Coating Thickness
- 8.2.11 Verification of Insulation Base and Support Strength
- 8.2.12 Gasket Tests
- Ref to ANSI Type Rating Tests (Ingress Protection Tests) for the 2 series /UL 50

Seismic Compliance

The product range is certified for Seismic withstand capability and has a qualification level - high (Zone-5) in accordance to IEEE standard 693-2005.

All certificates available on request



OHSAS 18001:2007
OHS 533652

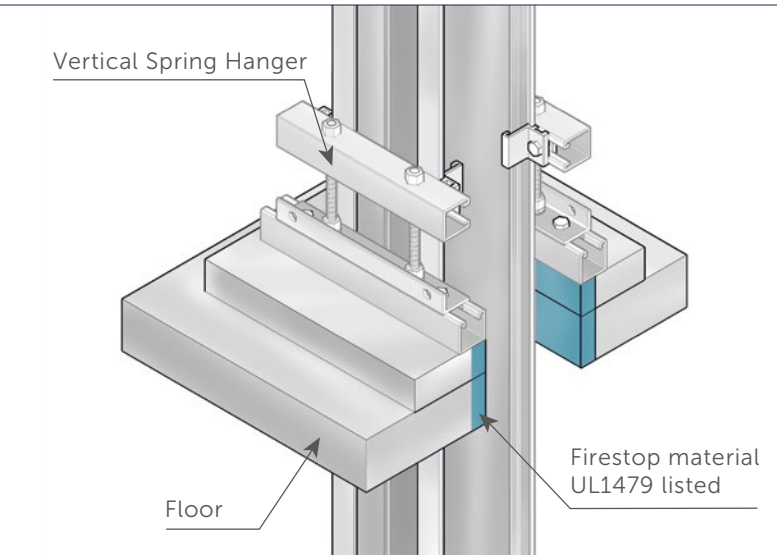


ISO 9001:2008
FM 12680



ISO 14001:2004
No: EMS 566536

TECHNICAL FEATURES



UL Fire Stop System

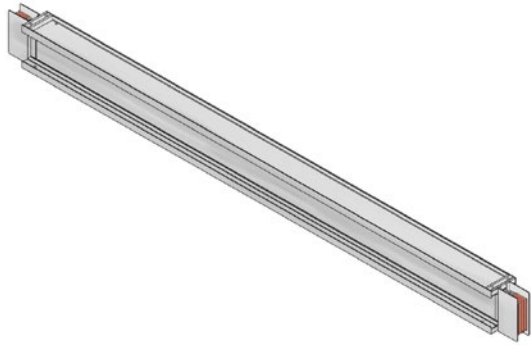
- High Powerbar is constructed from high density 99.99% conductivity copper
- The conductors are insulated with a Class B epoxy insulation applied uniformly using an electrostatic coating process. The epoxy coating is non-hygroscopic and chemical resistant with outstanding heat transfer characteristics
- The low impedance sandwich design:
 - Improves heat dissipation
 - Improves short circuit rating
 - Reduces voltage drop/ impedance
 - Removes potential pathways for flame, smoke and gas
- E+I Engineering's patented process of pressed out tabs to connect busplugs protects the integrity of the conductor
- HPB is constructed with an all-aluminum housing. Aluminum is an extremely light metal and is cheaper and easier to install than steel. Aluminum is much less reactive than steel so it is more durable and easier to maintain.
- E+I Engineering offer a 50% or 100% fully isolated ground for systems where ground isolation is required.
- A fully rated 200% neutral option is available for busduct systems with non-linear loads. The additional neutral capacity prevents overloading caused by zero sequence harmonic currents
- HPB UL857 can be used in 'Through-Penetration Fire Stop Systems' as listed in the UL Fire Resistance Directory

TECHNICAL FEATURES

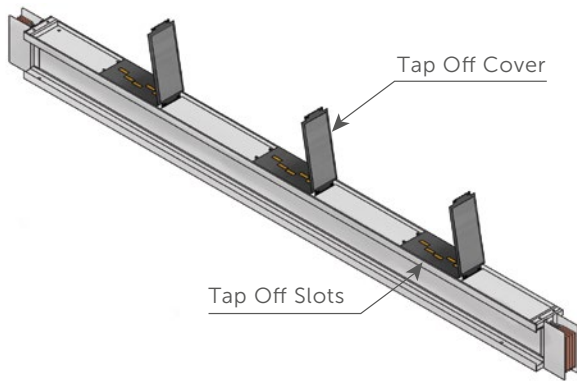
Configuration	Phases	Neutral	Ground
TP	100%	0%	Case
TP/N	100%	100%	Case
TP/E	100%	0%	100% or 50%
TP/NE	100%	100%	100% or 50%
TP/DN	100%	200%	Case

Note: Case refers to the aluminum casing being used as an integral ground. 100% or 50% ground bar can either be supplied as an isolated ground (ISO) or uninsulated internal ground (INT).

STRAIGHT LENGTHS



Feeder lengths account for the bulk of a busbar run



Distribution lengths allow tap off units to be plugged into the busbar run

Straight Lengths

Straight lengths can be supplied at any length between 2ft - 12ft.

The busplug slot outlet and cover are made from a durable, high strength, Class B, 130°C insulation material.

The busplug slot cover prevents access to the contacts behind the cover and protects it from the entry of dirt, dust or moisture. Busplugs are IP55 as standard but higher levels up to IP67.

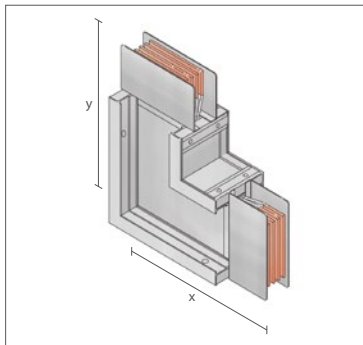
Busduct Rating (Amps)	Construction Type	Busduct Size			
		Width		Height	
		in	mm	in	mm
800A	Single	3.74"	95mm	5.83"	148mm
1000A	Single	4.33"	110mm	5.83"	148mm
1200A	Single	4.72"	120mm	5.83"	148mm
1350A	Single	5.32"	135mm	5.83"	148mm
1600A	Single	6.30"	160mm	5.83"	148mm
2000A	Single	7.87"	200mm	5.83"	148mm
2500A	Single	9.84"	250mm	5.83"	148mm
3000A	Double	13.58"	345mm	5.83"	148mm
4000A	Triple	19.69"	500mm	5.83"	148mm
5000A	Triple	23.82"	605mm	5.83"	148mm

Note: The maximum and minimum sizes recommended are not the limits of what can be produced but a guideline to help you choose the correct product. Dimensions are taken from the center of the joint.

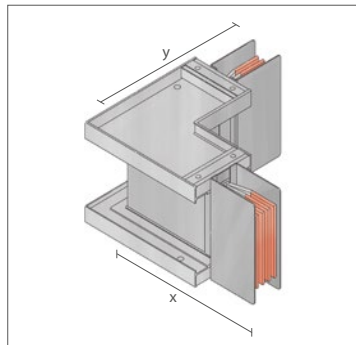
ELBOWS

Flatwise and Edgewise Elbows

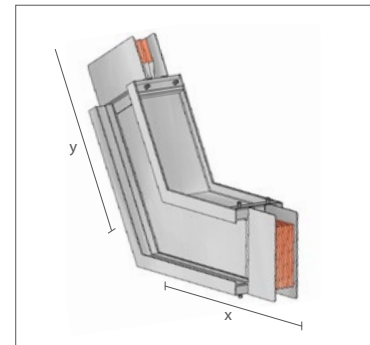
Flatwise and edgewise elbows are used to make 90° changes in the direction of the busduct system. E+I Engineering can also manufacture specially angled elbows for both flatwise and edgewise products.



Flatwise Elbows



Edgewise Elbows



Custom Elbows

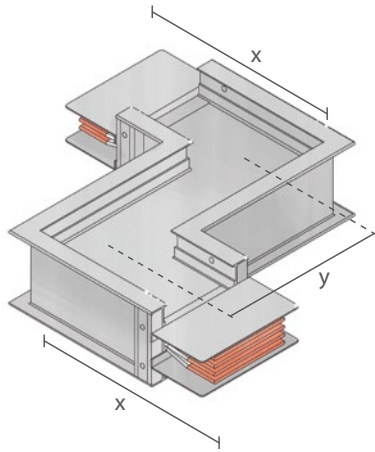
Flatwise Elbow (Up or Down)

Ratings (Amps)	Minimum Leg Size				Standard Leg Size				Maximum Leg Size			
	X		Y		X		Y		X		Y	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
800A	9.06"	230mm	9.06"	230mm	14"	355mm	14"	355mm	30"	762mm	30"	762mm
1000A	9.37"	238mm	9.37"	238mm	14"	355mm	14"	355mm	30"	762mm	30"	762mm
1200A	9.57"	243mm	9.57"	243mm	14"	355mm	14"	355mm	30"	762mm	30"	762mm
1350A	9.84"	250mm	9.84"	250mm	14"	355mm	14"	355mm	30"	762mm	30"	762mm
1600A	10.35"	263mm	10.35"	263mm	14"	355mm	14"	355mm	30"	762mm	30"	762mm
2000A	11.14"	283mm	11.14"	283mm	14"	355mm	14"	355mm	30"	762mm	30"	762mm
2500A	12.13"	308mm	12.13"	308mm	14"	355mm	14"	355mm	30"	762mm	30"	762mm
3000A	13.98"	355mm	13.98"	355mm	20"	508mm	20"	508mm	30"	762mm	30"	762mm
4000A	17.05"	433mm	17.05"	433mm	20"	508mm	20"	508mm	30"	762mm	30"	762mm
5000A	19.13"	486mm	19.13"	486mm	20"	508mm	20"	508mm	30"	762mm	30"	762mm

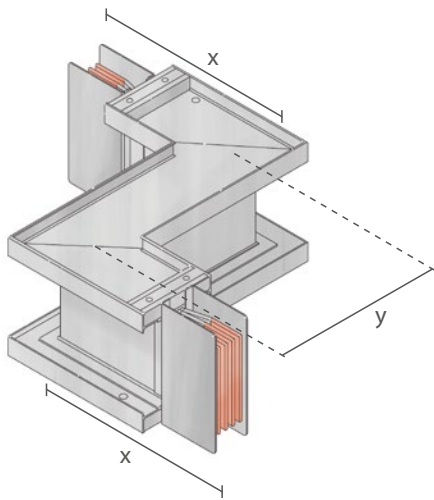
Edgewise Elbow (Left or Right)

Ratings (Amps)	Minimum Leg Size				Standard Leg Size				Maximum Leg Size			
	X		Y		X		Y		X		Y	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
800A, 1000A, 1200A, 1350A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A	10"	254mm	10"	254mm	14"	355mm	14"	355mm	24"	610mm	24"	610mm

OFFSETS



Flatwise Offset



Edgewise Offset

Offset Sections

An offset is used to avoid any obstacles eg. pipes or to steel columns and to conform to the structure of the building.

Flatwise Offset (Up or Down)

Ratings (Amps)	Minimum Leg Size				Maximum Leg Size			
	X		Y		X		Y	
	in	mm	in	mm	in	mm	in	mm
800A	9.06"	230mm	2"	51mm	26"	660mm	18.11"	460mm
1000A	9.37"	238mm	2"	51mm	26"	660mm	18.74"	476mm
1200A	9.57"	243mm	2"	51mm	26"	660mm	19.13"	486mm
1350A	9.84"	250mm	2"	51mm	26"	660mm	19.69"	500mm
1600A	10.35"	263mm	2"	51mm	26"	660mm	20.71"	526mm
2000A	11.14"	283mm	2"	51mm	26"	660mm	22.28"	566mm
2500A	12.13"	308mm	2"	51mm	26"	660mm	24.25"	616mm
3000A	13.98"	355mm	2"	51mm	26"	660mm	27.95"	710mm
4000A	17.05"	433mm	2"	51mm	26"	660mm	34.10"	866mm
5000A	19.13"	486mm	2"	51mm	26"	660mm	38.26"	972mm

Edgewise Offset (Left or Right)

Ratings (Amps)	Minimum Leg Size				Maximum Leg Size			
	X		Y		X		Y	
	in	mm	in	mm	in	mm	in	mm
800A, 1000A, 1200A, 1350A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A	10"	254mm	3"	76mm	20"	508mm	24"	610mm

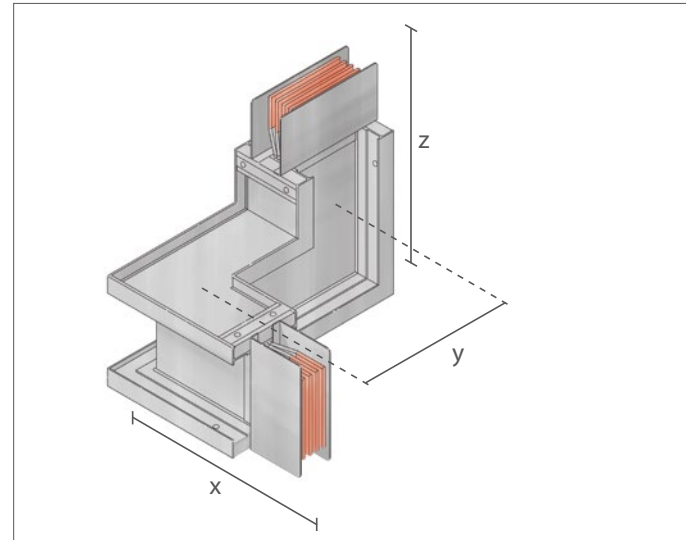
COMBINATIONS

Combination Elbows

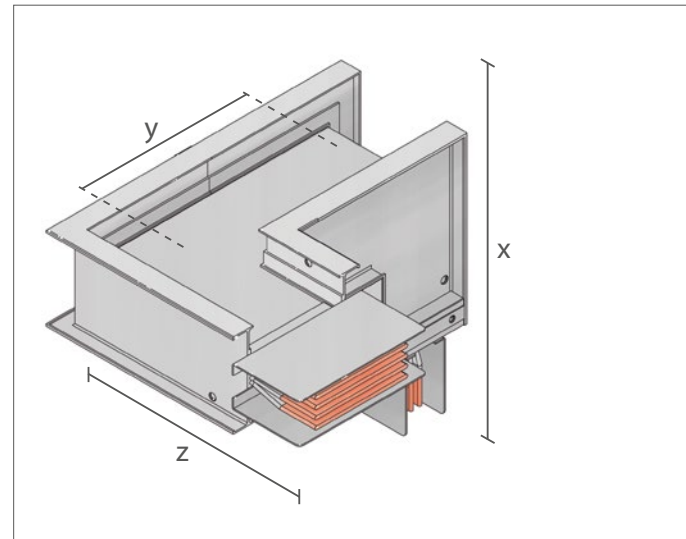
Combination elbows are used to conform to the building's structure and to change the direction of the busduct within a confined space.

Ratings (Amps)	Minimum Leg Size					
	X (Edgewise side)		Y		Z (Flatwise side)	
	in	mm	in	mm	in	mm
800A	10"	254mm	6.77"	172mm	9.06"	230mm
1000A	10"	254mm	7.05"	179mm	9.37"	238mm
1200A	10"	254mm	7.24"	184mm	9.57"	243mm
1350A	10"	254mm	7.56"	192mm	9.84"	250mm
1600A	10"	254mm	8.03"	204mm	10.35"	263mm
2000A	10"	254mm	8.82"	224mm	11.24"	283mm
2500A	10"	254mm	9.80"	249mm	12.13"	308mm
3000A	10"	254mm	11.36"	297mm	13.98"	355mm
4000A	10"	254mm	14.69"	373mm	17.05"	433mm
5000A	10"	254mm	16.73"	425mm	19.13"	486mm

Ratings (Amps)	Maximum Leg Size					
	X (Edgewise side)		Y		Z (Flatwise side)	
	in	mm	in	mm	in	mm
800A	24"	610mm	19.06"	484mm	30"	762mm
1000A	24"	610mm	19.37"	492mm	30"	762mm
1200A	24"	610mm	19.57"	497mm	30"	762mm
1350A	24"	610mm	19.84"	504mm	30"	762mm
1600A	24"	610mm	20.35"	517mm	30"	762mm
2000A	24"	610mm	21.14"	537mm	30"	762mm
2500A	24"	610mm	22.13"	562mm	30"	762mm
3000A	24"	610mm	23.98"	609mm	30"	762mm
4000A	24"	610mm	27.05"	687mm	30"	762mm
5000A	24"	610mm	29.13"	740mm	30"	762mm

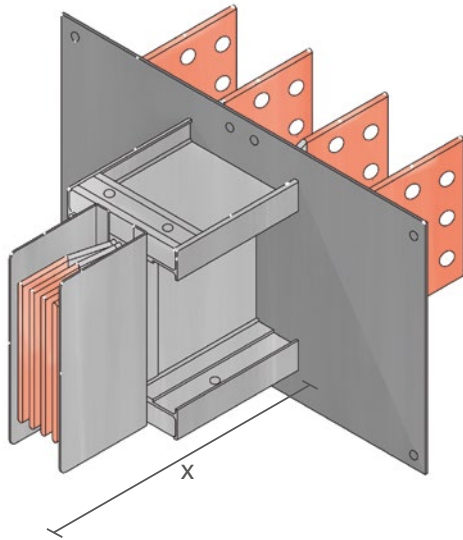


Edge Right Flatwise Up



Flatwise Up Edgewise Right

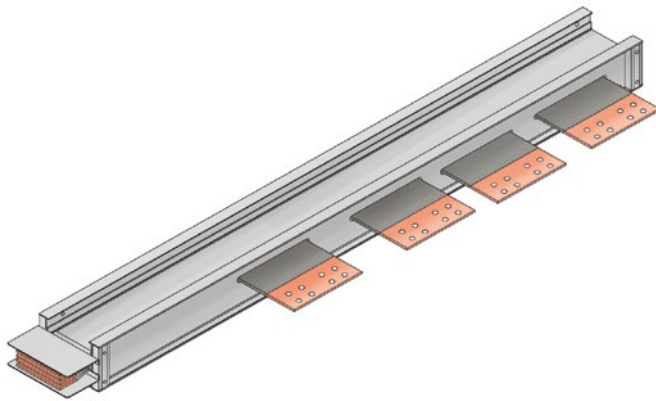
FLANGES



Panel Flange

Flange Connections

Flange connections provide a direct connection to low voltage switchgear, transformer enclosures and other electrical equipment. Standard flanges can be offset to the left or right of the section as required.



Parallel Flange

Panel Flange

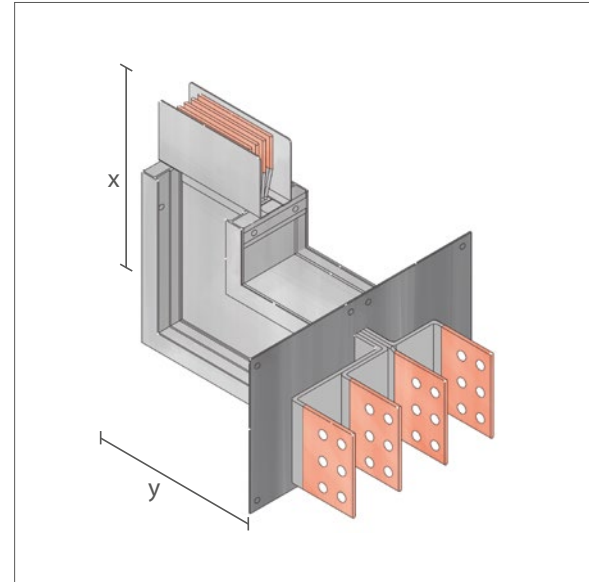
Ratings (Amps)	Width		Height	
	in	mm	in	mm
800A, 1000A, 1200A, 1350A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A	9"	229mm	33"	838mm

Combination Flange

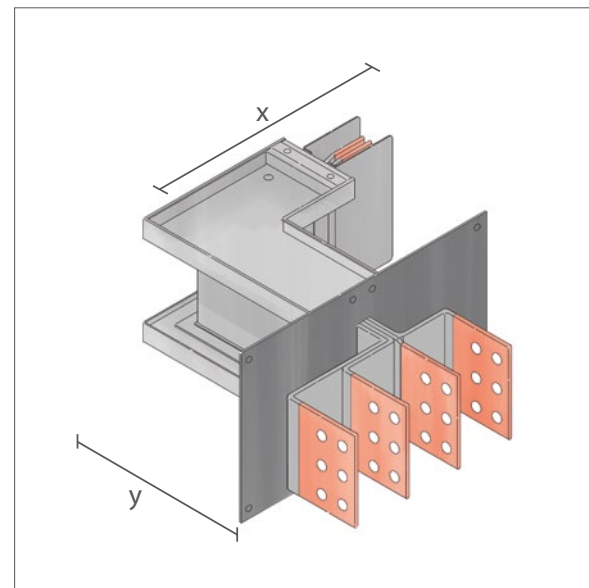
A combination flange is used when the minimum leg lengths for either the standard elbow or the standard flange cannot be met.

Flange/Elbows (Flatwise)

Ratings (Amps)	Minimum Leg Size				Maximum Leg Size			
	X		Y		X		Y	
	in	mm	in	mm	in	mm	in	mm
800A	9.06"	230mm	3.85"	98mm	30"	762mm	18.11"	460mm
1000A	9.37"	238mm	4.13"	105mm	30"	762mm	18.74"	476mm
1200A	9.57"	243mm	4.33"	110mm	30"	762mm	19.13"	486mm
1350A	9.84"	250mm	4.65"	118mm	30"	762mm	19.69"	500mm
1600A	10.35"	263mm	5.12"	130mm	30"	762mm	20.70"	526mm
2000A	11.14"	283mm	5.91"	150mm	30"	762mm	22.28"	566mm
2500A	12.13"	308mm	6.89"	175mm	30"	762mm	24.25"	616mm
3000A	13.98"	355mm	8.78"	223mm	30"	762mm	27.95"	710mm
4000A	17.05"	433mm	11.81"	300mm	30"	762mm	34.09"	866mm
5000A	19.13"	486mm	13.90"	353mm	30"	762mm	38.27"	972mm



Flatwise Elbow Flange

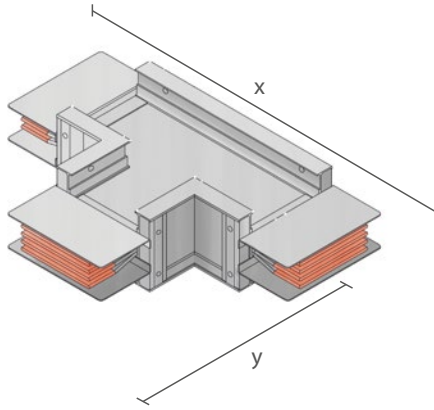


Edgewise Elbow Flange

Flange/Elbows (Edgewise)

Ratings (Amps)	Minimum Leg Size				Maximum Leg Size			
	X		Y		X		Y	
	in	mm	in	mm	in	mm	in	mm
800A, 1000A, 1200A, 1350A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A	10"	254mm	5"	127mm	24"	610mm	20"	508mm

SPECIALS



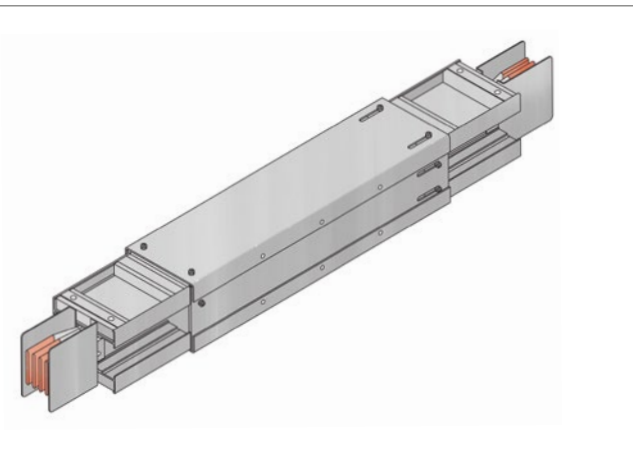
Flatwise Tee

Flatwise Tee

Flatwise tee's are used to split one busduct run into two runs going in different directions.

Flatwise Tee

Ratings (Amps)	Minimum Leg Size				Standard Leg Size				Maximum Leg Size			
	X		Y		X		Y		X		Y	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
800A	18.11"	460mm	9.06"	230mm	28"	711mm	14"	356mm	60"	1524mm	26"	660mm
1000A	18.39"	476mm	9.37"	238mm	28"	711mm	14"	356mm	60"	1524mm	26"	660mm
1200A	19.13"	486mm	9.57"	243mm	28"	711mm	14"	356mm	60"	1524mm	26"	660mm
1350A	19.69"	500mm	9.84"	250mm	28"	711mm	14"	356mm	60"	1524mm	26"	660mm
1600A	20.71"	526mm	10.35"	263mm	28"	711mm	14"	356mm	60"	1524mm	26"	660mm
2000A	22.28"	566mm	11.14"	283mm	28"	711mm	14"	356mm	60"	1524mm	26"	660mm
2500A	24.25"	616mm	12.13"	308mm	28"	711mm	14"	356mm	60"	1524mm	26"	660mm
3000A	27.95"	710mm	13.98"	355mm	40"	1016mm	20"	508mm	60"	1524mm	26"	660mm
4000A	34.09"	866mm	17.05"	433mm	40"	1016mm	20"	508mm	60"	1524mm	26"	660mm
5000A	38.27"	972mm	19.13"	486mm	40"	1016mm	20"	508mm	60"	1524mm	26"	660mm



Expansion Unit

Expansion Units

Expansion units are used to accommodate the expansion and contraction of a busduct system as well as allow for building movement. They allow for a 1.57" movement along the length of the busduct.

Expansion units are recommended when a straight busduct run exceeds 196ft.

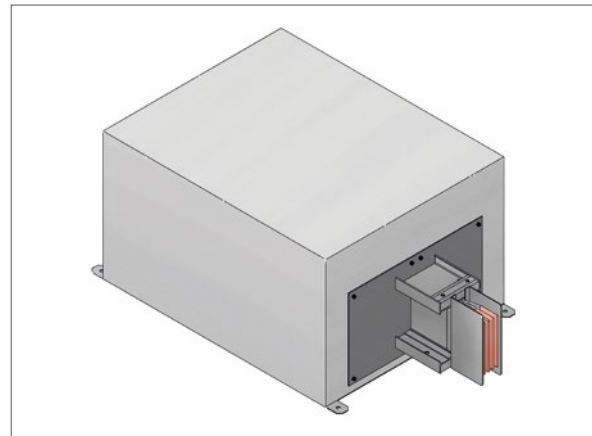
FEED UNITS & CAPS

Cable Feed Units

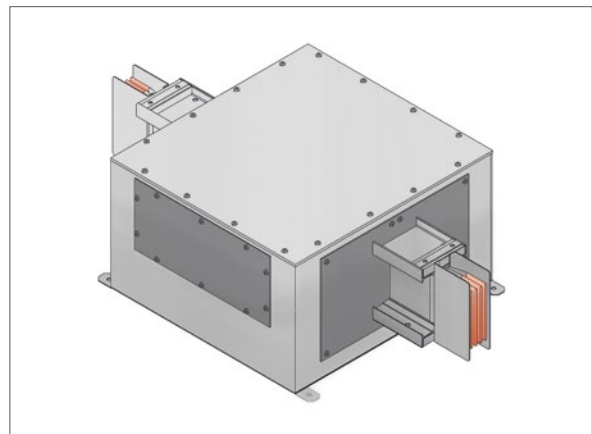
End feed units are used on the ends of busduct risers which are cable fed. Center feed units are used in the middle of busduct risers which are cable fed.

The size of cable feed required depends on a number of factors:

- rating of busduct
- size of cable
- number of cables
- use of a protective device or isolator



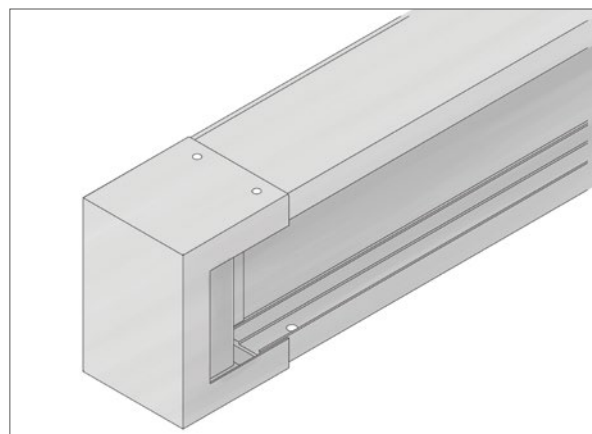
End Feed Units



Center Feed Units

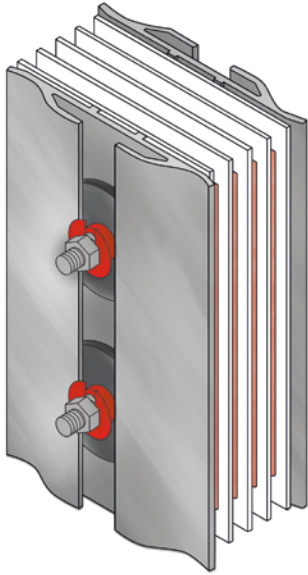
End Caps

End caps are used to safely cap off the end of a busduct run. The end cap units are factory fitted but can be easily removed to allow for the extension of the system.



End Caps

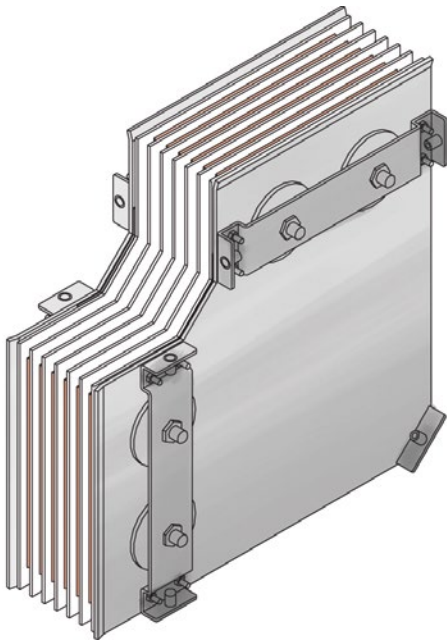
SPLICE



Splice

Splice

E+I Engineering's splice is a compression joint design utilising a specially designed Belleville washer to distribute the pressure evenly over the splice. The splice is supplied in specific sizes depending on the rating of busduct required.



Flatwise Elbow Splice

Flatwise elbow splices

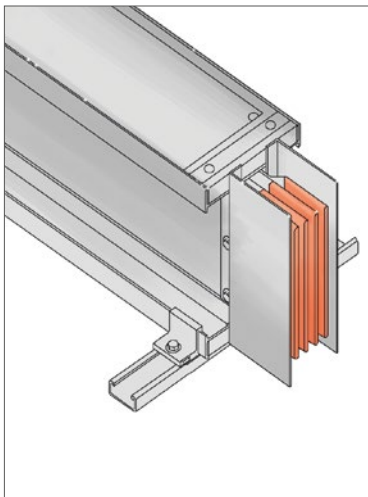
Flatwise elbow splices can be used to make 90° changes in the direction of the busduct system.

INSTALLATION

The modular design of HPB allows it to be installed flat or on its edge.

Edge Installation

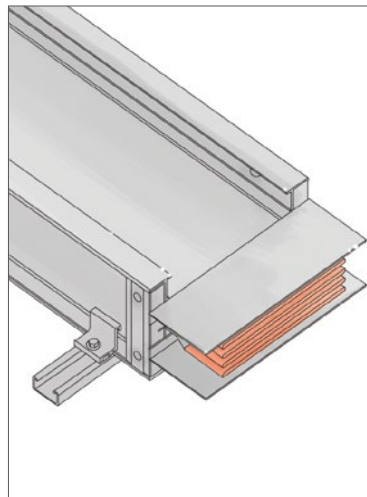
Edge installation is the preferred method of installation for a smaller rated busbar system.



Edge Installation

Flat Installation

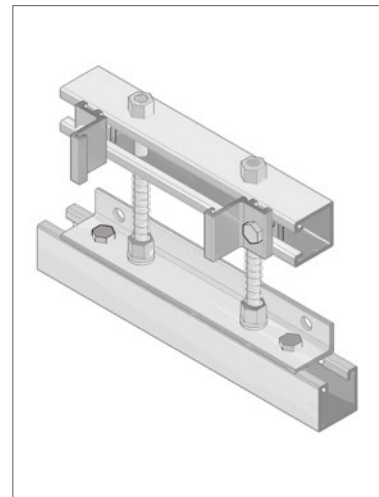
Flat installation is the preferred method of installation for a higher rated, multistack busbar system. When installed on its flat all busbar rating has a height of 145mm.



Flat Installation

Spring Hanger

Spring hangers are used to support vertical busbar runs on each floor. They compensate for building movement and thermal expansion.



Spring Hanger

Special Pieces

E-I Engineering manufacture a variety of more specialised units and components to meet unique system requirements. These include: edgewise tee's, flatwise cross, step up/ step down reducers, phase rotation units, in-line disconnect cubicles, in-line tap off units, custom built busbar connection units.

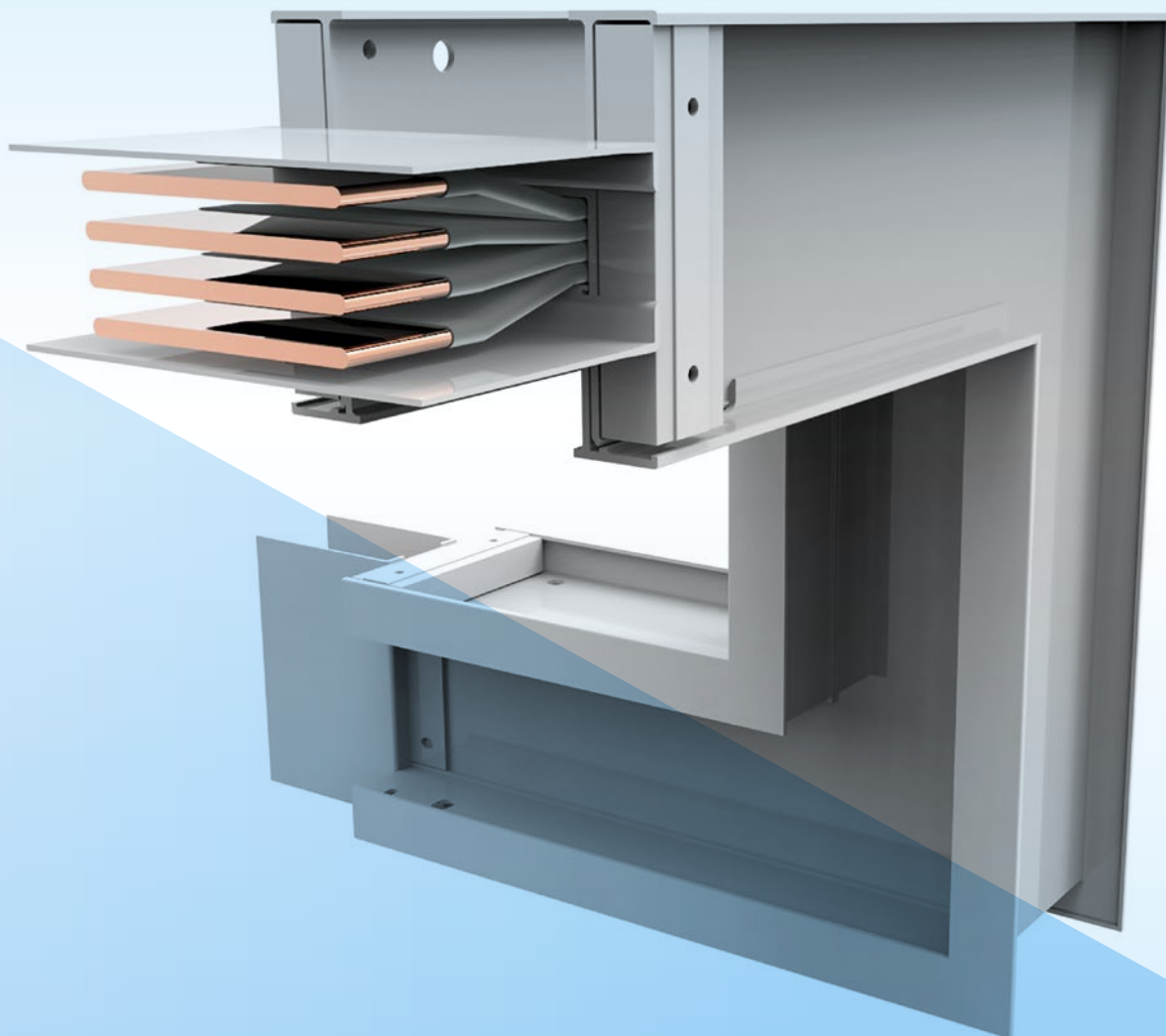
TECHNICAL DATA

Technical Data					
Rated Current (A)	800	1000	1200	1350	1600
Rated Operational Voltage (V)	600	600	600	600	600
Rated Insulation Voltage (V)	600	600	600	600	600
Short Circuit					
6 Cycle RMS Symmetrical Short circuit rating (KA)	75	100	100	100	150
Phase Conductor Cross Sectional Area					
inches ²	0.31	0.47	0.56	0.70	0.93
millimeters ²	202	300	360	450	600
Neutral Conductor Cross Sectional Area					
inches ²	0.31	0.47	0.56	0.70	0.93
millimeters ²	202	300	360	450	600
Isolated 100% Ground Conductor Cross Sectional Area					
inches ²	0.31	0.47	0.56	0.70	0.93
millimeters ²	202	300	360	450	600
50% Ground Cross Sectional Area					
inches ²	0.16	0.23	0.28	0.35	0.46
millimeters ²	105	150	180	225	300
Housing Ground Path Cross Sectional Area					
inches ²	2.68	2.82	2.92	3.06	3.30
millimeters ²	1730	1820	1880	1970	2120
Overall Dimensions					
Height x Width (in)	3.74 x 5.83	4.33 x 5.83	4.72 x 5.83	5.32 x 5.83	6.30 x 5.83
Height x Width (mm)	95 x 148	110 x 148	120 x 148	135 x 148	160 x 148
Weight					
Weight of 4 Bar System (lbs/ft)	10.43	12.89	14.57	17.09	21.29
Weight of 5 Bar System (lbs/ft)	11.77	14.80	16.87	20.33	25.12
Resistance					
Resistance (mΩ/100ft) at 68.5°F	2.591	1.450	1.098	0.838	0.561
Resistance (mΩ/100ft) at 176°F	3.201	1.785	1.385	1.042	0.732
Reactance					
Reactance (mΩ/100ft) at 60Hz	1.189	0.558	0.497	0.406	0.293
Impedance					
Impedance (mΩ/m) at 176°F	3.354	1.840	1.437	1.092	0.756
Voltage Drop Full Load 60Hz per 100ft					
Power Factor = 0.7 (V/100ft) at 176°F	4.299	2.853	2.752	2.384	1.998
Power Factor = 0.8 (V/100ft) at 176°F	4.573	3.052	2.922	2.519	2.109
Power Factor = 0.9 (V/100ft) at 176°F	4.756	3.203	3.041	2.606	2.179
Power Factor = 1.0 (V/100ft) at 176°F	4.482	3.091	2.879	2.436	2.018

Technical Data					
Rated Current (A)	2000	2500	3000	4000	5000
Rated Operational Voltage (V)	600	600	600	600	600
Rated Insulation Voltage (V)	600	600	600	600	600
Short Circuit					
6 Cycle RMS Symmetrical Short circuit rating (KA)	150	150	200	200	200
Phase Conductor Cross Sectional Area					
inches ²	1.30	1.77	1.86	2.51	3.49
milimeters ²	840	1140	1200	1620	2250
Neutral Conductor Cross Sectional Area					
inches ²	1.30	1.77	1.86	2.51	3.49
milimeters ²	840	1140	1200	1620	2250
Isolated 100% Ground Conductor Cross Sectional Area					
inches ²	1.30	1.77	1.86	2.51	3.49
milimeters ²	840	1140	1200	1620	2250
50% Ground Cross Sectional Area					
inches ²	0.65	0.88	0.93	1.25	1.74
milimeters ²	420	570	600	810	1125
Housing Ground Path Cross Sectional Area					
inches ²	3.66	4.14	6.60	9.60	10.56
milimeters ²	2360	2660	4238	6179	6809
Overall Dimensions					
Height x Width (in)	7.87 x 5.83	9.84 x 5.83	13.58 x 5.83	19.69 x 5.83	23.82 x 5.83
Height x Width (mm)	200 x 148	250 x 148	345 x 148	500 x 148	605 x 148
Weight					
Weight of 4 Bar System (lbs/ft)	28.01	36.42	43.17	58.37	59.95
Weight of 5 Bar System (lbs/ft)	33.37	43.69	50.97	68.59	70.17
Resistance					
Resistance (mΩ/100ft) at 68°F	0.480	0.327	0.293	0.232	0.149
Resistance (mΩ/100ft) at 176°F	0.587	0.403	0.341	0.283	0.199
Reactance					
Reactance (mΩ/100ft) at 60Hz	0.267	0.176	0.146	0.129	0.075
Impedance					
Impedance (mΩ/m) at 176°F	0.640	0.428	0.366	0.309	0.199
Voltage Drop Full Load 60Hz					
Power Factor = 0.7 (V/100ft) at 176°F	2.083	1.766	1.785	2.008	1.666
Power Factor = 0.8 (V/100ft) at 176°F	2.181	1.854	1.876	2.103	1.765
Power Factor = 0.9 (V/100ft) at 176°F	2.233	1.903	1.928	2.153	1.831
Power Factor = 1.0 (V/100ft) at 176°F	2.033	1.745	1.774	1.960	1.722

HIGH POWERBAR

COPPER UL857



QUICK REFERENCE GUIDE

Critical Dimensions

- The distance from the centre of a joint to the wall, ceiling or floor must be at least 7 inches.
- All joints must be accessible for maintenance. Joints should not be located inside a wall, ceiling or floor.
- There must be a minimum distance of 2 inches between the busduct and any wall/ ceiling/ other busduct.
- Allow adequate space for busplugs to be installed easily and safely.
- Busduct lengths are available from 2ft - 12ft.
- Distribution busduct lengths are available from 2ft - 12ft.
- Edgewise elbow sections are available with leg lengths from 10in - 2ft.
- Flatwise elbow sections are available with a maximum leg length of 2.5ft. The minimum leg length varies depending on the busduct.

Operating Conditions

- Ambient temperature from -22°F to +131°F
- High Powerbar may be operated continuously at its assigned ratings provided the ambient temperature does not exceed 131°F. For higher ambient temperatures, the ratings should be reduced by applying the appropriate multiplier as shown in the table below:

Ambient Temperature (°F)	Multiplier
131	1.00
140	0.95
149	0.90
158	0.85
167	0.80
176	0.74
185	0.68

- Relative humidity of 95% or below.
- This product designed for indoor use and can be installed horizontally or vertically.

Critical Details

- Busduct drawings must include all relevant dimensions. Centre-line dimensions are expected. Please highlight any dimensions that are not centre-line.
- Walls and floors must be indicated and the relevant dimensions provided.
- The phasing and location of all switchboards must be provided.
- Full details are required for any transformer connections.
- Horizontal busduct must be installed with the neutral phase to the top. Please indicate the phase orientation for vertically installed busduct.



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