

# AE246 High Pressure Teflon® Hose and "super gem"™ Reusable Fittings

Assembly and disassembly instructions  
for hand and machine assembly



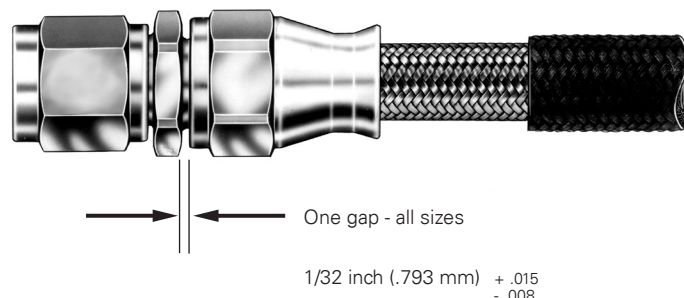
*Powering Business Worldwide*

# Table of Contents

Section I	Introduction	1
	1. Purpose	1
	2. Scope — “super gem” Fittings	1
	3. Description	1
Section II	Identification	2-4
	1. Identification and Construction of AE246 Teflon Hose	2
	2. Fire Sleeve	2
	3. Fittings - “super gem” Fittings	3
	4. Hose Assemblies	3
Section III	Disassembly	5
Section IV	Cleaning	6
Section V	Repair and Replacement	7
	1. General	7
	2. Fire Sleeved Hose Lines	7
Section VI	Assembly Procedure — Hand Tool Method	8-11
Section VII	Assembly Procedure — Machine Tool Method	12
	1. General	12
	2. Assembly of Fitting to Hose	12
Section VIII	Proof Test Procedures	13
	1. Equipment	13
	2. Recommended Hydrostatic and Pneumatic Proof Test Pressures	13
	3. Hydraulic Proof Test	13
	4. Pneumatic Proof Test	13
	5. Disposition If Fitting Leakage Is Noted	13
	6. After Proof Test Operation	13
Section IX	Removal of Hose Assemblies from Installation	14
	1. Inspection	14
	2. AN-MS Flared and Flareless Connections	14
	3. Handling General	14
Section X	Installation of Hose Assemblies	15-16
	1. Installation, General	15
	2. Routing and Clamping	15
	3. Torque Values, Installations	16
	4. “super gem” Fittings Used on Aeroquip AE246 Hose	16
Section XI	Inspection Procedures	17-18
	1. External Inspection of Hose Lines Removed from Service	17
	2. Internal Inspection of Hose Lines Removed from Service	17
	3. Hose End Fittings	17
	4. Inspection of Component Parts	18
Section XII	Permissible Rework	19
	1. Hose Assemblies	19
	2. Hose	19
	3. Fittings	19
	4. Fire Sleeves	19
Section XIII	Storage of Hose and Hose Assemblies	20
	1. Age Limitations	20
	2. Bulk Hose	20
	3. Hose Assemblies	20
Section XIV	Disposition	20
Section XV	Assembly Equipment, Special Tools, Fixtures and Service	21

## 1. Purpose

This manual provides specific instructions for maintenance and overhaul of Eaton's Aeroquip hose assemblies made of high-pressure tetrafluoroethylene (Teflon) hose. Eaton's Jackson, Michigan facility manufactures Aeroquip products (Federal Code Number 00624). The manual is divided into three areas of maintenance to enable each maintenance group to complete its service within a sequence of sections. The first area, following "Introduction" and "Identification" which are common to all levels, contains the maintenance and overhaul procedures for hose assemblies removed from service (Sections III through VIII). The second area provides maintenance and replacement instructions for hose assemblies which are in service (Sections IX through X). The last area of the manual is devoted specifically to inspection, storage and disposition of hose assemblies (Sections XI through XIV).



## 2. Scope

Hose assemblies fabricated in accordance with this manual will conform to the requirements listed in Specification MIL-H-38360 and are suitable for use in high temperature, 3,000 psi hydraulic and pneumatic systems. Use in other systems is permissible where pressure and fluid are compatible with the requirements of the specifications and as further specified in paragraph 6.1 of MIL-H-38360 or when specifically approved by Eaton.

## 3. Description

AE246 High Pressure Teflon Hose and reusable "super gem" fittings are manufactured by Eaton. Where applicable, supplementary information covering these hose lines protected with Eaton's Aeroquip fire sleeve is included.

Section II  
Identification

1. Identification and Construction of AE246 High Pressure Teflon Hose

- A. AE246 Teflon hose (Figure 1) conforming to the requirements of MIL-H-38360 has a corrosion resistant steel wire braid reinforcement covering an extruded Teflon inner tube. See Table 1.
- B. Identification of AE246 Teflon Hose
  - 1) Bulk hose Identification — Bulk hose has a tape with black letters specifying Aeroquip hose – size, operating pressure, lot number and hose manufacturer’s code. Tape is located at each end and in middle of hose.
  - 2) Hose Assembly Tag Identification — All factory assembled hose assemblies are identified with a metal band. Identification may include such information as customer part number, Federal Stock Number if required, hose assembly specification number, operating pressure in psig, manufacturer’s assembly part number, proof test symbol, date of assembly, and hose manufacturer’s Federal Code Number. See Figure 5.



Figure 1 - AE246 Bulk Hose

Table I

General Specifications — Aeroquip AE246 Teflon Hose

Hose Size	Tube Size O. D. inches (mm)	Operating Pressure psig (bar)	Min. Burst Pressure psig (bar)	Min. Bend Radius inches (mm)
- 4	1/4 (6.35)	3000 (206.84)	16000 (1103.16)	1.50 (38.09)
- 6	3/8 (9.52)	3000 (206.84)	14000 (965.26)	2.50 (63.50)
- 8	1/2 (12.70)	3000 (206.84)	14000 (965.26)	2.88 (73.15)
- 10	5/8 (15.87)	3000 (206.84)	12000 (827.37)	3.25 (82.55)
- 12	3/4 (19.05)	3000 (206.84)	12000 (827.37)	3.88 (98.55)

2. Fire Sleeve

AE102/624 firesleeve is identified by a red silicone impregnated, braided asbestos sleeve having a black lay line with “Aeroquip AE102/624”– size repeated at 10 inch intervals.

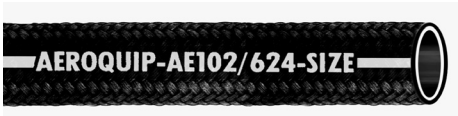


Figure 2 - Fire Sleeve

3. Fittings

All component parts of fittings are impression-stamped with the part number.

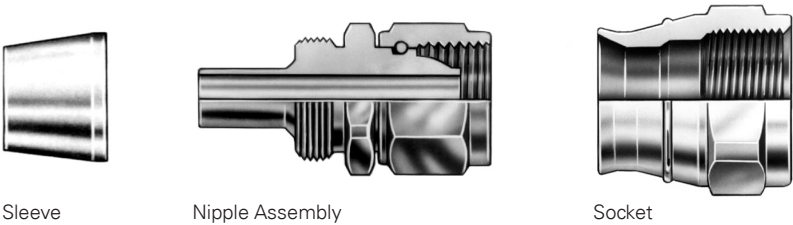


Figure 3. “super gem” fitting consists of 3 pieces: socket, sleeve and nipple assembly.

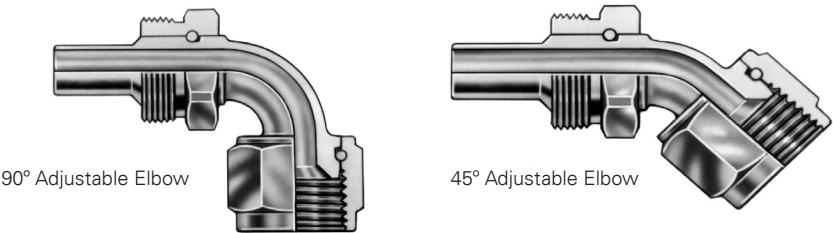


Figure 4. “super gem” elbow fittings

## 4. Hose Assemblies

All factory assembled hose lines are identified with a metal band (Figure 5) containing part numbers, date of assembly, etc. A detailed explanation of the different elements of a hose assembly part number is shown in Figure 6.

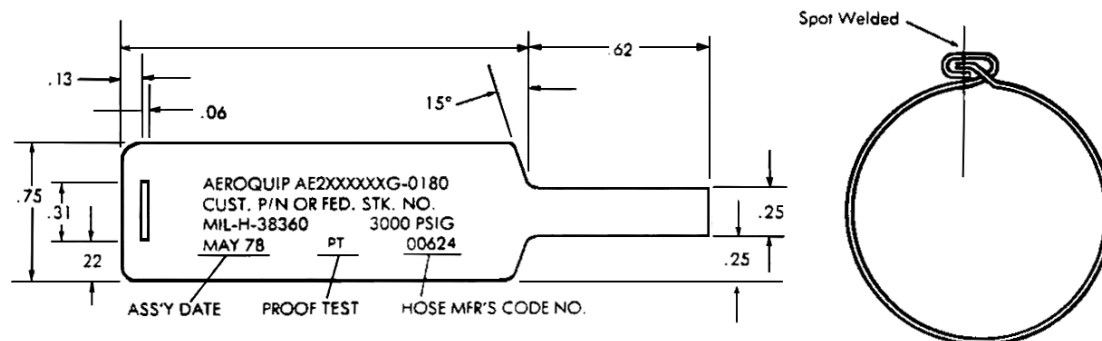


Figure 5. Identifying Metal Band

### How To Complete Assembly Part Number

Basic types of hose assembly numbers are shown below. A detailed explanation of the different elements of the part numbers are given on these pages.

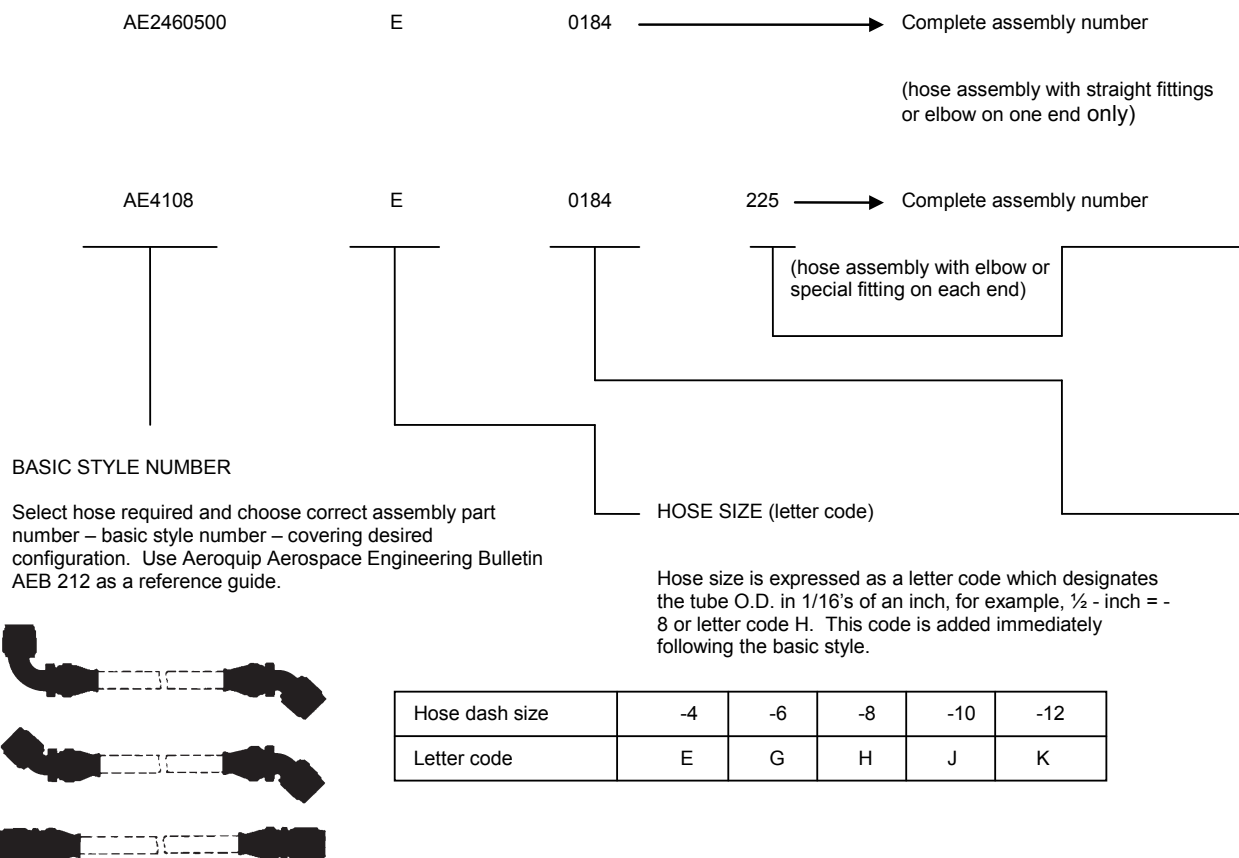
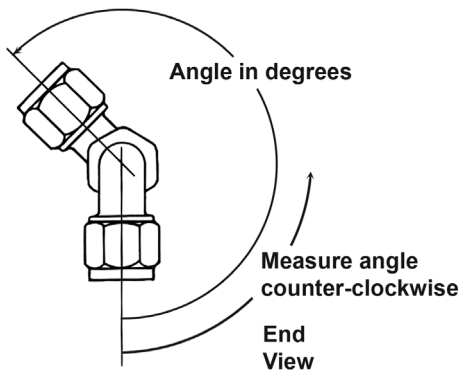


Figure 6 - Assembly Part Number Explanation

## Section II Identification

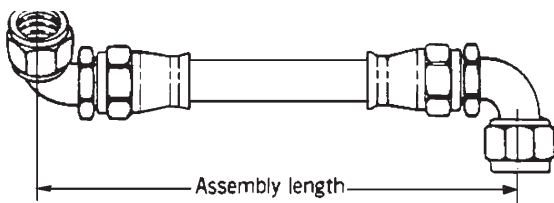


### Position Angle (Angle of Rotation)

For assemblies with an elbow fitting on each end, measure the position angle as shown and suffix the angle to the basic style number. The angle is expressed in three digits. For example: 35° would be written as 035. If the angle desired is 0°, specify as 000. The angle shown in the example is 225°.

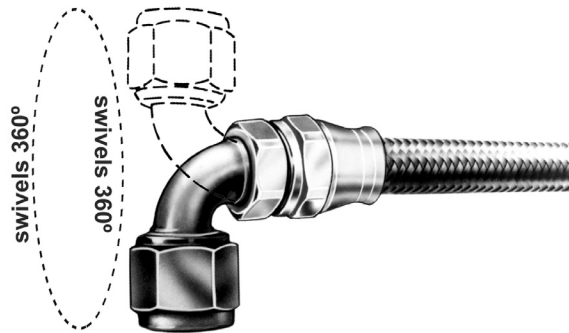
### Assembly Length

Assembly length is measured from sealing surface to sealing surface. On elbow fittings the measuring point is the intersection of the centerline of the elbow with the face of the sealing surface. Assembly length will always be expressed in four digits. Last digit shall always indicate fractional length in 1/8's of an inch. Thus, an assembly 18-1/2 long will be indicated as 0184.



### Assembly Length Tolerances (Teflon Hose)

- 18 inches or less  $\pm 1/8$  inch
- 18 inches to 36 inches  $\pm 1/4$  inch
- 36 inches or longer  $\pm 1\%$  length

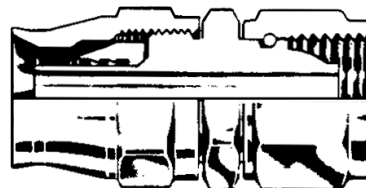
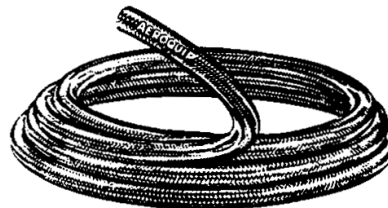


Adjustable elbow fittings are easily positioned through 360° to the desired relative angle between opposite elbow fittings. Mock-up and prototype installation changes are simplified as the position angle can be determined on the actual installation.

### Bulk Hose

- 300 ft., AE246-8 Hose (random lengths)
- 300 pcs., AE246-8-0120 (specific lengths)

Teflon hose will be shipped in random lengths. If specific lengths are required, order as shown in the example above. An additional charge is made on orders for specific lengths.



### Typical Straight Flareless Fitting Assembly

For complete configuration and style information, use Eaton Bulletin AEB 212 as a reference guide.

# 1. Complete Assembly Tear-Down

Procedure for salvage of hose assembly components:

- Step 1. (Fire-sleeved hose lines only). Remove band clamps by cutting clamp "buckles" with hack saw. Remove fire sleeve from hose assembly. (See Figure 7.)
- Step 2. Place socket in vise and remove nipple assembly by applying wrench to nipple hex. (See Figure 8.)
- Step 3. Cut hose approximately 1-inch from socket skirt.
- Step 4. Hold socket firmly in vise. Do not damage socket. Using needle nose pliers, remove the tube from the sleeve and hose reinforcement. (See Figure 8A). The tube may be removed by folding longitudinally and pulling it out of the socket.
- Step 5. With the socket still in the vise, separate the sleeve from the socket and hose reinforcement. The reinforcement can then be pulled out of the socket.
- Step 6. Remove hose fitting from opposite end of assembly, using the same procedures, step 2 through step 5.
- Step 7. Disposition of Component Parts — All hose shall be scrapped and component parts of fittings shall be inspected in accordance with inspection procedures. See Section XI.

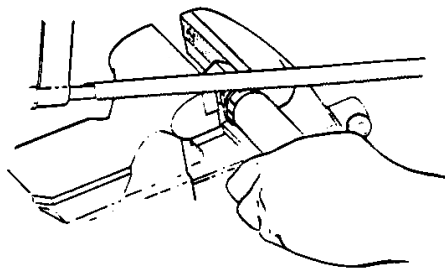


Figure 7. Removing Fire Sleeve From Hose Assembly

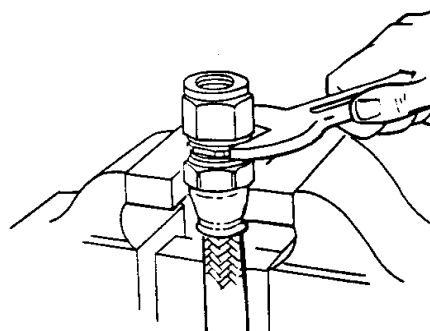


Figure 8. Removing Nipple From Socket

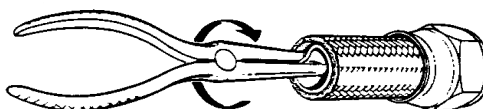


Figure 8A. Removing Tube From Sleeve



## Section IV Cleaning

### 1. General

It is recommended that all hose assemblies and component parts be thoroughly cleaned and degreased before inspection.

- A. Cleaning Hose Assemblies with AE102/624 Fire Sleeve — It is suggested that the fire sleeve be completely removed before cleaning. When cleaning after proof test, installation of the fire sleeve should be the last operation performed.
- B. Cleaning Hose Assemblies without Fire Sleeve — Flush hose assembly in cleaning fluid and brush, if necessary, to dislodge deposits. (For information covering F-2244 Hose Wash Stand, contact Eaton's facility, Jackson, MI.
- C. Cleaning Fitting Component Parts — Dip components parts and blow dry with clean air.

**Caution:** Do not wire brush parts.

- D. Cleaning Fluids — The following fluids may be used for cleaning hose assemblies of Teflon.

**Table II**

Fluids for Cleaning Teflon Hose Assemblies

Fluid	Specification
<b>Hose Assemblies:</b>	
Oleum Spirits	Commercial
Kerosene	P-S-661
Trichloroethylene	MIL-T-7003 or OT634-A. Type II
*Synthetic Detergents	MIL-D-16791
<b>Fitting Components:</b>	
Trichloroethylene	MIL-T-7003 or OT634-A. Type II

**Caution:** All dry filmed parts should be thoroughly dried after cleaning and before reuse.

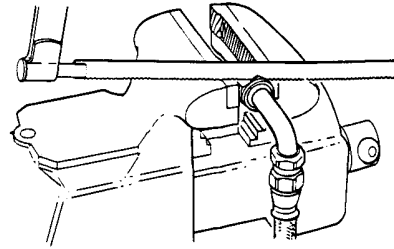
- E. Hose Assemblies After Proof Test — Flush hose assembly in cleaning fluid and blow dry with filtered air or dry nitrogen.



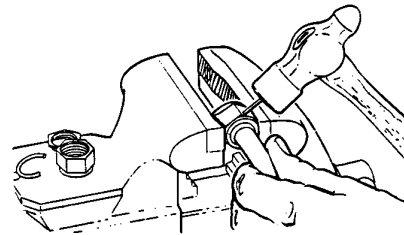
### 1. General

Fittings with minor damage may be repaired and reused as follows:

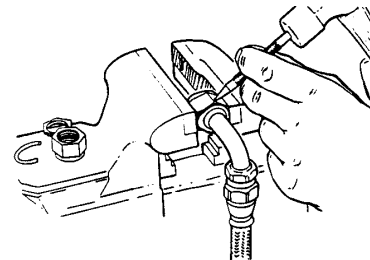
- A. Hose Assemblies — All hose assemblies with damaged hose shall have end fittings removed and salvaged and the hose scrapped.
  - B. Fittings (Nipple, Sleeve and Socket) —
    - (1) General — Replace all scrapped components.
    - (2) Damaged swivel nuts may be replaced as follows:
      - a. Cut nut down to retaining wire as shown in Figure 9.
      - b. Remove metal shavings and clean fitting.
      - c. Install new nut and drive in new retaining wire (Figure 10).
      - d. Set retaining wire with a punch (Figure 11).
- Note:** If nut does not turn freely after setting wire, it may be freed by tapping lightly with a hammer on the hex flats or tightening onto an AN815 adapter.
- (3) Backed-out wires on wired-on nuts may be driven back into place and set with a punch (Figures 10 and 11).



**Figure 9 - Removing Nut From Fitting**



**Figure 10 - Installation of Nut And Retaining Wire**



**Figure 11 - Setting Retaining Wire With Punch**

### 2. Fire Sleeved Hose Lines

Remove fire sleeve as shown in Section III, Disassembly.

- A. Replacement of Fire Sleeve — Lines requiring only replacement of fire sleeve may be repaired by replacing with a fire sleeve and clamp selected from Table III.

**Note:** Prior to assembling fire sleeve, the cut ends should be sealed with the compound as listed below in sub-section B, below.

- B. Repair of Fire Sleeve
  - (1) Minor Abrasions and Scuffs — Cover with brush application of synthetic sealer Aeroquip AE13702-001 Sleeve End Dip Compound.
  - (2) Frayed Ends — Trim loose ends and brush or dip ends at least one-half inch into synthetic sealer.

**Table III**

Fire Sleeve and Clamp Size Selector Chart

Hose Dash Size	Sleeve Part No.	Clamp Part No.
-4	AE102/624-8	900591B1C
-6	AE102/624-11	900591B2C
-8	AE102/624-13	900591B2C
-10	AE102/624-14	900591B2C
-12	AE102/624-16	900519B2C

# Section VI

## Assembly Procedure — Hand Tool Method

### 1. General

The following steps should be followed when fabricating hose assemblies from new or salvaged components:

**Note:** Assembly mandrels are not needed for assembly of fittings using hand tool method.

**Caution:** Do not salvage used hose. Used hose is defined as hose which has been removed from an installation and returned for replacement.

#### A. Straight Swivel Fittings —

- Step 1. Cut hose. Determine hose cut-off length by subtracting cut-off factors from Table IV from the desired hose assembly length. Cut hose squarely. A hose cut-off wheel is recommended. To prevent a flare-out of the wire end during the cut-off operation, several layers of tape should be wrapped around the hose at the cut-off point. After the hose is cut, and before proceeding with the assembly, the tape may be removed.

**Caution:** Hold hose firmly against angle plate or bolts of cut-off machine to bend hose at cutting point. It is recommended that the operator cut one sample and check length before proceeding with cutting the required quantity.

**Table IV Hose Cut-Off Factors**

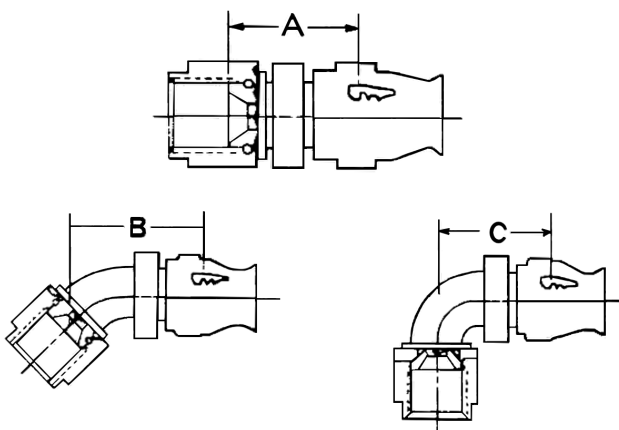
Dimensions shown in inches (mm)

#### 37° Flared Fittings

Size	Dim A ST	Dim B 45°	Dim C 90°
-4	.92 (23.36)	2.06 (52.32)	1.69 (42.92)
-6	1.04 (26.41)	2.35 (59.69)	1.92 (48.76)
-8	1.16 (29.46)	2.61 (66.29)	2.10 (53.33)
-10	1.21 (30.73)	2.74 (69.59)	2.06 (52.32)
-12	1.27 (32.25)	3.06 (77.72)	2.40 (60.95)

#### Flareless Fittings

Size	Dim A ST	Dim B 45°	Dim C 90°
-4	1.69 (42.92)	2.79 (70.86)	1.69 (42.92)
-6	1.80 (45.72)	3.13 (79.50)	1.92 (48.76)
-8	2.14 (54.69)	3.55 (90.16)	2.10 (53.33)
-10	2.35 (59.69)	3.83 (97.28)	2.06 (52.32)
-12	3.70 (93.98)	4.38 (111.25)	2.40 (60.95)



**Figure 12. Cut-Off Factors**

**NOTE:** Cut-off factors are for one end only (see Figure 12). Add cut-off factors for each end together and subtract from the desired hose assembly length to find the correct hose cut length.

## Section VI Assembly Procedure — Hand Tool Method

- Step 2. Install sockets (size -4 through size -10). Place two sockets skirt-to-skirt in vise (see Figure 13), and work hose through sockets with a twisting pushing motion. Installing sockets over “neckdown” end of hose will facilitate assembly.

(Size -12 only) — Assemble sockets from each end of hose.

**Note:** If tape was left in place to ease socket assembly, it must be removed before additional steps are performed.

- Step 3. Size tube and flare braid. Place nipple hex in vise. Push end of hose onto the nipple and work gently to aid in separating the wire braid from the tube. (See Figure 14.) Remove hose from nipple.

- Step 4. Install sleeve. Carefully insert sleeve between braid and tube O.D. insuring that no wires are trapped between the sleeve and tube O.D. If the sleeve cannot be inserted over the tube, insert a neck down tool (see chart) over the end of the tube and push firmly. This will resize the tubing O.D. to accept the sleeve. Complete positioning by pushing end of sleeve against flat surface until tube bottoms against shoulder in sleeve I.D. (see Figure 15.) However, neck down tool may not be required for all sizes. Visually inspect to see that tube end is bottomed against sleeve shoulder and that no wires are trapped under sleeve.

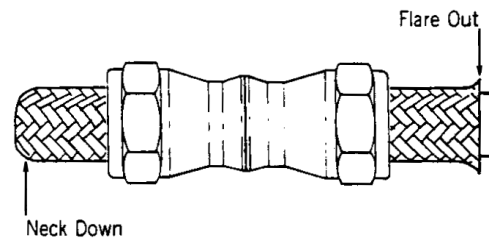


Figure 13 - Placing Sockets On Hose

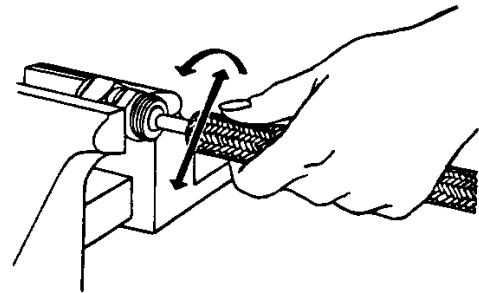


Figure 14 - Size Tube And Flare Braid

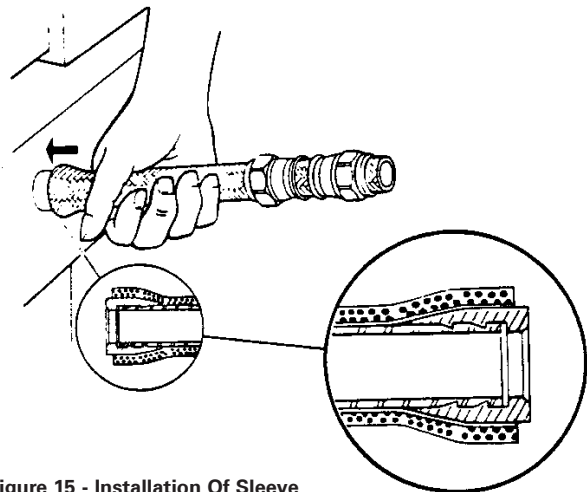


Figure 15 - Installation Of Sleeve

Hose Size	Neck Down Tool
-4	S1272-2-1
-6	S1272-2-2
-8	S1272-2-3
-10	S1272-2-5
-12	S1272-2-7

## Section VI

### Assembly Procedure — Hand Tool Method

- Step 5. Size tube to sleeve. Size tube to sleeve by pushing hose onto the nipple until the sleeve bottoms against the nipple chamfer. Remove and recheck to be certain that the sleeve is still properly positioned. Again push hose onto the nipple until the sleeve is bottomed against the nipple chamfer. (See Figure 16.)

**Note:** When assembling new fittings no lubrication is needed as component parts are dryfilm lubricated at the time of manufacture. After reuse of the fitting, if undue wearing of the dryfilm or bare metal is observed, the thread area should be lubricated with G N Paste. \*

- Step 6. (Size -4 through size -10) — Engage socket and tighten. Slide socket forward and thread onto nipple by hand. Remove assembly and place socket hex in vise. Using a wrench on the nipple hex, tighten to a gap of 1/32 inch nominal for all sizes. (Gap may vary from 0.023 to 0.046 inch.)

(Size -12 only) — Socket must be preseated prior to thread engagement. With the socket held firmly in a vise, insert socket preseat hand tool (S1272-8-1), into the hose. Using a nonferrous hammer, tap the preseating tool forcing the sleeve into the socket until the threaded end of the socket bottoms against the shoulder on the preseating tool. (See Figure 18.)

- Step 7. Install opposite hose fitting in the same manner.

**Caution:** If both fittings are elbow fittings, the relative position angle (index angle between fittings) must be set before tightening to final gap, see B, elbow fittings.

\*G N Paste is a product of the Dow Corning Corporation.

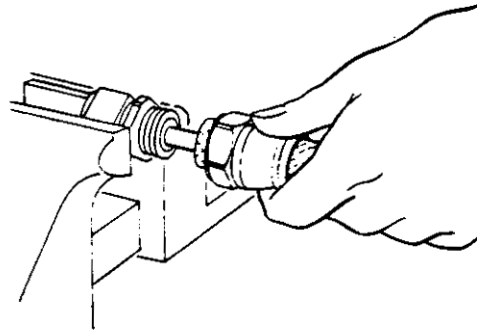


Figure 16. Sizing Tube to Sleeve

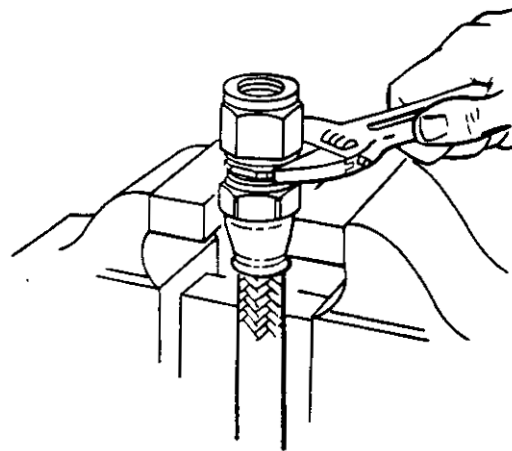


Figure 17. Engaging Socket to Nipple

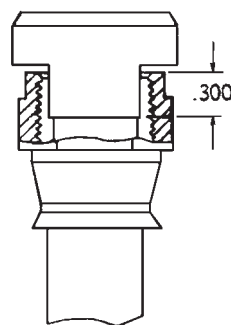
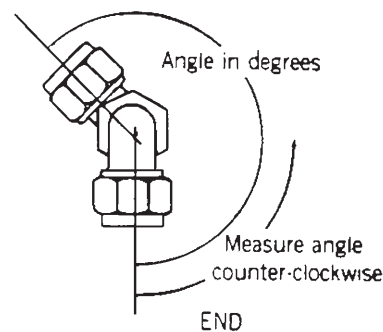
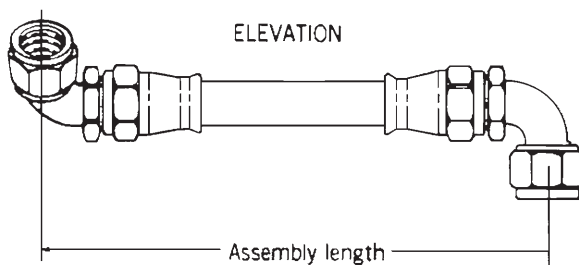


Figure 18. Preseating Socket on Size -12

- Step 8. Proof test hose assembly as described in Section VIII, Proof Test Procedures.
- Step 9. Marking — After proof test, all bulk hose manufacturer's code identification bands shall be removed and the hose assembly identified with a metal band containing the information listed in Section II, paragraph 1.B.2, plus a symbol to identify base or facility where hose assembly was made.
- B. Elbow Fittings — Method to establish the proper position angle of fittings when an elbow fitting is used on both ends.
- (1) Method for "standard" elbow fittings
- Step 1. Assemble one end as described previously in paragraph 1A, page 8 for assembly of straight swivel fittings.
- Step 2. Assemble the opposite end as described in paragraph 1A, except do not tighten socket to the specified gap. Leave nipple loose enough to swivel by hand.
- Step 3. Establish base position. Base position (or zero degrees) may be the top of a work bench or an elbow mounted in a vise with the nut pointed down.

- Step 4. Position and measure position angle. See Figure 19, below, for proper reading of position angle. While opposite fitting is still loose enough to swivel by hand, turn to required angle and measure, using a similar complete hose assembly or an adjustable protractor or other suitable angle-measuring device.
- Step 5. Complete fitting assembly by mounting the socket in a vise. Hold elbow from turning while tightening the elbow union to the required gap.
- Note:** Setting the angle may be facilitated by first tightening to near maximum gap, then back-off, set elbow to required angle and tighten to prescribed gap while holding elbow in position.
- Step 6. Recheck position angle to be sure position angle has not changed.



**Figure 19. Reading Position Angle**

## Section VII

### Assembly Procedure — Machine Tool Method

#### 1. General

The following approved equipment is recommended for production assembly of the hose assemblies covered by this manual:

Part No.	Name
S1022	Hose Cut-Off Machine, Bench Mounted
S1229	Hose Cut-Off Machine, Bench Mounted
F2152	Hose Assembly Machine
F2197	Hose Proof Test Stand

Machine equipment should be selected according to the individual need of the particular operator.

#### 2. Assembly Of Fitting To Hose

Step1. The general procedure described in Section VI, Assembly Procedures — Hand Tool Method, shall be followed. In addition, the following supplemental instructions will apply when using machine equipment for assembly. Specific instructions for operation, use, and maintenance of the equipment are included in the appropriate handbook for the particular type of equipment.

Step 2. Sleeve preseating, socket preseating, and tube neck down can be accomplished by machine when using the following tools:

Hose Size	Sleeve Preseating Tool	Socket Preseating Mandrel	Neck Down Tool
-4	S1272-7-1	S1272-3-1	F2717-6-7
-6	S1272-7-2	S1272-3-2	Not Required
-8	S1272-7-3	S1272-3-3	Not Required
-10	S1272-7-4	S1272-3-5	Not Required
-12	S1272-7-5	S1272-3-7	Not Required

- Step 3. Select proper mandrel for the machine being used.
- Step 4. Adjust jaws on the machine head to provide slip clearance on the nipple hex. This clearance should be approximately .010 inch (.254 mm).
- Step 5. Insert hose with socket in carriage and clamp securely. Insert nipple assembly in head.
- Step 6. Allow machine to screw the nipple into the socket to the prescribed gap: 0.023 to 0.046 inch (.584 to 1.168 mm).

## 1. Equipment

The following equipment is recommended for proof test of hose assemblies covered by this manual.

Eaton Part No.	Name
F2197	Hydraulic Proof Test Stand

For information covering pneumatic proof test equipment, contact Eaton.

## 2. Recommended Hydrostatic and Pneumatic Proof Test Pressures

- A. The recommended hydrostatic proof test pressure is 6,000 psi (413.68 bar) for all sizes.
- B. The recommended pneumatic proof test pressure is 3,000 psi (206.84 bar) for all sizes.

## 3. Hydraulic Proof Test

Proof test medium shall be hydraulic oil, Specification MIL-H-5606 or water. All hose assemblies shall be proof tested after assembly for a period of not less than 30 seconds and not more than 5 minutes.

**Note:** Proof test stands and special adapters are available from Eaton to facilitate testing large quantities of hose assemblies. See Assembly Equipment, Special Tools, Fixtures, and Services, Section XV.

## 4. Pneumatic test

Pressure test air-under-water for not less than 30 seconds nor more than 5 minutes and observe for bubbles indicating leakage.

**Warning:** Pneumatic leakage testing shall only be performed under a protective cover for the safety of the operator.

**Caution:** Never proof test sleeved hose lines under water.

## 5. Disposition If Fitting Leakage Is Noted

- A. Remove hose assembly and check for proper gap (Section VI – Assembly Procedure.)
- B. If proper gap was obtained, disassemble hose assembly according to Section III – Disassembly. Inspect fittings as described in Section XI.

## 6. After Proof Test Operation

- A. Cleaning — Clean and drain assembly after proof test. See Cleaning, Section IV.  
**Note:** Application of an identifying mark such as a paint dot, etc., indicating satisfactory proof test is recommended.
- B. Capping — Cap or plug all hose assemblies to ensure cleanliness.



## Section IX

### Removal of Hose Assemblies from Installation

#### 1. Inspection

Inspection and replacement of Teflon hose assemblies should be accomplished at specified maintenance or overhaul periods for the aircraft or engine as prescribed by applicable aircraft inspection requirements, or whenever leakage, abrasion of the cover, kinks or other mutilation is evident.

#### 2. AN-MS Flared And Flareless Connections

Apply one wrench to the swivel nut (also called "B" nut) and second wrench to hex on nipple portion of hose fitting. Turn nut to loosen and remove hose line. (See Figure 20.)

**Caution:** Do not place wrench on socket of hose fitting when removing hose line (See Figure 21).

#### 3. Handling General

Teflon hose assemblies will tend to preform themselves (assume their installed shape) to the installed position on hot fluid lines. For this reason, care should be exercised in handling and removing these lines from installation. Sharp or excessive bending will tend to kink Teflon hoses.

**Caution:** Do not bend or attempt to straighten pre-formed Teflon hose lines.

**Warning:** Do not stand on hose lines or use lines for a handle.

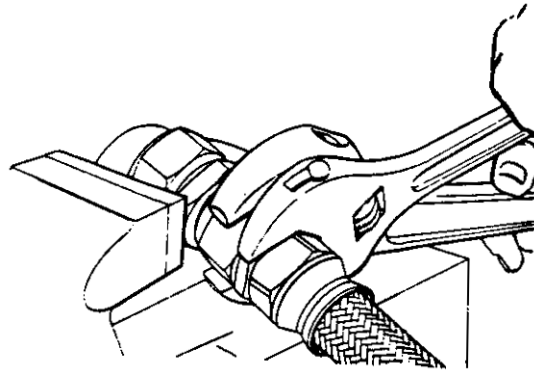


Figure 20. Loosening Swivel Nut

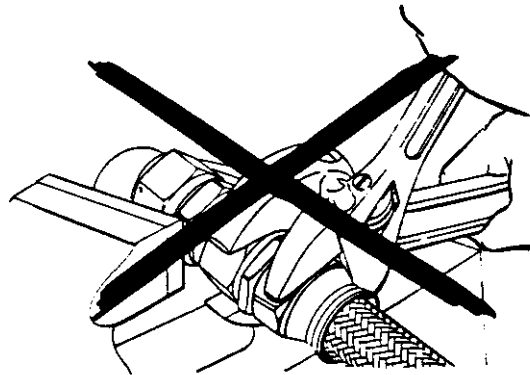


Figure 21. Wrong Method To Loosen Swivel Nut

### 1. Installation, General

Extra care should be exercised to avoid kinking as a result of sharp bending or twisting.

**Caution:** Kinking occurs more easily in larger size hose and in very short hose lines. Use care in handling and installing all Teflon lines.

**Note:** Wires and clamps used to hold pre-formed shapes should be removed at time of installation.

### 2. Routing And Clamping

All hose lines must be carefully routed and securely clamped to avoid abrasion and particularly to prevent kinking on flexing installations. Figure 22 illustrates routing and clamping of hose lines.

- A. Protection Against Abrasion — Eliminate chafing against structure, moving parts of other lines by proper clamping and by use of chafing guard on unsleeved hose assemblies (Aeroquip 656 Teflon Guard or 646 Neoprene Chafe Guard), if necessary.
- B. Hose Line Support — Support hose at least every 24 inches. Closer supports are preferred. Flexible lines should be supported so that they will not cause deflection of rigid connecting lines. Hose lines between two rigid connections may have excessive motion restrained where necessary but should never be rigidly supported. Support clamps shall not restrict travel or cause hose to be subjected to tension, torsion, compression or shear stress during flexing cycles. Select proper size support clamp from Table VI.

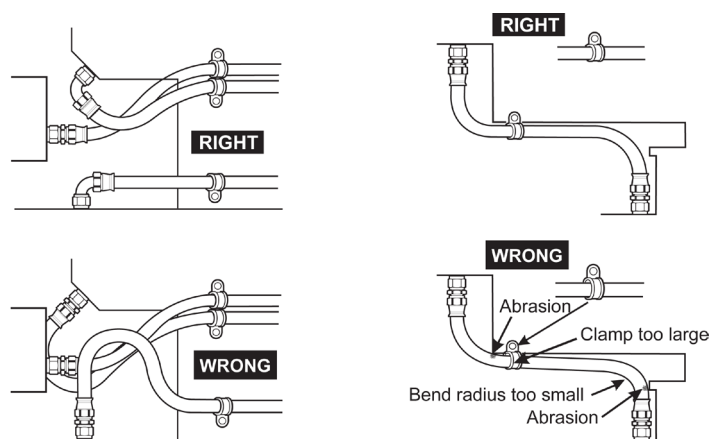


Figure 22. Routing and Clamping of Hose Lines

Table VI

Cushion support clamp sizes (for use with Aeroquip AE256 hose)

Hose Dash Size		-4	-6	-8	-10	-12
High Pressure AE246	MS21919-	6	8	10	12	14
High Pressure AE246 with AE102 Fire Sleeve	MS21919-	11	14	16	17	19

**Note:** Appropriate clamp cushion material to be determined by application conditions.

Section X  
Installation of Hose Assemblies

- C. Installation with Bending — When bends are required, the radii shown in Figure 23 should be maintained for normal installation with no flexing. A larger radius than the minimum allowed is preferred.
- D. Flexing Installations — The following precautions will help prevent kinking:
- (1) Hose should be bent in same plane as movement to avoid twisting. See Figure 24.
  - (2) Hose flexing in two directions should be clamped at the point where the hose changes planes. (This has effect of dividing hose into sections, each in one plane.) See Figure 24.

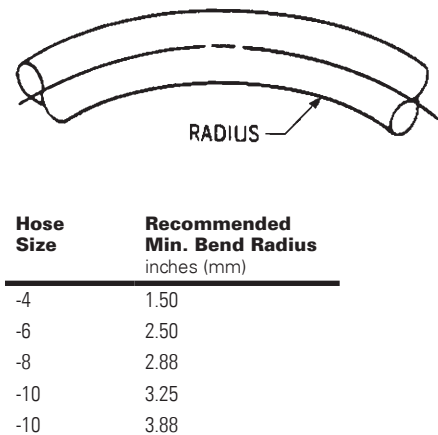


Figure 23. Minimum Bend Radius.

4. Fittings Used On Aeroquip AE246 Hose

In addition to the above general procedures, the following caution should be observed.

**Caution:** Do not place wrench on socket of hose fitting when installing hose lines.

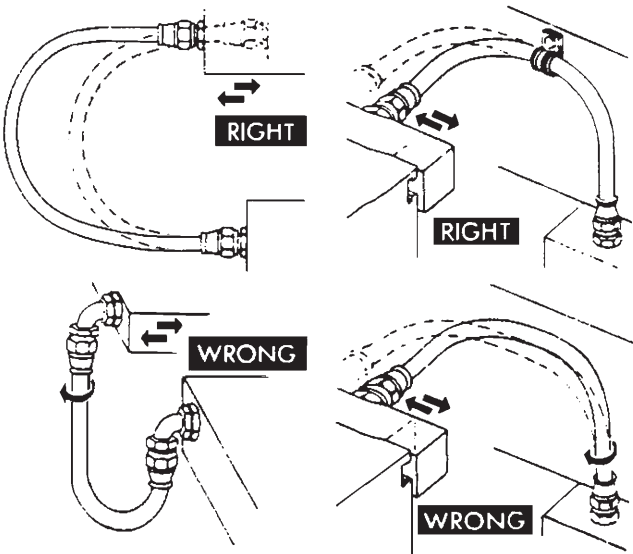


Figure 24. Flexing Installations.

3. Torque Values, Installation

Swivel Connections — Install flared and Aeroquip Globeseal flareless swivel connections using position-tightening procedure as follows:

- Step 1. Locate assembly in desired position and then turn nut finger tight.
- Step 2. While restraining nipple hex with one wrench, tighten nut to the appropriate torque value in Table VII. **Do not overtighten.**
- Step 3. If connection leaks during pressure check, loosen and completely disconnect the nut. Inspect the fitting for damaged sealing surfaces, present of foreign material or damage from previous overtightening.

Table VII

Installation Torque Values, Flared and Globeseal Flareless Swivel Fittings

Fitting Size	Torque in. - lbs.	
	Steel	
	Min.	Max.
-4	135	145
-6	215	245
-8	430	470
-10	620	680
-12	855	945

### 1. External Inspection of Hose Lines Removed From Service

All hose assemblies should be inspected to determine if the assembly can be returned to service, repaired, or if it must be replaced.

A. Unsleeved Hose Lines — Thoroughly examine hose externally for evidence of twisting, kinking, abrasion and broken wires.

- (1) Abrasion and Broken Wires — If excessive wire breakage, either general or localized as a result of abrasion, etc., is found, the hose assembly shall be rejected and the fittings salvaged.

**Note:** The following is offered as a rule-of-thumb measure — If two (2) or more broken wires per plait or more than six (6) broken wires per lineal foot are found, or any broken wire in a position where kinking is suspected, the hose should be scrapped. Crossed-over reinforcement wires shall not be cause for scrapping.

- (2) Hydraulic Pressure Lines — Hydraulic hose lines which are found to have broken wires shall be scrapped and the fitting salvaged.
- (3) Kinking — Any hose assembly showing evidence of dents, kinks or twisting should be scrapped.

B. Fire Sleeved Hose Lines

- (1) Fuel or oil soaked fire sleeve shall be scrapped.
- (2) Severely abraded or mutilated fire sleeve shall be scrapped.
- (3) Slight abrasion or frayed ends may be repaired and returned to stock. See Section V – Repair and Replacement.
- (4) Undamaged fire sleeve may be returned to stock.

### 2. Internal Inspection Of Hose Lines Removed From Service

A. Restrictions — Carefully examine hose internally for restriction, tube collapse or other signs of hose damage.

B. Inspection Procedures — The following internal inspection procedures are recommended:

- (1) Straight Hose Assemblies — Hose ID can be checked by looking through hose at a light source.
- (2) Elbow Fitting on One End — Insert flexible inspection light into one end and examine from straight-fitting end.

- (3) Elbow Fittings on Both Ends — Insert flexible inspection light into one end and examine from opposite end with dental-type mirror. This procedure is only practical on larger size hose assemblies.

- (4) Other Configurations and Small Size Hose — Pass a ball of proper size (select from Table VIII) through the hose assembly to check for restrictions.

AE246 Hose Dash Size	Ball Size (Inches)
-4	1/8
-6	15/64
-8	21/64
-10	27/64
-12	17/32

**Note:** These are standard master ball sizes.

### 3. Hose End Fittings

A. General — Examine end fittings for nicks, dents in bent tube portion, or other damage which would impair sealing under pressure or hose retention characteristics of the fitting. If any damage is evident upon visual inspection as described below, the hose assembly shall be disassembled and individual component fittings salvaged. See Disassembly procedure, Section III.

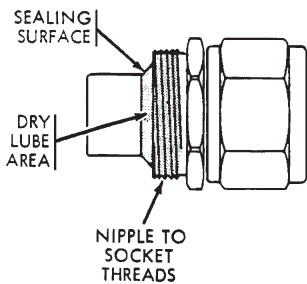
B. Swivel Connections — Examine swivel connections as follows:

- (1) Check for mutilated threads and evidence of overtightening. This will show up as a belled condition or “pulled” condition on flared connections, and may result in a frozen or tight swiveling nut. Damaged wired-on swivel nuts may be replaced. See Section V, Repair and Replacement.
- (2) Examine for backed-out retaining wires on wired on swivel nuts. Drive wire back into nut. See Section V, Repair and Replacement.
- (3) Visually inspect sealing surfaces of nipples for nicks, spiral or longitudinal scratches or scoring which could create an escape passage for fluids. Check for flare-out or distortion of cone seats resulting from overtorque.
- (4) All swivel fittings with damaged sealing surfaces shall be scrapped.

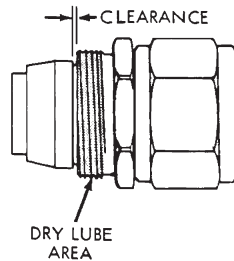
## Section XI Inspection Procedures

### 4. Inspection Of Component Parts

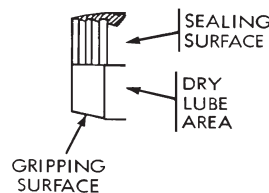
- A. General — All fitting components should be examined for corrosion damage. It is recommended that corrosion-damaged parts be scrapped. Minor scratches are not cause for replacement.
- B. Socket — Visually check for distortion or “egging” of socket and also test for damaged threads by threading a new nipple assembly of proper size into the socket threads. Damaged sockets shall be scrapped.
- C. Nipples
- (1) Visually inspect the sealing surface of nipples (see Figure 25) for damage or galling and condition of dry film lubricant.
  - (2) Visually check for galled threads (nipple to socket thread) and test by threading a new socket of proper size onto the nipple threads.
  - (3) Test for overtorque by placing a new sleeve on the nipple in the normal assembled position. Check for clearance between the sleeve and nipple faces. See Figure 26.
  - (4) Visually inspect wrench flats on forged-type elbow nipple assemblies for excessive wrench marks.
  - (5) Scrap damaged nipples or nipples with no clearance. See Figure 26.
- D. Hose — All hose removed from hose assemblies shall be scrapped.
- E. Nut and/or Male Nipples
- (1) Visually inspect nut internal threads and threads on male nipple assemblies. Acceptable threads will have at least 50% of entrance thread intact, provided balance of threads are not defective. Damage to balance of threads shall not exceed 25% of one thread, provided entrance thread is not damaged. All threads shall also fall within the pitch diameter tolerances of class 2, Military Specification MIL-S-8879, to be acceptable.
  - (2) Disposition — All damaged threaded components, except as described above, shall be scrapped. Wired-on swivel nuts may be replaced. See Figures 9, 10 and 11.
- F. Sleeve
- (1) Check the sealing surface (see Figure 27) for nicks, scratches or galling.
  - (2) Visually inspect gripping surface (sloping OD, Figure 27) for severe brinelling from hose braid, crimping or obvious out-of-round condition.
  - (3) Disposition — Damaged sleeves shall be scrapped.



**Figure 25**  
Sealing Surface of Nipples



**Figure 26**  
Nipple Assembly



**Figure 27**  
Sleeve

**1. Hose Assemblies**

- A. Hose assemblies may be shortened (new assemblies only) by removal of one end fitting.
- B. On fire sleeved assemblies, it may also be necessary to shorten the fire sleeve.
- C. Disassembly of the end fitting shall be in accordance with Section III.
- D. Cut hose to the desired length.
- E. Assembly of the end fitting shall be in accordance with Section VI.

**2. Hose**

- A. None (except length may be cut as described in 1A above).

**3. Fittings**

- A. Rework of fittings is restricted to the replacement of damaged swivel "B" nuts.
- B. Swivel "B" nuts will be replaced in accordance with Section V, paragraph 1.B.
- C. Dry Film — Inspect threads and sealing surfaces for wear. If undue wearing of the dry film is observed or bare metal is revealed, the entire thread and/or sealing surface may be evenly lubricated with G N Paste\*. Lubrication should be performed after cleaning just prior to assembly.

**Note:** G N Paste should not be thinned.

**4. Fire Sleeves**

Fire sleeves may be repaired as outlined in Section V, paragraph 2.

\* G N Paste is a product of the Dow Corning Corporation

## Section XIII

### Storage of Hose and Hose Assemblies

#### 1. Age Limitations

No age limitations have been established on high-pressure tetrafluoroethylene hose.

#### 2. Bulk Hose

Cut ends of hose should be taped closed to prevent wire flare-out and keep out dirt. Storage in a straight position is preferred. If coiling is necessary, large, loose coils are preferred.

**Caution:** Under no circumstances shall hose be piled to a height which could result in damage to the under sections. This caution applies to hose in cartons as well as unpackaged hose.

#### 3. Hose Assemblies

All hose assemblies should have ends capped or plugged during storage with plugs conforming to Specification MIL-C-5501 (ASG), or other applicable plastic or metal plugs.

---

## Section XIV

### Disposition

#### 1. General

All hose, fittings, or hose assemblies which are scrapped or are otherwise unsatisfactory for use on aircraft, missiles, and related accessories, shall be condemned in accordance with applicable regulations.



**1. General**

Many special tools and equipment have been designed by Eaton to facilitate the assembly, proof testing, cleaning, etc. of Teflon hose. These include special tool and power equipment for both small volume and production-type shops. Service engineering assistance is available for shops or engineering groups relative to either equipment or hose assembly installation. For a copy of Eaton product brochures, or to obtain engineering assistance, contact Eaton Aerospace Group, Conveyance Systems Division, 300 South East Avenue, Jackson, Michigan 49203.

**Eaton**  
**Aerospace Group**  
**Fluid & Electrical Distribution Division**  
**300 South East Avenue**  
**Jackson, Michigan 49203-1972**  
**Phone: (517) 787 8121**  
**Fax: (517) 789 2947**