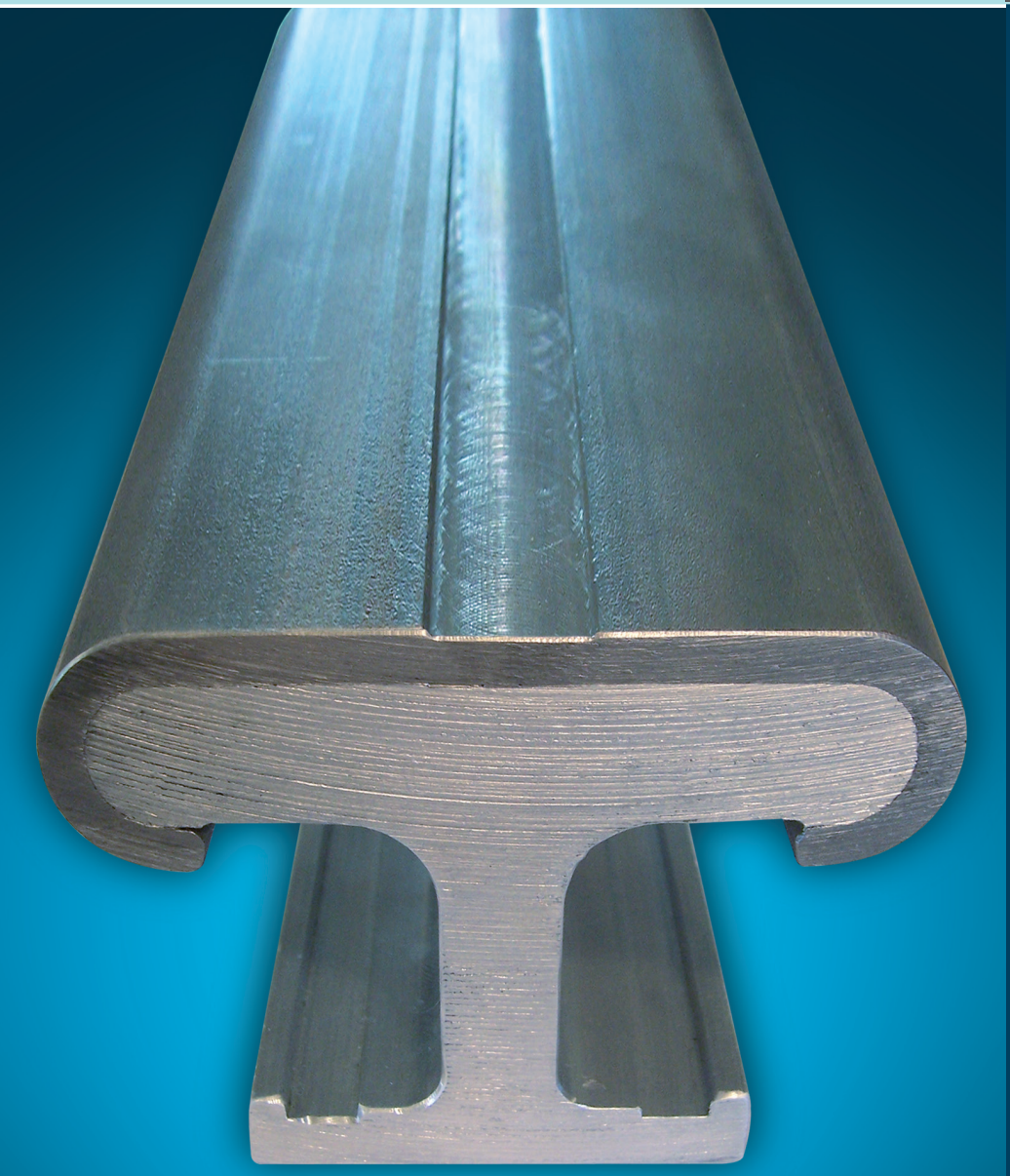
HJBar

Engineered Conductor System

TransTech™
POWER TRANSFER SYSTEMS



- **Superior Strength and Durability**
- **High Current Capacity**
- **Low Maintenance**
- **Engineered for Harsh Environments**
- **Lightweight and Compact**
- **Easy Installation Using Common Hand Tools**

Coke Oven Door Machine

Features

- Patented manufacturing process ensures low electrical resistance between aluminum and stainless steel components through continuous contact pressure
- Full range of standard components including hangers, anchors, feeders, splice joints, expansion joints, isolation joints and collector assemblies
- Service-proven stainless steel cap design yields high strength without shifting or peeling from the aluminum bar, even under extreme loads
- Hard 3/16" thick stainless steel running surface for extended life under continuous use
- Systems are engineered to customer specifications, including system layout and installation support
- No cleaning or conditioning of the conductor surface required for infrequent use situations

Moving Electrification Forward

Hybrid Aluminum/Stainless Steel Conductor System

HJ-Bar combines the high conductivity of aluminum with the corrosion resistance and durability of a stainless steel cap into a single conductor bar. Unlike other aluminum/steel designs that use aluminum conductors bolted to standard steel rail to improve electrical performance, HJ-Bar optimizes the aluminum/steel electrical interface through a proprietary manufacturing process that provides continuous contact pressure along the entire length of the rail. This design results in a lightweight, durable and low-maintenance conductor rail. Systems are available with ratings of 1750, 2500, 4000 and 6000 amperes. Larger systems are available upon request.

Features

- Patented manufacturing process ensures low electrical resistance between aluminum and stainless steel components through continuous contact pressure
- Full range of standard components including hangers, anchors, feeders, splice joints, expansion joints, isolation joints and collector assemblies
- Service-proven stainless steel cap design yields high strength without shifting or peeling from the aluminum bar, even under extreme loads
- Hard 3/16" thick stainless steel running surface for extended life under continuous use
- Systems are engineered to customer specifications, including system layout and installation support
- No cleaning or conditioning of the conductor surface required for infrequent use situations
- 1750, 2500, 4000 and 6000 amp capacities available
- AC or DC voltages up to 4160V based on insulator selection
- 30 foot standard rail lengths. custom lengths available
- Compatible with the corresponding 'H' and 'HC' conductor bar system components
- Suitable for top-running, under-running and side-running installations, with both tracking and non-tracking collectors

Project Engineering and On-Site Installation Support

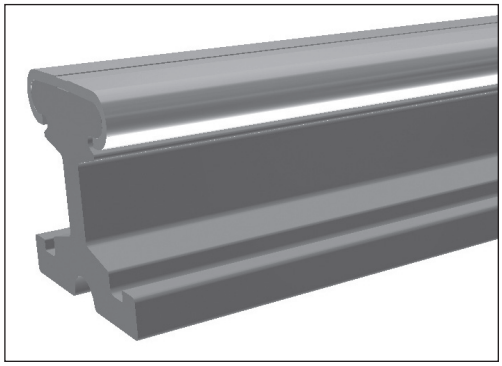
TransTech's engineers custom-configure our products and systems to meet each customer's unique application requirements. We provide on-site technical installation support and layout drawings to our customers and their installation teams.

HJ Bar Dimensions

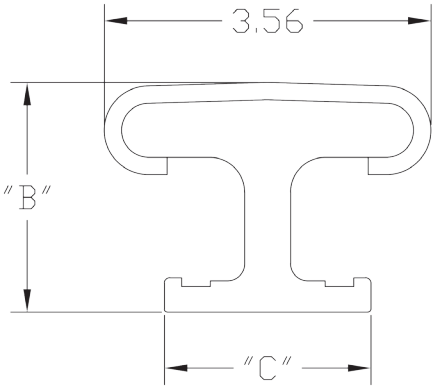
Series	A (in.)	B (in.)	Wt./Ft.
1750	2.50	2.25	7.3
2500	3.25	3.75	9.5
4000	4.00	4.50	12.2
6000	5.00	5.50	16.4

STANDARD COMPONENTS — System - Series				
Component	**1750 Amps**	**2500 Amps**	**4000 Amps**	**6000 Amps**
Conductor Bar	106199	300050	300075	300100
Hanger Assembly	106126	106127	106128	106129
Hanger Assembly (dual insulator)	107826	107827	107828	107829
Splice Joint Assembly (friction)	106132	106134	106136	106137
Splice Joint Assembly (bolt thru)	n/a	300055	300080	300105
Anchor Assembly (friction)	106141	106142	106143	106144
Anchor Assembly (bolt thru)	n/a	300070	300095	300120
Isolating Joint Assembly (friction)	106146	106147	106148	106149
Isolating Joint Assembly (bolt thru)	n/a	300060	300085	300110
Fixed Expansion Joint	106152	106153	106155	106157
Feeder Assembly (friction)	106173	106174	107949	106178
Feeder Assembly (bolt thru)	n/a	300065	300090	300115
Field Drilling Jig	n/a	300051	300076	300101

Conductor



The Aluminum/Stainless Steel HJ-Bar Conductor is designed for main runway or cross travel applications. It may be mounted with the conductor surface in any plane. Under or side running are the most common mounting positions. The"H" configuration was selected for its structural strength allowing maximum hanger spacing, thereby reducing installation costs. The conductor is supplied in maximum 30 foot lengths. Shorter lengths are available (5 foot minimum) in one foot increments to coincide with your runway length requirements.



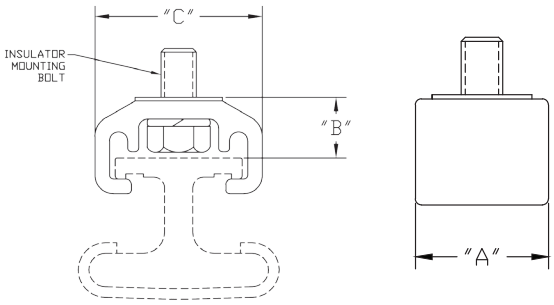
System Ampere Rating	Conductor Cat. No.	A	B	C	Cross Sectional Area		Weight Lbs/Ft.	DC Resistance Ohms/ 1000 ft. at 20˚C.	AC Resistance Ohms/ 1000 ft. at 20˚ C.	Self Geometric Distance d s - Inches	Current Rating Amperes-Continuous 40˚ C. Ambient
					Sq. Inches	MCM					30˚ C. Rise
1750	106199	3.56	2.51	2.25	3.3	4250	7.3	0.0045	0.0069	1.357	1750
2500	300050	3.56	3.25	3.75	5.2	6650	9.5	0.0028	0.0051	1.680	2500
4000	300075	3.56	4.00	4.50	7.5	9590	12.2	0.0020	0.0040	2.003	4000
6000	300100	3.56	5.00	5.50	11.1	14120	16.4	0.0013	0.0031	2.411	6000

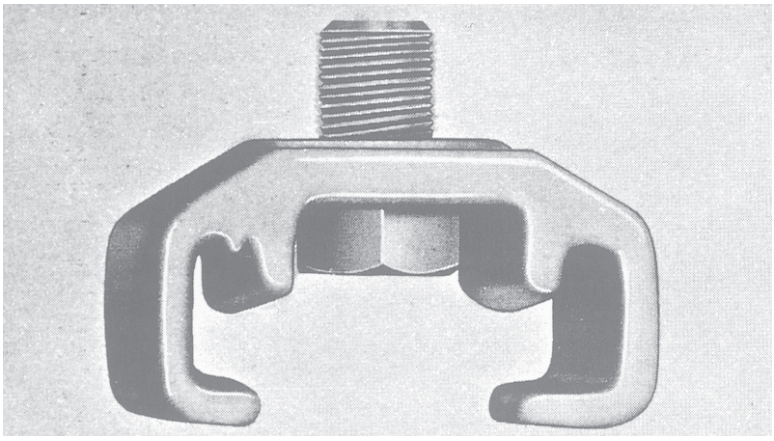
Hanger Assembly

The hanger assembly is used to support the conductor section with the aid of an insulator. The hanger is made of cast aluminum, nylon coated to assure free sliding during expansion and contraction of the conductor through the hanger. Conductor "lock-up" has been eliminated by this added feature. The hanger, like the conductor, may be mounted in any plane.

Insulator selection depends on the operating voltage of the system and the hanger bolt size.

Dual-Insulator supports also available.





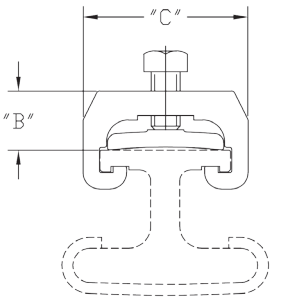
System	Hanger Cat. No.	A	B	C	Insulator Bolt	Maximum Support Centers Feet	Net Weight Lbs.
1750	106126	2	$1^{1}/_{16}$	$2^{7}/_{8}$	$^{5}/_{8}$-11 UNC	12	.31
2500	106127	3	$1^{3}/_{8}$	$4^{5}/_{8}$	$^{5}/_{8}$-11 UNC	14	1.2
4000	106128	$3^{1}/_{2}$	$1^{7}/_{8}$	$5^{7}/_{8}$	$^{5}/_{8}$-11 UNC	16	1.6
6000	Consult TransTech						

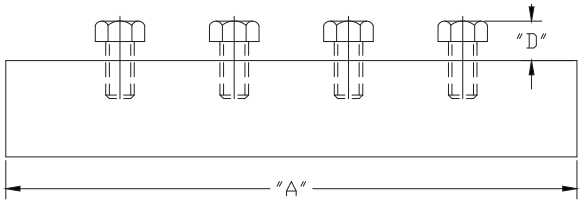
Splice Joint Assembly

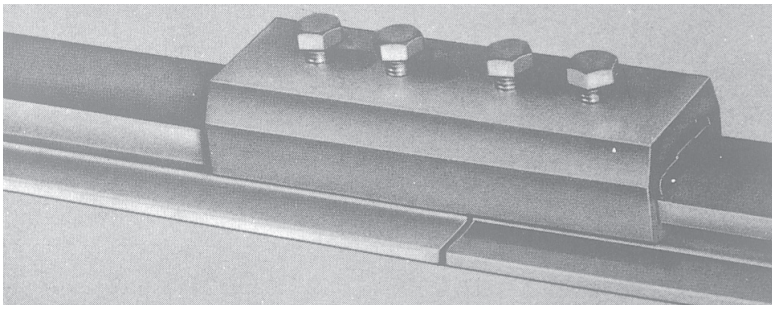
The splice joint assembly connects and aligns adjoining conductor sections without drilling or welding. Simplicity of the assembly requires only standard hex wrenches. Bolts secure a Belleville-spring-type, aluminum plate which insures the electrical connection.

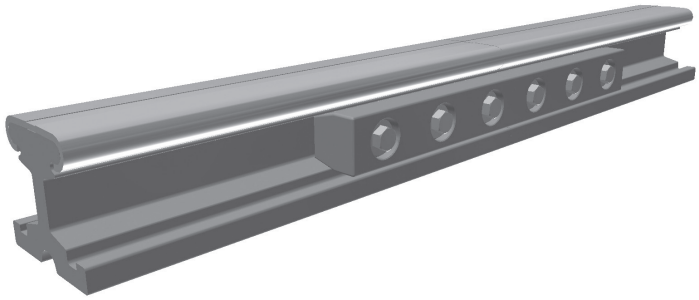
The aluminum splice joint has an electrical efficiency of greater than 100% when compared by the resistance test method (NEMA SG1-5.02) to an equal length of conductor.

Bolt through splice joints also available.









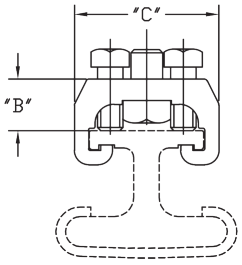
System	Splice Joint Cat. No.	A	B	C	D	Number of Bolts	Rating Amperes 30°C. Over 40°C.	Net Weight Lbs.
1750	106132	10	$1^{1}/_{16}$	$2^{7}/_{8}$	$^{5}/_{8}$	4	1750	2.8
2500	300055	Consult TransTech						
4000	300080	Consult TransTech						
6000	300105	Consult TransTech						

Anchor Assembly

Anchor assemblies are employed at one or more points in the system to secure the conductor to a fixed point from which the conductor can expand or contract through the hangers.

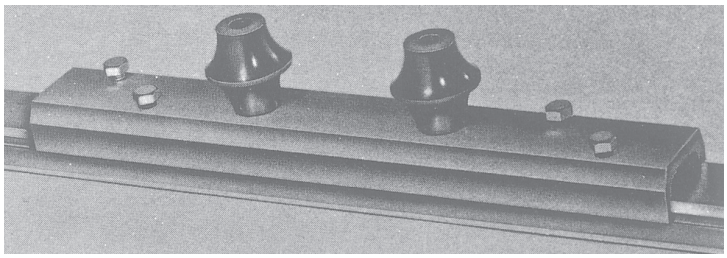
The assembly consists of an aluminum extrusion with bolts that securely clamp to the conductor.

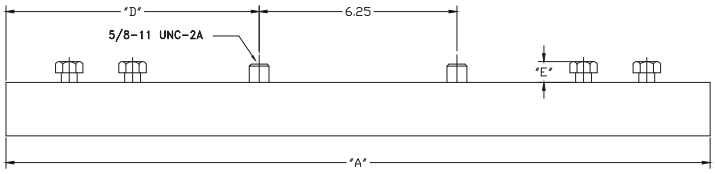
An anchor assembly replaces a hanger in the system and requires two mounting insulators.



Insulator selection depends on the operating voltage of the system and the anchor bolt size.

Bolt through anchor assembly also available.



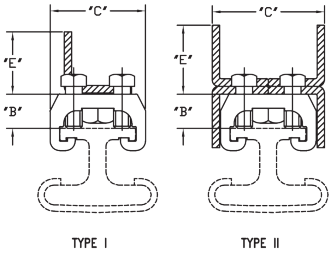


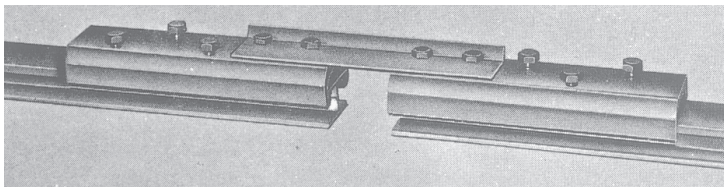
System	Anchor Cat. No.	A	B	C	D	E	Insulator Bolt	Net Weight Lbs.
1750	106141	21	4 1/2	2 7/8	7 3/8	5/8	5/8-11 UNC	5.2
2500	300070	Consult TransTech						
4000	300095	Consult TransTech						
6000	300120	Consult TransTech						

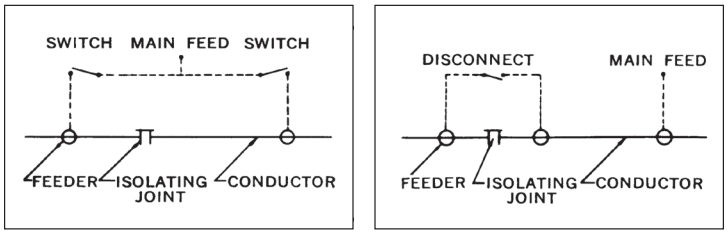
Isolating Joint Assembly

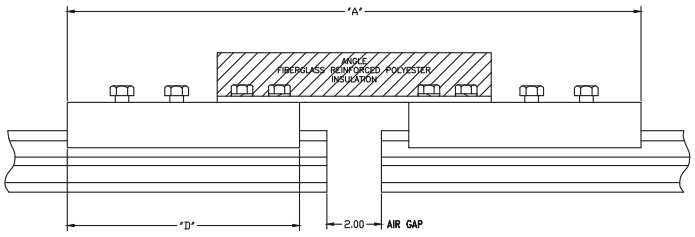
The Isolating Joint Assembly is used to insulate adjacent conductor sections from each other without interfering with collector travel. It allows portions of the system to be electrically disconnected while operations continue on other live sections. At installations where more than one crane will be operated on a single conductor system, the isolating joint is used to create maintenance and repair bays. The isolating joint may be inserted at any point on the system in place of a standard splice joint assembly. When installed, it assures correct alignment between adjacent conductors. There are two methods of feeding the conductor system at isolation joints. (See Diagram).

Each side can be fed individually through adequate safely switches or the isolation joint can be by-passed with the use of feeder assemblies and a suitable disconnect switch.





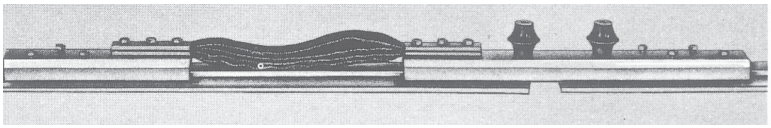


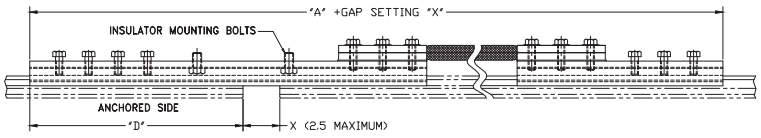


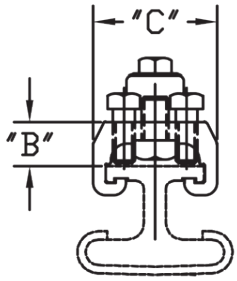
System	Isolating Joint Cat. No.	Type	A	B	C	D	E	Net Weight Lbs.
1750	106146	I	21	1 1/16	2 7/8	8 1/2	2	4.6
2500	300060	Consult TransTech						
4000	300085	Consult TransTech						
6000	300110	Consult TransTech						

Fixed Expansion Joint

Fixed expansion joints are sometimes necessary to accommodate building or supports structure expansion. Normal indoor installations do not require expansion joints if temperature ranges do not exceed 80˚F. Extreme variations in temperature will require expansion joints on longer systems. Electrical continuity is maintained through flexible copper shunts. Shunts are separated from the aluminum by use of bi-metal plates. Conductor gap setting is based on both the ambient temperature at the time of installation and the expected temperature variation to which the system will be exposed. Two insulators are required with each fixed expansion joint.





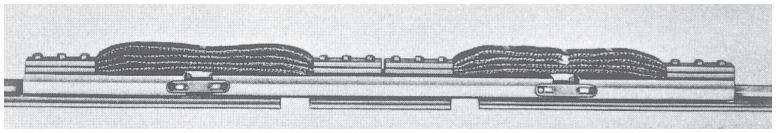


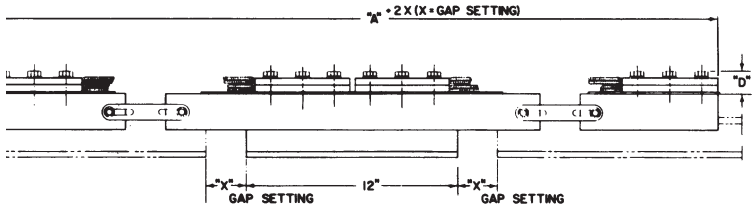
System	Expansion Joint Cat. No	Maximum Expansion (X) inches	A	B	C	D	Insulator Bolt	Rating Amperes 30˚C Over 40˚C	Recommended Max. System Length				Net Wt Lbs.
									Ft. Center Anchor		Segment Between Expansion Joints		
									Indoor	Outdoor	Indoor	Outdoor	
1750	106152	2 1/2	57	1 1/16	2 7/8	14 1/2	5/8-11 UNC	1750	Not required for normal installation	1500	---	250	19.9
2500	106153	2 1/2	63	1 3/8	4 1/2	18 1/2	5/8-11 UNC	2500		2000	---	400	45.9
4000	106155	2 1/2	66	1 13/16	5 25/32	20	5/8-11 UNC	4000		2500	---	400	55.2
6000	Consult TransTech												

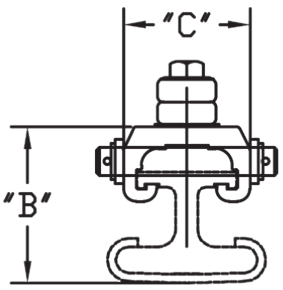
Floating Expansion Joint

Floating Expansion Joints are used only when the gap setting exceeds the fixed expansion joint capability. Electrical continuity is maintained through flexible copper shunts. Shunts are separated from the aluminum by use of bi-metal plates.

Conductor gap setting is based on both the ambient temperature at the time of installation and the expected temperature variation to which the system will be exposed. *NO insulators are required.*







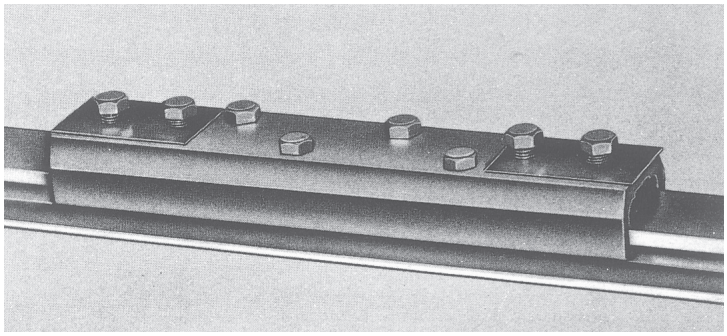
System	Expansion Joint Cat. No	Maximum Expansion (2X) inches	A	B	C	D	Rating Amperes 30˚C Over 40˚C	Net Wt Lbs.
1750	106165	5	56	3 5/16	3 13/16	1 3/8	1750	37.4
2500	106167	5	56	4 1/8	5 1/2	1 1/8	2500	67.4
4000	106169	5	60	5 13/32	6	1 1/8	4000	80.3
6000	Consult TransTech							

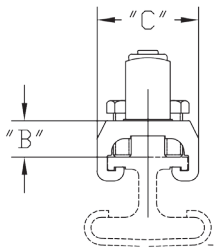
Feeder Assembly

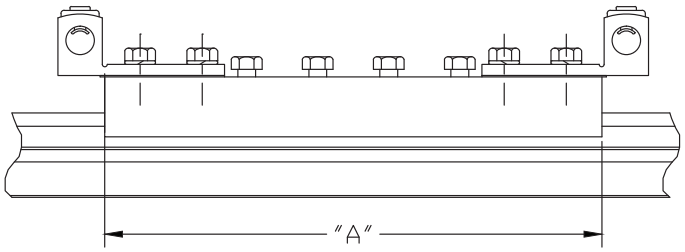
The Feeder Assembly provides the electrical connection from the power source to the conductor system. It may be located at any point within the system.

Long systems should locate the feeder near the center of the system. Feeders should be located no closer than 6 inches from the nearest component. Provisions are made for 1, 2, 3 or 4 feeder lugs. Lugs are *not* furnished with the assembly except by request. Feeders are tapped for standard NEMA type lugs. Bi-metal plates are provided to prevent electrolytic action between aluminum and the bronze or copper lug.

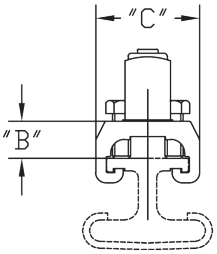
Bolt through feeder assembly also available.

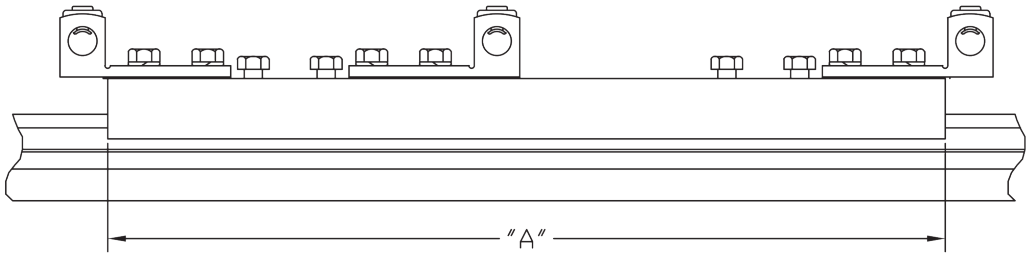




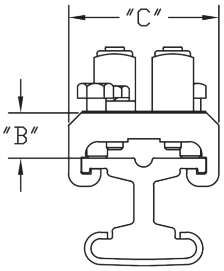


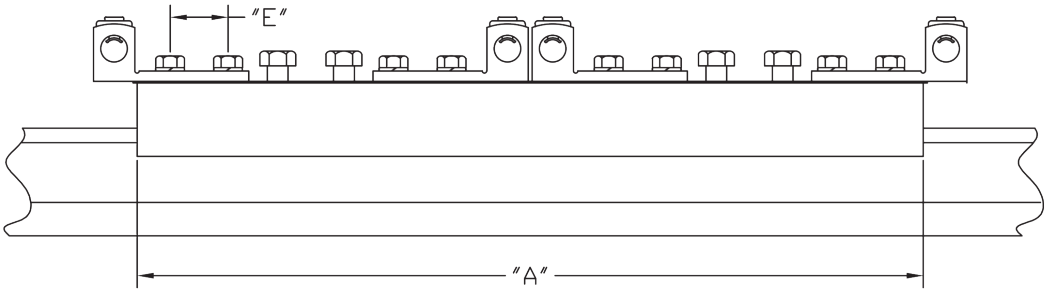
TYPE II





TYPE III





TYPE IV

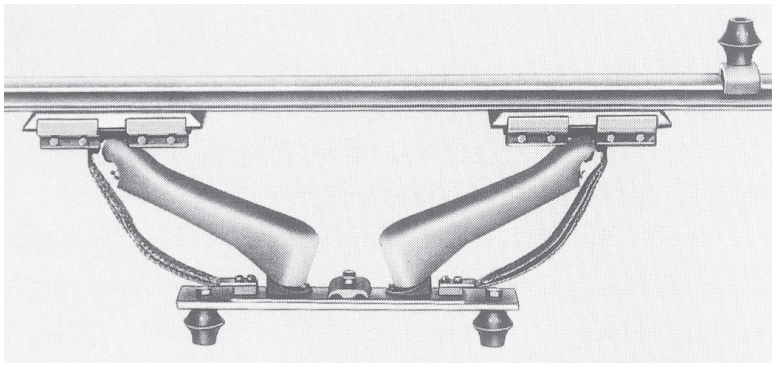
System	Feeder Cat. No	Type	A	B	C	Feeder Lug Provision			Rating Amperes 30˚C Over 40˚C	Net Wt Lbs.
						Quantity	Bolt Size	Bolt Spacing "E"		
1750	106173	III	23	$1^{1}/_{16}$	$2^{7}/_{8}$	3	$^{1}/_{2}$-13 UNC	$1^{3}/_{4}$	1750	5.7
2500	300065	Consult TransTech								
4000	300090	Consult TransTech								
6000	300115	Consult TransTech								

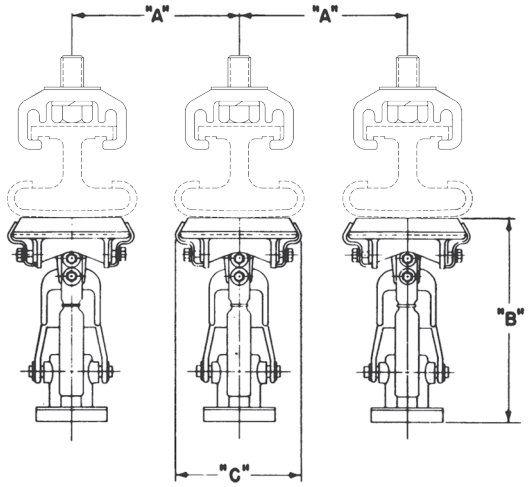
Collector Assembly

The collector assembly is used to pick up current from the conductor and transmit it to the crane. The contact shoe, which is in contact with the conductor, is made of a metal graphite composition which insures long shoe life without affecting conductor wear. The collector arms are of cast aluminum, and the assembly has provisions for varying the contact shoe pressure by means of an adjustable spring. The arm assembly provides for vertical misalignment while the shoe width accommodates for horizontal misalignment. The entire collector assembly can be mounted in any plane. Under or side running are the most common mounting positions.

Collectors can be provided with one, two, or four arms depending on the current requirements. Two insulators must be used with the one and two arm collector while four are required for the four arm unit. Normally, the same insulator used for the hangers would be employed.

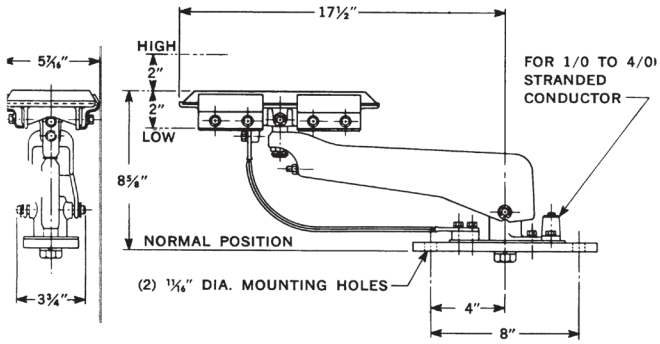
Collector arms, sub-assemblies, contact shoes, and other components are readily available and can be ordered separately, from the entire collector assembly.



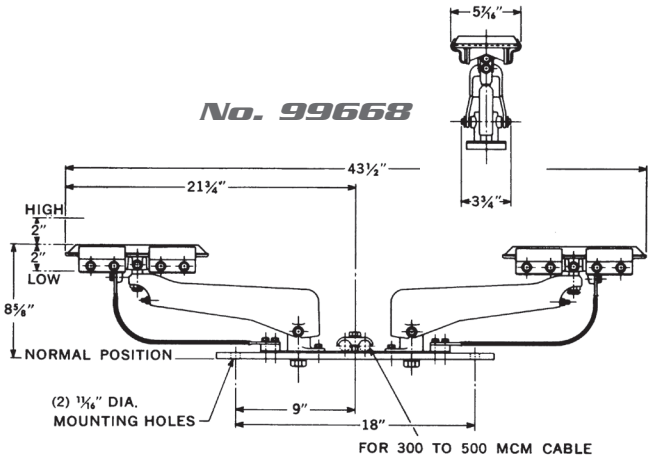


System	Collector Cat. No.	Rating Amperes 30˚C Over 40˚C	No. of Arms	A Min.	B	C	Net Weight Lbs.
1750	99833	1200	4	$6^{1}/_{2}$	$8^{5}/_{8}$	$5^{7}/_{16}$	116
2500	106394	2000	4	8	10	$6^{7}/_{16}$	125
4000	106394	2000	4	8	10	$6^{7}/_{16}$	125
6000	106394	2000	4	8	10	$6^{7}/_{16}$	125

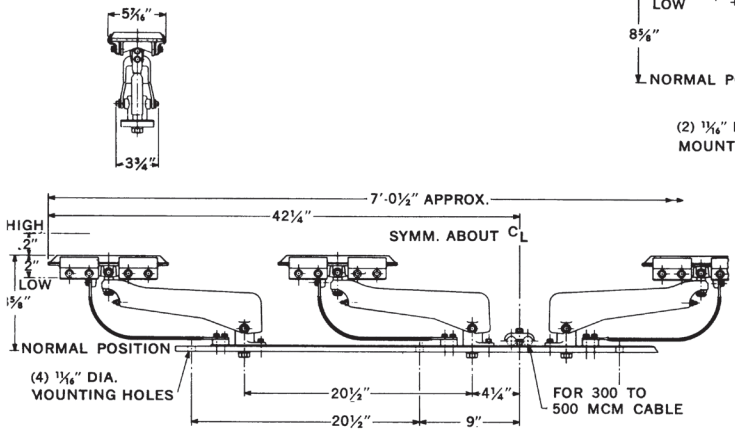
Current Rating		System Series					
		1750			2500 — 4000 — 6000		
		Single Arm (1)	Double Arm (2)	Four Arm (4)	Single Arm (1)	Double Arm (2)	Four Arm (4)
Catalog Number		99832	99668	99833	106391	106392	106394
Continuous Duty Amperes 40˚C Ambient	30˚C	250	600	1200	500	1000	2000
	40˚C	350	750	1500	650	1300	2800
	60˚C	1000	2200	4400	1200	2400	5000
	70˚C	1200	2500	5000	1500	3000	6000
Intermittent Duty Amperes 40˚C Rise Over 40˚C Ambient	1 Min - On 1 Min - Off	1050	2200	4400	1850	3600	7500
	5 Min - On 5 Min - Off	950	2000	4000	1700	3200	7000
	15 Min - On 15 Min - Off	600	1400	2800	1200	3000	6000



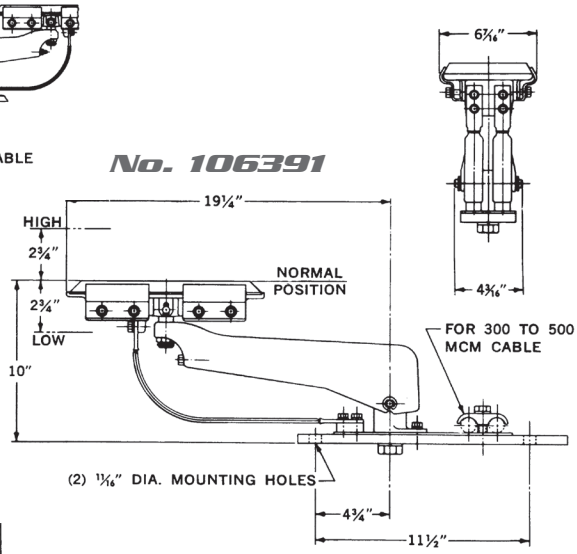
No. 99832



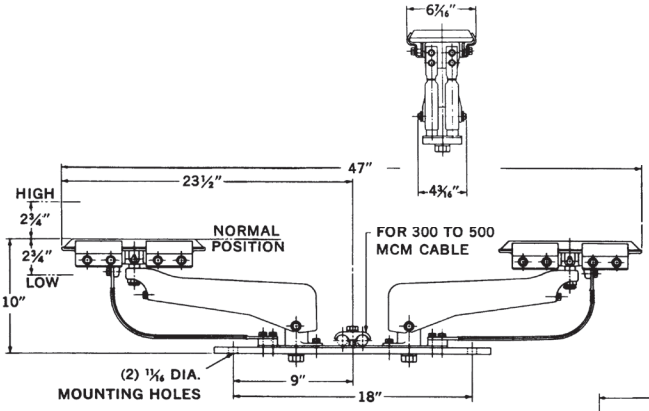
No. 99668



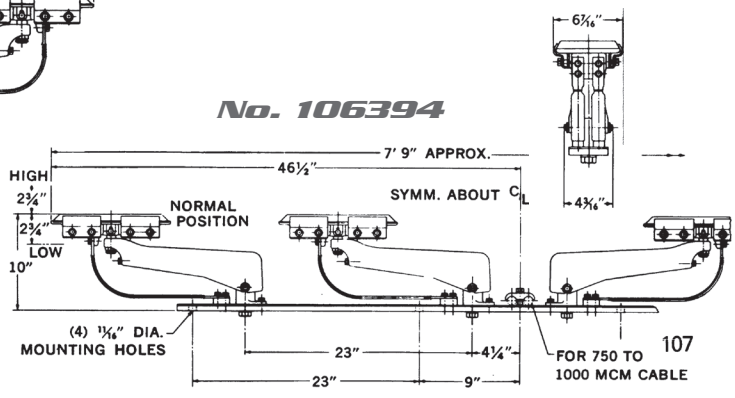
No. 99833



No. 106391



No. 106392



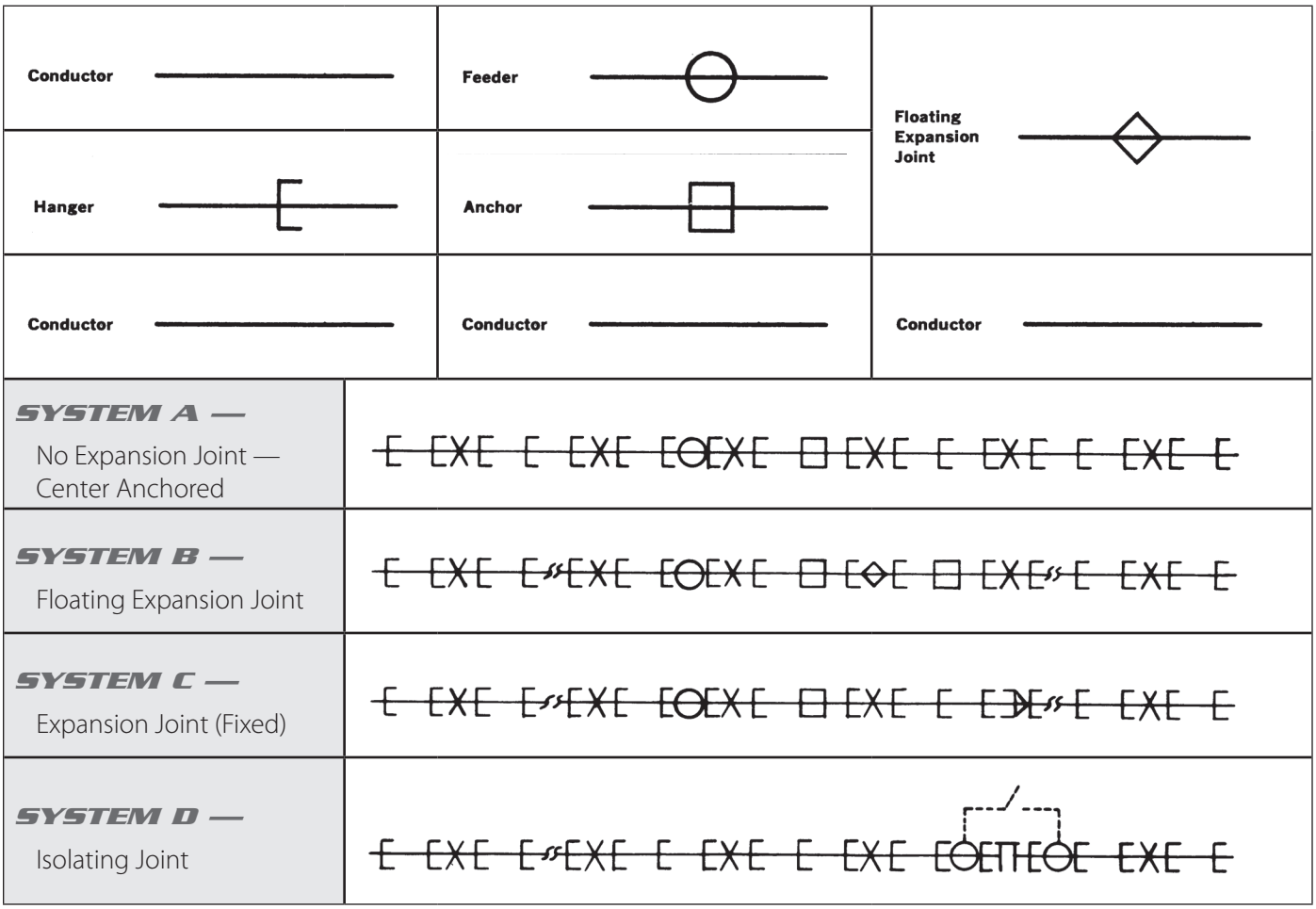
No. 106394

System Layout

The first step in preparing a system layout is to select the proper amperage conductor rating required for the installation. Once the conductor size has been selected the hanger support-centers for that particular size conductor may be selected from the chart shown with the hanger assembly. In order to determine if an expansion joint is required, refer to the fixed expansion joint chart. In the majority of installations none is required. This is due to the advanced design of the nylon coated hanger. In the event a building expansion joint occurs near mid-point in the system, a floating expansion joint assembly should be considered. Where no expansion joints are required the system should be anchored approximately in the center. The feeder assembly, if possible, should be located near the center of the system. This reduces the effective systems length "L" which is used in the formula to determine the proper conductor amperage rating. Feeders with provisions for one to four lugs may be selected from the feeder assemblies.

Careful attention must be given to mechanical clearances between components. All splice joints, expansion joints feeders, and isolation joints must be kept at a minimum of six (6) inches away from the nearest insulated hanger to insure free sliding of the conductor through the hanger.

The following symbols and example layouts are intended for a guide in preparing a layout. However, upon request Trans Tech will prepare an application layout to fit your requirements.



TECHNICAL DATA

CONDUCTOR SIZE CALCULATION

There are two accepted methods of determining the maximum ampere demand of one or more cranes on a single runway.

Method A

Maximum load equals the sum of all main and auxiliary hoist H.P. plus one-half ($^1/_2$) the sum of all bridge motor and trolley H.P.

Method B

Maximum load equals one-half ($^1/_2$) the sum of all motor and accessory H.P.

CALCULATION

Load H.P. (Method A or B) x amperes per H.P. (Table A) = maximum ampere demand.

Maximum ampere demand x crane factor (Table C) = adjusted maximum ampere demand.

VOLTAGE DROP CALCULATION

Symbols

VL = Line Voltage at Feeder (Source).

VD = Voltage Drop.

I = Load Amperes.

L = Effective System Length in Feet. Maximum distance from feeder to end of system.

RDC = D. C. Resistance-ohms/1000 feet.

K = Voltage Drop Multiplier. A factor derived from tests which accounts for variables such as A. C. resistance, inductive reactance, power factor, phase spacing, and conductor shape factors.

Formulas

Direct Current

$$VD = \frac{ILR_{DC}}{500}$$

Alternating Current - Three Phase
(80 percent Power Factor-Flat Spacing)
VD=I L K (Line to Line*)

*For Line to Neutral Voltage Drop divide by 1.73.

Voltage Regulation

$$\% \text{ Regulation} = \frac{VD}{VL-VD} \times 100$$

TABLE A Amperes Per Horsepower Conversion		
Current	**Voltage**	**Multiplier***
D.C.	115 230 600	8 4 1.6
A.C. (3ø)	110 220 440 550 2300	7.0 3.0 1.5 1.2 0.25
A.C. (2ø)	110 220 440 550 2300	6.0 2.6 1.3 1.1 0.21
*Average conversion factors calculated from National Electric Code Full Load Current Motor Charts. Motors built for especially low speeds or high torques may require more running current. In which case, name-plate or design current ratings should be used.		

TABLE C CRANE FACTOR (C^F)	
Current	**Multiplier***
1	1
2	0.95
3	0.91
4	0.87
5	0.84
*In the event there are two or more cranes operating on the same load side of the feeder, the multiplying factors shown in Table C would be applied to the maximum ampere demand calculated by Method A or B.	

Expansion Gap Setting Guide

The following chart is provided as a means of determining the initial expansion gap setting, depending upon application ambient conditions.

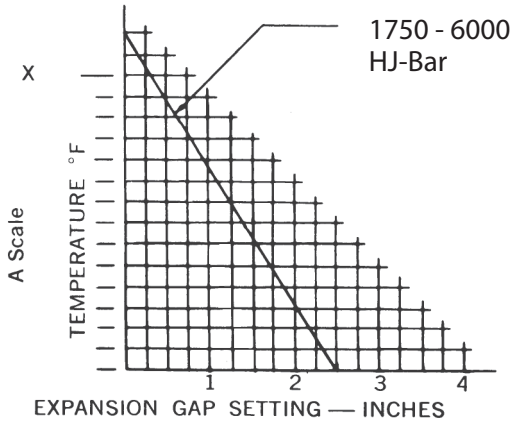
The chart should be used according to the following procedure:

(a) Select system under consideration and respective curve line, indicating maximum gap opening.

(b) Determine local ambient temperature rang: Example -20 to 100˚F.

(c) Starting at point X on A scale, write in the ambient range starting at highest expected ambient and decrease in 10 degree increments to the lowest expected ambient.

(d) Determine ambient temperature at time of gap setting. From the existing ambient temperature, A scale, read across to the appropriate curve and down to the gap setting. Adjust conductor accordingly.



GENERAL SPECIFICATIONS

The conductor-collector system shall be of the HJ-Bar Aluminum/Stainless Steel Series as manufactured by Trans Tech.

Each system shall consist of necessary conductor sections, hanger supports, insulators, anchor supports, expansion joints, collectors, and/or special components as determined from plans and specifications.

The conductor section shall be aluminum/stainless steel of HJ-Bar configuration. The conductor aluminum alloy shall have a minimum conductivity of 56% IACS and a current carrying capacity of (1750) (2500) (4000) (6000) amperes based on a 30˚C rise over 40°C ambient when operating in still, but unconfined air. The conductor shall have sufficient thermal capacity to withstand a 300% overload for intermittent duty cycles.

The conductor hangers shall be cast of high strength aluminum alloy. The hanger will be nylon coated to provide free conductor movement through the hanger to accommodate expansion or contraction of the conductor rail. Splice joints, anchors, feeders, and expansion joints shall be provided as required. These elements shall be manufactured from the same aluminum alloy as the conductor rail. The design shall be such that only bolting to the conductor is required; no drilling or welding of the rail at erection shall be necessary.

The splice joints, feeders, and expansion joints shall have an electrical efficiency of greater than 100 percent when compared by the resistance test method (NEMA SG 1-5.02) to an equal length of conductor.

The temperature rise of the accessory components shall not exceed the 30˚C rise of the conductor with which it is intended.

Insulators

The insulators shall be of the Red-Poly Type, molded from fiberglass reinforced polyester material, as manufactured by Trans Tech. The insulator shall have a dew flashover strength when tested per ABA Specification C29.1 of at least four (4) times normal system voltage.

The basic insulator material shall exhibit the following minimum performance levels when tested in accordance with American Society of Testing Materials Specifications. (ASTM)

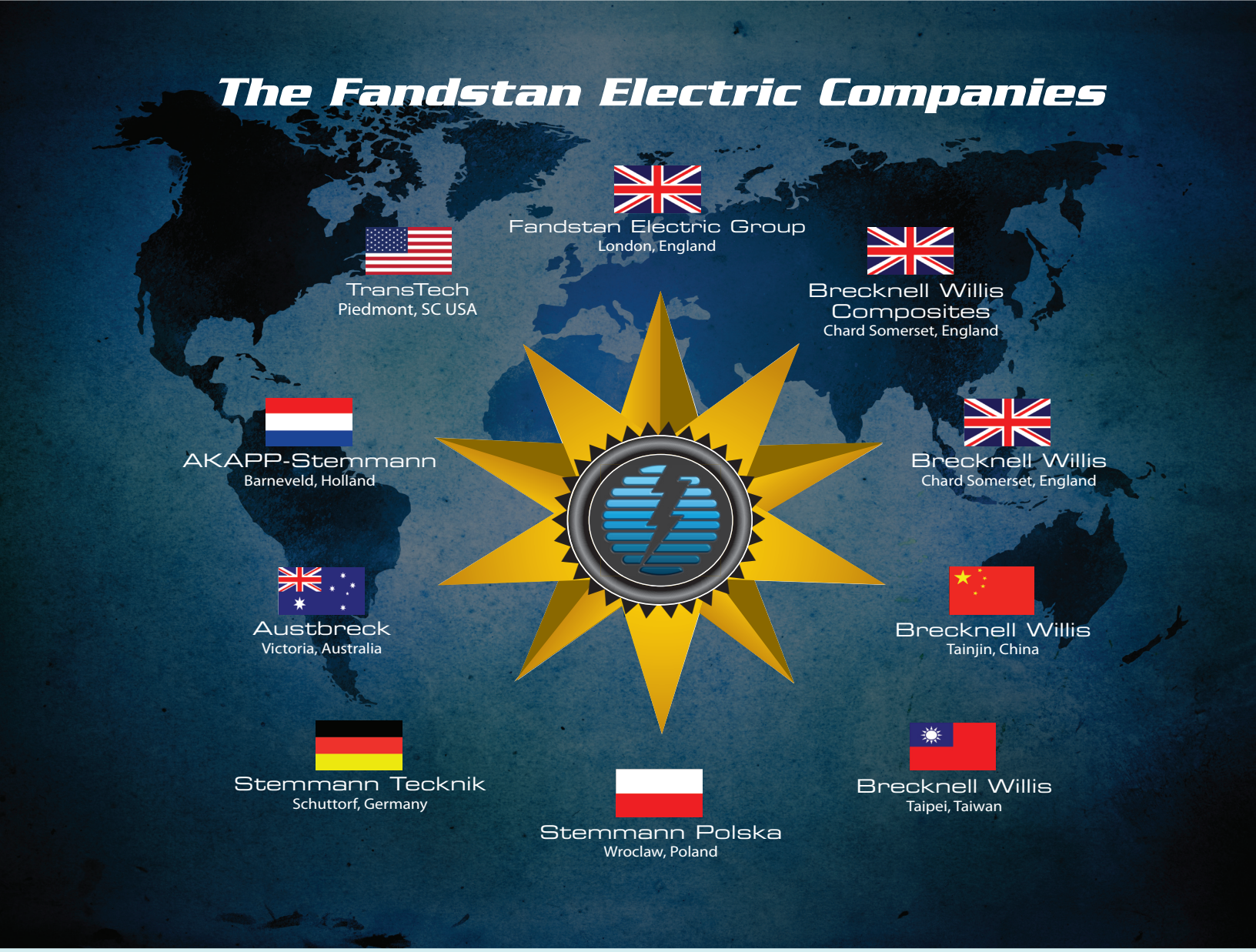
Property	Minimum	ASTM No.
Dielectric Strength	400VPM	D149
Arc Track Resistance	180 Seconds	D495
Flame Retardance	Self-Exting.	D635
Heat Distortion Temp. @ 264 psi	400˚F	D648
Dissipation Factor, 60N	.035	D150
Impact Strength, Ft-Lbs.	4	D256
Flexural Strength, psi	16,000	D790

Collectors

The collectors shall have a current carrying capacity of (250) (500) (600) (1000) (1200) (2000) amperes based on a 30°C rise over a 400 ambient when operated in still, but unconfined air. The collectors shall have sufficient thermal capacity to withstand a 300% overload for intermittent duty cycles. The collectors shall incorporate means of adjusting the contact pressure. The collector shall consist of a high strength aluminum arm which covers the collector spring.

Notes

The Fandstan Electric Companies



Fandstan Electric Group

The Fandstan Electric Group specializes in engineering solutions for the supply of electrical power and data to moving objects, both linear and rotary. Applications are as wide ranging as public mass transit, mobile cranes, industrial equipment, robots and wind turbines. The Group's Knowledge of the electrical interface is unrivalled. Fandstan is an independent, privately owned, electrical engineering group with major subsidiaries in Europe, America, Asia (including China) and Australia. The Group, which was founded in 1979, has grown both organically and by acquisition and now employs over 700 people, manufactures across four continents and sells throughout the world. The global positioning of the companies within the Group enables Fandstan Electric to supply close support to the customer and operator.

TransTech™
POWER TRANSFER SYSTEMS

The Leaders In Power Transfer Technology

TransTech is a subsidiary of Fandstan Electric, a global group of companies focusing on energy transfer systems with installations in over 100 countries. Working synergistically with our European sister companies such as Brecknell-Willis, Stemmann and AKAPP, we are able to leverage a broad product portfolio and a wealth of technical expertise. Our goal is to better serve our power transfer markets by continuing to provide solutions that improve product life, performance, and reliability.

TransTech
POWER TRANSFER SYSTEMS

709 Augusta Arbor Way
Piedmont, SC 29673

800.245.4552 ph | 864.422.9027 fx
transtech.com

A Fandstan Electric Company