

**Nonsegregated Phase 600V—
Bus Run Section**



End View



1.1 Medium Voltage Busway—Nonsegregated Phase Bus

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Nonsegregated Phase 600V, 10 kV BIL–5 kV, 60 kV BIL–15 kV, 95 kV BIL–38 kV, 170 kV BIL



Typical 5/15 kV Bus Run Section



End View

Application Description

Eaton’s nonsegregated phase bus runs are designed for use on circuits whose importance requires greater reliability than power cables provide. Typical of such applications are the connections from transformers to switchgear assemblies in unit substations, connections from switchgear assemblies to rotating apparatus, and tie connections between switchgear assemblies. Nonsegregated phase bus is an assembly of bus conductors with associated connections, joints and insulating supports confined within a metal enclosure without interphase barriers. The conductors are adequately separated and insulated from each other and ground by insulating bus supports. Each conductor for 2400V service and above is insulated with a fluidized bed epoxy coating throughout that reduces the possibility of corona and electrical tracking.

Features, Benefits and Functions

Ease of Installation

Because of its compact dimensions, relative light weight and user-friendly design, nonsegregated phase bus is easily installed. The inherent rigidity of the design permits hanging rods to be spaced approximately every 4 ft (1.2m) for indoor bus runs, and allows supporting frames to be spaced approximately every 8 ft (2.4m) for outdoor runs. Standard length of bus run sections is 100 inches (2540 mm) or less.

Short-Circuit Force Withstand Ability

Nonsegregated phase bus runs in 600V, 5 kV and 15 kV are designed to withstand three-phase and phase-to-ground short-circuit current of 78 kA rms asymmetrical (132 kA peak) for 10 cycles and 50 kA rms symmetrical for 2 seconds. Momentary 4-cycle withstand ratings up to 158 kA peak (98.8 kA rms asymmetrical) are also available. For 27 kV nonsegregated phase bus runs, short-circuit withstand ratings of 64 kA rms asymmetrical (108 kA peak) for 10 cycles and 40 kA rms symmetrical for 2 seconds are standard.

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Construction

Enclosures are fabricated from 11-gauge aluminum, and are welded for maximum rigidity. 11-gauge steel and stainless steel are options. Removable covers are secured with bolts for ease of access when making joints and subsequent and periodic inspection.

Enclosures are painted with a baked-on polyester powder coat paint system resulting in a very durable finish with uniform thickness and gloss. This cosmetically pleasing finish minimizes the risk of problems in harsh environments. The standard color is ANSI-61 light gray, and special paint colors are available upon request. Stainless steel hardware option is available.

Expansion joints are supplied in all straight bus runs at approximately 50 ft (15.2m) intervals to allow for the expected expansion when the conductors are energized and are carrying rated current.

A variety of terminations is available to accommodate most termination requirements. Bus runs can be terminated with flexible shunts, potheads, porcelain bushings, or conductor stub ends for connection to riser bars in switchgear assemblies.

Conductors

All conductors are 100% conductivity copper bars. Bus joints are made by solidly bolting the bus bars together with splice plates on each side. All joint surfaces are silver-plated to ensure maximum conductivity through the joint. Tin-plating is also available. After bolting, each standard joint is covered by a preformed, flame-retardant insulating boot, providing full insulation for bus conductors. These boots are easily removable for inspection of the joints at any future time.

Temperature Rise

The bus will be capable of carrying rated current continuously without exceeding a conductor temperature rise of 65°C above an outside ambient temperature of 40°C, as required by ANSI Standard C37.23.

Standards and Certifications

The metal-enclosed bus runs are designed for 600V, 5 kV, 15 kV, 27 kV and 38 kV service in accordance with ANSI C37.23. 600V, 5 kV and 15 kV bus is available with continuous current ratings of 1200, 2000, 3000, 3200 or 4000A. 27 kV and 38 kV bus is available in 1200 and 2000A continuous ratings.

Tests

The design of nonsegregated bus runs has been tested per ANSI C37.23. Certification of momentary current testing, impulse testing and heat rise are available upon request.

Seismic Application

Bus run assemblies are designed to meet Uniform Building Code (UBC) and California Code Title 24 for Seismic Zones 4, 3, 2A, 2B, 1 and 0. Complete guidelines for proper supports are provided on each seismic specified order.

Additional Information

- Technical Data: TD01702001E
- Brochure: BR01702001E
- Final Fit Program: SA01702001E
- *Consulting Application Guide*, CA08104001E

Technical Data and Specifications

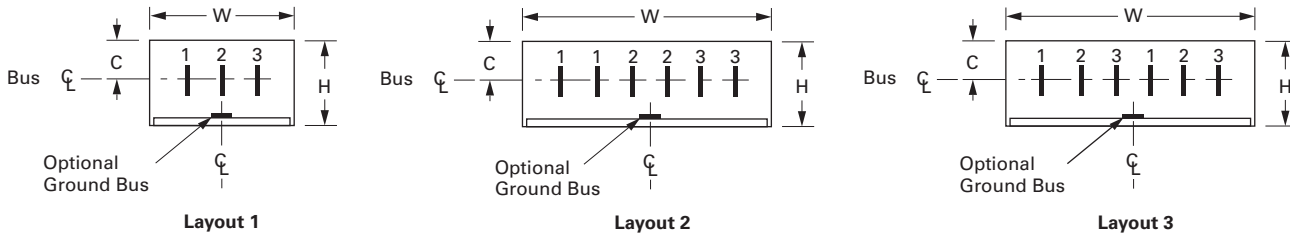
Available Nonsegregated Bus Ratings per ANSI/IEEE Standard C37.23-1987

Rated Maximum Voltage kV rms	Rated Power Frequency Hz	Power Frequency Withstand 1 Min. Dry kV rms	Impulse Withstand (1.2 x 50 microsec) kV Peak	Rated Continuous Current Amperes	Rated Short-Time Short-Circuit Withstand Current (kA rms Symmetrical)		Rated Momentary Short-Circuit Withstand Current 10 Cycle	
					2 Sec.	1 Sec. ①	kA Peak	kA rms Asym.
0.635	60	2.2	10	1200	49	69	132 ②	78 ②
				2000				
				3000				
				4000				
				5000				
0.635	60	2.2	10	1200	63	89	170	100.8
				2000				
				3000				
				3200				
4.76	60	19	60	1200	49	—	132	78
				2000				
				3000				
				4000				
				5000				
4.76	60	19	60	1200	63	—	170	100.8
				2000				
				3000				
				3200				
8.25	60	36	95	1200	41	—	111	66
				2000				
				3000				
				4000				
				5000				
8.25	60	36	95	1200	63	—	170	100.8
				2000				
				3000				
				3200				
15	60	36	95	1200	48	—	130	77
				2000				
				3000				
				4000				
				5000				
15	60	36	95	1200	63	—	170	100.8
				2000				
				3000				
				3200				
27	60	60	125	1200	40	—	108	64
				2000				
38	60	80	170	1200	40	—	104	64
				2000				
				3000				
				3200				
				4000				
				5000				

Notes

- ① This is a value calculated from 2 second short-circuit current withstand rating based on relationship $I^2t = \text{constant}$.
- ② For 600V application, 4-cycle momentary current withstand rating up to 158 kA peak (98.8 kA rms asymmetrical) is also available.

Medium Voltage Nonsegregated Phase Bus—Standard Configurations



Bus Duct Rated 49 kA rms Symmetrical 2 Seconds

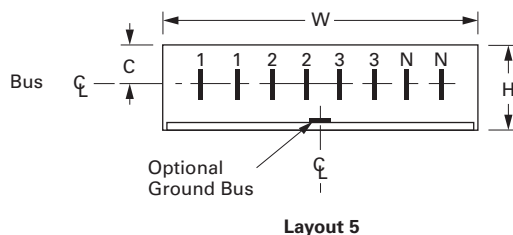
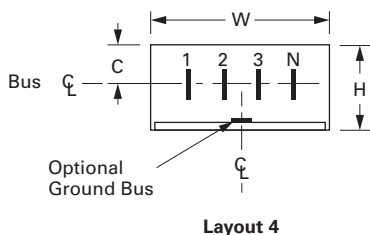
Wire	Voltage (kV) ①	Ampere Rating	Layout Number	Width	Height	Conductor Centerline	Conductor Size	Phase-Phase Conductor Spacing	Bracing Supports ②	Optional Ground Bus	Average Weight Per Foot Lbs (kg) ③	Standards Listing
Aluminum Enclosures												
3	0.635/5/15	1200	1	20.00	17.38	8.13	(1) 0.5 x 3	5.38	Glass polyester	0.25 x 2	38 (17)	CSA
	0.635/5/15	2000	1	20.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 2	47 (21)	CSA
	0.635/5/15	3000	1	20.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 2	68 (31)	CSA
	0.635/5/15	3200	1	20.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 2	68 (31)	—
	0.635/5/15	4000	2	35.75	17.38	8.13	(2) 0.5 x 6	5.38	Glass polyester	0.25 x 2	101 (46)	CSA
	0.635/5/15	5000	2	35.75	17.38	8.13	(2) 0.5 x 8	5.38	Glass polyester	0.25 x 2	118 (54)	CSA
4	0.635/5/15	1200	4	26.00	17.38	8.13	(1) 0.5 x 3	5.38	Glass polyester	0.25 x 2	48 (22)	CSA
	0.635/5/15	2000	4	26.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 2	60 (27)	CSA
	0.635/5/15	3000	4	26.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 2	88 (40)	—
	0.635/5/15	3200	4	26.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 2	88 (40)	—
	0.635	4000	5	35.75	17.38	8.13	(2) 0.5 x 6	4.00	Glass polyester	0.25 x 2	127 (58)	—
Steel Enclosures (Steel, Stainless Steel and Galvanized Steel)												
3	0.635/5/15	1200	1	20.00	17.38	8.13	(1) 0.5 x 3	5.38	Glass polyester	0.25 x 2	58 (26)	CSA
	0.635/5/15	2000	1	20.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 2	67 (30)	CSA
	0.635/5/15	3000	1	20.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 2	106 (48)	—
	0.635/5/15	3200	1	20.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 2	106 (48)	—
	0.635/5/15	4000	2	35.75	17.38	8.13	(2) 0.5 x 8	5.38	Glass polyester	0.25 x 2	154 (70)	—
	0.635/5/15	5000	3	35.75	17.38	8.13	(2) 0.5 x 8	5.38	Glass polyester	0.25 x 2	154 (70)	—
4	0.635/5/15	1200	4	26.00	17.38	8.13	(1) 0.5 x 3	5.38	Glass polyester	0.25 x 2	72 (33)	CSA
	0.635/5/15	2000	4	26.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 2	84 (38)	CSA
	0.635/5/15	3000	4	26.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 2	124 (56)	—
	0.635/5/15	3200	4	26.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 2	124 (56)	—
	0.635	4000	5	35.75	17.38	8.13	(2) 0.5 x 8	4.00	Glass polyester	0.25 x 2	188 (85)	—

Notes

- ① All phase conductors above 635V are fully insulated with epoxy insulation for the rated maximum voltage. Epoxy insulation is available at 600V as an option.
- ② Optional poly/porcelain or poly/epoxy bracing supports are available. Consult factory.
- ③ Add 3 lbs to the weights shown when using poly/porcelain or poly/epoxy support bracing.

For dimensions in mm, multiply inches by 25.4.

Medium Voltage Nonsegregated Phase Bus—Standard Configurations



Bus Duct Rated 63 kA rms Symmetrical 2 Seconds

Wire	Voltage (kV) ^①	Ampere Rating	Layout Number	Width	Height	Conductor Centerline	Conductor Size	Phase-Phase Conductor Spacing	Bracing Supports ^②	Ground Bus	Average Weight Per Foot Lbs (kg) ^③	Standards Listing
Aluminum Enclosures												
3	0.635/5/15	1200	1	20.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 3	48 (22)	CSA
	0.635/5/15	2000	1	20.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 3	48 (22)	CSA
	0.635/5/15	3000	1	20.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 3	78 (35)	CSA
	0.635/5/15	3200	1	20.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 3	78 (35)	—
	0.635/5/15	4000	2	35.75	17.38	8.13	(2) 0.5 x 6	5.38	Glass polyester	0.25 x 3	105 (48)	—
	0.635/5/15	5000	2	35.75	17.38	8.13	(2) 0.5 x 8	5.38	Glass polyester	0.25 x 3	121 (55)	—
4	0.635/5/15	1200	4	26.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 3	61 (28)	—
	0.635/5/15	2000	4	26.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 3	61 (28)	—
	0.635/5/15	3000	4	26.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 3	101 (46)	—
	0.635/5/15	3200	4	26.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 3	101 (46)	—
	0.635	4000	5	35.75	17.38	8.13	(2) 0.5 x 6	4.00	Glass polyester	0.25 x 3	128 (58)	—
	Steel Enclosures (Steel, Stainless Steel and Galvanized Steel)											
3	0.635/5/15	1200	1	20.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 3	68 (31)	—
	0.635/5/15	2000	1	20.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 3	68 (31)	—
	0.635/5/15	3000	1	20.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 3	89 (40)	—
	0.635/5/15	3200	1	20.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 3	89 (40)	—
	0.635/5/15	4000	2	35.75	17.38	8.13	(2) 0.5 x 6	5.38	Glass polyester	0.25 x 3	134 (61)	—
	0.635/5/15	5000	3	35.75	17.38	8.13	(2) 0.5 x 8	5.38	Glass polyester	0.25 x 3	160 (73)	—
4	0.635/5/15	1200	4	26.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 3	85 (39)	—
	0.635/5/15	2000	4	26.00	17.38	8.13	(1) 0.375 x 6	5.38	Glass polyester	0.25 x 3	85 (39)	—
	0.635/5/15	3000	4	26.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 3	115 (52)	—
	0.635/5/15	3200	4	26.00	17.38	8.13	(1) 0.5 x 8	5.38	Glass polyester	0.25 x 3	115 (52)	—
	0.635	4000	5	35.75	17.38	8.13	(2) 0.5 x 6	4.00	Glass polyester	0.25 x 3	188 (85)	—

Notes

- ① All phase conductors above 635V are fully insulated with epoxy insulation for the rated maximum voltage. Epoxy insulation is available at 600V as an option.
- ② Optional poly/porcelain or poly/epoxy bracing supports are available. Consult factory.
- ③ Add 3 lbs to the weights shown when using poly/porcelain or poly/epoxy support bracing.

For dimensions in mm, multiply inches by 25.4.

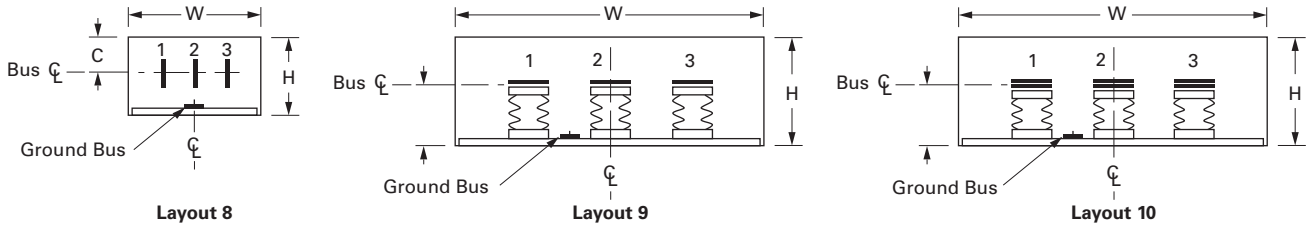
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Medium Voltage Busway

Medium Voltage Busway—Nonsegregated Phase Bus

1

27 kV/38 kV Nonsegregated Phase Bus—Standard Configurations



27 kV Bus Rated up to 108 kA Peak Momentary, 40 kA rms Symmetrical 2 Second

Wire Type	Rated Maximum Voltage kV ^①	Rated Cont. Current Amperes	Layout No.	Enclosure Material		Enclosure Size (Inches)			Number of Bars Ph and Size, Cu (Inches) ^①	Ph-Ph Bus Spacing (Inches)	Insulating Supports		Optional Ground Bus, Cu (Inches)	Approx. Average Weight per Foot Lbs (kg) ^③	Listing		
				Std.	Opt.	W	H	C			Std.	Opt. ^②			CSA	UL	
3	27	1200	8	Aluminum	—	30.00	21.13	10.00	(1) 0.25 x 4	7.00	④	⑤	⑥	0.25 x 2	37 (17)	Yes	No
	27	2000	8	Aluminum	—	30.00	21.13	10.00	(1) 0.50 x 4	7.00	④	⑤	⑥	0.25 x 2	49 (22)	Yes	No
	27	1200	8	—	Steel	30.00	21.13	10.00	(1) 0.25 x 4	7.00	④	⑤	⑥	0.25 x 2	37 (17)	Yes	No
	27	2000	8	—	Steel	30.00	21.13	10.00	(1) 0.50 x 4	7.00	④	⑤	⑥	0.25 x 2	49 (22)	Yes	No

38 kV Bus Rated up to 104 kA Peak Momentary, 40 kA rms Symmetrical 2 Second

Wire Type	Rated Maximum Voltage kV ^①	Rated Cont. Current Amperes	Layout No.	Enclosure Material		Enclosure Size (Inches)			Number of Bars Ph and Size, Cu (Inches)	Ph-Ph Bus Spacing (Inches)	Insulating Supports		Optional Ground Bus, Cu (Inches)	Approx. Average Weight per Foot Lbs (kg) ^③	Listing		
				Std.	Opt.	W	H	C			Std.	Opt. ^②			CSA	UL	
3	38	1200	9	Aluminum	—	40.25	21.50	11.00	(1) 0.25 x 4	10.50	Epoxy	—	—	0.25 x 3	61 (28)	Yes	No
	38	2000	10	Aluminum	—	40.25	21.50	11.00	(1) 0.38 x 4	10.50	Epoxy	—	—	0.25 x 3	89 (40.4)	Yes	No
	38	1200	9	—	Steel	40.25	21.50	11.00	(1) 0.25 x 4	10.50	Epoxy	—	—	0.25 x 3	88 (40)	No	No
	38	2000	10	—	Steel	40.25	21.50	11.00	(1) 0.38 x 4	10.50	Epoxy	—	—	0.25 x 3	116 (53)	No	No

Notes

- ① All bus bars for applications above 600V are fully insulated with fluidized epoxy coating for the rated maximum voltage.
- ② Check with Eaton for availability.
- ③ Add 3 lbs to the weights shown when using poly/porcelain or epoxy insulating supports in place of glass polyester.
- ④ Glass polyester.
- ⑤ Polyester/porcelain.
- ⑥ Epoxy.

For dimensions in mm, multiply inches by 25.4.

Medium Voltage Busway—Nonsegregated Phase Bus

Nonsegregated Phase Bus Electrical Properties and Watt Loss Data

Wire Type	Rated Max. Voltage kV	Cont. Rated Current Ampere	Conductor (Copper)				Enclosure	Size	Electrical Properties				$\mu\text{F/PH/FT}$ Cap to Grd Cg
			No./Ph	Thick Inch	Width Inch	Phase Arrang.			$\mu\text{OHM/PH/FT}$				
									DC R 20°C	60 Hz R	X_L	$Z = R + jX_L$	
3	0.635/5/15	1200	1	0.50	3.00	1-2-3	Aluminum	20.00 x 17.38	5.5	7.1	49.8	50.3	2.2
	0.635/5/15	2000	1	0.38	6.00	1-2-3	Aluminum	20.00 x 17.38	3.7	4.7	37.0	37.3	4.4
	0.635/5/15	3000	1	0.50	8.00	1-2-3	Aluminum	20.00 x 17.38	2.1	2.	31.1	31.3	5.9
	0.635/5/15	3200	1	0.50	8.00	1-2-3	Aluminum	20.00 x 17.38	2.1	2.7	31.1	31.3	5.9
3	0.635/5/15	4000	2	0.50	6.00	1-1-2-2-3-3	Aluminum	35.75 x 17.38	1.4	1.8	35.6	35.6	5.9
	0.635/5/15	5000	2	0.50	8.00	1-1-2-2-3-3	Aluminum	35.75 x 17.38	1.0	1.3	32.9	32.9	7.8
	0.635/5/15	1200	1	0.50	3.00	1-2-3	Steel	20.00 x 17.38	5.5	7.1	49.8	50.3	2.2
	0.635/5/15	2000	1	0.38	6.00	1-2-3	Steel	20.00 x 17.38	3.7	4.7	37.0	37.3	4.4
3	0.635/5/15	3000	1	0.50	8.00	1-2-3	Steel	20.00 x 17.38	2.1	2.7	31.1	31.3	5.9
	0.635/5/15	3200	1	0.50	8.00	1-2-3	Steel	20.00 x 17.38	2.1	2.7	31.	31.	5.9
	0.635/5/15	4000	2	0.50	8.00	1-1-2-2-3-3	Steel	35.75 x 17.38	1.0	1.3	32.9	32.9	7.8
	0.635/5/15	5000	2	0.50	8.00	1-2-3-1-2-3	Steel	35.75 x 17.38	1.0	1.3	14.6	14.6	7.4
4	0.635/5/15	1200	1	0.50	3.00	1-2-3-N	Aluminum	26.00 x 17.38	5.5	7.1	49.8	50.3	1.5
	0.635/5/15	2000	1	0.38	6.00	1-2-3-N	Aluminum	26.00 x 17.38	3.7	4.7	37.0	37.3	3.1
	0.635/5/15	3000	1	0.50	8.00	1-2-3-N	Aluminum	26.00 x 17.38	2.1	2.7	31.1	31.3	4.1
	0.635/5/15	3200	1	0.50	8.00	1-2-3-N	Aluminum	26.00 x 17.38	2.1	2.7	31.1	31.3	4.1
	0.635	4000	2	0.50	6.00	1-1-2-2-3-3-N-N	Aluminum	35.75 x 17.38	1.4	1.8	35.6	35.6	4.9
4	0.635/5/15	1200	1	0.50	3.00	1-2-3-N	Steel	26.00 x 17.38	5.5	7.1	49.8	50.3	1.5
	0.635/5/15	2000	1	0.38	6.00	1-2-3-N	Steel	26.00 x 17.38	3.7	4.7	37.0	37.3	3.1
	0.635/5/15	3000	1	0.50	8.00	1-2-3-N	Steel	26.00 x 17.38	2.1	2.7	41.1	41.2	4.1
	0.635	3200	1	0.50	8.00	1-2-3-N	Steel	26.00 x 17.38	2.1	2.7	41.1	41.2	4.1
	0.635	4000	2	0.50	8.00	1-1-2-2-3-3-N-N	Steel	35.75 x 17.38	1.0	1.3	32.9	32.9	6.6
3	27	1200	1	0.25	4.00	1-2-3	Aluminum	30.00 x 21.00	8.3	10.6	51.6	52.7	1.7
	27	2000	1	0.50	4.00	1-2-3	Aluminum	30.00 x 21.00	4.1	5.3	24.8	25.4	1.7
	27	1200	1	0.25	4.00	1-2-3	Steel	30.00 x 21.00	8.3	10.6	51.6	52.7	1.7
	27	2000	1	0.50	4.00	1-2-3	Steel	30.00 x 21.00	4.1	5.3	24.8	25.4	1.7
3	38	1200	1	0.25	4.00	1-2-3	Aluminum	40.25 x 21.50	8.3	10.6	61.3	62.3	2.0
	38	2000	2	0.38	4.00	1-2-3	Aluminum	40.25 x 21.50	4.1	5.3	59.0	59.2	2.0
	38	1200	1	0.25	4.00	1-2-3	Steel	40.25 x 21.50	8.3	10.6	61.3	62.3	2.0
	38	2000	2	0.38	4.00	1-2-3	Steel	40.25 x 21.50	4.1	5.3	59.0	59.2	2.0

Note

For dimensions in mm, multiply inches by 25.4.

1.1

Medium Voltage Busway

Medium Voltage Busway—Nonsegregated Phase Bus

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