

Cynergy[®] Clamp-to-FlareLock[®] II Adapter Assembly Procedures

PRODUCT SPECIFICATIONS

Maximum operating pressures:

- 689 kPa (100 psig) at ambient temperature
- 449 kPa (65 psig) @ 90°C (194°F)
- 414 kPa (60 psig) @ 2°C (35°F)

The versatile Cynergy[®] clamp adapter enables you to connect any standard sanitary clamp fitting to Entegris PFA tubing via the FlareLock[®] II end connection.

FLARELOCK II FITTING CONNECTION

Assembling the FlareLock II fitting consists of grooving, flaring and final assembly. Grooving the tubing outside diameter (OD) provides a groove in which the FlareLock II nut firmly connects. The flaring process provides a permanent expansion (flare) of the tubing end, allowing insertion of the Flaretek fitting body. Proper grooving, flaring, and fitting assembly result in a secure tubing connection.

Entegris recommends the following procedures for use only with Entegris groove tools, heat sources, and standard wall PFA tubing (0.062" wall thickness for $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" OD, 0.047" wall thickness for $\frac{1}{4}$ ").

NOTE: The FlareLock II nut is assembled at the factory with the split locking ring properly in place. If disassembled in the field, proper reassembly is crucial to ensure a good connection that functions properly.

TUBING PREPARATION

1. Cut the tubing end squarely (0.070" maximum squareness tolerance) using a Galtek[®] tubing cutter.

GROOVING INSTRUCTIONS

1. Obtain the proper FlareLock II groove tool designed to groove the tubing OD.
2. While maintaining slight force between the tube end and groove tool, rotate groove tool in direction of arrow, four complete revolutions.
3. Depress thumb rest. Remove tube and inspect groove to be certain that the depth is uniform and free from burrs.
4. Insert the grooved end of the tubing through the nonthreaded end of the nut.

⚠ WARNING! If you do not put the nut on the tube now you will not be able to put it on after you complete the flare.

HEAT FLARING INSTRUCTIONS

⚠ WARNING! For your safety, do not attempt to heat flare tubing that has been exposed to chemical. Tubing cools rapidly so please read and understand all instructions before flaring your tubing.

1. When using an Entegris hot air gun, set the hot air gun (see Figure 1) on "high." Hold $\frac{1}{2}$ " to $\frac{3}{4}$ " of the PFA tubing $\frac{1}{2}$ " to $\frac{3}{4}$ " above the heater and continually rotate the tubing 360° for the approximate time specified in Table 1 or until a fine, clear line appears around the tubing.

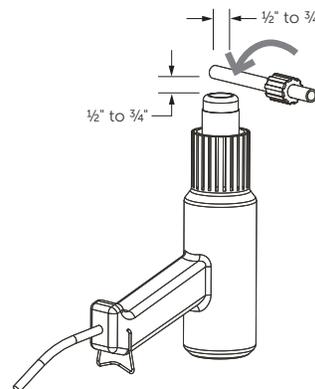


Figure 1. 213-79.

NOTE: It is very important to fully rotate the tubing over the heat source so all surface areas receive an equal amount of heat. Uniform heating is essential to making a good flare.

When using an Entegris infrared heating tool, turn on heating tool (see Figure 2). Center 1/2" to 3/4" of the PFA tubing between the heat rings. While slowly rotating the PFA tubing back and forth between your forefinger and thumb, heat for the approximate time specified in Table 1 or until a fine, clear line appears around the tubing.

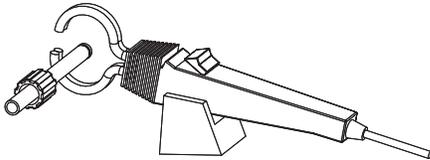


Figure 2.

NOTE: To flare 1" tubing with an Entegris infrared heating tool, a 1" heat ring is needed. See part number on back page.

NOTE: It is very important to rotate the tubing within the heat source so all surface areas receive an equal amount of heat. Uniform heating is essential to making a good flare.

2. Remove the PFA tubing from the heat source. Immediately push the flaring mandrel (see Figure 3) into the tubing until the end of the tubing reaches the tube stop.

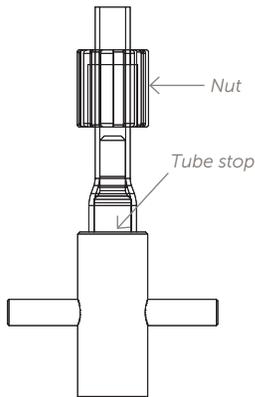


Figure 3.

NOTE: Flaring 1/4" tubing is challenging because of its small size. To get a firm grip on the small tube diameter, we recommend using the grip pad that is included in the mandrel kit.

3. Firmly hold the tubing onto the mandrel for the time specified in Table 1.

NOTE: To ensure that the FlareLock II fitting functions properly, it is crucial that the tubing is held firmly against the tube stop for the time specified in Table 1.

4. Let the flared tubing continue to cool on the mandrel the time specified in Table 1.
5. The flaring process is now complete and the tubing may be removed from the mandrel.

FLARELOCK II FITTING ASSEMBLY INSTRUCTIONS

1. Push the flared tubing end onto the Flaretek fitting body until the end of the fitting body contacts the flare transition of the tube (see Figure 4). The maximum gap between the tube end and fitting shoulder should be 0.08" to 0.15".

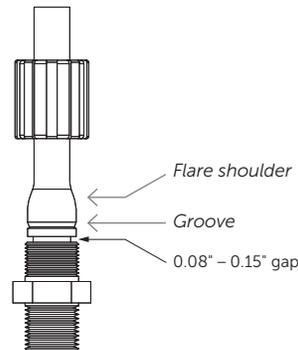


Figure 4.

2. Tighten the nut onto the fitting body until hand tight (see Table 1 for recommended minimum torque values).

RETIGHTENING

All fitting connections assembled using the room temperature flaring technique should be retightened to the minimum nut torque values identified in Table 1.

Additionally, after initial exposure to elevated temperatures, all fitting connections, including Flaretek, Flaretek "SpaceSaver", and FlareLock II, exposed to temperatures $\geq 165^\circ$ F must be retightened to the minimum torque values identified in Table 1 (fitting must be returned to room temperature before retightening).

Table 1. Assembly procedure times

| TUBING AND FITTING SIZE | 1/4" | 3/8" | 1/2" | 3/4" | 1" |
|----------------------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|
| Heating time for PFA | | | | | |
| Air gun | 15 sec | 25 sec | 25 sec | 25 sec | 25 sec |
| Infrared heater | 40 sec | 50 sec | 50 sec | 50 sec | 60 sec |
| Hold tubing on flare mandrel | 20 sec | 20 sec | 20 sec | 20 sec | 25 sec |
| Minimum cooling time on mandrel | 2 min | 2 min | 3 min | 3 min | 3 min |
| Minimum nut torque | 0.57 N•m (5 in•lbs) | 0.90 N•m (8 in•lbs) | 1.24 N•m (11 in•lbs) | 1.58 N•m (14 in•lbs) | 3.39 N•m (30 in•lbs) |

CYNERGY CLAMP CONNECTION ASSEMBLY

1. Clean the Cynergy clamp fitting face with isopropyl alcohol (IPA) to remove surface contaminants and particles.
2. Select the recommended sanitary gasket and clamp as specified in Table 2.
3. Place the appropriate gasket between the two sanitary flanges (Figure 5).
4. While holding the flanges together, place the clamp around them and secure the clamp. Tighten the clamp to the torque specification shown in Table 2.

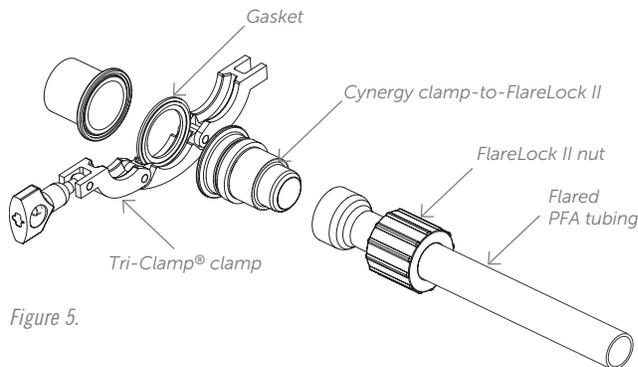


Figure 5.

NOTE: Laboratory testing of Cynergy clamp fittings shows performance reliability is dependent on the type of clamp and gasket used. Entegris strongly recommends the use of Tri-Clamp three-piece clamps for 1", 1 1/2", and 2" sizes and Tri-Clamp two-piece clamps for 1/4", 1/2", and 3/4" sizes. Entegris also recommends the use of EPDM sanitary gaskets by Tri-Clover® or Newman with Entegris' Cynergy clamp fittings. In-house testing has been performed on other high-performance gasket materials with favorable results. Contact your local Entegris distributor or Entegris, Inc. for a recommendation.

Table 2. Gasket and clamp recommendations

| Cynergy clamp connection size | Rubber fab Tuf-Flex® PTFE/EPDM gasket number | Entegris part number for Tuf-Flex gasket | Tri-Clover EPDM gasket part number | Entegris EPDM gasket part number | Tri-Clamp clamp number | Entegris part number for Tri-Clamp | Clamp-torque N•m (in•lbs) |
|-------------------------------|----------------------------------------------|------------------------------------------|------------------------------------|----------------------------------|------------------------|------------------------------------|---------------------------|
| 1/4" | — | — | 0-42MP-E-1/4* | 1333-022 | 13MHHS-3/4-S | 01-008141 | 1.7 (15) |
| 1/2" | A42MPGR-TF-050-E | 01-1014718 | 42MP-E-1/2 | 01-008136 | 13MHHS-3/4-S | 01-008141 | 1.7 (15) |
| 3/4" | A42MPGR-TF-075-E | 01-1014351 | 42MP-E-3/4 | 01-008137 | 13MHHS-3/4-S | 01-008141 | 1.7 (15) |
| 1" | A40MPGR-TF-100-E | 01-034815 | 40MP-E-1 | 01-008138 | 13MHHS-11/2-S | 01-008142 | 2.8 (25) |
| 1 1/2" | A40MPGR-TF-150-E | 01-034816 | 40MP-E-11/2 | 01-008139 | 13MHHS-11/2-S | 01-008142 | 2.8 (25) |

*Newman EPDM gasket part number.

TROUBLESHOOTING – FLARELOCK II TUBE FITTING ASSEMBLY

| PROBLEM | POSSIBLE CAUSE | SOLUTION |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| After flaring the tubing, one side of the expanded portion of the tubing is wrinkled and shorter than its original length. | The tubing was not heated evenly. The wrinkled areas were overheated. | The wrinkles can be avoided by rotating and moving the tubing through the heat source with more uniformity. Cut off the flared tubing end and reflare. |
| The tubing kinks when pushing it onto the flaring mandrel. | The tubing was not heated properly before flaring. | 1/2" to 3/4" of the tubing needs to be heated. Closely follow the recommended heating times in Table 1. Cut off the flared tubing end and reflare. |
| When the flared tubing is pushed onto the fitting body, the tubing is more than 0.150" away from the threaded area of the fitting body. | The tubing was not pushed onto the flaring mandrel all the way or the tubing was removed from the mandrel before it was cool. | Tubing may need longer heating time or longer cooling time on the flaring mandrel. Cut off the flared tubing end and reflare. |
| The flared tubing will not fit onto the fitting body. | The tubing was removed from the mandrel before it was cool. | Reheat and reflare the undersized flared tubing end. Allow adequate cooling time prior to removing from the flare mandrel. OR Cut off the flared tubing end and reflare. Be sure the tubing is cool before removing it from the mandrel. |

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