Lauritz Knudsen

Electrical & Automation

BUSBAR TRUNKING SYSTEM
FOR EVERY APPLICATION

S-Line

Busduct System & Solution

Busbar Trunking System & Overview

A Busduct System is an assembly comprising a system of conductors with one or more bars separated or/ and supported by insulating material and contained in a conduit or similar casing.

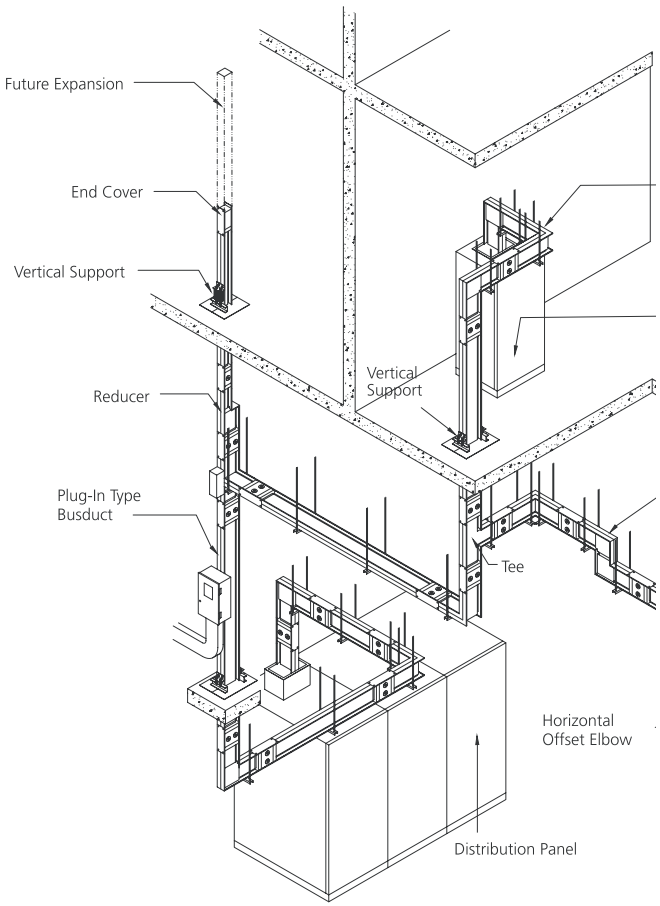
There are mainly two types of busduct systems based on the type of construction: Air-insulated and Sandwich.

An air-insulated busduct construction has air as an insulation between conductors, hence the overall size of this type of busduct is greater compared to a sandwich busduct. Sandwich construction means that the conductors are individually insulated and mounted so as to resemble a sandwich of conductors and insulation within the busduct casing.

A busduct is manufactured into totally enclosed, pre-fabricated sections consisting of copper or aluminium busbars. Power is simply tapped off by plug-in points positioned at required intervals. Typically, a busduct system will consist of straight lengths, flanged ends, elbows, end feed boxes, end covers, plug-in boxes and other accessories.

The busduct system has several key advantages over conventional forms of power distribution:

- Reduced on-site installation time when compared to a cable system, leading to cost savings.
- Increased flexibility in design and versatility for future modifications.
- Increased safety features brought about by the use of high-quality manufactured components, which provide greater safety.



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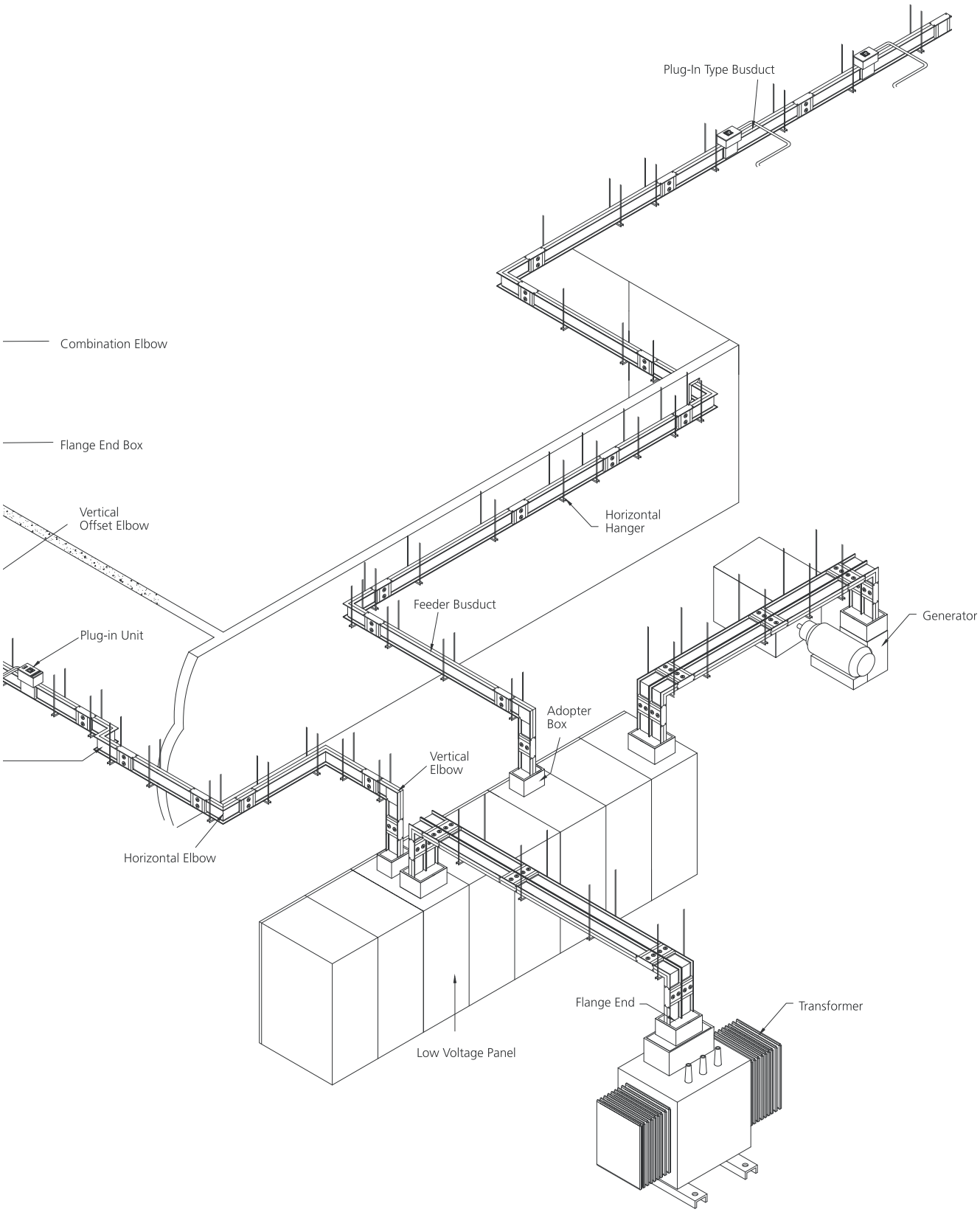

Benefits of Sandwich Busduct System

- Lower impedance of the busduct system results in lower voltage drop as compared to cable and air insulated busduct systems.
- The busduct system is compact in size, resulting in big savings on electrical shaft size, and more usable floor area on every floor.
- Fewer joints in the sandwich busduct system result in savings on installation costs as compared to air insulated busducts.
- The system is simple, compact and adds a touch of elegance to the ambience.
- The sturdy and robust metal enclosure gives it high mechanical strength.
- In a cable system, if the load on any section exceeds the limits, an additional cable has to be run from a spare feeder on the main board to that section; in a busduct system, each plug-in box can normally be added to or removed with the busduct in live condition, eliminating production downtime.
- When used for rising main application or a wall/crossing, the sandwich busduct system negates the need for internal fire barriers, because there is no air gap in the casing to give the chimney effect which would allow the passage of smoke and fire. Better protection against ingress makes sandwich construction more secure against flashover because of ingress.
- Any section of busduct system can be removed without disturbing the adjacent sections.
- Flexible and safe distribution system increases the ease and speed of installation. The system can be dismantled and re-used.
- Sandwich busduct systems have high mechanical strength because of the metal enclosure, and therefore have higher short-circuit withstand capacity compared to cables.

Technical Specifications

Applicable Standard	IEC 61439 Part - 1 & 6
Busduct Construction	Sandwich Type
Busduct Rating	Aluminium - 250A to 6300A Copper - 400A to 6300A
Rated Operational Voltage (Ue)	up to 1000V
Rated Insulation Voltage (Ui)	1000 V
Rated Impulse Voltage (Uimp)	8kV/12kV (1.2/50 µs)
Rated Dielectric Voltage	2.5kV for 5 sec
Rated Frequency	50Hz/60Hz
Pole Configurations	3P3W/3P4W (50%N) / 3P4W (100%N) / 3P5W (200%N) with or without 50% internal earth and provision for mounting external earth, 3P4W+PE (Protective / Insulated Earth)
Insulation Class	Class-F (155 degree C)
Insulation Material	Multilayer Polyethylene Terephthalate (UL listed)
Enclosure Material	Aluminium Busduct - 1.6mm Gl or 2.5mm AL Copper Busduct - 2.5mm AL
Surface Coating on Enclosure	Epoxy Powder Coating
Paint Shade	RAL 7015
Degree of Protection	IP54/IP55 for Indoor and IP66 for Outdoor
Plug-in Box	16A to 630A
Tap-off Box	125A to 1250A
Joint Block	Uniblock joint with twin-headed maintenance-free nut
Seismic Compliance	Zone 5, as per IS 1893 (Part 1) - 2002 and IEEE 693 - 2005 Tested with Vertical+Horizontal busduct and Plug-in Box assembly
Fire Resistance in Building Penetration	Verified for Integrity: 240 minutes
Resistance to Flame Propagation	Verified

Electrical Characteristics of Busducts

Dimensions (Aluminium Busduct)

Rating (A)	Dimensions (mm)			Weight (kg/m)*		
	Conductor Size	Height (H)	Width (W)	Indoor Busduct		
				3W	4W	5W
250A	1-6x30	135	70	7	7	8
400A	1-6x40	135	80	8	9	9
630A	1-6x60	135	100	10	11	12
800A	1-6x80	135	120	11	13	14
1000A	1-6x100	135	140	13	15	16
1250A	1-6x125	135	165	15	17	19
1600A	1-6x150	135	190	17	19	22
2000A	1-6x200	135	240	21	25	28
2500A	1-6x250	135	290	25	29	33
3200A	2-6x150	135	380	34	38	44
4000A	2-6x200	135	480	42	50	56
4500A	2-6x250	135	580	50	58	66
5000A	3-6x200	135	720	63	75	84
6300A	3-6x250	135	870	75	87	99

*Weight given in above table is straight feeder weight; it can vary by +/-5%

Dimensions (Copper Busduct)

Rating (A)	Dimensions (mm)			Weight (kg/m)*		
	Conductor Size	Height (H)	Width (W)	Indoor Busduct		
				3W	4W	5W
400A	1-4x40	135	78	8	10	11
630A	1-6x40	135	78	10	12	14
800A	1-6x50	135	88	12	15	18
1000A	1-6x55	135	93	13	16	19
1250A	1-6x75	135	113	17	21	25
1600A	1-6x102	135	140	23	28	33
2000A	1-6x140	135	178	30	37	45
2500A	1-6x175	135	213	37	46	55
3200A	2-6x102	135	280	49	56	70
4000A	2-6x140	135	356	60	75	89
5000A	2-6x175	135	426	74	92	111
6300A	3-6x160	135	594	102	127	152

*Weight given in above table is straight feeder weight; it can vary by +/-5%

Short Circuit Withstand Capacity

Rating (A)	Short Circuit Rating (kA for 1 Sec)	
	Aluminium	Copper
250A	18	
400A	25	25
630A	40	40
800A	50	50
1000A	50	50
1250A	65	65
1600A	80	80

Rating (A)	Short Circuit Rating (kA for 1 Sec)	
	Aluminium	Copper
2000A	80	80
2500A	80	100
3200A	100	100
4000A	100	100
4500A	100	-
5000A	100	100
6300A	100	100

Impedance at 50Hz (Aluminium Busduct)

Ampere(A)	Conductor(mm)	(Unit: μΩ/m)			
		Resistance (Rac) @20°C	Resistance (Rac) @80°C	Reactance(X)	"Impedance(Z) @80°C"
250A	1-6x30	161.27	197.61	30.51	199.95
400A	1-6x40	120.95	149.68	25.01	151.76
630A	1-6x60	81.43	100.78	18.84	102.53
800A	1-6x80	62.28	76.33	15.46	77.88
1000A	1-6x100	50.30	61.65	13.34	63.08
1250A	1-6x125	41.00	49.79	11.57	51.12
1600A	1-6x150	34.80	42.29	10.36	43.54
2000A	1-6x200	26.82	32.60	8.82	33.77
2500A	1-6x250	22.23	26.79	7.88	27.92
3200A	2-6x150	17.40	21.15	5.18	21.78
4000A	2-6x200	13.41	16.30	4.41	16.89
4500A	2-6x250	11.12	13.40	3.94	13.96
5000A	3-6x200	8.94	10.87	2.94	11.26
6300A	3-6x250	7.41	8.93	2.63	9.31

Impedance at 50Hz (Copper Busduct)

Ampere(A)	Conductor(mm)	(Unit: μΩ/m)			
		Resistance (Rac) @20°C	Resistance (Rac) @80°C	Reactance(X)	"Impedance(Z) @80°C"
400A	1-4x40	112.17	137.81	19.49	139.18
630A	1-6x40	76.26	92.79	25.01	96.10
800A	1-6x50	61.60	74.95	21.39	77.94
1000A	1-6x55	56.00	68.14	20.01	71.02
1250A	1-6x75	42.25	50.95	16.16	53.45
1600A	1-6x102	31.94	38.53	13.16	40.72
2000A	1-6x140	24.11	28.84	10.80	30.80
2500A	1-6x175	19.97	23.91	9.48	25.72
3200A	2-6x102	15.97	19.27	6.58	20.36
4000A	2-6x140	12.06	14.42	5.40	15.40
5000A	2-6x175	9.99	11.96	4.74	12.86
6300A	3-6x160	7.22	8.57	3.33	9.19

Electrical Characteristics of Busducts

Line-to-Line Voltage Drop at 50Hz (Aluminium Busduct)

Ampere(A)	Conductor(mm)	(Unit : V/m)		
		1.00*	0.90*	0.80*
250A	1-6x30	0.0856	0.0828	0.0764
400A	1-6x40	0.1037	0.1009	0.0934
630A	1-6x60	0.11	0.1079	0.1003
800A	1-6x80	0.1058	0.1045	0.0975
1000A	1-6x100	0.1068	0.1062	0.0993
1250A	1-6x125	0.1078	0.1079	0.1013
1600A	1-6x150	0.1172	0.118	0.111
2000A	1-6x200	0.1129	0.115	0.1087
2500A	1-6x250	0.116	0.1193	0.1133
3200A	2-6x150	0.1172	0.118	0.111
4000A	2-6x200	0.1129	0.115	0.1087
4500A	2-6x250	0.116	0.1193	0.1133
5000A	3-6x200	0.0941	0.0958	0.0906
6300A	3-6x250	0.0974	0.1002	0.0952

*Power Factor

Line-to-Line Voltage Drop at 50Hz (Copper Busduct)

Ampere(A)	Conductor(mm)	(Unit : V/m)		
		1.00*	0.90*	0.80*
400A	1-4x40	0.0955	0.0918	0.0845
630A	1-6x40	0.1012	0.103	0.0974
800A	1-6x50	0.1039	0.1064	0.1009
1000A	1-6x55	0.118	0.1213	0.1152
1250A	1-6x75	0.1103	0.1145	0.1092
1600A	1-6x102	0.1068	0.112	0.1073
2000A	1-6x140	0.0999	0.1062	0.1024
2500A	1-6x175	0.1035	0.1111	0.1075
3200A	2-6x102	0.1068	0.112	0.1073
4000A	2-6x140	0.0999	0.1062	0.1024
5000A	2-6x175	0.1035	0.1111	0.1075
6300A	3-6x160	0.0935	0.1	0.0966

*Power Factor

Voltage Drop Calculation Formula
$\Delta V = \sqrt{3} \times IL \{R (AC) \cos\phi + X \sin\phi\}$
Where: ΔV: Line-to-line Voltage Drop
IL: Rated Current
R(AC): AC Resistance at Rated Current (μΩ/m)
X: Reactance (μΩ/m)
Sinø: $\sqrt{(1 - \cos^2\phi)}$
Cosø: Load Power Factor