

QUALITY SYSTEM PROCEDURE

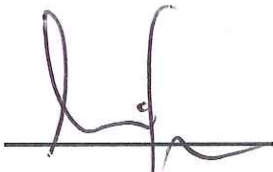
BUS CONNECTOR FITTING INSTALLATION PROCEDURE


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APPROVALS


ENGINEERING


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QUALITY

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DATE	REV.	DESCRIPTION OF CHANGE
8/15/2011	NC (-)	New Procedure - Replaces SOP611-001
1/25/2012	A	Updated Figure 1 with New Rendering. Deleted "*"1" from Table 1. Changed "*"2" to "*"1". Added DLT06MAPE2200 to Optional Electric Battery Pump. Added Figure Title to Section 4.2. Updated All Figure Numbers to Reflect Updated Figure Title to Section 4.2. Deleted Figure from Section 4.7 and Updated "Caution" Note.

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1.0 INTRODUCTION

DMC Power Bus Connector fittings are used to join aluminum pipe in substations. The connection is achieved by means of mechanically compressing a DMC Power Bus Connector fitting over the pipe using DMC Power Swaging Tools.

The DMC Power Swaging Tools consist of a power unit, head assembly, and a hydraulic pump. The DMC Power Swaging Tool is activated by 10,000 Psi which is provided by the hydraulic pump. The power unit has a piston inside the power unit which is connected to the die block (shown in figure 1). The die block holds one swage die while the head holds another swage die.

The Swage Tool is placed over the fitting after the DMC Power Bus Connector fitting is placed over the bus. When the pump is activated, the piston inside the power unit will extend with the die block which swages the Bus Connector fitting onto the pipe.

The swage is then checked using an inspection gauge.

The purpose of this manual is to provide instructions for the proper installation of the DMC Power Bus Connector fittings using DMC Power Swage Tools.

2.0 TRAINING

DMC Power provides optional training at no additional cost to the customer. Training courses are designed to teach personnel how to properly install DMC Power Bus Connectors and operate DMC Power Swage Tools. The training will be conducted by a certified instructor or by an authorized DMC Power representative.

3.0 DMC POWER SWAGE TOOLING SYSTEM

The DMC Power Tooling System consists of the DLT Power Swage Tool, DMC Power Bus Connector fitting, and a hydraulic pump. There are 5 DMC Power Swage Tools which are used to swage pipe sizes 1 thru 6 inches (refer to table 1). There are 3 types of hydraulic pumps that can be used with DMC Power Swage Tools (refer to table 1).

CAUTION: THE EQUIPMENT USED IN SWAGING IS SUBJECTED TO HIGH PRESSURE. IMPROPER USE MAY RESULT IN TOOL FAILURE AND/OR SERIOUS PERSONAL INJURY. IT IS NOT SAFE TO APPLY HYDRAULIC PRESSURE WHEN THE HEAD ASSEMBLY IS NOT ENGAGED WITH THE POWER UNIT.

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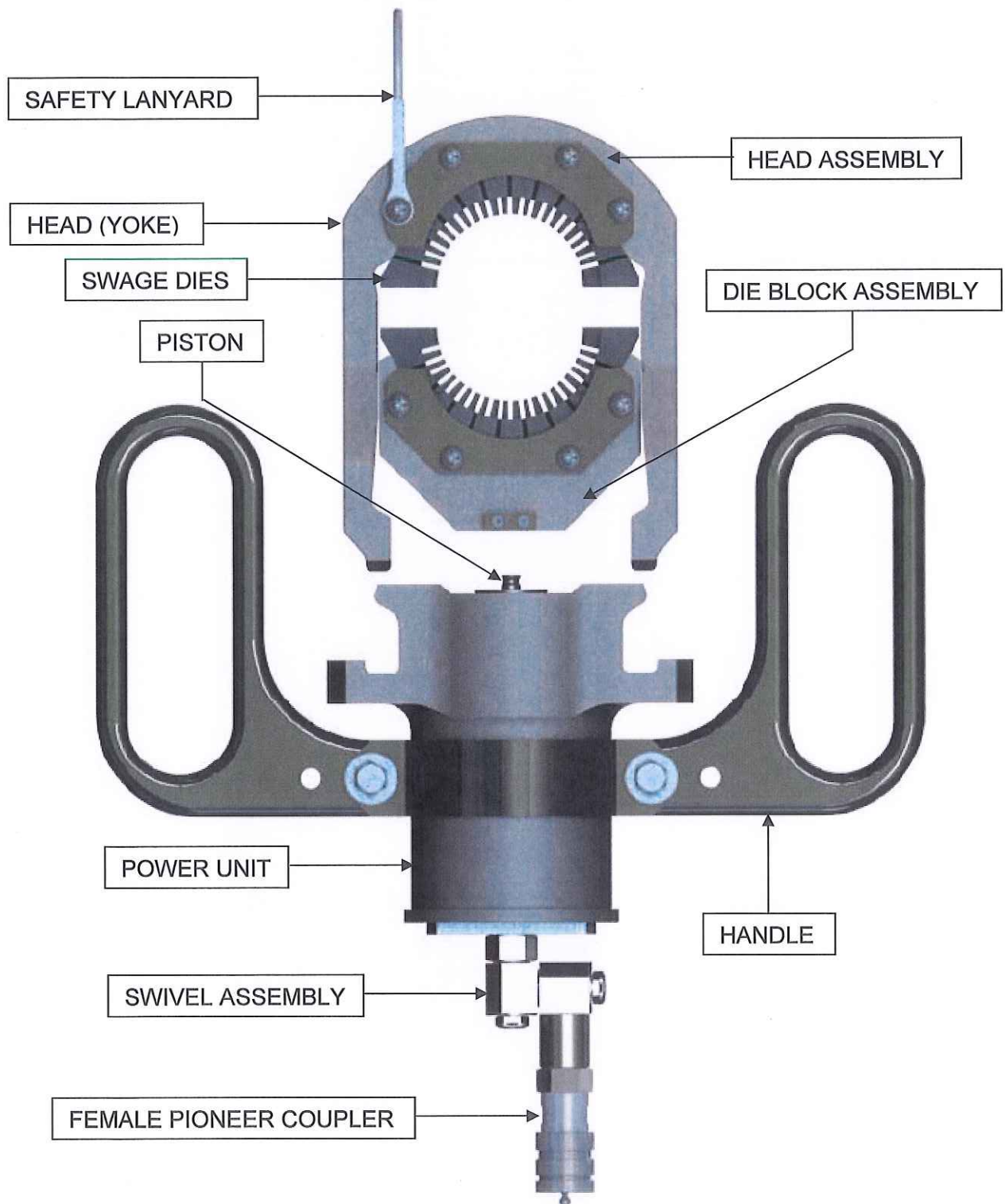


Figure 1: DMC Power Swage Tool nomenclature.

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Bus Connector		DMC Power Swage Tools			Hydraulic Pump Kit
Size	Pipe [NPS]	Power Unit	Head Assembly	Inspection Gauge	
16	1	DLT58MAPW0000	DLT57PLHA0016	PLKIG2000-16	DLT12MAPE1000*
24	1-1/2		DLT57PLHA0024	PLKIG2000-24	
32	2		DLT57PLHA0032	PLKIG2000-32	
40	2-1/2		DLT57PLHA0040	PLKIG2000-40	
48	3		DLT57PLHA0048	PLKIG2000-48	
56	3-1/2	DLT65MAPW0000	DLT65PLHA0056	PLKIG2000-56	
64	4		DLT65PLHA0064	PLKIG2000-64	
80	5	DLT86MAPW0000	DLT86PLDI0080	PLKIG2000-80	
96	6	PLT115PLTA0000		PLKIG2000-96	PLT115MAPE1000

*: Optional electric battery operated pump (P/N DLT06MAPE2001 or DLT06MAPE2200) available upon request.

Table 1: DMC Power Swage Tooling Systems.

4.0 INSTALLATION PROCEDURE

Before beginning installation, visually inspect all DMC Power Bus Connector fittings to verify that the inside surface is coated with AFC.

4.1 VERIFYING OUTER DIAMETER OF PIPE

Confirm that the DMC Power Bus Connector match the pipe size. Use the side labeled "Pipe Dia –No Go–" on the Inspection Gauge PLKI2000-XX (refer to table1 for sizes, Gauge shown in figure 2a) to verify the pipe's minimum outside diameter.

4.2 CLEAN THE OUTSIDE OF THE PIPE

Clean the outside of the pipe using a rough cloth (Scotch Brite, sandpaper, wire brush, etc...) such that the outside of the pipe is completely free of oil, debris and any oxide layer. Clean a length greater than what is listed in table 2 under "Max Depth of Insertion" (shown in figure below).



Figure 2: Cleaning the bus with a rough cloth.

4.3 TRACING THE INSERTION MARK

Position the Inspection Gauge on the pipe with the stop pin pressed against the pipe end as shown in figure 3b. Use a marking pen to trace the insertion window on the pipe. If an Inspection Gauge is not available, refer to table 2 for the dimensions to trace an insertion window.

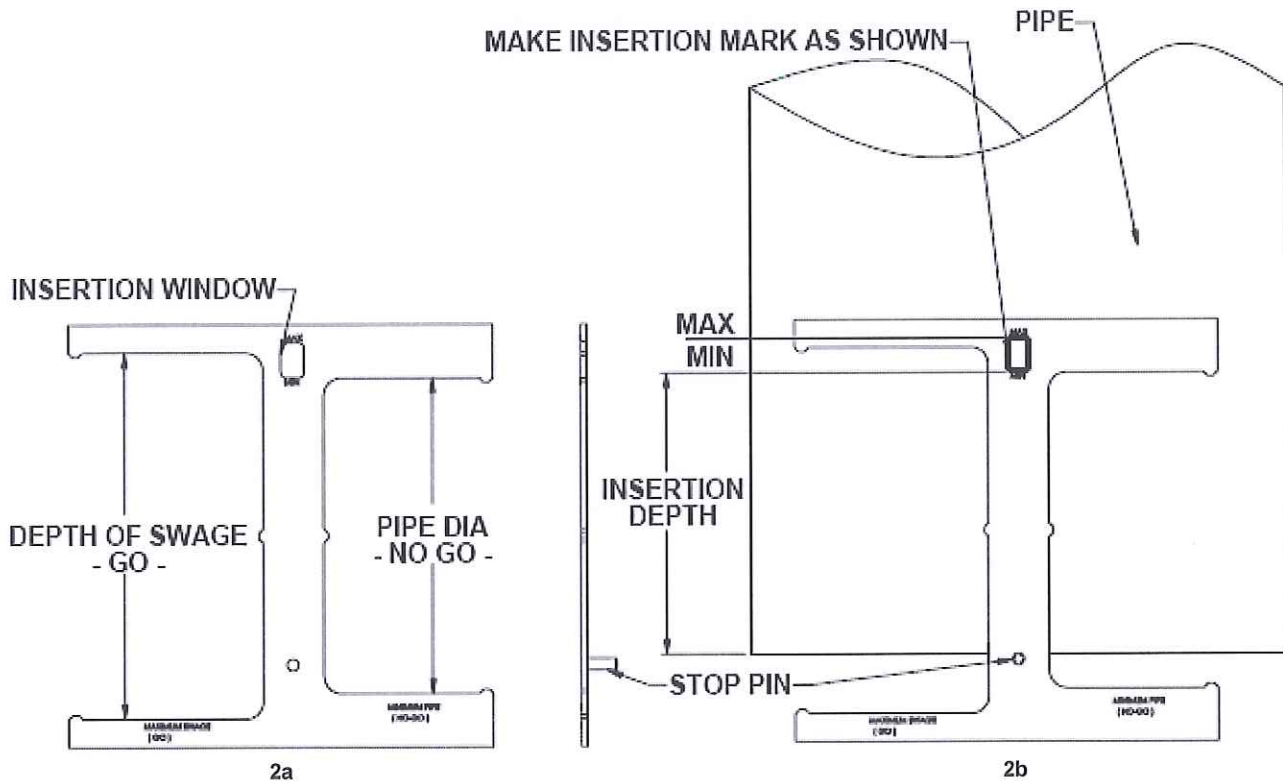


Figure 3: a) Insertion Gauge. b) How to place the Gauge on the pipe and trace the insertion mark.

Size	Pipe Size [NPS]	Min Depth of Insertion [in]	Max Depth of Insertion [in]
16	1	1-1/2	2
24	1-1/2	1-1/2	2
32	2	2	2-1/2
40	2-1/2	2	2-1/2
48	3	3	3-1/2
56	3-1/2	3	3-1/2
64	4	3	3-1/2
80	5	5	5-3/4
96	6	6	6-3/4

Table 2: Minimum and Maximum Depth of Insertion marks.

- 4.4 SLIDE THE BUS CONNECTOR FITTING OVER THE PIPE
Slide the DMC Power Bus Connector fitting over the pipe making sure that the end of the fitting is in between the "MAX" and "MIN" portion of the insertion mark as shown in figure 4.
- 4.5 CONNECTING THE HYDRAULIC PUMP TO THE POWER UNIT
Connect the DMC Power Swage Tool to the hydraulic pump via the threaded or push/pull quick disconnect to the hydraulic hose line.
- 4.6 PERFORMING A SWAGE
Position the Swage Tool as shown in figure 4 ensuring that the Swage Dies' teeth are aligned with the Swage Line marks on the Bus Connector fitting. Use the Head Bracket (shown in figure 1) if the Bus is vertically upward. The Head Bracket helps keep the Head assembly flushed with the Cylinder. Activate the pump once the Swage Tool is properly placed over the Bus Connector fitting. The swage is complete after the pump reaches 10,000psi.

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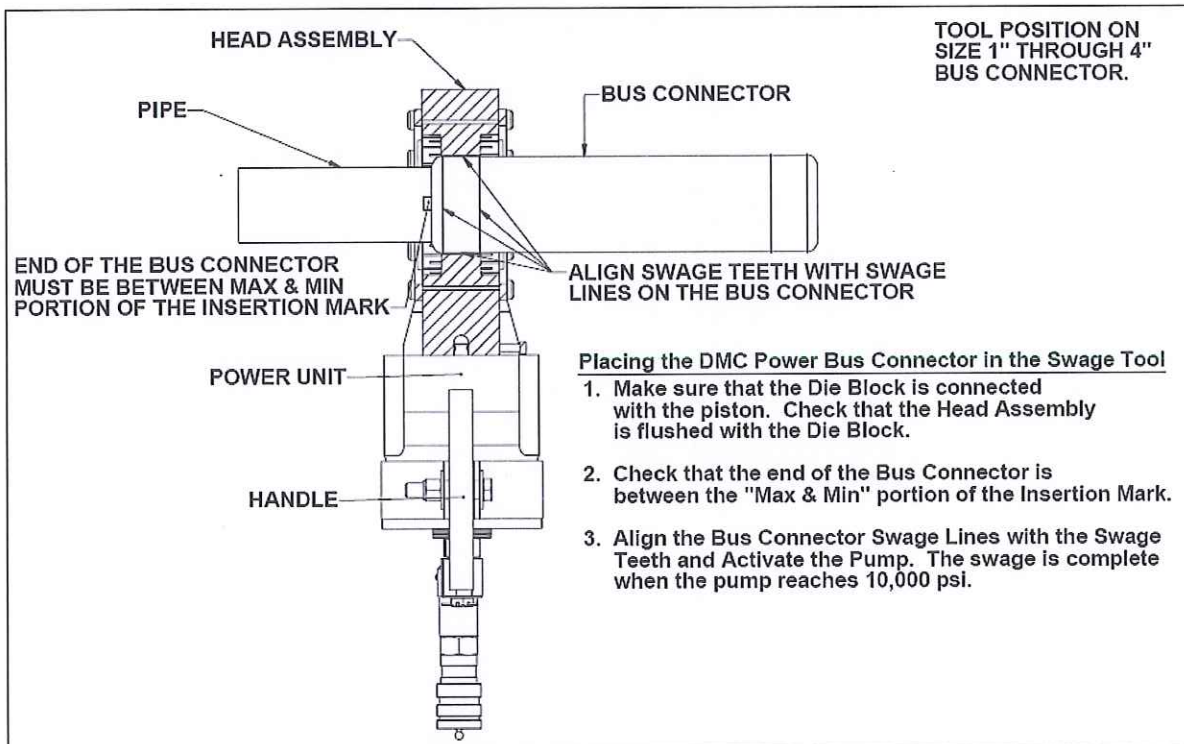


Figure 4: DMC Power Swage tool, Bus Connector fitting, and pipe swaging positioning.

4.7 INSPECT THE SWAGED FITTING

Use the "Depth of Swage - Go" -"portion of the Inspection Gauge (refer to figure 3a) to verify that the swage is good by positioning the Inspection Gauge on the swaged portion of the fitting. Then check again, this time at 90° from the first position. If the Inspection Gauge does not go in at the first and second position, re-swage the fitting and re-check the swage with the Inspection gage again.

REPEAT STEPS 4.1 THROUGH 4.6 FOR EACH BUS CONNECTOR FITTING END.

CAUTION: ALWAYS POSITION YOURSELF AWAY FROM THE SIDES OF THE YOKE (HEAD ASSEMBLY) DURING SWAGING.

5.0 SWAGING A 5" BUS CONNECTOR FITTING

The 5" DMC Power Bus Connector fittings require 2 swages per fitting end. Follow steps 4.1 through 4.5, however swage the Inboard Swage Lines first then the Outboard Swage Lines second as shown below in figure 5. Repeat for the other fitting end (if applicable). And proceed to step 4.6.

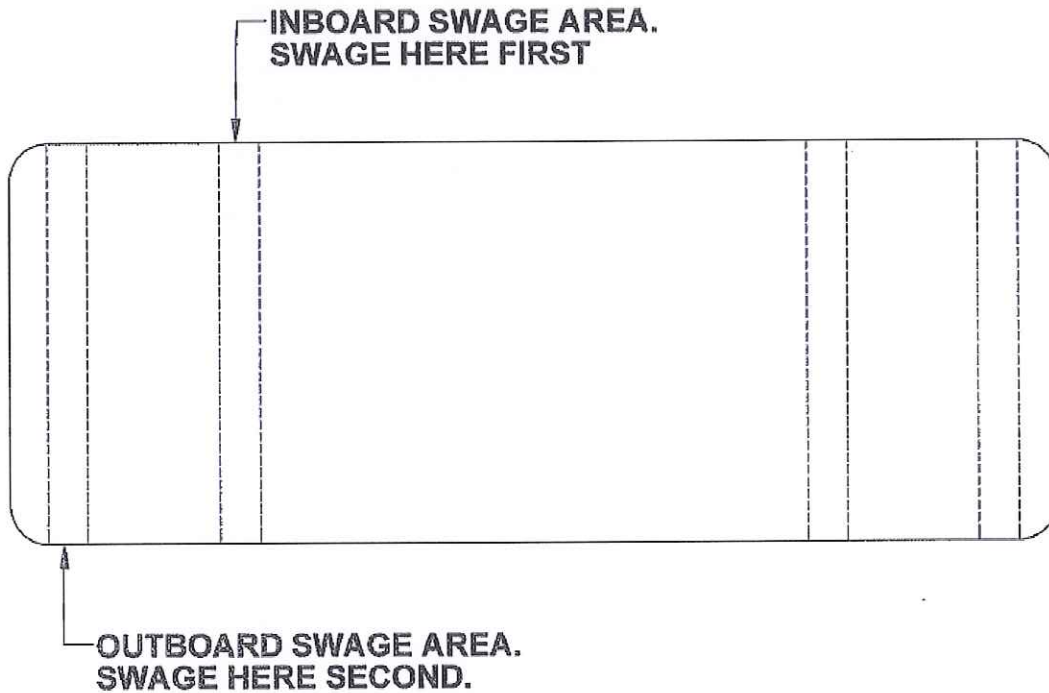


Figure 5: DMC Bus Connector sketch for the first and second swage.

6.0 TOOL MAINTENANCE

This section covers regular inspection and cleaning of the DMC Swage Tools. The quick disconnects and hoses are all rated for 10,000 psi and are not to be substituted. In handling the tools, do not hold tools by the quick disconnect or the hose.

Refer to table 3 for Preventive Maintenance.

PROCEDURE	FREQUENCY
With the Head Assembly attached to the Power Unit, actuate the Swage Tool a few times.	Before each use
Ensure the quick disconnect is tight and works properly.	Before each use
Ensure the swivel is secured tightly.	Before each use
Ensure the piston is retracted to its lowest position.	Before each use
Ensure the head sliding areas are free of dirt and damage.	Before each use
Ensure the pushpin in the die block is operating properly and ensure the die block engages properly with the piston.	Before each use
Check swage dies for debris between slots and for any cracks. Clean the dies using a wire brush to remove metal chips accumulated between the slots of the dies. Clean the head and die block.	As needed
Apply DMC Power Swage Lube on head and lower die block.	Frequently, after dies and head are cleaned.
Perform die penetrate inspection on the cylinder and head.	At least once a year

Table 3: Preventive Maintenance.

CAUTION: DLT TOOLS ARE NOT TO BE REPAIRED BY THE CUSTOMER, UNLESS AUTHORIZED BY DMC POWER TO DO SO. ANY UNAUTHORIZED REPAIRS DONE BY THE CUSTOMER WILL VOID THE WARRANTY. THIS ALSO MAY CAUSE THE EQUIPMENT TO PERFORM IN AN UNSATISFACTORY MANNER. A DMC POWER REPRESENTATIVE HAS TO BE CONTACTED REGARDING RETURN OF TOOLS FOR EVALUATION AND REPAIRS.

7.0 REFERENCE

For a shorter, two page laminated version of this instruction manual refer to QWI-DMCP-7.3-001 Rev “-“ Addendum.

8.0 WARRANTY INFORMATION

DMC Power agrees to repair or replace, free of charge, any DLT tooling manufactured by DMC Power which proves to be defective due to faulty workmanship or materials within 1 year of shipment from the factory. This will be done provided written notice is received by the company immediately following the discovery of such defect. All parts returned for warranty service must be shipped, prepaid, to the factory by the customer.

DMC Power shall have no liability for damages or delays resulting from the use of defective materials or workmanship in its parts, or from any repairs or alterations to the parts made by the customer, or from the use of substitute service parts, unless such use was authorized in writing by DMC Power. DMC Power's liability is confined to the replacement of defective parts, subject to conditions expressed in this warranty.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

DMC Power Bus Connector Assembly Instructions

Step 1: VERIFY THE OUTER DIAMETER OF PIPE

Confirm that the DMC Power Bus Connector fitting match the pipe size. Also, confirm that the Swage Tool matches the Bus Connector fitting. Use the side labeled "Pipe Dia No Go" on the Inspection Gauge PLKIG2000-XX to verify the pipe's minimum outside diameter (see table 1 for appropriate sizes). Clean any oil, debris, and any oxide layer off.

Step 2: TRACE THE INSERTION MARK

Position the Inspection Gauge on the Pipe with the stop pin pressed against the pipe end. Use a marking pen to trace the insertion window on the pipe as shown in picture 1. If an Inspection Gauge is not available, refer to table 1 for the dimensions to trace an insertion window.

Step 3: SLIDE THE BUS CONNECTOR FITTING OVER THE PIPE

Slide the DMC Power Bus Connector fitting over the pipe making sure that the end of the fitting is in between the "MAX" and "MIN" portion of the insertion mark as shown in figure 2.

Step 4: CONNECT THE HYDRAULIC PUMP TO THE POWER UNIT

Connect the DMC Power Swage Tool to the hydraulic pump via the quick disconnect (threaded or push-pull) fitting to the hydraulic hose line.

Step 5: PERFORMING A SWAGE

For 1, 1-1/2, 2, 2-1/2, 3, 3-1/2, & 4 inch Bus Connector

Position the Swage Tool such that the Swage Dies' teeth are aligned between the Swage Line marks on the Bus Connector fitting (refer to figure 2 and picture 2). Activate the pump once the Swage Tool is properly placed over the Bus Connector fitting. The swage is complete after the pump reaches 10,000 psi.

For 5 & 6 inch Bus Connector (Includes Long Splices)

First, position the Swage Tool such that the Swage Dies' teeth are aligned between the Inboard Swage Lines and activate the pump to perform a swage. Second, position the Swage Tool such that the Swage Dies' teeth are aligned between the Outboard Swage Lines and activate the pump to perform a swage (refer to figure 3).

Use the Head Bracket if the Bus is in a vertically position. The Head Bracket helps keep the Head assembly flushed with the Cylinder.

Step 6: INSPECT THE SWAGED CONNECTOR FITTING

Use the "Depth of Swage – Go –" portion of the Inspection Gauge (see picture 3) to verify that the swage is good by positioning the Inspection Gauge on the swaged portion of the fitting. Then check again, this time at 90° from the first position. If there are no Inspection Gauges available, refer to table 1 for "Depth of Swage" dimensions for the swage inspection.

REPEAT STEPS 1 THROUGH 6 FOR EACH BUS CONNECTOR FITTING END.

<i>Visually inspect all Bus Connector fittings to verify that the inside surface is coated with AFC.</i>
<i>Remove the Swage Dies when dirty and clean the slots with a wire brush to remove the excess debris. Once cleaned, re-lubricate with DMC Power Swage Lube.</i>
<i>Refer to DMC Power Bus Connector Standard Operating Procedure QWI-DMCP-7.3-001 Rev "A" for more detailed information.</i>
DO NOT USE ON ANY OTHER PRODUCT OTHER THAN DMC POWER FITTINGS.
DO NOT OPERATE THE DMC POWER SWAGE TOOL WITHOUT THE HEAD ASSEMBLY. IMPROPER USE MAY RESULT IN TOOL FAILURE AND/OR SERIOUS INJURY.

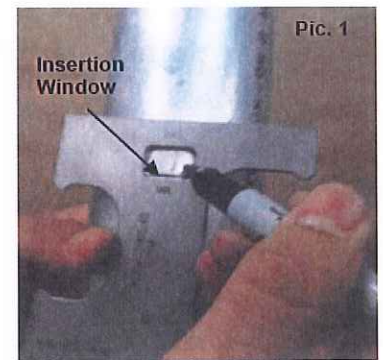
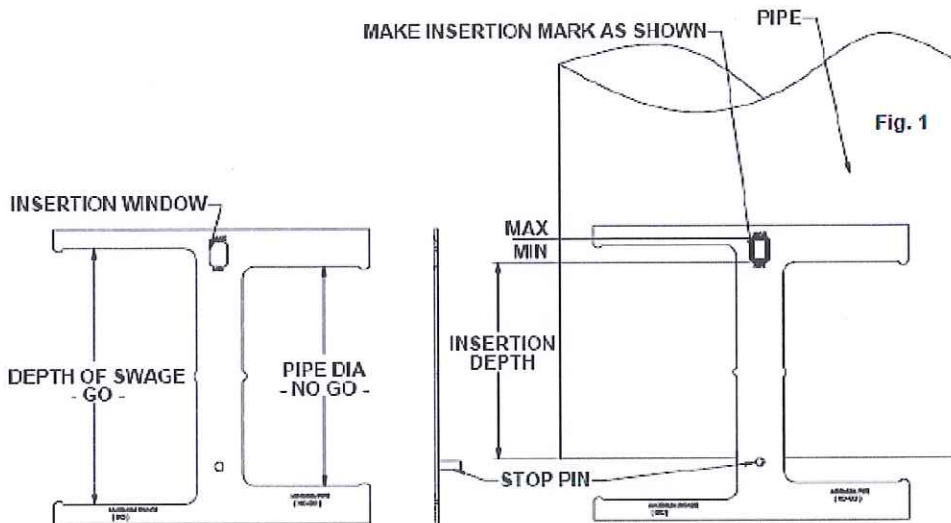
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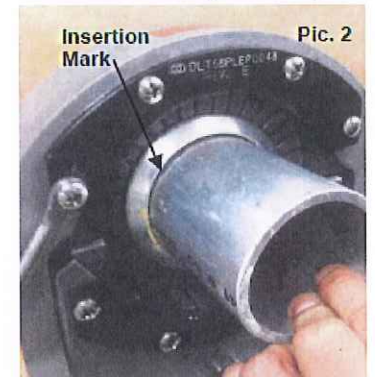
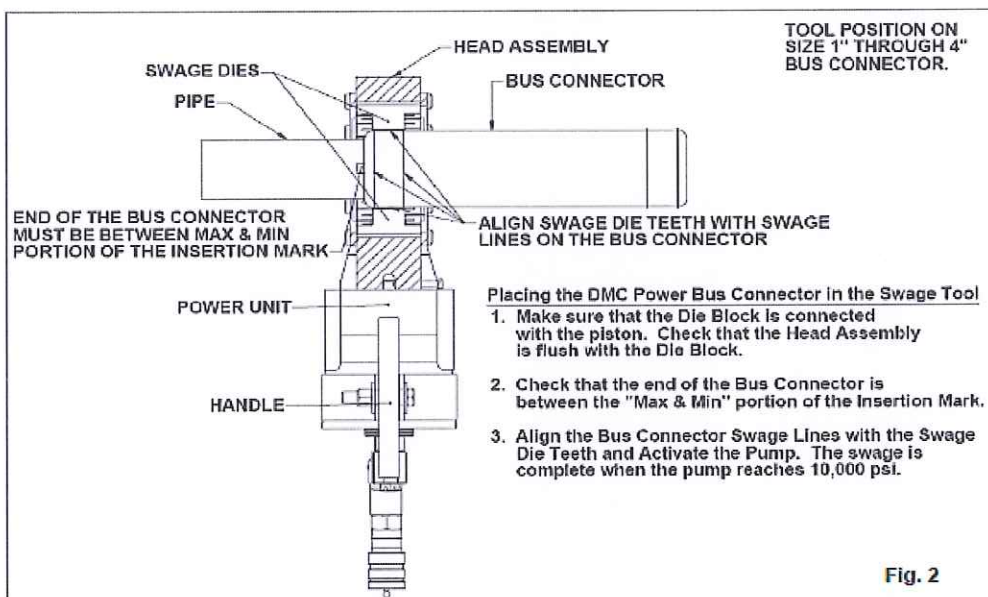
14502 S. Figueroa St., CA 90248

Customer Service: (888) SWAGE NOW

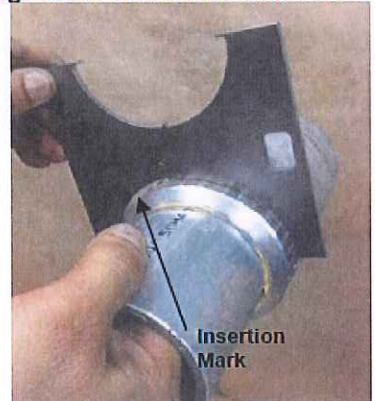
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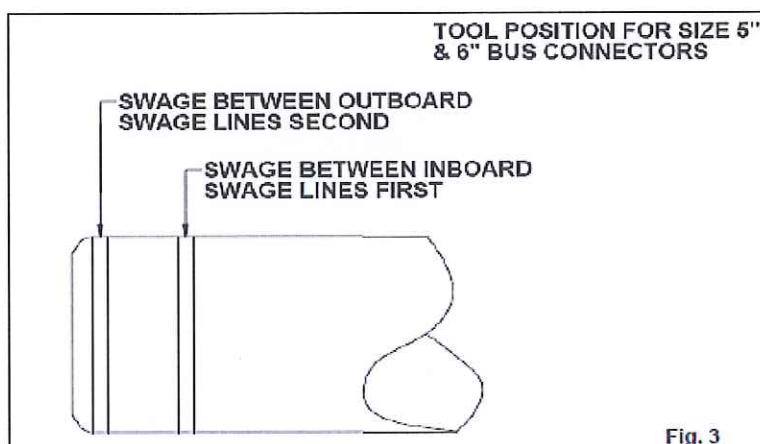
Prepare pipe and trace the Insertion Window using the Gauge.



Position the Swage Tool making sure that the Swage Die Teeth are aligned between the Swage Lines on the Bus Connector.



Verify the Swage using the "Depth of Swage -GO-" portion of the Inspection Gauge.



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Table 1

PART NUMBER	SIZE [NPS]	DEPTH OF SWAGE -GO- [in]	PIPE DIA -NO GO- [in]	MIN DEPTH OF INSERTION [in]	MAX DEPTH OF INSERTION [in]
PLKIG2000-16	1	1.887	1.285	1 1/2	2
PLKIG2000-24	1 1/2	2.365	1.870	1 1/2	2
PLKIG2000-32	2	2.890	2.350	2	2 1/2
PLKIG2000-40	2 1/2	3.660	2.845	2	2 1/2
PLKIG2000-48	3	4.250	3.465	3	3 1/2
PLKIG2000-56	3 1/2	4.870	3.960	3	3 1/2
PLKIG2000-64	4	5.335	4.455	3	3 1/2
PLKIG2000-80	5	6.225	5.505	5	5 3/4
PLKIG2000-96	6	7.625	6.550	6	6 3/4

Placing the DMC Power Bus Connector fitting in the Swage Tool
1. Place the Head Assembly on the Bus Connector fitting such that the Head Assembly Swage Die is positioned between the Inboard Swage Lines. Actuate the Pump.

2. Move the Swage Tool towards the Outboard Swage Lines. Align the Head Assembly Swage Dies so that they are between the Bus Connector Outboard Swage Lines. Actuate the Pump.