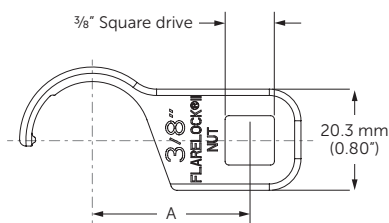


# Torque Verification Device

For  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ " and 1" sizes

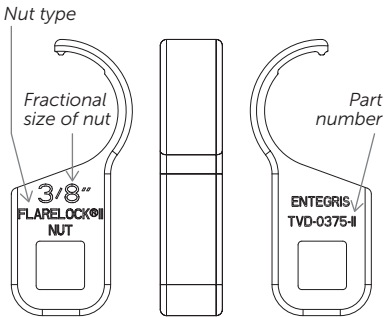
Achieving the nut torque required to seal Flaretek® fitting connections to rated pressures is easily achieved by hand tightening the nut. However, for hard to reach places and to better maintain user consistency, Entegris developed the Torque Verification Device (TVD). Entegris designed each TVD to specifically tighten an Entegris nut with Entegris PFA tubing on an Entegris PFA fitting or valve body. Each TVD is designed for a specific nut size ( $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ " and 1") and nut material (e.g., PVDF, PFA, CPFA, FlareLock® II) combination.



Part number	Dimension A	Standard nut size	Nut material	Fitting style
TVD-0375-1	1.25" (31.8 mm)	$\frac{3}{8}$ "	PVDF (-1)	Flaretek and Flaretek "SpaceSaver"
TVD-0375-3	1.25" (31.8 mm)	$\frac{3}{8}$ "	PFA (-3)	Flaretek and Flaretek "SpaceSaver"
TVD-0375-6	1.25" (31.8 mm)	$\frac{3}{8}$ "	CPFA (-6)	Flaretek and Flaretek "SpaceSaver"
TVD-0375-II	1.25" (31.8 mm)	$\frac{3}{8}$ "	PFA (-II)	FlareLock II
TVD-0500-1	1.25" (31.8 mm)	$\frac{1}{2}$ "	PVDF (-1)	Flaretek and Flaretek "SpaceSaver"
TVD-0500-3	1.25" (31.8 mm)	$\frac{1}{2}$ "	PFA (-3)	Flaretek and Flaretek "SpaceSaver"
TVD-0500-6	1.25" (31.8 mm)	$\frac{1}{2}$ "	CPFA (-6)	Flaretek and Flaretek "SpaceSaver"
TVD-0500-II	1.25" (31.8 mm)	$\frac{1}{2}$ "	PFA (-II)	FlareLock II
TVD-0750-1	1.44" (36.6 mm)	$\frac{3}{4}$ "	PVDF (-1)	Flaretek and Flaretek "SpaceSaver"
TVD-0750-3	1.44" (36.6 mm)	$\frac{3}{4}$ "	PFA (-3)	Flaretek and Flaretek "SpaceSaver"
TVD-0750-6	1.44" (36.6 mm)	$\frac{3}{4}$ "	CPFA (-6)	Flaretek and Flaretek "SpaceSaver"
TVD-0750-II	1.44" (36.6 mm)	$\frac{3}{4}$ "	PFA (-II)	FlareLock II
TVD-1000-1	1.75" (44.4 mm)	1"	PVDF (-1)	Flaretek and Flaretek "SpaceSaver"
TVD-1000-3	1.75" (44.4 mm)	1"	PFA (-3)	Flaretek and Flaretek "SpaceSaver"
TVD-1000-6	1.75" (44.4 mm)	1"	CPFA (-6)	Flaretek and Flaretek "SpaceSaver"
TVD-1000-II	1.75" (44.4 mm)	1"	PFA (-II)	FlareLock II

## LASER MARKING

Each TVD is laser marked to coincide with a fitting nut size and material. Be sure to confirm you have the correct TVD for the nut size and nut material (type) you need to tighten.



The middle four digits of the part number define the nut size in inches as follows:

Part number middle four digits	Fractional size of nut
0375	$\frac{3}{8}$ "
0500	$\frac{1}{2}$ "
0750	$\frac{3}{4}$ "
1000	1"

The nut material (type) that the TVD is designed for is plainly marked below the size (e.g., PVDF, PFA, CPFA, FlareLock II). Also note that the last characters in the TVD part number match the last characters in Entegris nut part numbers, where 1 is for PVDF, 3 is for PFA, 6 is for CPFA, and II is for FlareLock II.

The TVD is made from PVDF material, which makes it compatible with most chemicals. Repeated contact with base chemicals (e.g., ammonium hydroxide) and ketones (e.g., acetone) may affect the strength of this material over time and ultimately the torque delivered to the fitting nut. If exposed to these chemicals, rinse after use.

## PERFORMANCE TESTING

Entegris has cycle tested TVD's over 10,000 cycles. After 10,000 cycles, the TVD achieved at least the minimum specified torque. Entegris recommends you mark the purchase date on your TVD for future age identification. Periodically test your TVD (every 3–6 months depending on usage) to ensure it can create the minimum torque recommended by Entegris (see following directions).

## HOW TO HOLD AND ACTUATE TVD

You can only turn the TVD in the direction such that the hook feature is pulled around the nut, versus being pushed around the nut.

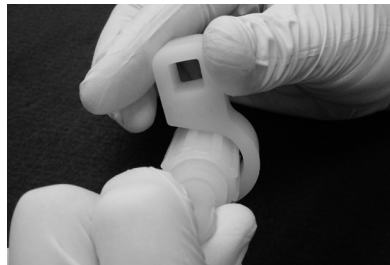
### Index Finger Pull

Turn wrench by using index finger and pulling on the handle side adjacent to the hook (use thumb to pinch the handle so TVD isn't dropped when it breaks free of the nut).



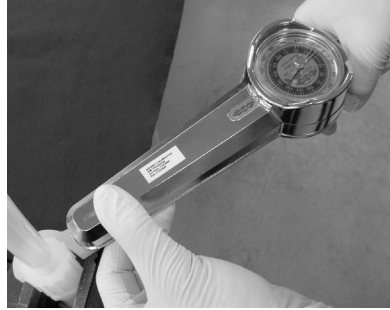
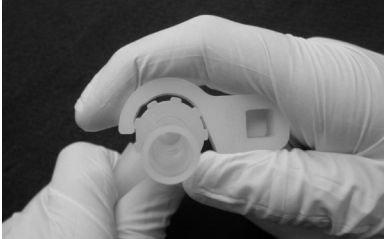
### Thumb Push

Turn wrench by pushing with thumb on the handle side adjacent to the hook (use index finger to pinch the handle so TVD isn't dropped when it breaks free of the nut).



### How NOT to Hold and Actuate TVD

Keep fingers away from the hook portion of the tool. This may cause excessive torque beyond what the tool is designed to create.



Adjust the torque wrench reading to compensate for the TVD wrench length.

### Use Breaker Bar for Extension

Using an extension will not change effective nut torque. A breaker bar with  $\frac{3}{8}$ " drive can be inserted into the  $\frac{3}{8}$ " square drive hole from either side. Ratchet handles do not work as well as breaker bars because the TVD will rotate abruptly when the TVD breaks free of the nut.



1. Add the torque wrench length in inches (L) to the TVD length in inches (Dimension A).
2. Multiply this by the torque wrench reading (G) from step 3 above.
3. Divide this by the torque wrench length in inches (L).

The formula is written as

$$T = (G \times [L+A])/L$$

where:

- G = Torque wrench reading (in•lbs)
- L = Torque wrench length (inches)
- A = TVD wrench length (inches)
- T = Actual nut torque (in•lbs)

### How to Verify TVD is at or Above Minimum Torque Specification

1. Hold an Entegris fitting firmly (in a clamp or vise) with hot-flared Entegris tubing in place on the fitting.
2. Turn the nut until finger tight. Insert a  $\frac{3}{8}$ " drive torque wrench into the  $\frac{3}{8}$ " square drive hole of the TVD. Continue tightening the nut with the TVD.
3. Read the torque value of the wrench, in in•lbs, just before it breaks free of the nut. Record this value (it will be value G in following calculation).

### Minimum Nut Torque for Entegris Nuts

Tube and fitting size	$\frac{3}{8}$ " in•lbs (N•m)	$\frac{1}{2}$ " in•lbs (N•m)	$\frac{3}{4}$ " in•lbs (N•m)	1" in•lbs (N•m)
PFA fitting/ PVDF nut	8 (0.90)	11 (1.24)	14 (1.58)	30 (3.39)
PFA fitting/ PFA nut	8 (0.90)	11 (1.24)	14 (1.58)	30 (3.39)
PFA fitting/ CPFA nut	8 (0.90)	11 (1.24)	14 (1.58)	30 (3.39)
PFA fitting/ FlareLock II nut	8 (0.90)	11 (1.24)	14 (1.58)	30 (3.39)

## PERFORMANCE CONDITIONS

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### Use Only on Entegris Components

The TVD is specifically designed, tested and characterized to work with specific Flaretek fitting components manufactured by Entegris. It can be used to tighten Flaretek "SpaceSaver" connections on Entegris PFA fittings or PFA valves. It can also be used on Flaretek nuts for connections between Entegris PFA tubing and Entegris PFA fittings or PFA valves. Customer assumes the risk of connection integrity if Flaretek fittings, body, tubing and/or nut components are attached to components manufactured by third parties.

### Use Only on PFA Fittings and PFA Valves

The TVD is specifically designed, tested and characterized to tighten Flaretek nuts onto fittings or valves made of PFA. Do not use the TVD on fittings/valves made of other materials (e.g., PTFE, stainless steel, quartz).

### Use Only With PFA Tubing

The TVD is specifically designed, tested and characterized to tighten connections made with PFA tubing. Do not use the TVD on connections made of tubing material other than PFA (e.g., PTFE, PVDF, latex).

### Hot Flaring Recommended

Entegris recommends flaring all PFA tubing using the hot flaring method (see the Flaretek Tube Fitting and Assembly Procedures on the Entegris website <http://www.entegrisfluidhandling.com> or the instruction sheet accompanying each fitting). For best results when flaring PFA tubing, use hot flaring tools available from Entegris.

## FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit [entegris.com](http://entegris.com) and select the Contact Us link to find the customer service center nearest you.

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