TITEFLEX COMMERCIAL ASSEMBLY PROCEDURE

TITLE: R105/R115/R122/R144 SERIES MEDIUM PRESSURE HOSE ASSEMBLIES UTILIZING TK2 FITTINGS (ABRASIVE WHEEL)

AP-33
Rev. E

Total No. of Pages: 15

SPECIFICATION CHANGE HISTORY

REV LTR	REV DATE	DESCRIPTION-CHANGE	APPROVALS		
			REQ	ENG	QA
IR	6/24/04	Initial Release	RNK 6/23/04	RNK 6/23/04	HBG 6/23/04
A	10/12/04	Revised Tables 1 & 2 to reflect swage/crimp diameter tolerance of ± .005 and added to size –16 data.	RNK 10/04/04	RNK 10/04/04	HBG 10/04/0
B	2/20/06	Updated Tables 4 and 5 'JIC Pusher' to reflect change in TK2 nuts.	AJB 2/14/06	AJB 2/14/06	HBG 2/17/06
C	10/11/10	Added note for McLube application to Swaging Procedure	TMS 10/8/10	AJB 10/11/10	JJM 10/11/10
D	3/6/12	Updated Tables 4 and 5: 'MNPT Pusher' part numbers for step down fittings were corrected	TSJ 3/5/12	AJB 3/5/12	JJM 3/5/12
E	02/06/2013	Added warning labels and swaging information	TSJ 02/04/13	AJB 02/04/13	CGB 02/04/13

NOTE: This specification shall be modified from time to time, as required, by modifications to the products herein, or as required by addition of new products, or deletion of old products. Holders of this specification outside of the normal Titeflex Commercial change distribution list will not be kept up to date.

As you read this procedure and the instructions included within, you will see NOTICES, **CAUTIONS, WARNINGS and DANGER**. Each message has a specific purpose.

NOTICE

NOTICES are additional information to help you complete a procedural task or add additional useful information.

⚠CAUTION

CAUTIONS are safety messages that indicate a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. A **CAUTION** may also be used to alert against unsafe practice or possible equipment damage.

⚠WARNING

WARNINGS are safety messages that indicate a potentially hazardous situation, which, if not avoided could result in moderate to serious injury.

⚠DANGER

DANGER: are safety messages that indicate a hazardous situation which, if not avoided, will result in death or serious injury

CAUTIONS, WARNINGS and **DANGER** identify the hazard, indicate how to avoid the hazard, and advise of the probable consequence of not avoiding the hazard.

⚠WARNING

WARNING: ***Failure to read, thoroughly understand, and follow all instructions can result in serious personal injury, damage to equipment, or voiding of factory warranty! It is the assembler's responsibility to make sure all components are properly assembled and installed using the instructions provided.***

1.0 PURPOSE

To establish assembly instructions and inspection procedures for R105/R115/R122/R144 Series medium pressure extruded PTFE assemblies using TK2 fittings for assemblies cut with an abrasive wheel.

2.0 DEFINITIONS

N/A

3.0 ASSOCIATED DOCUMENTS

CQP-830 Nonconforming Material Report and Control
CQP-833 Scrap Processing
CQP-835 Daily Scrap Reports
MES 246 McLUBE Dip Coating

4.0 PROCEDURE

4.1 General

4.1.1 Check the tooling for wear, cracks, and contamination.

4.2 Preparation of Hose

4.2.1 Select the appropriate R105, R115, R122 or R144 hose and calculate the desired hose length by subtracting the fitting deduct length of both end fittings.

4.2.2 Wrap the area of the hose to be cut with a single layer of reinforced packing tape or masking tape. Note: This step may be omitted for sizes 4, 5 and 6 hose.

4.2.3 Measure with a tape measure or other suitable device and cut hose (See Figure #1) to the predetermined length. Use a cutoff wheel or other suitable device. Ends must be cut clean and approximately square.

NOTE: When measuring hose length at this operation or at 4.7, it is permissible to measure from the 1" mark on the tape to minimize wear on the tab.

4.2.4 Trim any burrs in the innercore using a sharp knife or chamfer tool and blow out any grit from ID of hose using clean shop air.

4.2.5 Trim any excess braid wire using wire snips or the edge of the cutoff wheel to achieve a consistent outside diameter. Excessive braid wire left behind from the cutting operation can affect the assembly of the fitting to the hose.

4.3 Hose/Fitting Insertion (One Piece Fitting)

4.3.1 Expand the hose ends per Figure #2 using the appropriate hose expander T168658-X as shown in Table 4. The expander should be rotated inside the hose 4 – 6 revolutions using a hand held variable speed drill at slow speed. Remove the tape from the ends of the hose.

4.3.2 Place the fitting with collar end up as shown in Figure #3 into appropriate 117483-X Fitting Installation Fixture and cap off with the split dies halves. Push hose end firmly into the die halves per Figure #4 until hose bottoms in collar. A slight twisting motion may be required. (Note: To insure the hose is bottomed in the collar, mark the hose OD prior to installing fitting where the collar ends. Push on the hose until the end of the collar now meets the mark on the hose OD.)

4.3.3 Repeat for other end of hose.

4.4 Hose/Fitting Insertion (Two Piece Fitting)

4.4.1 Remove tape from cut ends of the hose. Place the collar into the appropriate 117484-X Fitting Installation Fixture per Figure #7 and cap off with the split dies halves. Push the hose end firmly into the die halves until the hose bottoms in collar. A slight twisting motion may be required. (Note: To insure the hose is bottomed in the collar, remove the collar from

the installation fixture and visually inspect the opposite end of the collar for the hose.)

4.4.2 Repeat for other end of hose.

4.4.3 Expand the hose end per Figure #8 using the appropriate hose expander as shown in Table 4 by inserting the expander through the open end of the collar. The expander should be rotated inside the hose 4 – 6 revolutions using a hand held variable speed drill at slow speed.

4.4.4 Repeat for other end of hose.

4.4.5 Assemble the insert into prepared hose end by hand and push the fitting until it bottoms against the collar per Figure #9. Note: It may be necessary to use the side of a bench or other suitable device to facilitate the fitting insertion.

4.5 Crimping Procedure

Crimp the entire length of the retaining collar to the dimensions shown in Table 1 or Table 2 for detailed crimping dimensions. Note: The entire length of the collar must be crimped.

4.6 Swage Procedure

Note: McLube 1700L must be used on collars prior to swaging. Dip all collars into McLube 1700L then remove and allow to dry. If Aerosol version is used apply 2-3 coats allowing each coat to dry thoroughly between each application.

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Select the appropriate swage die and pusher set from Table 4 for R115/R122 hose and Table 5 for R105/R144 hose for the size assembled. Place the dies around the assembly and into the swage machine paying close attention to not pinch the reinforcing braid of the hose between swage die halves. Activate the swager and push the fitting into the die set per Figures #6 or 10 until the hex of the fitting makes contact with the top of the die set. Retract swage pusher and remove hose assembly from die halves. Repeat for other end.

4.7 Inspection

4.7.1 Perform a visual/dimensional inspection of the assembly per the following:

A. Crimp/Swage Diameter -
B. Overall Length -
C. Swage Length -

Measure first piece and visually compare to remainder of order.

Overall length tolerances are shown below and crimp/swage diameter and swage length per Table 1 or Table 2.

Use a vernier or equivalent to measure crimp diameter and a tape measure to measure overall length. The tape measure does not require calibration.
Overall length and dimensional tolerances are as follows:

Up to 18"	+1/4" - 1/8"
18" to 36"	+1/2" - 1/4"
36" to 50"	+1" -1/2"
Over 50"	+2" - 1"

4.8 Pressure Test

⚠WARNING

WARNING: ***Proof pressure values exceed the working pressures of the hose, therefore extreme care must be taken to protect from personnel injury and property damage. There is potential risk of flying parts, sudden release of energy and high pressure injection from test fluids among other dangers. Always test inside a protective cabinet and direct hose ends away from personnel and in a safe direction.***

4.8.1 Pressure test each assembly with water per following:

a. Connect assemblies to pressure manifold.
b. Run water through assemblies to remove air. Leave water on.
c. Place caps on assemblies.
d. Adjust pressure to proof value specified in for R115/R122 and Table 2 for R105/R144 of this document.
e. With air hose, blow water from outside of hose assemblies and close safety cover.
f. Set timer for three minutes minimum. Longer assemblies may require longer than 3 minutes to visually inspect.

⚠CAUTION

CAUTION: ***Never leave assemblies at proof pressure longer than necessary to evaluate, proof pressure values exceed the working pressures of the hose.***

g. Examine lines. Any evidence of leakage constitutes failure.

⚠WARNING

WARNING: Never touch pressurized lines to feel for wetness. Serious injury from high pressure injection is possible. Proof testing must be done in a protective cabinet to protect from personnel injury and property damage.

h. Complete Pressure Test Log (Form AP01-1) and Initial Factory Order or Router as required.

4.8.2 Sampling of pressure test is permitted in accordance with Table 3. If any part is rejected, the entire lot is to be tested. Acceptable parts shall be routed to packing/stores and shipping. Rejectable parts shall be processed per CQP-830, CQP-833 and CQP-835.

TABLE 1 R115/R122 Hose Crimp/Swage Diameters

Size	Crimp/Swage Diameter ±.005	Swage Length (Min)	Max Operating Pressure, Room Temp. (PSI)	Proof Pressure (PSI) ±100 psi
-4	.350	.426	3000	4500
-5	.404	.426	3000	4500
-6	.478	.545	2500	3750
-8	.568	.572	2000	3000
-10	.705	.668	1500	2250
-12	.800	.733	1200	1800
-16	1.057	.854	1000	1500

TABLE 2 R105/R144 Hose Crimp/Swage Diameters

Size	Crimp/Swage Diameter ±.005	Swage Length (Min)	Max Operating Pressure, Room Temp. (PSI)	Proof Pressure (PSI) ±100 psi
-4	.375	.426	3000	4500
-5	.432	.426	3000	4500
-6	.492	.545	2500	3750
-8	.585	.572	2000	3000
-10	.724	.668	1500	2250
-12	.818	.733	1200	1800
-16	1.066	.854	800	1200

TABLE 3

Lot Size*	Sample Size
2 to 8	All

9 to 15	9
16 to 25	13
26 to 50	13
51 to 90	13
91 to 150	13
151 to 280	50
281 to 500	50

- For lot sizes above 500 contact Quality Engineering for sample size.

TABLE 4 R115/R122 Swage Tools

Size	Swage Dies	Hose Expander	JIC Pusher	MNPT Pusher
4	117455-4	T168658-4	117512-04	106576-4-2 (1/8”) 106576-4 (1/4”)
5	117455-5	T168658-5	117512-05	106576-4 (1/4”)
6	117455-6	T168658-6	117512-06	106576-6-4 (1/4”) 106576-6 (3/8”)
8	117455-8	T168658-8	117512-08	106576-8-6 (3/8”) 106576-8 (1/2”)
10	117455-10	T168658-10	117512-10	106576-8
12	117455-12	T168658-12	117512-12	106576-12
16	117455-16	T168658-16	117512-16	106576-16

TABLE 5 R105/R144 Swage Tools

Size	Swage Dies	Hose Expander	JIC Pusher	MNPT Pusher
4	117455-4A	T168658-4	117512-04	106576-4-2 (1/8”) 106576-4 (1/4”)
5	117455-5A	T168658-5	117512-05	106576-4 (1/4”)

6	117455-6A	T168658-6	117512-06	106576-6-4 (1/4”) 106576-6 (3/8”)
8	117455-8A	T168658-8	117512-08	106576-8-6 (3/8”) 106576-8 (1/2”)
10	117455-10A	T168658-10	117512-10	106576-8
12	117455-12A	T168658-12	117512-12	106576-12
16	117455-16A	T168658-16	117512-16	106576-16

Figure #1: Hose Cut-off – Abrasive Wheel

Figure #2: Hose Expanding – One Piece Fitting

Figure #3: One Piece Fitting Installation Fixture

Figure #4: One Piece Fitting Assembly onto Hose

Figure #5: Assembled One Piece Fitting

Figure #6: Swaging of One Piece Fitting

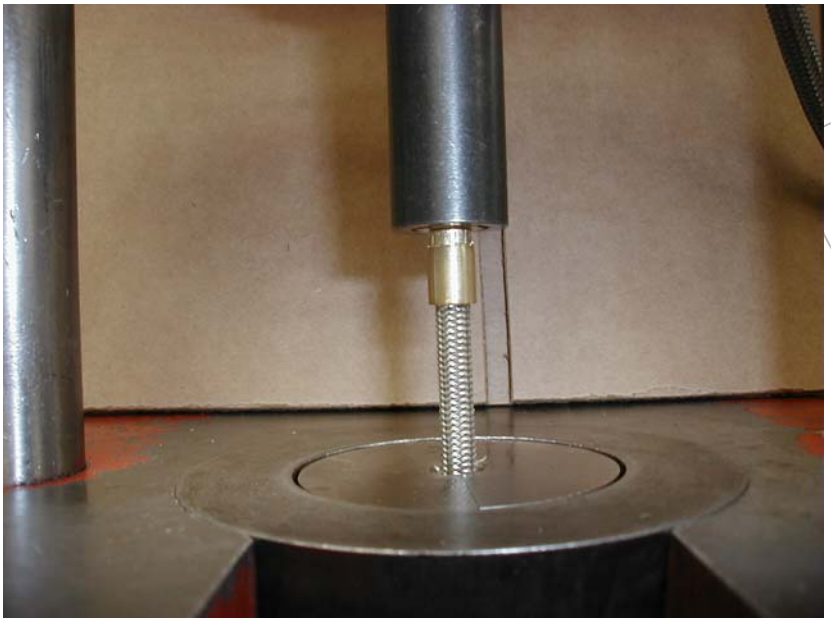

Figure #7: Collar Assembly – Two Piece Fitting

Figure #8: Hose Expansion – Two Piece Fitting

Figure #9: Assembled Two Piece Fitting

Figure #10: Swaging of Two Piece Fitting

Figure #11: Swaged Two Piece Fitting