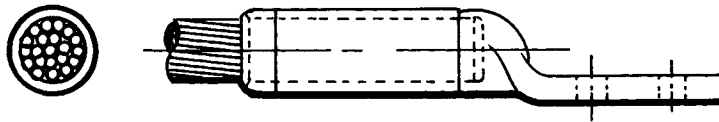


TECHNICAL DATA

DIE REFERENCE CHART C-13282



CONVENTIONAL COMPRESSION TOOL AND DIE INFORMATION FOR TYPE CCLS-EHV

DIE REF.	BURNDY TOOLS & DIES						ANDERSON	ALCOA TOOLS & DIES		
	INDEX	Y34A	735	748B	7486RB	Y60B	VCTOOLS	12A, 12HA	60A	F1, H, H2, H2H
1.625	301			C39AR	F39AR	L39ART	VC 8		6027AH	4427AH
1.844	302			C44AR	F44AR	L44ART	VC 8		6030AH	4430AH
2.062	479				F48AR	L48ART			6034AH	4434AH
2.375	478			C46AR	F46AR	L46ART			6038AH	4438AH
2.625										4442AH
2.750										4444AH

- Notes:
1. It is recommended that a light coat of lubricant (such as Anderson's No. 155 grease) be applied to the crimping face of the dies.
 2. For Alcoa and Burndy tooling, crimps should start from inside crimp line, work outwards with the crimps overlapped, and the last crimp extending past the end of the connectors.
 3. For Anderson VC tooling, crimps should start from inside crimp line, work outwards with the crimps spaced 1/8" apart, and the last crimp spaced 1/4" from the end of barrel.
 4. VC tools not recommended for extra high voltage.

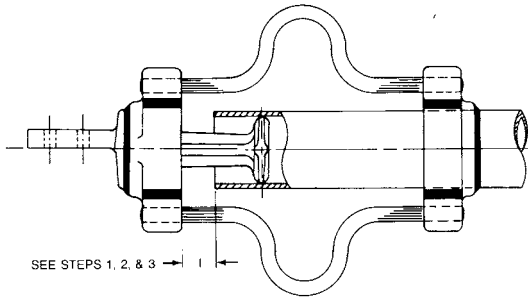


TECHNICAL DATA

INSTALLATION CHART

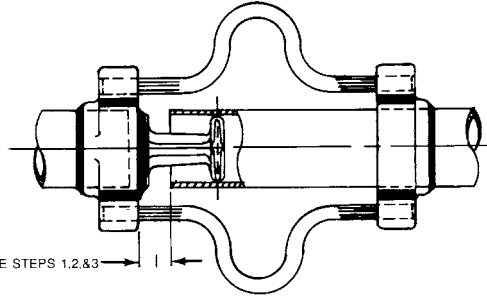
DC-9295

FOR TYPES EVKET AND HVWETT/EVWETT



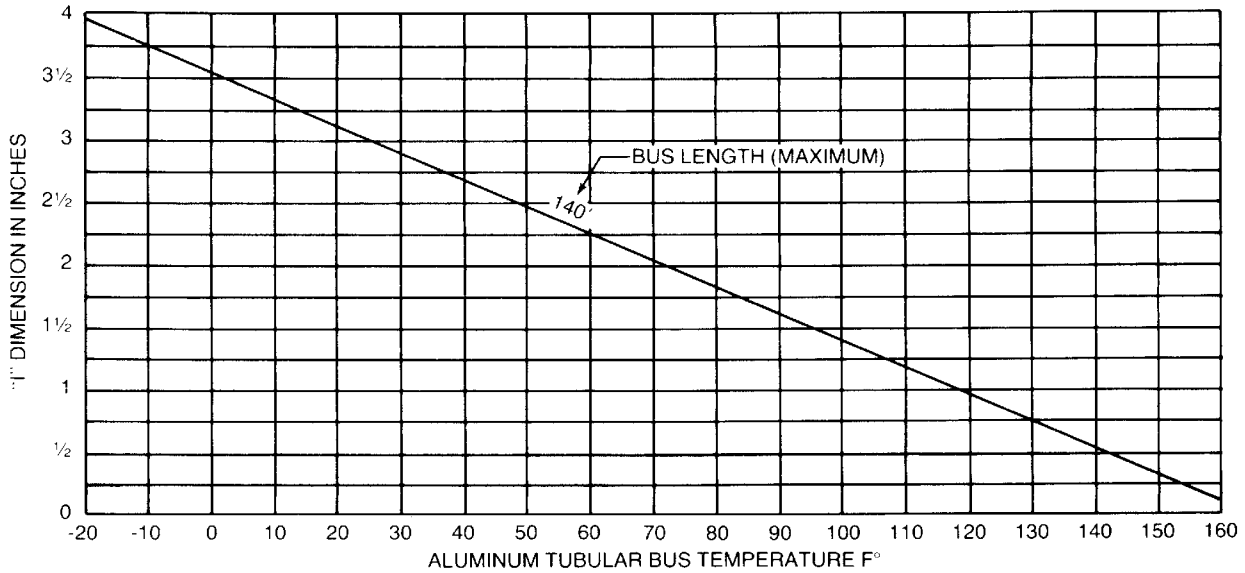
SEE STEPS 1, 2, & 3

TYPICAL FLEXIBLE TERMINAL



SEE STEPS 1, 2, & 3

TYPICAL FLEXIBLE COUPLER

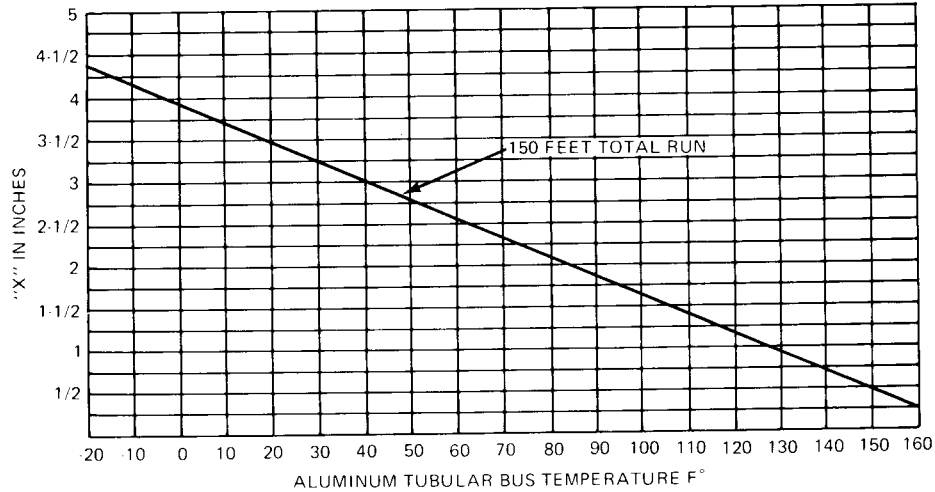
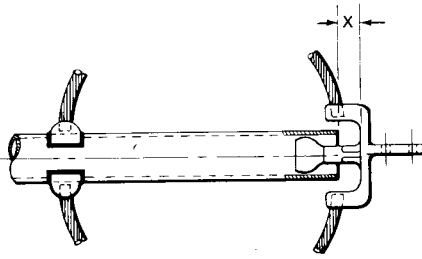


HOW TO USE CHART

1. Determine tubular bus temperature and locate on temperature scale.
2. Using 140 ft. bus length, locate the intersection of the bus length and the temperature reading.
3. Read "I" dimensions setting from this intersection point.
4. Total tubular bus length must not exceed 140 feet.

TECHNICAL DATA

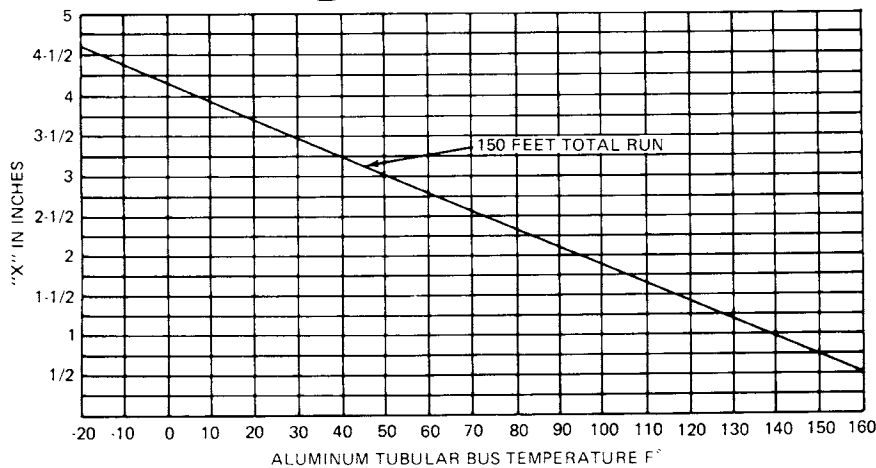
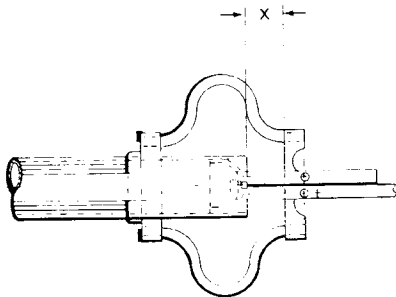
INSTALLATION CHART DC-11853 FOR TYPES HVRTE



DC-6750 FOR TYPES HVETF/EVETF

HOW TO USE CHARTS

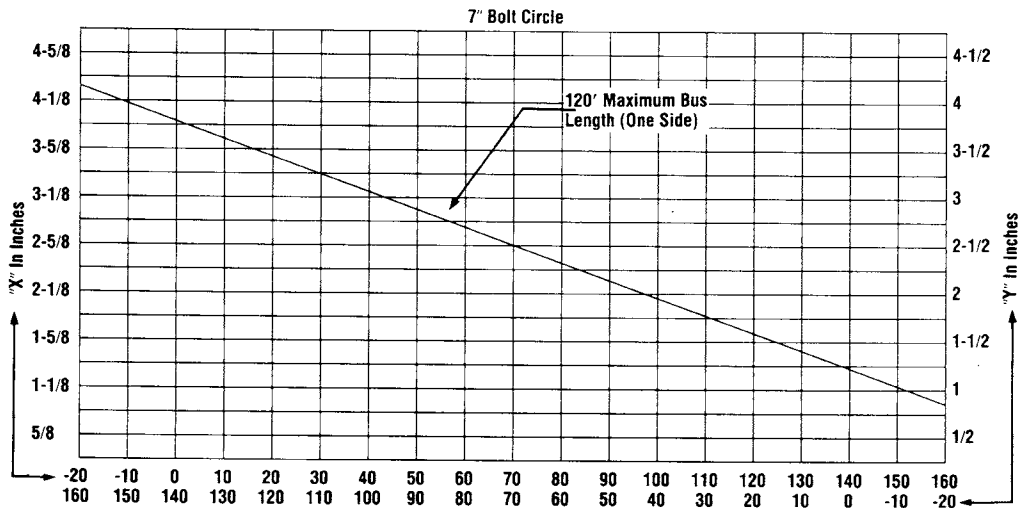
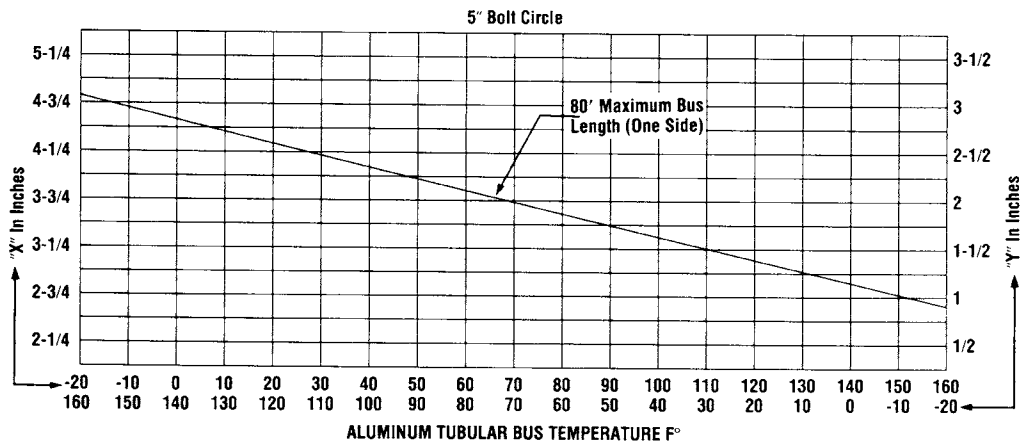
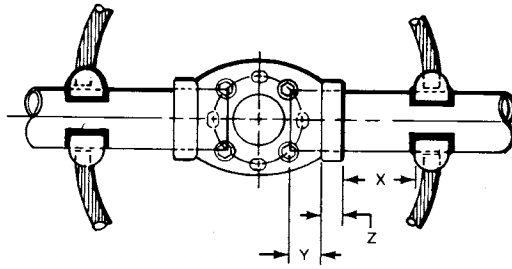
1. Determine tubular bus temperature and locate on the temperature scale.
2. Using given bus length, locate the intersection of the bus length and the temperature reading.
3. Read "X" dimensions setting from this intersection point.





TECHNICAL DATA

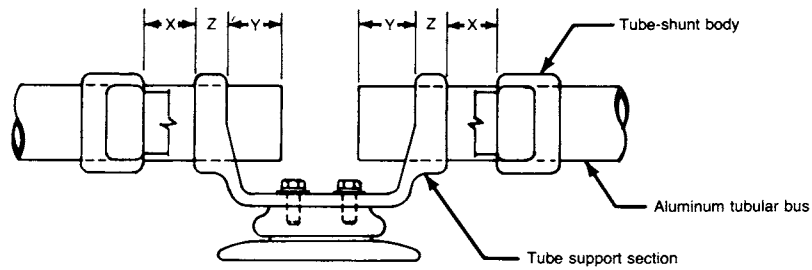
INSTALLATION CHART DC-11852 FOR TYPE HVRTS



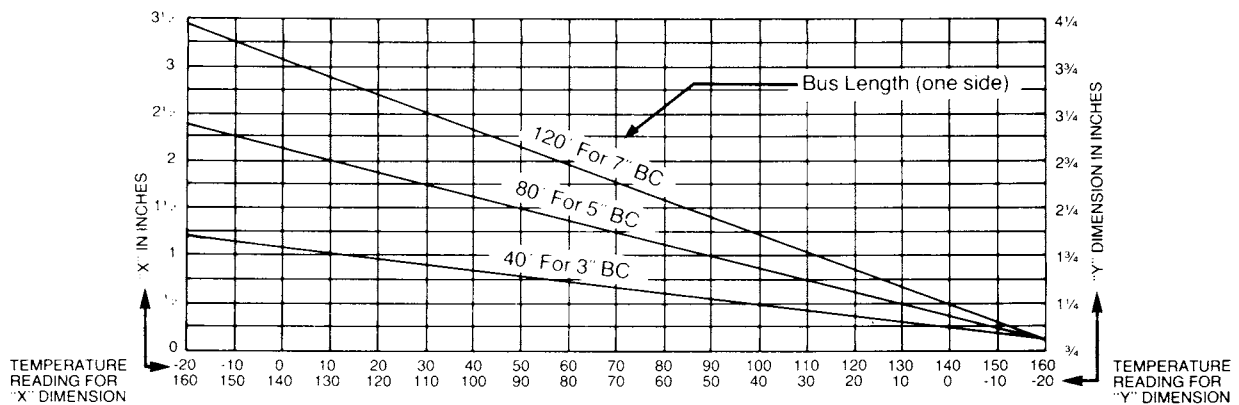
HOW TO USE CHARTS

- Determine tubular bus temperature and locate this temperature on the "Temperature Reading For "X" dimension scale.
- Using given bus length for one side of the connector, locate the intersection of the bus length and the temperature reading.
- Read "X" dimension setting from this intersection point.
- Determine "Y" dimension in a similar manner.
- Determine "Z" dimension from applicable ANDERSON Assembly Dwg. The location of the tube-shunt body from the end of the tube may be determined by adding $X + Y + Z$.
- Repeat this procedure for the tubular bus on the other side of the connector.

TECHNICAL DATA
INSTALLATION CHART
DC-6536
FOR TYPES EVKES, HVETS/EVETS



TYPICAL FLEXIBLE BUS SUPPORT



ALUMINUM TUBULAR BUS TEMPERATURE °F

HOW TO USE CHART

1. Determine tubular bus temperature and locate this temperature on the "Temperature Reading for "X" Dimension" scale.
2. Locate the intersection of the given bus length and the temperature reading.
3. Read "X" dimension setting from this intersection point.
4. Determine "Y" dimension in a similar manner.
5. Determine "Z" dimension from applicable ANDERSON connector assembly. The location of the tube-shunt body from the end of the tube may be determined by adding $X + Y + Z$.
6. Repeat this procedure for the tubular bus on the other side of the connector.
7. Do not exceed given bus length for each particular bolt circle.

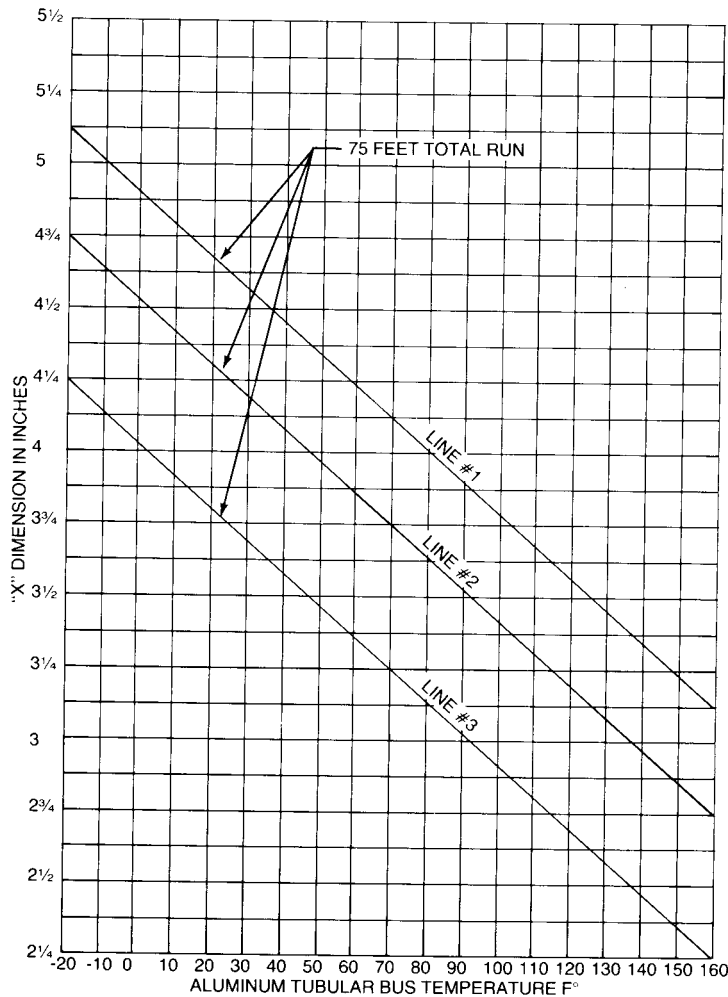
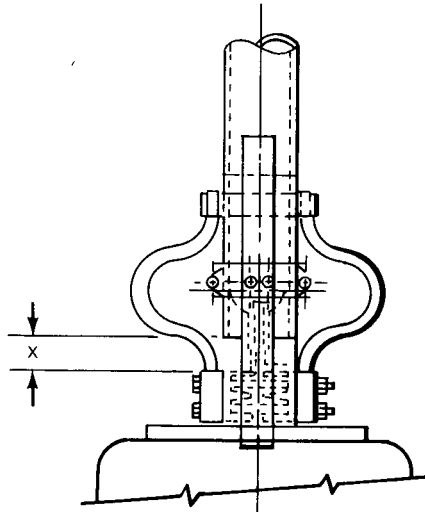


TECHNICAL DATA

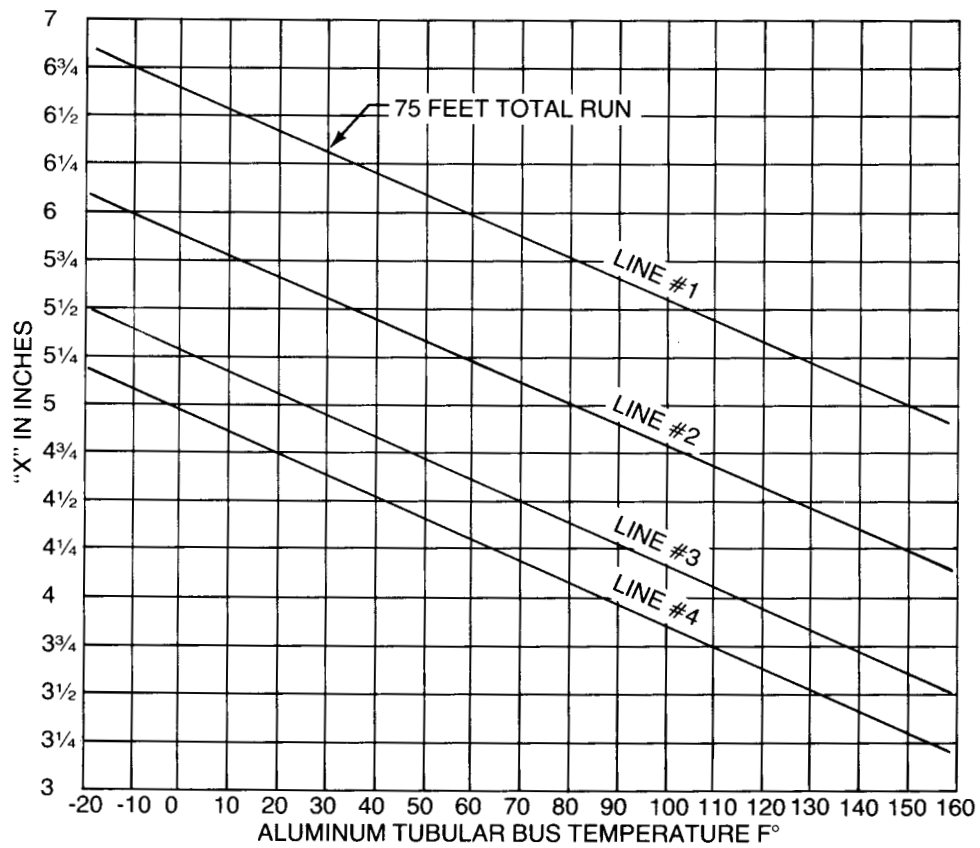
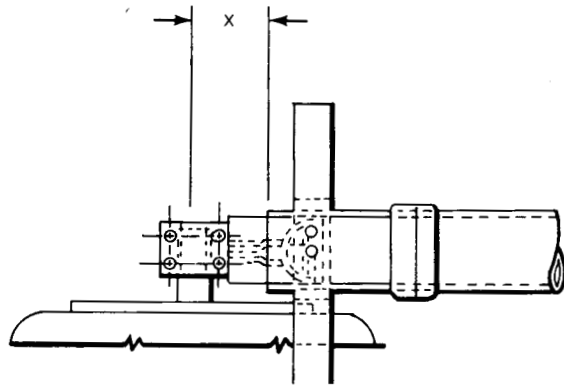
INSTALLATION CHART

DC-6788

FOR TYPES HVEDST/EVEDST



TECHNICAL DATA
INSTALLATION CHART
DC-6790
FOR TYPES HVEDST-90/EVEDST-90





TECHNICAL DATA

WELDING ALUMINUM BUSES AND CONNECTORS

Recommended welding procedures to ensure a sound weld are as follows:

Pure aluminum melts at 1220°F while aluminum alloys melt in the range of 1020°F depending on the alloy content of the particular metal involved. When aluminum alloys are heated there is no color change. This makes it difficult, if not impossible, to tell if the metal is near the welding temperature.

The ever present surface oxide films on aluminum have a melting point of 3600°F. The parent aluminum or aluminum alloy can therefore be melted without fusing the surface oxides. Unless the film is removed, cleanliness of the molten filler metal and the parent metal cannot be complete and both strength and conductivity may be sacrificed. Therefore, it is of prime importance that the aluminum oxides be removed from the aluminum alloys before welding is started. In the shielded arc welding method the shielding gas has a tendency to clean the material as welding progresses.

CLEANING OF BUSES AND FITTINGS

It is very important to remove all greases and oxides from the surfaces to be welded. This can be accomplished by using a mild alkaline solution or standard degreasing solution. The preferred method is to use a stainless steel wire brush and vigorously scrub the surfaces to be welded. The stainless steel brushes are specified because the stainless steel has less of a tendency to pick up particles of aluminum and aluminum oxides.

WELDING METHODS

Anderson recommends the following two types of welding methods for welding aluminum fittings and buses:

1. **TUNGSTEN-ARC WELDING (TIG).** The inert gas shielded tungsten-arc process is widely used for welding aluminum bus fittings. In this process the arc is established between a non-consumable tungsten electrode and the section to be welded. Inert gas envelopes the arc to prevent oxidation during welding. Hence, no flux is required. A bare filler rod supplies filler metal to the weld area. To initiate the arc the tungsten electrode is placed in contact

with the component and then withdrawn to establish an arc length of approximately 3/16". The arc is given a circular motion until the base metal liquifies and the weld puddle is established. Filler metal is added by hand as required. In this process, if more than one pass is required for a sufficient weld, the weld should be wire brushed between passes to remove any surface dirt or oxides which have accumulated from the previous pass. Since no flux is used the finished weld does not require cleaning. In this process the heat of the tungsten arc is concentrated in a smaller area and is much faster than the conventional type of welding and distortion of the weld is negligible since the heat is concentrated in a small area. In this process, if thicknesses greater than 1/2" are to be welded, preheating of the parts before welding will increase the welding speed.

2. **METALLIC-ARC INERT-GAS SHIELDED WELDING.**

The consumable electrode inert-gas shielded metal arc (MIG) welding process combines the advantages of tungsten-arc welding with increased welding speed. Welding can be done from any position and the process can be either manual or automatic. Manual welding techniques are somewhat different from other methods. However, a welder can be trained to use the MIG process with only a few days concentrated training. In the MIG process the bare filler rod is supplied as a coil of bare wire. In the commercially available equipment this wire is added to the weld at a predetermined rate by a motor-driven feed that can be adjusted to the magnitude of the welding current. In this process, as well as the tungsten-arc process, gas forms a shield around the arc to prevent oxidization during welding. Either helium, argon or a mixture of helium and argon are suitable shielding gases. Pure argon is most widely used on sections less than 3/4" thick. On sections over 3/4" thick the gases are usually mixed to combine the hotter arc characteristics of helium with the stabilizing effect of argon. If exceptionally hot arc characteristics are required, pure helium can be substituted for the gas mixture. Precaution should be exercised if this substitution is made in that it is very easy to burn through the items that are to be welded with a pure helium atmosphere.

WELDING ALUMINUM BUSES AND CONNECTORS

The reasons that Anderson has selected the metallic-arc inert-gas shielded welding method is that in this process the filler metal can be automatically fed through the welding mechanism and eliminates holding the electrode holder in one hand and the filler metal in the other as in the tungsten-arc method. Figure 1 of the attached drawing shows the basic components for a metallic-arc inert-gas shielding process (MIG) and Figure 2 shows the basic components for the tungsten-arc process (TIG). As it is readily apparent, the basic difference between the two types of welding apparatus is the automatic feeding mechanism for the filler wire.

In both types of apparatuses the electrode holder and the welding gun can or cannot be cooled by water. If welding currents of more than 125 amps are required, both methods will have to add water cooling apparatuses to the electrode holder and the welding gun.

WELDER'S QUALIFICATIONS

No welding should be done until the operator has had experience with welding aluminum alloys by the methods described above. Men with previous experience in metal welding should be selected for training in welding aluminum

for a period of training of not less than one week after which time the man can be considered proficient in the use of the equipment and in the welding of aluminum joints. After this period, there should be no difficulty experienced in welding aluminum alloys. It is suggested, if practical, that welders should practice on actual fittings or buses before proceeding with the welding of the required job.

The following is Anderson's recommended specification for current fittings, wire feeds, gas flows, etc. These specifications are of a general nature to the extent that many factors have to be considered such as:

1. Type of equipment used, whether water cooled or not, etc.
2. The size and mass of the piece to be welded.
3. The position of the weld.
4. And most important of all, the operator's skill.
5. All persons in the welding area should wear the proper shields. The arc is approximately twice as strong as the standard AC welding arc. Extreme caution should be exercised for the protection of eyes.

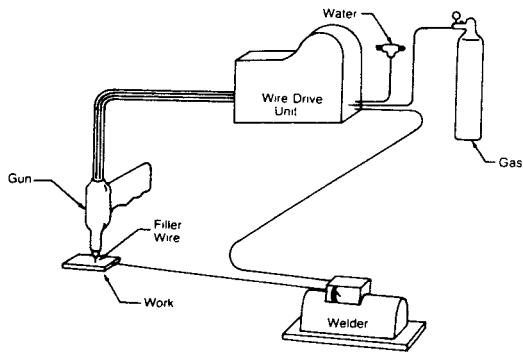


Fig 1. Metallic-arc inert-gas shielded welding (MIG)

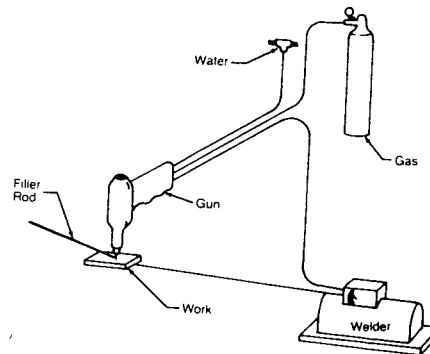


Fig. 2 Inert-gas shielded tungsten-arc welding (TIG)



TECHNICAL DATA

GENERAL WELDING SPECIFICATIONS FOR CONSUMABLE ELECTRODE WELDING METHOD

SCOPE:

This specification applies primarily to welded aluminum connectors for substation construction.

arc inert-gas shielding (MIG). A 400 amp welding machine with reverse polarity is capable of handling the majority of aluminum welding jobs.

MATERIAL:

CASTINGS – As furnished by Anderson are molded from 356 aluminum alloy and heat treated to T6 condition, or #99 pure aluminum depending on the application.

PROCEDURES:

It is of the utmost importance to remove oil, grease, water and oxide from the surfaces to be welded. All surfaces to be welded should be wire brushed with a stainless steel brush prior to welding. If more than one weld pass is required, the original weld should be wire brushed before applying additional weld.

FILLER ROD – 4043 aluminum alloy 1/16” diameter for all joints as shown in the Anderson catalog.

SHIELDING GAS – Argon.

Pre-heating of surfaces to 400°F is optional, but by preheating the surfaces before welding it is possible for the operator to weld easily and faster.

WELDING APPARATUS – Tungsten-arc (TIG) or metallic-

METALLIC-ARC INERT-GAS CONSUMABLE ELECTRODE

IPS SIZE	WALL THICKNESS	AMPERES	4043 FILLER ROD SIZE	APPROX. ARGON FLOW CFH	PREHEAT °F	WIRE SPEED INCHES PER MIN.	NO. PASSES
1/2	.108	125-150	1/16	20	None	170	1
3/4	.113	125-150	1/16	20	None	180	1
1	.133	125-150	1/16	30	None	180	1
1-1/4	.140	160-170	1/16	30	None	180	1
1-1/2	.144	160-170	1/16	30	None	180	1
2	.154	170-190	1/16	30	None	180	1
2-1/2	.203	170-190	1/16	40	None	180	1
3	.216	170-190-	1/16	40	Optional to 400° F	180	1
3-1/2	.226	170-190	1/16	40	Optional to 400° F	200	1
4	.237	180-200	1/16	50	Optional to 400° F	200	1
4-1/2	.247	180-200	1/16	50	Optional to 400° F	200	1
5	.258	180-200	1/16	50	Optional to 400° F	200	1 or 2
6	.280	180-200	1/16	50	Optional to 400° F	200	1 or 2

FLAT BAR

FLAT BAR THICKNESS	AMPERES	4043 FILLER ROD SIZE	APPROX. ARGON FLOW CFH	PREHEAT °F	WIRE SPEED INCHES PER MIN.
1/8	125-150	1/16	30	None	180
1/4	180-200	1/16	50	Optional to 400° F	180
3/8	300	1/16	50	Optional to 400° F	200
1/2	340	1/16	60	400° F	200
3/4	375	1/16	60	400° F	200

TECHNICAL DATA



TUNGSTEN - ARC

IPS SIZE	WALL THICKNESS	AMPERES	GAS CUP DIA. INCHES	TUNGSTEN DIA.	ARGON FLOW CFH	PREHEAT °F	NO. PASSES	4043 FILLER ROD SIZE
1/2	.108	125-150	3/8	1/8	20	None	1	1/8
3/4	.113	125-150	3/8	1/8	20	None	1	1/8
1	.133	125-150	3/8	1/8	30	None	1	1/8
1-1/4	.140	160-170	3/8	1/8	30	None	1	1/8
1-1/2	.144	160-170	3/8	1/8	30	None	1	1/8
2	.154	170-190	1/8	1/8	30	None	1	3/16
2-1/2	.203	170-190	1/2	3/16	40	None	1	3/16
3	.216	170-190	1/2	3/16	40	Optional to 400°F	1	3/16
3-1/2	.226	170-190	1/2	3/16	40	Optional to 400°F	1	3/16
4	.237	180-200	1/2	3/16	50	Optional to 400°F	1	3/16
4-1/2	.247	180-200	1/2	3/16	50	Optional to 400°F	1	3/16
5	.258	180-200	1/2	3/16	50	Optional to 400°F	1 or 2	3/16
6	.280	180-200	1/2	3/16	50	Optional to 400°F	1 or 2	3/16

FLAT BAR

FLAT BAR THICKNESS	AMPERES	GAS CUP DIA. INCHES	TUNGSTEN DIA.	ARGON FLOW CFH	PREHEAT °F	NO. PASSES	4043 FILLER ROD SIZE
1/8	125	3/8	1/8	30	None	1	1/8
1/4	150	1/2	3/16	30	None	1	3/16
3/8	300	1/2	3/16	50	Optional to 400°F	1	1/4
1/2	400	5/8	1/4	50	400°F	1 or 2	1/4
3/4	450	5/8	1/4	50	400°F	2	5/16
1	500	5/8	5/16	50	400°F	2	5/16



TECHNICAL DATA

See Substation General Reference Data Section for additional information on installation procedures, hardware applications, and recommended torque values for bolted connectors.

TECHNICAL DATA



NOTES:

CONTENTS

<p>EHV Substation Connectors Introduction 1</p> <p>TERMINALS</p> <p>Bolted Terminals for Tube to Flat Pad Type HVSTF/EVSTF 3</p> <p>Bolted Terminals for Cable to Flat Pad Type HVCF 4</p> <p>Bolted Terminals Two Cables to Flat Pad Type HV2CF 5</p> <p>Compression Terminals for Cable Type CCL-EHV 6</p> <p>Short Barrel Compression Terminals for Cable Type CCLS-EHV 7</p> <p>External Welded Terminals for Tube to Flat Pad Type WSTFE-EHV 8</p> <p>Internal Welded Terminals for Tube to Center-Formed Flat Pad – Type WSTFX-EHV 9</p> <p>External Welded Terminals for Tube to Two Flat Pads Type WST2F-EHV 10</p> <p>Welded Cable Terminals for Cable to Flat Pad Type WCF-EHV 11</p> <p>Welded Cable Terminals Two Cables to Flat Pad Type W2CF-EHV 12</p> <p>Welded Expansion Terminals for Tube to Flat Pad Type HVRTE 13</p> <p>Welded Expansion Terminals for Tube to Flat Pad Type EVKET 14</p> <p>Welded Expansion Terminals for Tube to Flat Pad Type HVETF/EVETF 15</p> <p>Bifurcating Terminals One Flat Pad to Two Flat Pads Type EVT2F-D 17</p> <p>Trifurcating Terminal One Flat Pad to Three Flat Pads Type EVT3F-D 17</p> <p>COUPLERS</p> <p>Bolted Couplers for Tube Type HVSTT/EVSTT 18</p> <p>Welded Angle Couplers for Tube Type WLI-45-EHV/WLI-90-EHV 20</p> <p>Expansion-Welded Couplers for Tube Type HVWETT/EVWETT 21</p> <p>Welded Couplers for Tube Type WCI 22</p> <p>Welded Trifurcating Couplers for Tube to Three Flat Pads – Type EVST3F 23</p> <p>Welded Bifurcating Couplers for Tube to 2 Flat Pads Type EVST2F 24</p> <p>TEES</p> <p>Bolted Tee Connectors Tubing Main to Tubing Tap Type HVTTT/EVTTT 25</p> <p>Bolted Tee Connectors Tubing Main to Flat Pad Type HVTTF/EVTTF 27</p> <p>Bolted Terminals for Cable to Flat Pad Type EVTCF 28</p> <p>Bolted Tee Connectors Cable Main to Cable Tap Type HVTBCC/EVTBCC 29</p> <p>Tee-Taps Compression Cable to Cable-Open Run Type 22 31</p> <p>Tee-Taps Compression Cable to Pad-Open Run Type 21 32</p> <p>Welded Tee Connector Tube to Flat Pad Type WTTFR 33</p> <p>Welded Tee Connectors Tube to Flat Self Shielding Type EVWTF 34</p> <p>Welded Trifurcating Tee Connectors Tube to Three Flat Pads – Type EVTT3F 35</p> <p>Welded Bifurcating Tee Connectors Tube to Two Flat Pads – Type EVTT2F 36</p> <p>BUS SUPPORTS</p> <p>Bolted Bus Supports Type EVTS 37</p> <p>Bolted Bus Supports for Cable Type HVCS 38</p> <p>Bolted Bus Supports Type HVDCS/EVDCS 39</p> <p>Bolted Bus Supports Type HVDCH/EVDCH 41</p> <p>Welded Bus Supports Type WURE-EHV 42</p>	<p>Hook-On Bus Supports Type WTH-EHV 43</p> <p>Welded Bus Supports Type WUR-EHV 44</p> <p>Bus Supports Type EVBCF 45</p> <p>Welded Bus Supports Type EVVBS 46</p> <p>Expansion Tubular Bus Support Type HVRTS 47</p> <p>Welded Expansion Tubular Bus Supports Type EVKES 48</p> <p>Expansion Tubular Bus Supports Type HVETS/EVETS 49</p> <p>Suspension Clevis Type HVSCCS 51</p> <p>Bus Supports Type HVSEES 52</p> <p>Tubular Bus to Insulator String Type EVIS 53</p> <p>Bolted Expansion Tubular Bus Support Type HVBETS/EVBETSH 54</p> <p>Double Mounted Tubular Bus Support Type HVT2S/EVT2S 55</p> <p>STUD CONNECTORS</p> <p>Bronze Bolted Stud Connectors to Flat Pad with Hardware Shield – Type BHVSF 56</p> <p>Bronze Bolted Stud Connectors to Flat Pad with Hardware Shield – Type BHVSD 57</p> <p>Aluminum EHV Bolted Stud Connectors to Flat Pad with Hardware Shield – Type HVSF 58</p> <p>Bifurcating Stud Connectors to Two Flat Pads Type EVSF2 59</p> <p>Trifurcating Stud Connectors to Three Flat Pads Type EVSF3 60</p> <p>Trifurcating Stud Connectors to Three Flat Pads Type EVSF3B 61</p> <p>Stud Connectors Stud to Four Flat Pads Type EVSF4 62</p> <p>Welded Expansion Stud Connectors for Tube Type HVEDST/EVEDST 63</p> <p>Welded 90° Expansion Stud Connectors for Tube Type HVEDST-90/EVEDST-90 65</p> <p>END BELLS</p> <p>Bolted End Bells for Tube Type HVTEB/EVTEB 67</p> <p>Welded End Bells for Tube Welded Angle Coupler Type HVWTEB/EVWTEB 68</p> <p>SPECIALTIES</p> <p>Bolted Grounding Studs for Tube Type EVTGS 69</p> <p>Bolted Grounding Studs for Cable Type HVCGS 70</p> <p>Tube Terminal Welded End Plug-Eye Type WEPE 71</p> <p>Tube Terminal Welded Spade Plug Type EVSP 72</p> <p>Grounding Stud Flat Pad to Grounding Stud with Corona Ball Type AFGS 73</p> <p>Welded Grounding Studs for Tube Type EVWTGSR 74</p> <p>Bolted Conductor Spacers Type HVS2C/EVS2C 75</p> <p>Bolted Conductor Spacers Type EVS3C 77</p> <p>Cable Spacer Ultra High Voltage Spacer for Four Cables Type UVS4C 78</p> <p>Cable Spacer Terminals Type HVS2CT/EVS2CT 79</p> <p>Parallel Connectors Type HVPC/EVPC 81</p> <p>Hardware Shields Type EVHS 82</p> <p>Type HVHS-90-D 83</p> <p>Extension Pad Type EVEF-D 84</p> <p>TECHNICAL DATA 85–98</p>
---	---

