Threaded Base Cartridges Installation Instruction

1. Turn off the pump. Close inlet and outlet valves to the housing.
2. Open the top vent and drain the housing through the bottom drain. Drain a few gallons out of the inlet compartment dirty drain if so equipped.
3. Loosen the bolts and swing away/remove the cover.
4. Remove the spider (if installed); remove all cartridges.
5. Inspect the inside of the housing and wipe it clean if necessary.
6. The cartridges are packaged in individual poly-bags (the anti-static poly-bag protects the cartridge from being disarmed by handling, and prevents build up of static charge to cartridge). Cut the bag at the threaded base end and slide it back a few inches. DO NOT TOUCH THE OUTER SOCK/MEDIA.
7. Hold the cartridge with the poly-bag still protecting the cartridge or by the endcaps only if no bag and place it over the threaded base adapter. Screw on hand tight.
8. Remove the poly-bag ***SLOWLY*** from the cartridge after it is in place.
9. For 4 inch diameter cartridges, tighten to 15 ft-lbs of torque or hand tight. For 6 inch diameter cartridges, tighten to 30 ft-lbs of torque (about ¼-turn past hand tight). It is preferable to use a special Gammon Technical Products part number GTP-1224 four-sided adapter to do this. ***(DO NOT touch the outer sock.)***
10. Make sure that no poly-bags remain in the housing. (If spider is not included proceed to step #11.) Replace the spider as follows:
    - Install the flat washer over each cartridge end and install the spider over the ends of the cartridges.
    - Affix the spider to the threaded clips on the vessel walls using the nut and lockwasher.
    - Adjust the spider clip nuts, so the spider lies flat on the ends of the cartridges
    - Install the washer and nut over the ends of the cartridges, to affix the spider to the cartridge ends. Snug the nuts. DO NOT TIGHTEN YET.
    - Adjust the ends of each cartridge to create even separation between the cartridges and between the cartridge and vessel wall. Cartridges should NOT be touching each other, nor touching the vessel wall. The ends of the cartridges can be shifted within the spider plate holes as follows:

Cartridge Length	Shift Within the Spider Hole
Greater than 33"	Full movement within the spider hole
30"	Less than 5/8" (16 mm)
28"	Less than 9/16" (14 mm)
24"	Less than 1/2" (12 mm)
22"	Less than 1/2" (12 mm)
20"	Less than 3/8" (10 mm)
18"	Less than 3/8" (10 mm)
16"	Less than 5/16" (8 mm)
14"	Less than 1/4" (6 mm)
11"	Less than 3/16" (5 mm)
9"	Less than 3/16" (5 mm)

    - When the cartridges are spaced properly, tighten the spider nuts to 5 ft-lbs.
11. Inspect the cover gasket and replace it if necessary. Tighten the cover securely in a cross-pattern process. Follow procedures listed on Bulletin 1935, on back of this form.
12. Close the bottom drain valve and start the system pump.
13. With the outlet valve closed, slightly open the inlet valve and allow the vessel to fill SLOWLY with fuel until the air eliminator closes or fluid begins to flow from the manual air vent. Close the vent valve. Fully open the inlet valve.
14. Open the outlet valve ***SLOWLY***.
15. When the unit is operating, check the differential pressure across the cartridges. There should be indication of positive pressure, normally 1-5 psid. This insures that all seals have been properly made during the installation.

OPERATING PROCEDURES

Velcon Recommended Cartridge Changeout
(Please also check with your company's fuel handling guidelines and operating procedures.)
Coalescer Cartridges: One (1) year or 15 psid, whichever occurs first
Filter Cartridges: Three (3) years or 25 psid, whichever occurs first (**INSPECT VESSEL ANNUALLY**)

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TORQUE REQUIREMENTS FOR VESSELS WITH "0-RING CLOSURE"

Bolted pressure vessel closures operate on the premise that the joint is clamped closed with a force sufficient to resist the internal pressure yet still maintain a seal. The clamping force, or pre-load, is applied by the closure bolts and its magnitude is controlled by the torque applied. Application of the correct preload is essential to maintaining a positive seal and avoiding closure failures from fatigue or overstressed vessel components.

The short term, and most obvious effect of grossly under-torqued bolts is insufficient clamping force resulting in a leaking closure. A more ominous result of under-torqued bolts in systems which see a great number of pressure cycles (such as refuelers, loading racks etc.), is bolt fatigue failure. Repeated applications of stress to the bolt eventually create a small crack at the surface of the bolt which continues to grow until the bolt breaks and the closure fails.

It is a good idea to re-torque the closure bolts after they have been in use for a month or so to ensure the joint has not "relaxed" and the preload reduced.

Over-torquing closure bolts will result in breaking or bending vessel bolt clips or actually breaking the bolt itself. Table One lists guideline torque values for lubricated bolts for common sizes used for vessel closures. Always use lubricated bolts, as this reduces the required torque, improves torque accuracy, and retards corrosion.

TABLE ONE*

Bolt Diameter mm (in.)	Recommended Torque m-kgs (ft-lb)
13 (1/2)	**3** (20)
19 (3/4)	**6** (45)
25 (1)	**14** (100)
32 (1-1/4)	**22** (160)
38 (1-1/2)	**36** (260)

**NOTE: These recommended torque values are only for vessels with an O-Ring closure.*

A common cause of inaccurate bolt torque is inappropriate bolt torquing procedures. Key elements to the procedure are application of the torque in stages and in a specific cross-torquing sequence. For most applications, torque is applied to all bolts to 30% of full torque, then to all bolts to 60% of full torque, and finally to all bolts to 100% of full torque. Each torquing cycle is carried out in the applicable cross-torquing sequence. Torquing sequences vary with the number of bolts on the cover.

The tightening pattern is as follows: Tighten two bolts diametrically opposite from each other, then tighten a second pair of bolts diametrically opposite each other, approximately 90 degrees away from the first pair, and so on until all bolts have been tightened.

Using a clock as an example, the sequence would be: 12, 6, 9, 3, 11, 5, 10, 4, 7, 1, 8, 2.

On large vessels, the cross-torquing process is tedious but the addition of a second operator applying torque improves the situation vastly.

Correct closure torquing will result in many years of trouble-free vessel operation. Occasional inspections for bolt cracks or clip damage is good practice to detect possible closure problems before they occur. More detailed or specific information on bolt torquing requirements and procedures can be obtained by calling Jim Head at +1 719 528 7255

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