



TITFLEX COMMERCIAL ASSEMBLY PROCEDURE

**AP-09
Rev. R**

TITLE: INDUSTRIAL PTFE CONVOLUTED HOSE ASSEMBLY

SPECIFICATION CHANGE HISTORY

REV LTR	EFFECTIVE DATE	DESCRIPTION-CHANGE	APPROVALS		
			ENG	QA	
G	04/16/99	Revisions to Tables I, III, and IV to include size -10 hose. Put into latest format.			
H	04/28/00	Revisions to Tables I and IV to add -40 information. Added new section 4.6, remaining renumbered accordingly.	REQ	ENG	QA
			RNK 5/1/00	RNK 5/1/00	SAF 5/1/00
J	1/16/03	Revisions to para. 3.0 and 4.7.3 to remove reference to obsolete SOP: QA-203. Added Form AP-01.	HBG 1/13/03	RNK 1/15/03	HBG 1/16/03
K	10/12/04	Removed reference to R267 hose and replaced with 109365.	RNK 10/04/04	RNK 10/04/04	HBG 10/04/04
L	2/17/05	Revisions made to Table I 'Swage Dia.'	RNK 2/16/05	RNK 2/16/05	HBG 2/16/05
M	8/13/09	Removed references to-48, -64, 110051-8, R272-8NPT, 109365, Sugarlines, and Dry Pressure Test	TMS 7/14/09	AJB 8/12/09	JJM 8/12/09
N	06/14/11	Added instructions for tape application in para. 4.2. Deleted assembly info for size -40	SKT 6/13/11	AJB 6/14/11	JJM 6/14/11
P	02/06/2013	Added crimping procedure and related data Added warning labels, McLube for swaging	TSJ 02/04/13	AJB 02/04/13	CGB 02/04/13
Q	8/28/18	IN-1224 Added swager safety to sect 4.4 and remove reference to PT Log from 4.6.2.h	GR 8/20/18	AP 8/27/18	LS 8/27/18
R	01/07/19	Change Table I R285/287-24 swage die and diameter. Re-formatted warning in 4.4.2a	GPR 01/04/19	MC 1/4/19	LS 1/4/19

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 change distribution list will not be kept up to date.

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



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.*

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



TITFLEX COMMERCIAL ASSEMBLY PROCEDURE

AP-09

TITLE: INDUSTRIAL PTFE CONVOLUTED HOSE ASSEMBLY

Rev. R

1.0 PURPOSE

To establish assembly instructions and inspection procedures for Titeflex Commercial Convoluted PTFE Hose Assemblies. This procedure covers assembly of R272, R276, R285, R287, R270 and R273 hose.

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 246C McLUBE Dip Coating

4.0 PROCEDURE

4.1 Preparation of Hose

Calculate the cut off length by subtracting the fitting deduct length. The fitting deduct length can be determined from the catalog data or from measuring the face of the fitting to the back of the “dog lock” ring on each fitting. Measure length with a tape measure or other suitable device and wrap cutting area with appropriate masking tape. Then using abrasive cut off wheel or another suitable device, cut hose to desired length. Trim end of hose innercore to remove rough edges. Ends must be cut clean and approximately square

NOTE Because of the Pressure Test process the -24 & -32 braid is sometimes a little loose and needs to be milked down. The best way to handle this is to tape one end of the hose with masking tape and, with rope tied in a slip knot, attach the rope to the end of the hose and with leather palm gloves milk the braid down. Then gather the extra braid together tightly, put masking tape on the hose end, and then cut off the excess braid

**** This is best done in long lengths before cutting hose for assemblies.****

NOTE When measuring hose length at this operation or at 4.6 it is permissible to

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



TITFLEX COMMERCIAL ASSEMBLY PROCEDURE

TITLE: INDUSTRIAL PTFE CONVOLUTED HOSE ASSEMBLY

***AP-09
Rev. R***

measure from the 1” mark on the tape to minimize wear on the tab.

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”

Inspect ID and OD of cut hose for obvious flaws.

4.2 Fitting Preparation

When taping the barbs, it is important that the PTFE tape, P/N 97452, adheres to the insert. This usually requires a “rough-up” of the barb area with a file prior to applying the tape. Use care in taping so that all barbs except the one closest to the collar lock area are covered, and no tape extends into the collar lock area. This “rough-up” operation shall not include the doglock barb.

Wrap PTFE tape (97452) firmly around fitting end 3-1/2 ±1/2 overlapping turns wrapping in a clockwise direction. The one exception to this is the 2” Tefzel coated stub ends which require only 1 -0+1 wrap. Remove masking tape from hose end and slide collar on the hose.

If swaging, collars must be lubricated using McLUBE 1700L per MES 246C and then may also be brushed with non halogenated high pressure oil such as Dura Lube high pressure oil or equivalent.

4.3 Fitting Assembly

Thread fitting into hose with a smooth and firm clockwise motion to avoid distortion of the PTFE tape on the O.D. of the insert. A power threading tool or a vise to hold the

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



insert while this is done may be helpful on the larger sizes. While threading take care not to push the innercore out through the other end of the hose. If necessary, holding the hose securely at a 90° bend will hold the innercore firmly in place. A properly taped insert will act as a screw. It will engage the helix of the hose and draw the hose onto the insert.

NOTICE NOTE: Do not “over-insert so the innercore is loaded into the collar lock area. Stop inserting just as the collar is completely bottomed-out on the end fitting.” Back off the innercore 1/8” from the insert before swaging. Failure to do so may cause leaks.

It is necessary in the case of R285/R287 hose to remove approximately two turns of the inner support spring wire before sliding the collar onto the hose. Cut this spring off with a wire cutter and tuck it back under the braid. When all the wire is left under the collar, there is a possibility that it will work out of the convolutions during the insertion and swage operation and may cut through the innercore.

4.4 Prepare Swager

WARNING

Swaging operation develops extreme pressure on the tooling. Misalignment, wear, or damaged tooling could result in tooling failure and flying objects which could cause serious personal injury.

For protection, safety glasses with a face shield must be worn while swaging. All guarding around the swager should be inspected and in place prior to use.

- 4.4.1 Select proper pusher, see Table I, and install with 97302P3A master pusher into crossbar. Set base ring and proper size die (See Table I). Fit die halves around hose and place fitting into pusher. Lubricate fitting collar with aerosol spray of McLube 1700L and allow drying before repeating. After second spray, allow to dry and lubricate collar and I.D. of die with high viscosity oil.

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



Table I
Swaging Tools

HOSE SIZE	DIES R272, R276, 109365, R270, R273	SWAGE DIA	DIES R285, R287	PUSHER: JIC (All conv. hoses)	PUSHER: MPT (All conv. hoses)
-08	1 st pass 106539-12 2 ND pass 97954-08	.800 ±.003 .781 ± .010	-	97302-A-08	97302-C-08
-10	97954-10	.884 ± .005	-	97302-A-10	97302-C-10
-12	97954-12	1.063 ± .005		97302-A-12	97302-C-12
-16	97954-16	1.295 ± .005		97302-A-16	97302-C-16
-20	97954-20	1.547 ± .005	-	97302-A-20	97302P3A
-24	97954-24	1.810 ± .005	-	97302-A-24	97302P3A
-24	-	1.845 ± .005	97954-24HVB	97302-A-24	97302P3A
-32	97954-32	2.375 ± .010	-	97302-A-32	97302P3A
-32		2.445 ± .010	97954-32HV	97302-A-32	97302P3A

NOTE: FOR FLANGE RETAINING INSERT ASSEMBLIES. USE 97302P3A ONLY.

NOTE: FOR -32 HALAR ENCAPSULATED FLANGE RETAINERS IT IS RECOMMENDED THAT YOU USE A TWO PASS SWAGE, FOR THE 1ST PASS USE 97954-32HV DIES AND FOR THE 2ND PASS USE THE 97954-32 DIES

4.4.2 Swaging Operation

- a) Activate swager and lower ram until collar nests concentrically with die opening. Activate swager ram and continue swaging, smoothly and without joggng, until top of collar is flush with top face of die. Return ram immediately upon attaining fully swaged position. Remove dies, and repeat process for other end of hose assembly.



CAUTION: Always be certain that proper pusher is in place for each fitting used. Failure to do so may cause damage to tooling, equipment or product causing flying objects that could severely injure the operator

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



NOTICE NOTE: On open throat swagers, always close gate prior to swaging. Failure to do so may damage swager.

4.5 Crimping Operation

- a) Crimping is allowed as an assembly option. McLube 1700L coating of the collars is not necessary for crimping. The resulting shape of the crimp simulates the shape of a swage.
- b) Crimp the collar per Tables I and II. The dies should at the final crimp be 1/32” apart or less. Use only smooth, cylindrical dies.
- c) If maintaining the “A” dimension (the distance from the collar to the crimp fingers) is difficult due to fitting motion during crimping, a locator stop per the illustrations is recommended.
- d) If the flare of the collar is larger than the hex of the insert, crimp the flare to a diameter equal to the distance across the flats of the hex.
- e) Measure the crimp diameter at the center of the collar length at several locations around the diameter.

Table II

Hose size	Crimp diameter ±.005	“A” ±.010
-8	.781	.312
-10	.884	.344
-12	1.063	.375
-16	1.295	.375
-20	1.547	.500
-24	1.790	.500
-32	2.375	.500

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

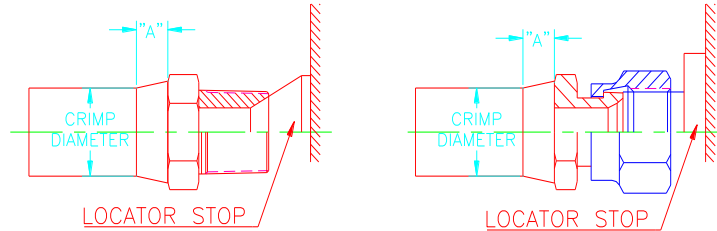
The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



TITFLEX COMMERCIAL ASSEMBLY PROCEDURE

TITLE: INDUSTRIAL PTFE CONVOLUTED HOSE ASSEMBLY

**AP-09
Rev. R**



4.6 Inspect and Test Procedure

⚠ 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.

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

- A. Swage/Crimp Diameter - } Measure first piece and visually
- B. Overall Length - } compare to remainder of order.

Overall length tolerances per paragraph 4.1, swage diameter per Table I, crimp parameters per Table II. Measure swage diameter in center of collar approximately 90° from longitudinal marks caused by die parting line.

Use a vernier, Pi tape or equivalent to measure swage or crimp diameter and a tape measure to measure overall length. The tape measure does not require calibration.

4.6.2 Pressure test each assembly with water per proof pressure values in Table III.

For flanged assemblies, pressure test per drawing requirements or double the primary service rating of 150 lb flange and one and half the primary service rating of 300 lb flange:

- 150 lb flange test at 300 psi
- 300 lb flange test at 450 psi.

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



TITLE: INDUSTRIAL PTFE CONVOLUTED HOSE ASSEMBLY

Perform water pressure test according to the 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 test value specified in Table IV of this document or above.
- e. With air hose, blow water from outside of hose assemblies.
- 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 Router as required.

4.6.3 Sampling of pressure test is permitted in accordance with Table IV on all products except “heavywall” R285 and R287. These products are not to be sampled at pressure test. 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 III

Note: Test pressures apply to JIC and male pipe fittings only.

R272/ R276	Test Pressure	Length of Test
-8	1500 PSI	3 MIN
-10	1500 PSI	3 MIN
-12	1500 PSI	3 MIN
-16	1500 PSI	3 MIN
-20	1500 PSI	3 MIN
-24	1125 PSI	3 MIN
-32	750 PSI	3 MIN

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.



TITFLEX COMMERCIAL ASSEMBLY PROCEDURE

AP-09

TITLE: INDUSTRIAL PTFE CONVOLUTED HOSE ASSEMBLY

Rev. R

R285/R287	Test Pressure	Length of Test
-24	1125 PSI	3 MIN
-32	750 PSI	3 MIN
R270/R273	Test Pressure	Length of Test
-8	300 PSI	3 MIN
-12	260 PSI	3 MIN
-16	260 PSI	3 MIN
-20	225 PSI	3 MIN
-24	225 PSI	3 MIN

Table IV

LOT SIZE*	SAMPLE SIZE
2 to 8	All
9 to 150	13
151 to 500	50

* For lot size above 500 contact Quality Engineering for sample size.

PROPRIETARY DATA NOTICE TO ALL RECEIVING THIS DOCUMENT

The information contained in this document was developed at the private expense by Titeflex Commercial. The contents are deemed proprietary and all patent rights are reserved. Any submission is in a spirit of confidence and acceptance is deemed to be an acknowledgment of the confidential relationship. Information contained hereon not lawfully obtained from another source shall not be released, duplicated, used or disclosed in whole or in part for any procurement or manufacturing purpose with the prior written permission of the president, Titeflex Commercial.