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SPECIFICATION No. E-016

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January 30, 2017

REV. 8

GUAM POWER AUTHORITY  
P.O. BOX 2977  
HAGATNA, GUAM 96932

TRANSMISSION & DISTRIBUTION SPECIFICATION  
Specification No. E-016  
For

**CONDUCTOR CONNECTORS**

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### 1.0 SCOPE

- 1.1 This specification covers GPA requirements for the different types of overhead line connectors used in the Transmission and Distribution System of GPA.
- 1.2 The connectors are intended for use in tropical weather conditions with a corrosive sea air atmosphere, sustained winds of 155mph with gusts of 180mph and subject to moderate and severe earthquakes.

### 2.0 APPLICABLE PUBLICATION

The connectors shall meet the requirements of the following standards, including the latest revision with respect to material, design and tests.

- 2.1 AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)
  - 486B - Wire connections for use with aluminum conductors.
  - C119.4 - Connectors to use between aluminum-to-aluminum or aluminum-to-copper conductors.

### 3.0 DEVIATIONS AND NON-CONFORMANCE REQUIREMENTS

- 3.1 Deviations from this specification or changes in the material or design after the purchase order has been placed must be approved by the GPA Engineering Division and acknowledged by a Purchase Order Amendment issued by GPA.
- 3.2 Units received with deviations or non-conformances that are not acknowledged per Section 3.1 are subject to rejection. The Supplier of rejected units is responsible for any corrective action including but not limited to materials, labor and transportation necessary to dispose of or make the units conform to the specification.
- 3.3 Notification of defective units discovered before or after installation that are believed to be inherent to manufacturing problems or workmanship shall be made and forwarded to the Supplier. The description of the item, documentation of the problem and the described information, disposition and/or follow-up (as appropriate) that GPA expects from the Supplier will be specified. The response shall be made within thirty (30) days unless an extension IS acknowledged and approved in writing by the GPA Manager of Engineering.

### 4.0 SUBMITTALS

The bidder shall provide with their bid or proposal a written notification of any deviations from this specification. Submittals shall include product and data sheets, part numbers, a statement of compliance to this specification and other relevant information necessary to

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evaluate the submittal. The acceptance of GPA shall in no way abrogate the requirements of this specification.

## 5.0 DESIGN

- 5.1 Connectors shall be designed such that they will be installed with a minimum of effort, run cooler than the conductors being joined, and provide optimum performance under all operating conditions.
- 5.2 Spacers when provided shall increase the contact area and prevent excessive distortion and cutting of the stranded conductors.
- 5.3 Connectors shall have flared ends to prevent nicking of the conductors.
- 5.4 Connectors shall be made to provide maximum pressure and assure secure connections on all combinations of run and tap conductors.

## 6.0 CONSTRUCTION

- 6.1 Connectors shall be made of silicon bronze, copper or aluminum alloy. Material shall be of high strength, and resistant to corrosion, galling and cracking.
- 6.2 Threads shall be chemically treated to minimize friction and have free running nuts to develop maximum clamping pressure.
- 6.3 All materials shall be durable and made of the highest quality to meet the requirements of the intended use.

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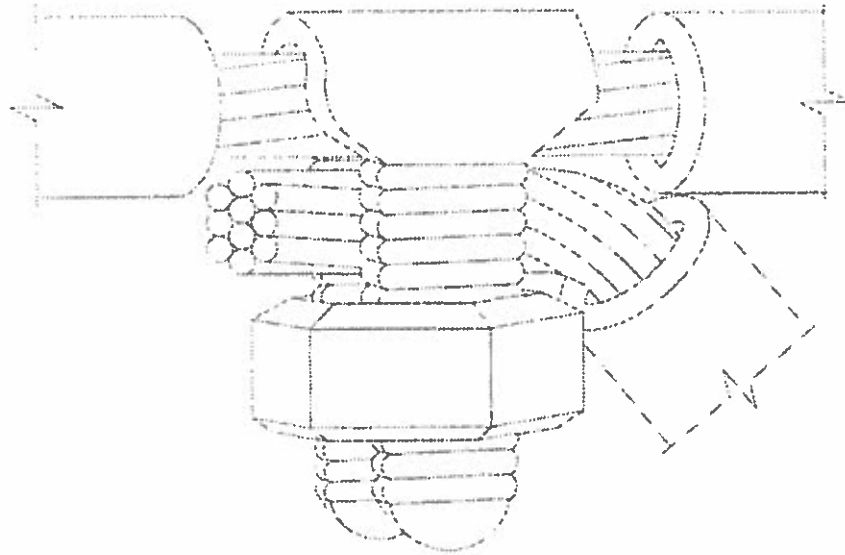


Figure A  
SPLIT BOLT CONNECTOR

7.0 SPLIT BOLT CONNECTOR

DESIGN FEATURES

- 7.1 Connector shall be compact, high strength, high copper alloy with free-running threads and easy to grip wrench flats.
- 7.2 Dimensions and requirements are shown in Table 1.

Table 1

GPA INDEX NUMBER	RANGE FOR EQUAL RUN AND TAP (AWG)	MINIMUM TAP WITH MAX RUN (AWG)
SSOC0357	#2 Solid - #4/0 Strand	#6 Solid
SSOC0358	#6 Strand - #2 Strand	#14 Strand
SSOC0359	#10 Strand- #8 Strand	#14 Strand
SSOC0360	#4 Strand- #1/0 Strand	#14 Strand
SSOC0361	#2 Strand- #2/0 Strand	#14 Strand
SSOC0362	#2/0 Strand - #500 KCMIL	#2/0 Strand
SSOC0363	#4/0 Strand- #750 KCMIL	#4/0 Strand
SSOC0364	#1 Strand- #250KCMIL	#8 Strand
SSOC0372	#4 Solid -#8 Solid	#14 Solid

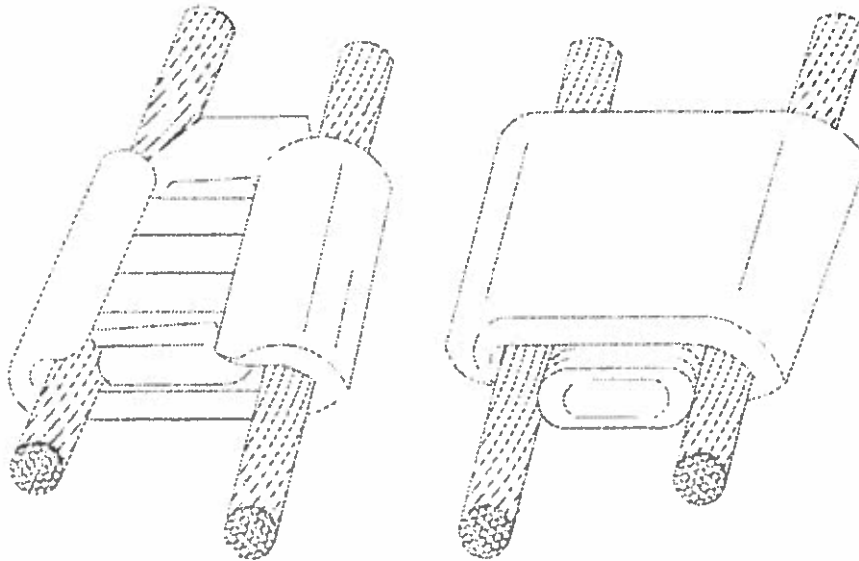


Figure B  
WEDGE CONNECTOR

## 8.0 WEDGE CONNECTOR

### DESIGN FEATURES

- 8.1 For Aluminum Taps: The "C" and wedge shall be made of aluminum alloy. These are to be used to connect solid aluminum and stranded aluminum, Aluminum alloy and stranded aluminum composite conductors including AAC, AAAC, ASCR, ACAR, AW, and ACSR/AW.
- 8.2 For Copper Taps: The "C" shall be made of an aluminum bronze alloy and the wedge made of a copper alloy. These are to be used to connect copper conductors in highly corrosive environments.
- 8.3 A locking tab shall be provided to prevent the wedge from loosening after it has been driven into position. Each connection should allow visual inspection by checking wedge movement and locking tab.
- 8.4 Taps shall allow connecting multiple conductor combinations. Design must be such that there is no damage to the conductor when installing or removing tab.
- 8.5 The "C" and wedge shall be factory coated with an inhibitor containing abrasive particles to help clean the contact surfaces during installation.



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- 8.6 Individual tap packages shall be imprinted with applicable conductor combinations. Packages and labels shall be color coded to easily match taps with proper tool and shell combination.
- 8.7 Dimensions and requirements are shown in Table 2.

Table 2

GPA INDEX NUMBER	CONNECTOR SIZE AWG
SSOC0268	#2 Strand- #2 Strand Aluminum
SSOC0269	#1/0 Strand- #1/0 Strand Aluminum
SSOC0270	#2/0 Strand - #2/0 Strand Aluminum
SSOC0271	#1/0 Strand- #4/0 Strand Aluminum
SSOC0272	#4/0 Strand - #4/0 Strand Aluminum
SSOC0273	#1/0 Strand- #2 Strand Aluminum
SSOC0274	#2/0 Strand Aluminum - #336 KCMIL
SSOC0275	#4/0 Strand - #336 KCMIL
SSOC0276	#927 KCMIL Aluminum
SSOC0405	#336.4-KCMIL - #336.4KCMIL

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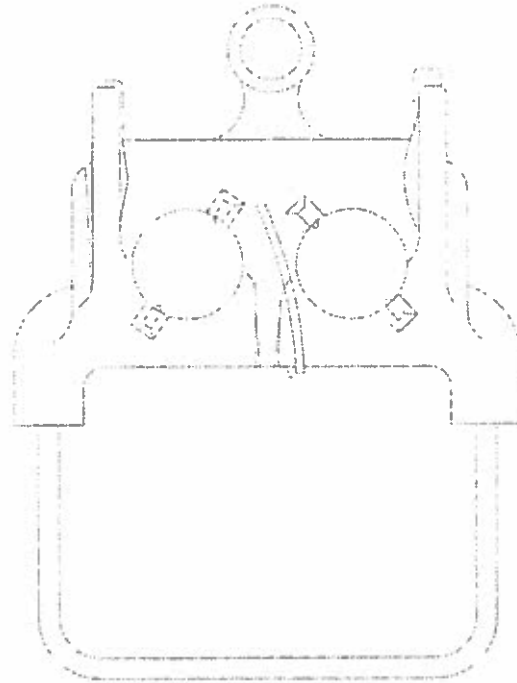


Figure C  
BAIL CLAMP

9.0 BAIL CLAMP

DESIGN FEATURES

- 9.1 The body casting of the clamp shall be made of strong, lightweight, heat-treated aluminum alloy for compatibility with all-aluminum conductors.
- 9.2 The clamp shall be of the snap-on type with bolts for tightening and for securing the conductor and bail ends to prevent loosening under thermal and vibration effects.
- 9.3 The clamp shall have a contoured main line contact to securely grip the conductor and add to the resilience of the gripping action.
- 9.4 Dimensions & requirements are shown in Table 3.

Table 3

INDEX NUMBER	CONDUCTOR RANGE	HARDWARE	BAIL TYPE
SSOC0185	#6 Strand to #1/0 Strand	Plated Steel With Eye Nuts	#2 Solid Cu., Plated
SSOC0186	#1/0 Strand to #336 KCMIL	Aluminum With Eye Nut	#2/0 Solid Cu., Plated



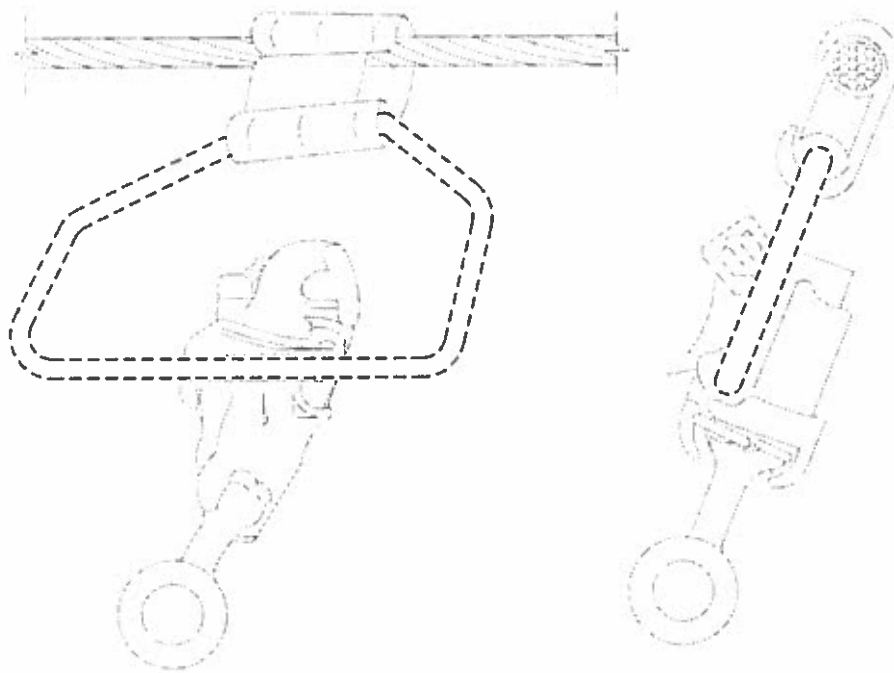


Figure D  
HOT LINE CLAMP CONNECTOR

10.0 HOT LINE CLAMP CONNECTOR

DESIGN FEATURES

10.1 Clamp shall be cast of high strength, corrosion resistant silicon bronze and plated for use with all combinations of conductor-copper, aluminum, galvanized guy strand, etc.

10.2 Dimensions and requirements are shown in Table 4.

Table 4

GPA INDEX NUMBER	CONDUCTOR SIZE AWG
SSOC0166	#2/0 Strand
SSOC0171	#4/0 Strand



Figure E  
AUTOMATIC SPLICE CONNECTOR

## 11.0 AUTOMATIC SPLICE CONNECTOR

### DESIGN FEATURES

- 11.1 The splicing shall be designed for high tension lines and shall be fully automatic and not of the compressed type.
- 11.2 The connector shall be for solid and stranded-copper conductors.
- 11.3 Dimensions and requirements are shown in Table 5.

Table 5  
COPPER

GPA INDEX NO.	WIRE SIZE AWG
SSOS1213	#2
SSOS1215	#2/0
SSOS1216	#4/0



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Figure F  
COMPRESSION SLEEVE SPLICE CONNECTOR

12.0 COMPRESSION SLEEVE SPLICE CONNECTOR

DESIGN FEATURES

- 12.1 Connector must meet industry requirements for full tension splicing per ANSI C119.4.
- 12.2 The splicing shall be designed for high tension lines and shall be compression type.
- 12.3 The connector shall be for stranded aluminum, made of aluminum tubing with a staked-in cable stop.
- 12.4 The connector shall be pre-filled with an anti-corrosive paste to create a gas tight joint and prevent corrosion.
- 12.5 Dimensions and requirements are shown in Table 6.

Table 6

ALUMINUM	
GPA INDEX NO.	WIRE SIZE (AWG)
SSOS1219	#2 AAAC
SSOS1220	#2/0 AAAC
SSOS1212	#336.4 AAC
SSOS1218	#927 AAAC
COPPERWELD STATIC WIRE	
SSOS1203	3/8" (7#8)



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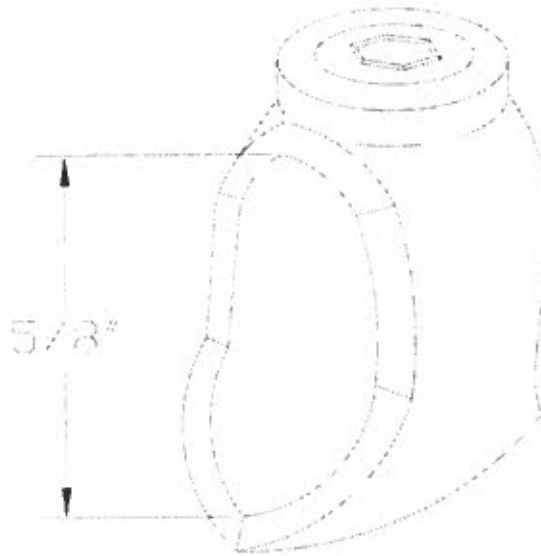


Figure G  
GROUND ROD CLAMP CONNECTOR

### 13.0 GROUND ROD CLAMP CONNECTOR (SSOG0670)

#### DESIGN FEATURES

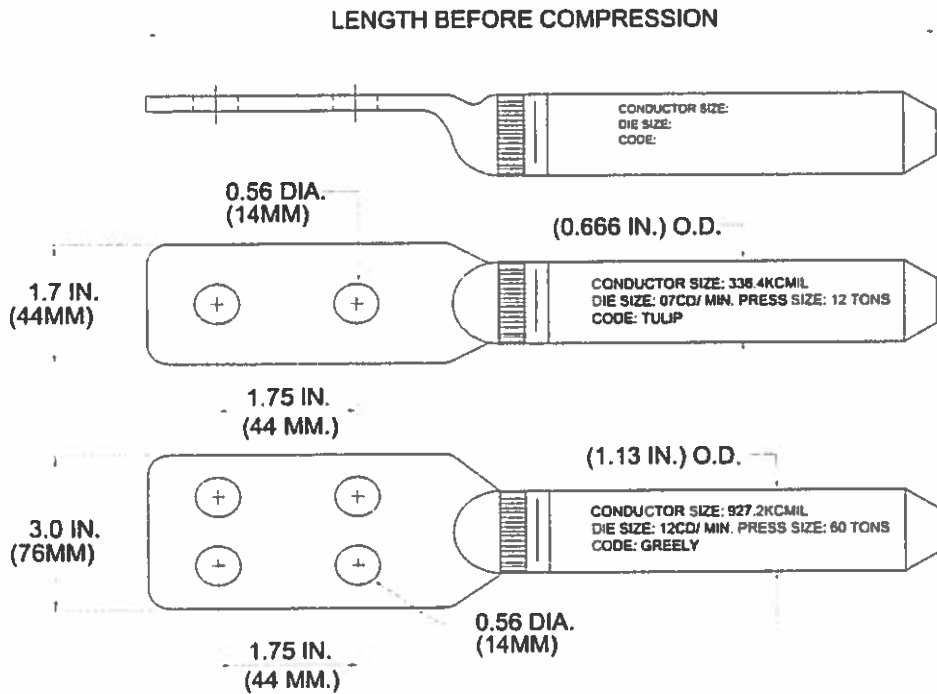
- 13.1 The copperweld ground rod clamps shall provide permanent low-resistance, copper connections.
- 13.2 The connector shall be made with a strong bronze body and especially designed for use with copperweld ground rods. These connectors shall provide a high-pressure contact between the rod and the grounding wire and allow for easy disconnection.
- 13.3 Copperweld ground rod clamps shall be furnished with non-ferrous set screws.
- 13.4 Clamp shall fit 5/8" grounding rod and accommodate the size of ground wires from #1/0 to #8 AWG.

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**Figure H  
COMPRESSION JUMPER TERMINAL**

**14.0 COMPRESSION JUMPER TERMINAL (SSOT 1333)**

**DESIGN FEATURES**

- 14.1 The jumper terminal material shall be Seamless Extruded Aluminum Alloy Tube Hardware-Aluminum Alloy.
- 14.2 Jumper terminals are prefilled with inhibitor. Taper and pad are coated with protective strippable plastic and bore is capped.
- 14.3 Standard hardware shall be stainless steel and includes one Yz-13 bolt, nut and two washers per .56 diameter hole.
- 14.4 Tongue holes shall follow NEMA spacing. Dimensions and requirements are shown in Table 7.

Table 7

INDEX NUMBER	CONDUCTOR SIZE	LENGTH BEFORE COMPRESSION	PAD WIDTH
SSOT1333	#336.4 kcmil (TULIP)	9.2 inches(234mm)	1.7 (44mm) 2 holes
SSOT1336	#927.2 kcmil (GREELY)	12.7inches (323mm)	3.0 (76mm) 4 holes



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Figure I  
STEM CONNECTORS

## 15.0 STEM CONNECTORS

### DESIGN FEATURES

- 15.1 The stem connectors shall be used with cold shrink terminations.
- 15.2 The stem connectors shall have copper stems.
- 15.3 Stem connectors shall have aluminum barrels with antioxidant paste.
- 15.4 Stem connectors shall be used for copper or aluminum conductors.
- 15.5 Stem connectors shall meet dimensions and requirements shown in Table 8.

Table 8

INDEX NUMBER	CONDUCTOR SIZE	STEM DIAMETER
SSUC0250	#2	0.257 inches (6.528 mm)
SSUC0251	#2/0	0.325 inches (8.255 mm)

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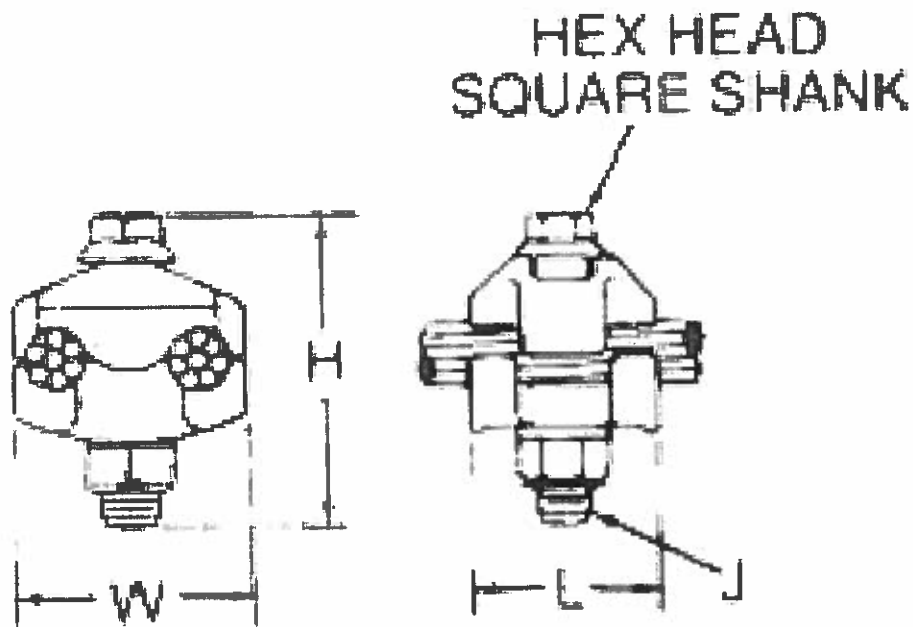


Figure J  
Single Bolt Connector

### 16.0 SINGLE BOLT CONNECTOR

#### DESIGN FEATURES

- 16.1 The connector shall be for use with aluminum to aluminum and aluminum to copper conductor connections.
- 16.2 The body shall be made from aluminum alloy.
- 16.3 The hardware shall be made from galvanized steel.
- 16.4 Single bolt connector dimensions are shown in Table 9.

Table 9

INDEX NUMBER	CONDUCTOR RANGE		DIMENSIONS (INCHES)			
	MAIN	TAP	L	W	H	J
SSOC0280	#8 Sol. - #2/0 AAC, #8 - 2/0 ACSR	#8 Sol. - #2/0 AAC, #8 - 2/0 ACSR, #8 Sol. - 2/0 Str. Cu.	1-3/8	1-21/32	2	3/8

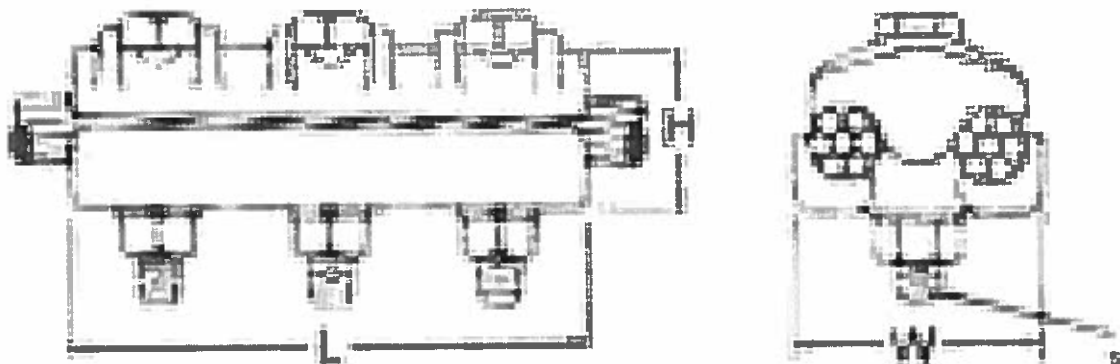


FIGURE 2

Figure K  
Multiple Bolt Connector

17.0 MULTIPLE BOLT CONNECTOR

DESIGN FEATURES

- 17.1 The connector shall be for use with aluminum to aluminum and aluminum to copper conductor connections.
- 17.2 The body shall be made from aluminum alloy.
- 17.3 The hardware shall be made from galvanized steel.
- 17.4 Multiple bolt connector dimensions are shown in Table 10.

Table 10

INDEX NUMBER	CONDUCTOR RANGE		DIMENSIONS (INCHES)			
	MAIN	TAP	L	W	H	J
SSOC0281	350 – 556.5 MCM AAC, 336.4 – 477 ACSR	350 – 556.5 MCM AAC, 336.4 – 477 ACSR, 350 – 550 MCM Cu	5-1/4	2-13/16	2-1/2	1/2





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## 18.0 QUALITY CONTROL

- 18.1 The supplier shall have a quality control program to ensure compliance with the requirements of this specification. The program shall be documented and available for GPA's review if requested.
- 18.2 Documentation of the quality control program shall indicate where in the production and manufacturing process the quality checks are taken, describe the purpose of the checks, and describe the nature of the check, e.g. if check is visual only or if electrical or mechanical testing is used.

## 19.0 PACKING AND SHIPPING

- 19.1 The supplier shall have adequate work and inspection instructions for handling, storage, prevention, packing and shipping to protect the quality of the connectors and to prevent damage, loss and deterioration of the material.
- 19.2 The connectors shall be placed and crated with suitable materials to prevent damage and injury during shipment and handling operations.

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