



Emer PRD Replacement for Gillig CNG Fuel Systems with Type 4 Cylinders and Electric Solenoid Cylinder Valves

ENP-740

June 11, 2020

1. Introduction

Agility Fuel Solutions (Agility®) has determined that pressure relief devices (PRDs) manufactured by Emer™ may fail to operate as designed. This issue has been reported to the National Highway Traffic and Safety Administration (NHSTSA Recall No. 20E-019). Impacted parts include Emer™ p/n PRD2302T-004 (Agility® p/n 10306997) and Emer™ cylinder valve PRD, p/n PRD2102T (no equivalent Agility® p/n) used in Agility® compressed natural gas (CNG) fuel systems produced from October 6, 2016, to April 1, 2020.

PRDs are essential for safe vehicle operation and must be replaced if non-compliant. Agility® personnel have identified fuel system top level part numbers supplied for Gillig buses containing recalled Emer™ PRDs as original equipment manufacturer (OEM) equipment.

Agility® has engineered two retrofit kits for fuel systems equipped with Type 4 cylinders and manual cylinder valves to replace recalled Emer™ PRDs. The two retrofit kits replace 85-in. and 120-in. fuel system plumbing with PRDs manufactured by VTI and new PRD supply and vent tubes. Agility is also supplying Emer™ cylinder valve PRD, p/n PRD2102T (no equivalent Agility® p/n) for cylinder valve direct replacement.

Agility® created this instructional document to guide trained CNG fuel system service technicians in the removal, replacement, and reporting of affected Emer™ PRDs.

1.1. Warning Messages and Symbols used in this document



Will cause death or severe injuries if procedures are not followed.



Could cause death or severe injuries if procedures are not followed.



Could cause minor or moderate injuries if procedures are not followed.



Practices not related to physical injury. Includes procedures to prevent vehicle damage as well as hints to help an operation or procedure go smoothly.



Critical Characteristic

Procedure directly affects safety of vehicle users, people nearby and maintenance personnel, or regulatory compliance.



Manufacturing Characteristic

- *A product feature solely used to improve manufacturability or maintain process control .*
- *A process parameter or step that has a significant effect on achieving a Critical Characteristic or Significant Characteristic, or maintaining material identification/traceability.*

2. Affected Units

Agility® top level system part numbers as follows:

25519000 - Roof Mount, 155 DGE, 2084 L, 8 Tanks, 3 Pin Harness, Gillig, Type 4

25521000 - Roof Mount, 185 DGE, 2468 L, 8 Tanks, Type 4, 3 Pin Harness, Gillig

3. Tools and Supplies Required

Fall protection equipment	Safety glasses
Safety ladder	Defueling hose with nozzle**
NGV1 fuel receptacle adapter*	Microfiber towels
Water pump plier or Vise-Grip® locking plier or equivalent	Socket and combination wrenches
	Torque wrench†
Loctite® 276 thread sealer	Loctite® 577 thread sealer
Parker® O-lube O-ring lubricant or equivalent	Swagelok® Snoop® leak detection solution or equivalent
Torque Seal marker	Agility® reporting form FT.0323
Permanent marker	Flashlight
Blue paint marker	Camera / phone camera
Zip lock bag (Supplied by Agility® with bulk replacement PRD shipment—use for PRD return)	15/16-in. angled open end wrench (Tekton® p/n WAE83024 or equivalent) OR Modified 1/2-in. drive 24mm deep socket and 1/2-in. drive ratchet†

*may be required for defueling on some FMMs

**If not provided at CNG fueling facility

†If modified 24mm socket is unavailable, a 15/16-in. crow foot must be used with torque wrench.

3.1. PRD retrofit kits

NOTICE

Before beginning work, verify proper quantity of the appropriate Agility® PRD retrofit kit is on hand.

Agility® fuel system part numbers and corresponding retrofit kit part numbers are as follows:

Agility® Fuel system p/n	QTY required Kit, Retrofit, Gillig, 120" tanks PRD Retrofit, Agility® p/n 25519031	QTY required Kit, Retrofit, Gillig, 85" tanks PRD Retrofit, Agility® p/n 25519030	QTY required Valve PRD, Emer™ p/n PRD2102T
25519000	1	1	8
25521000	2	n/a	8

Verify proper parts and quantities according to the following content lists and drawings:

Kit contents: Kit, Retrofit, Gillig, 120" tanks PRD Retrofit, p/n 25519031. Figure 1			
Item	p/n	Description	QTY
1	10200065	Fitting, Tube, Connector, 1/2-in. Tube OD, 9/16-18 Male SAE, SS	2
2	10200208	Fitting, Tube, Tee, 1/2-in. Tube OD, 1/2-in. Tube OD, 1/2-in. Tube OD, SS	2
3	10200238	Fitting, Tube, Adapter, 1/2-in. Tube OD, 9/16-18 Male SAE, SS	2
4	10200563	Fitting, JIC, Straight, -8 Male JIC, 1/2-20 Male SAE, Steel	4
5	10300513	T-PRD, VTI, Remote, PRD 1	4
6	10701508	Tube Clamp Kit, 1/2-in., Double Mounting Hole, -40F to 212F	6
7	10702147	P-Clip, 1/2-in., Rubber Clamp	2
8	25519028	Tube Subassembly, 25519420, PRD to Vent	1
9	25519029	Tube Subassembly, 25519421, PRD To Vent	1
10	25519037	Tube Subassembly, 25519429, PRD to Vent	1
11	25519038	Tube Subassembly, 25519430, PRD To Vent	1
12	25519123	Bracket, tube clamp	2
13	25519416	Tube, Formed, HP Fuel, 1/2-in. X .049-in., Tee to PRD	2
14*	25519039	Hardware, Retrofit Kit	1
15	10602157	Decal, System, Danger Live High Pressure PRD Line	4
16	10602442	Decal, PRD Vent Line, Caution	8

*Not shown

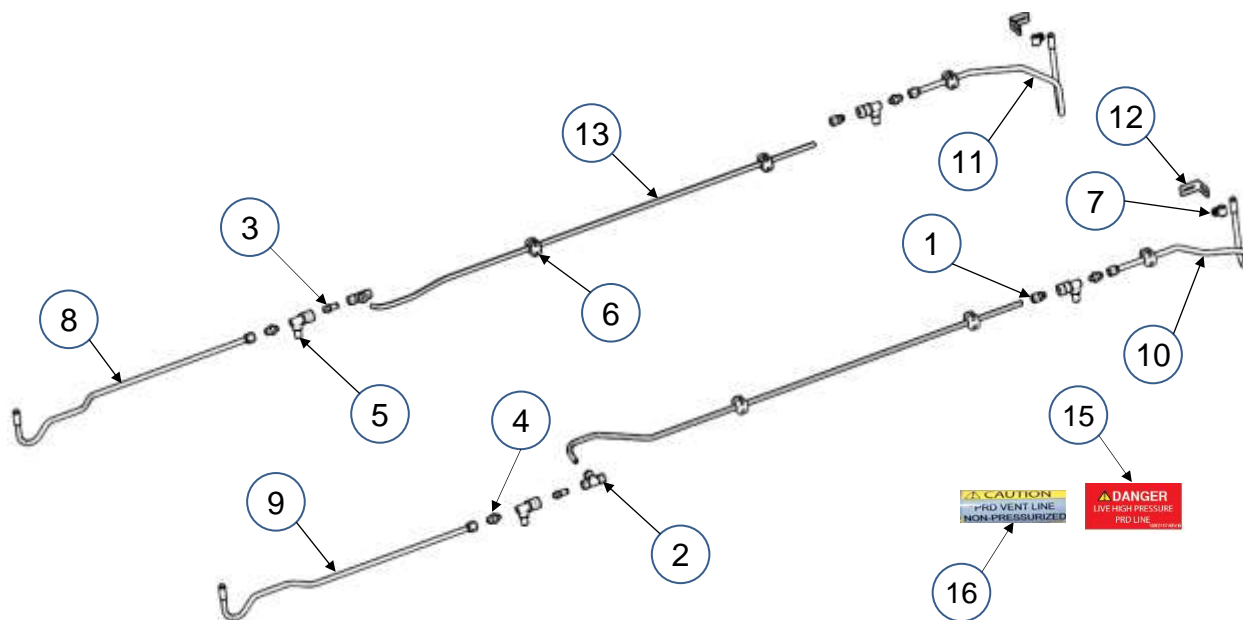


Figure 1.
Kit, Retrofit, Gillig, 120" tanks PRD Retrofit, p/n 25519031.

Kit contents: Kit, Retrofit, Gillig, 85" tanks PRD Retrofit, p/n 25519030. Figure 2			
Item	p/n	Description	QTY
1	10200065	Fitting, Tube, Connector, 1/2-in. Tube OD, 9/16-18 Male SAE, SS	2
2	10200208	Fitting, Tube, Tee, 1/2-in. Tube OD, 1/2-in. Tube OD, 1/2-in. Tube OD, SS	2
3	10200238	Fitting, Tube, Adapter, 1/2-in. Tube OD, 9/16-18 Male SAE, SS	2
4	10200563	Fitting, JIC, Straight, -8 Male JIC, 1/2-20 Male SAE, Steel	4
5	10300513	T-PRD, VTI, Remote, PRD 1	4
6	10701508	Tube Clamp Kit, 1/2-in., Double Mounting Hole, -40F to 212F	6
7	10702147	P-Clip, 1/2-in., Rubber Clamp	2
8	25519026	Tube Subassembly, 25519414, PRD to Vent	1
9	25519027	Tube Subassembly, 25519415, PRD To Vent	1
10	25519037	Tube Subassembly, 25519429, PRD to Vent	1
11	25519038	Tube Subassembly, 25519430, PRD To Vent	1
12	25519123	Bracket, tube clamp	4
13	25519417	Tube, Formed, HP Fuel, 1/2-in. X .049-in., Tee to PRD	2
14*	25519039	Hardware, Retrofit Kit	1
15	10602157	Decal, System, Danger Live High Pressure PRD Line	4
16	10602442	Decal, PRD Vent Line, Caution	8

*Not shown

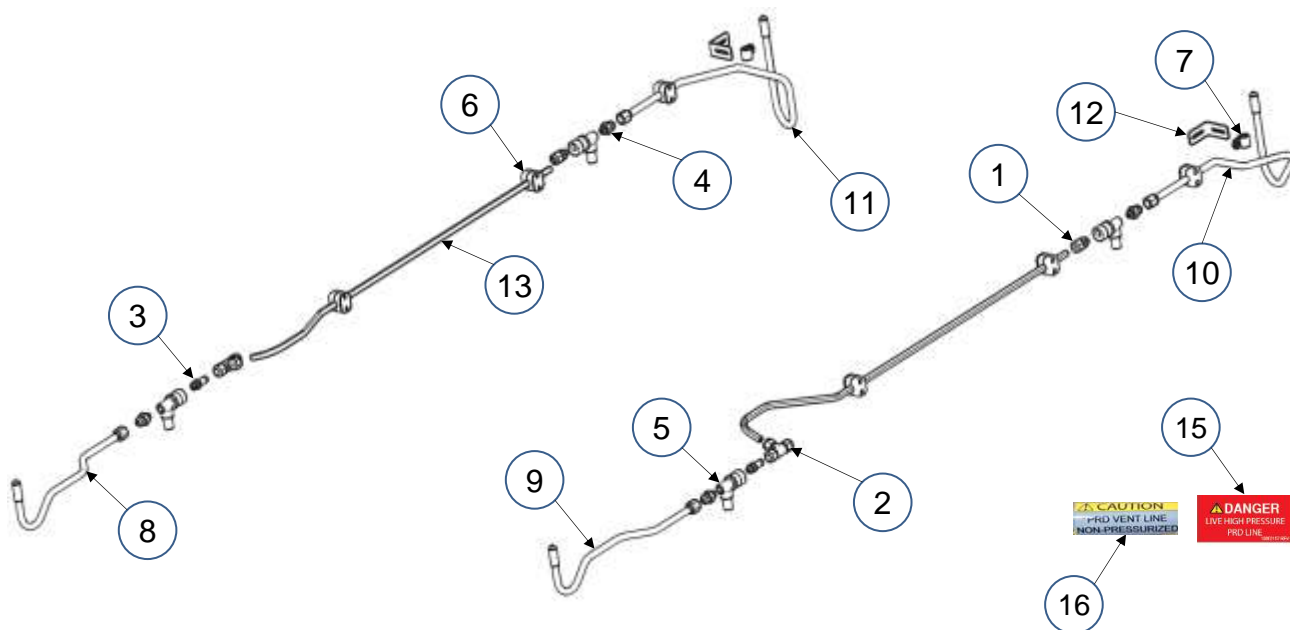


Figure 2.
Kit, Retrofit, Gillig, 85" tanks PRD Retrofit, p/n 25519030

4. Parts Location Identification

Refer to the appropriate fuel system illustration to locate the affected Emer™ PRDs in fuel system plumbing for 85-in. and 120-in. cylinders. *Figures 3, 4 and 5*



Figure 3.

Locations of Emer™ remote PRDs (1) in 85-in. cylinder fuel system plumbing. NOTE: PRD bracket (2) elevated for clarity.

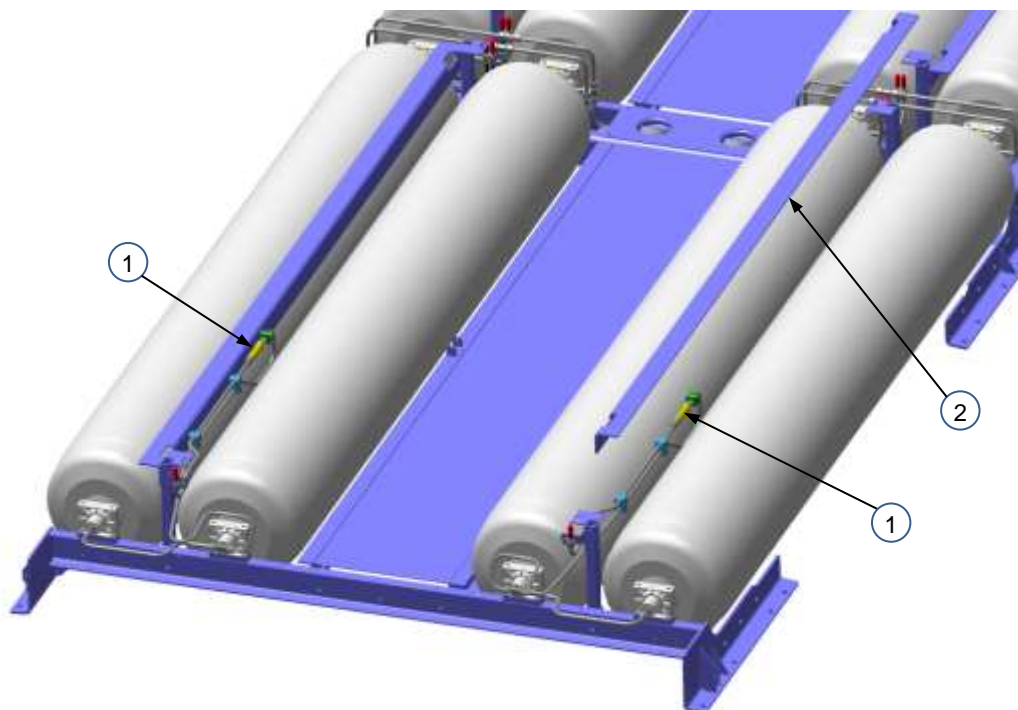


Figure 4.

Locations of Emer™ remote PRDs (1) in 120-in. cylinder fuel system plumbing. NOTE: PRD bracket (2) elevated for clarity

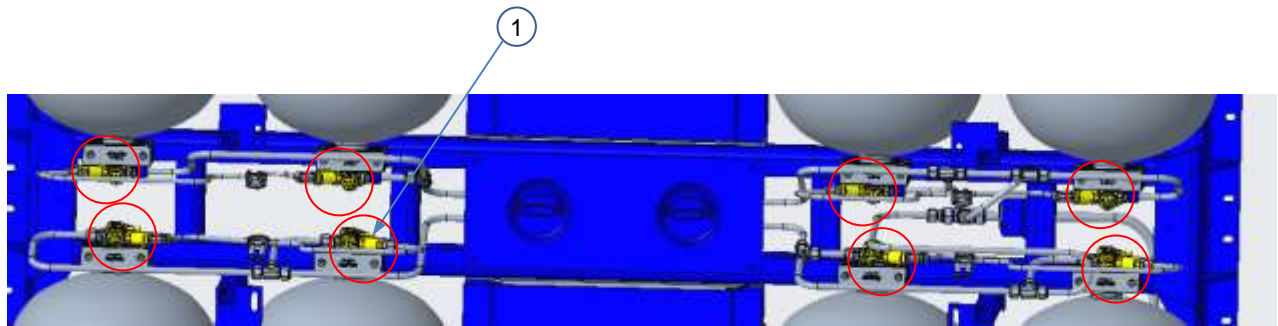



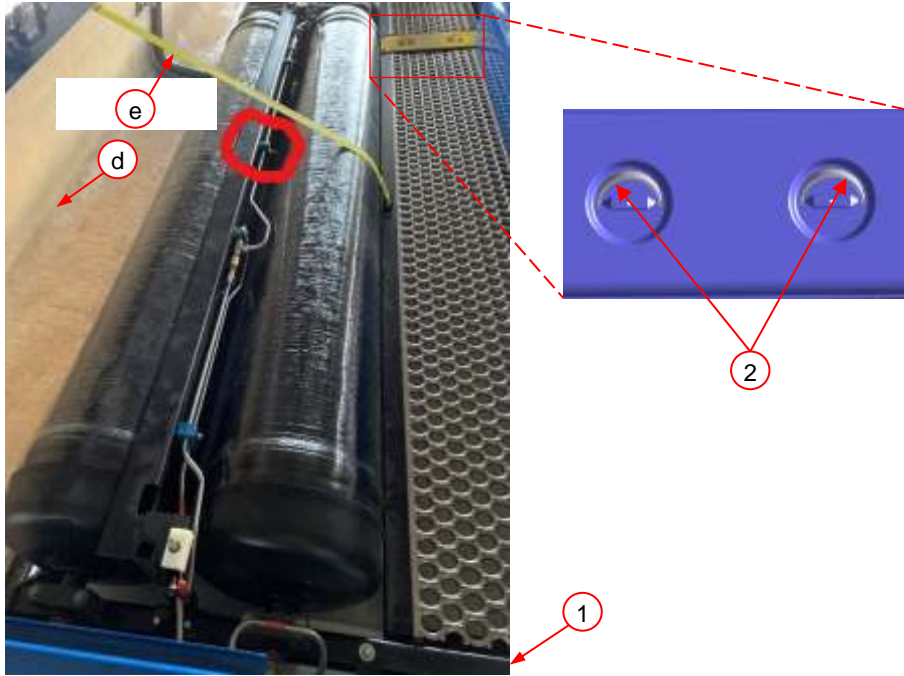


Figure 5.
Locations of Emer™ valve end PRDs (3).


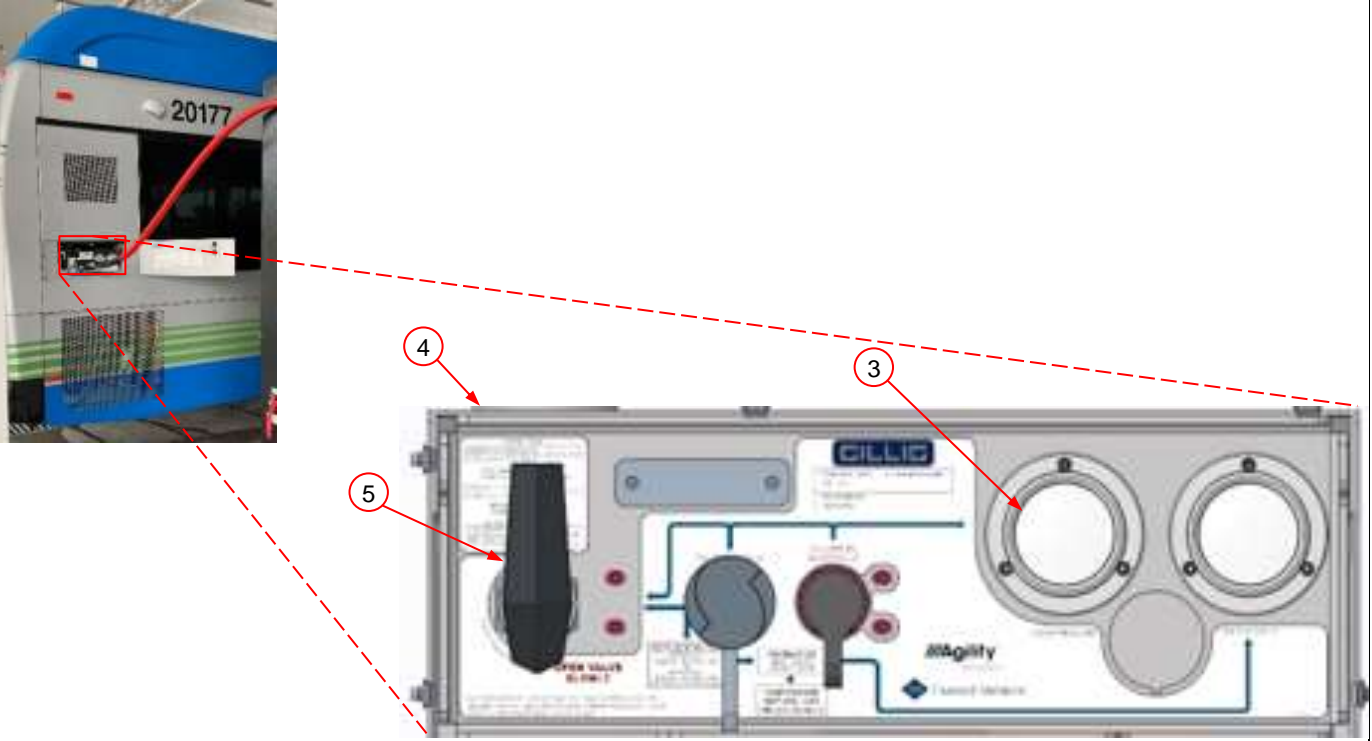
5. Corrective Action / Procedure

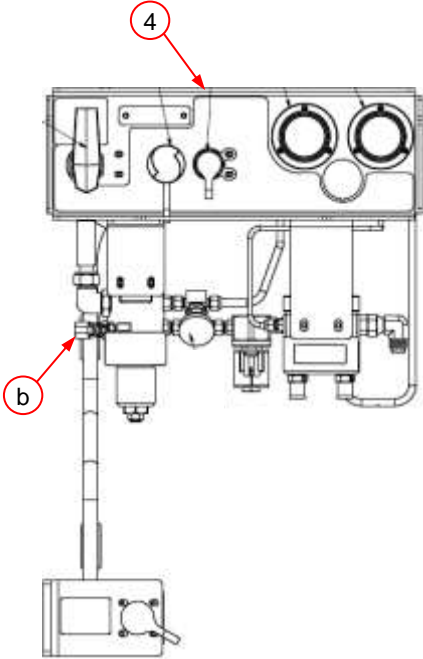
5.1. Preliminary Safety Preparation

1	WHAT	 WARNING Set parking brake and secure vehicle with wheel chocks (<i>not shown</i>).		2	WHAT	 WARNING Attach a lock and tag (<i>not shown</i>) to block vehicle ignition.	
	WHY	Worker safety.			WHY	Prevent vehicle start during repair procedure.	
3	WHAT	 WARNING Secure a safety ladder in either of the following locations: A. Inside bus hatch opening B. Rear of bus exterior					
	WHY	Worker safety.					

4	<p>1. Open fuel system roof pod doors (d).</p> <p>⚠ WARNING</p> <p>2. Secure fall protection equipment to facility fall restraint equipment (<i>not shown</i>).</p> <p>If no fall restraint is present at the facility, secure fall protection equipment (<i>not shown</i>) to fall restraint lanyard attachment points (2).</p> <p>⚠ WARNING</p> <p>3. Secure doors open with door retention strap (e). Refer to vehicle OEM instructions.</p> <p>⚠ WARNING</p> <p><i>Always reattach fall PPE when resuming work on the roof mount portion of the fuel system.</i></p>	
WHY	Fall safety.	

5.2. Prior to defueling

1 WHAT	<p>⚠ WARNING</p> <p>Verify all eight cylinder valves (circled) are open.</p>	
WHY	Ensure cylinders can be properly defueled.	
2 WHAT	<p>1. Check high pressure gauge (3) on fuel management module (FMM) (4) to verify amount of fuel in the system.</p> <p>2. Verify FMM (4) 1/4-turn manual shut off valve (5) is in the OPEN position.</p> <p>IMPORTANT: If vehicle has no fuel onboard, proceed to Step 4.</p>	
WHY		

<p>3</p> <p>WHAT</p>	<p>If not already defueled: Defuel bus according to Agility publication ENP- 729.</p> <p>⚠ WARNING</p> <p><i>Always follow local facility regulations and procedure for defueling.</i></p> <p>If required: use defuel hose kit.</p> <p>⚠ WARNING</p> <p><i>Only trained CNG fuel systems technicians may perform system defueling.</i></p> <p>NOTICE</p> <p>If required: Use appropriate defuel nozzle adapter.</p>		<p>4</p> <p>WHAT</p>	<p>⚠ WARNING</p> <p>Relieve any remaining system pressure by slowly opening the FMM (4) bleed valve (b).</p>	
<p>WHY</p>	<p>PRD supply tubes to be removed are pressurized “live” lines.</p>		<p>WHY</p>		

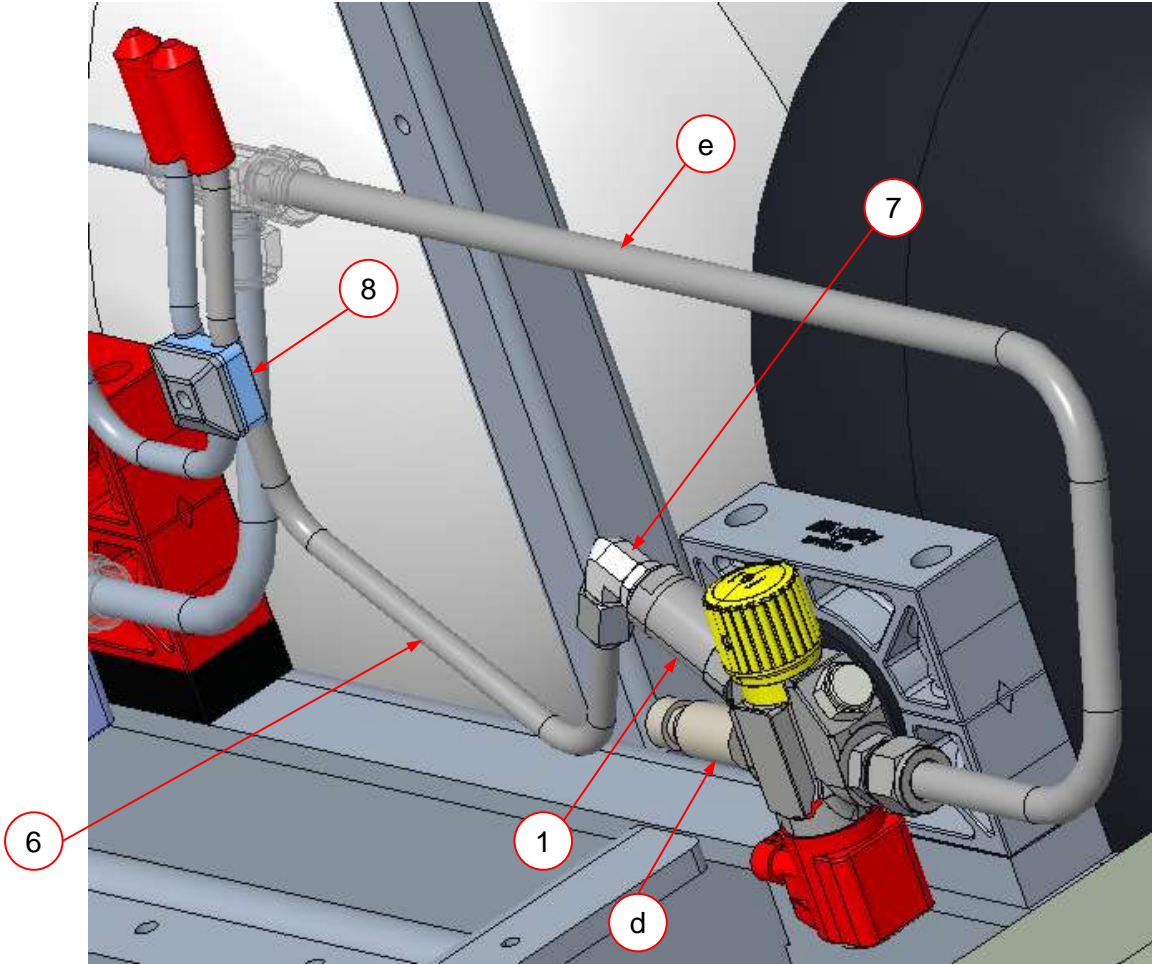
5.3. Remove and replace Emer™ valve end PRDs, Emer™ p/n PRD2102T

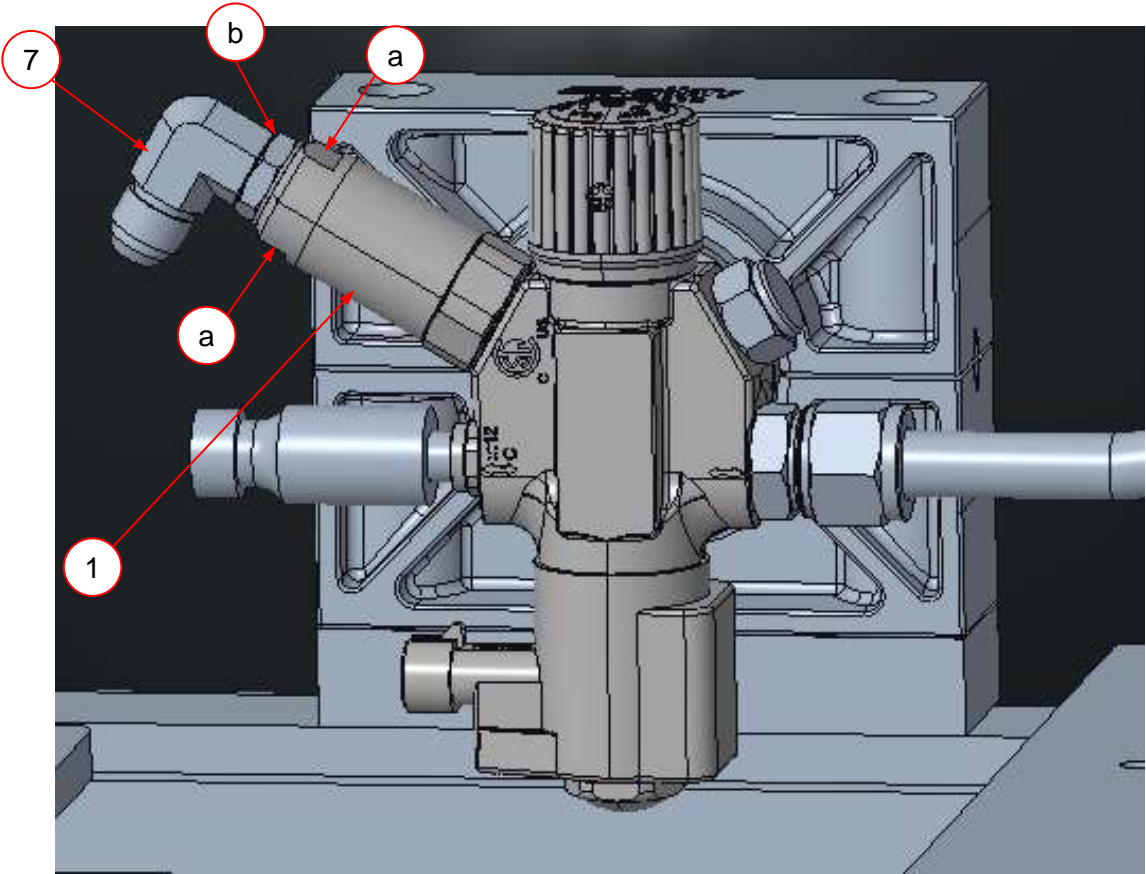
⚠ WARNING

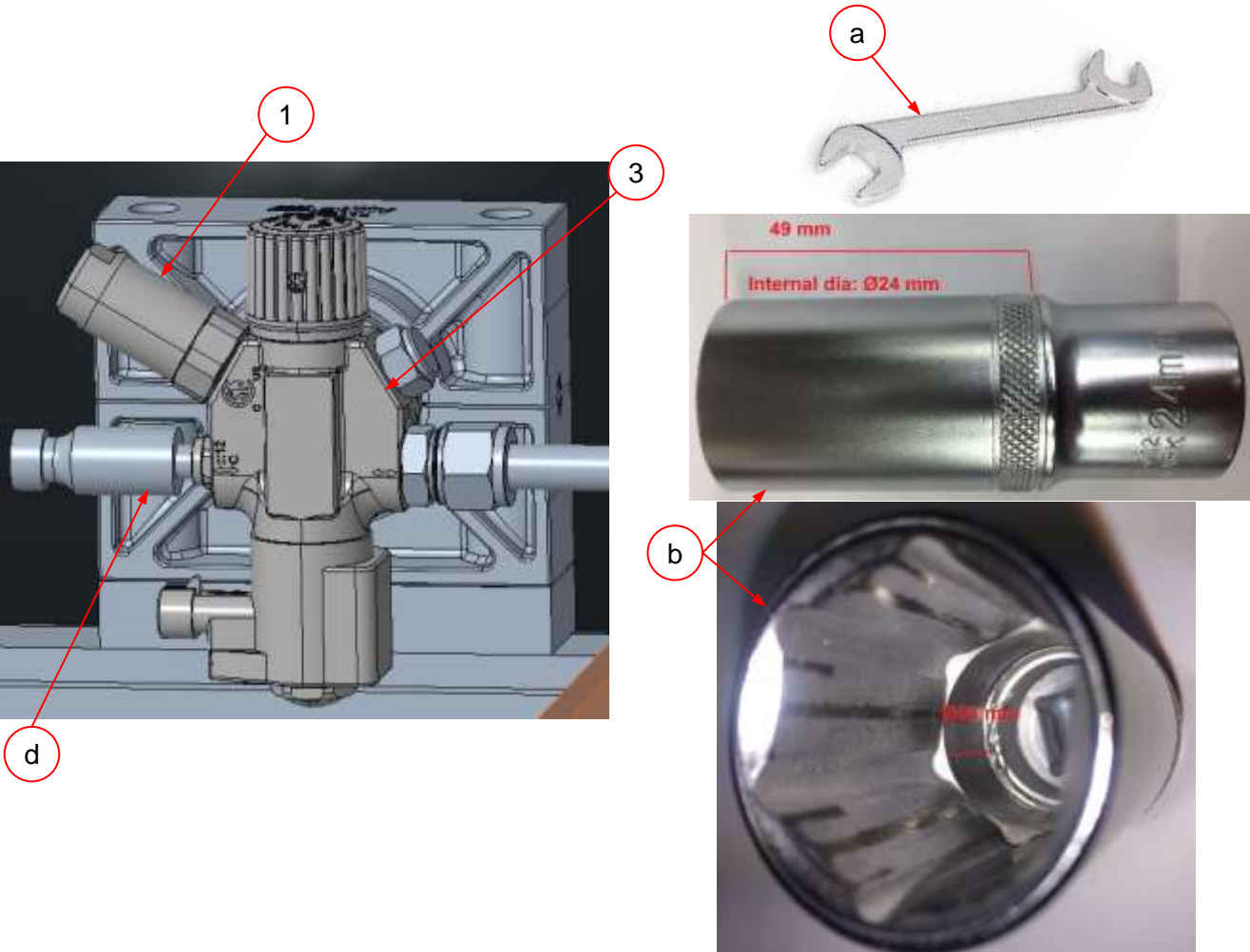
Refer to Appendix C: “OEM Emer Instruction PRD Manual to Replace the PRD” (below) for installation details.

NOTICE

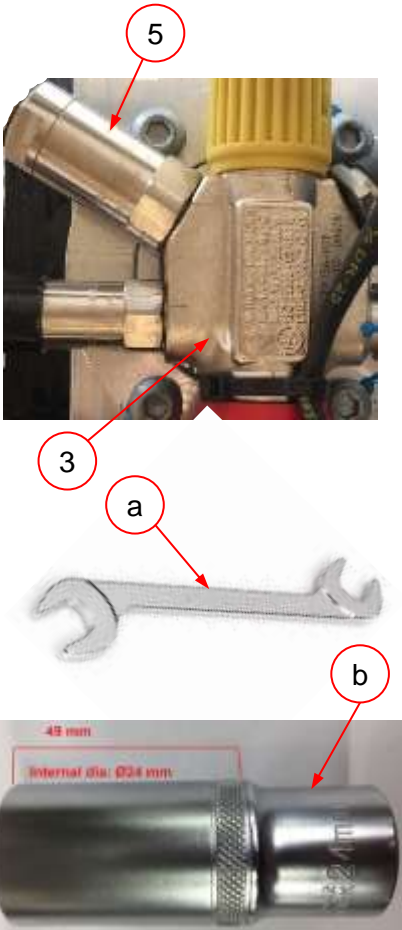
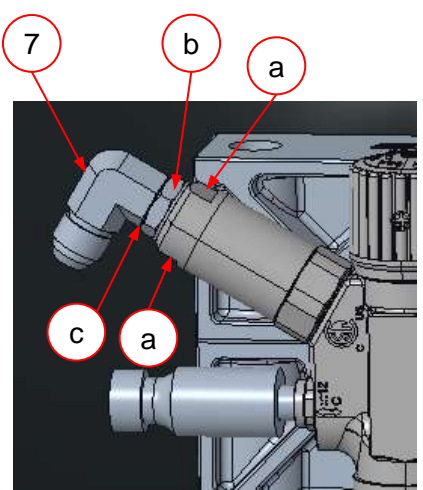

Always perform installation steps in the order specified.

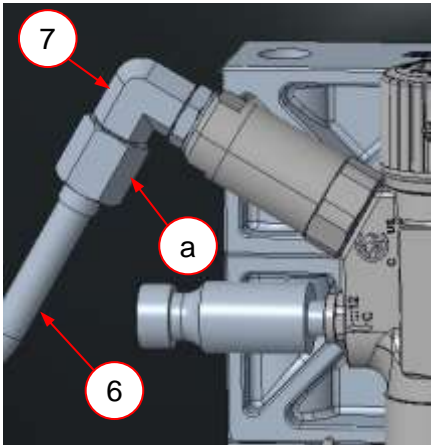
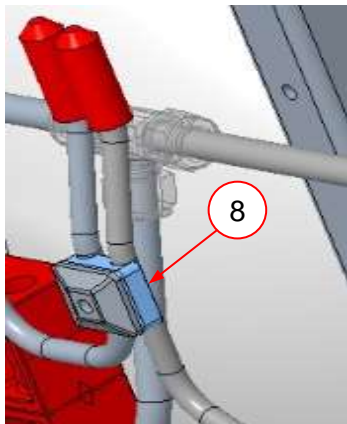
<div>1</div> <div>WHAT</div>	<p>A. Use a wrench to loosen dual tube clamp (8) fasteners (<i>not visible</i>) to aid in moving PRD vent tube (6) aside but do not remove.</p> <p>B. Use a pair of wrenches to disconnect PRD vent tube (6) nut fitting (a) from PRD (1) elbow fitting (7).</p> <div>NOTICE</div> <p>Avoid damage to pressure transducer (d) and high pressure fuel tube (e).</p>	
<div>WHY</div>		

3	Use a wrench to loosen jamb nut (b) of elbow fitting (7) while holding PRD (1) with another wrench at PRD flats (a).	
WHAT		
WHY		


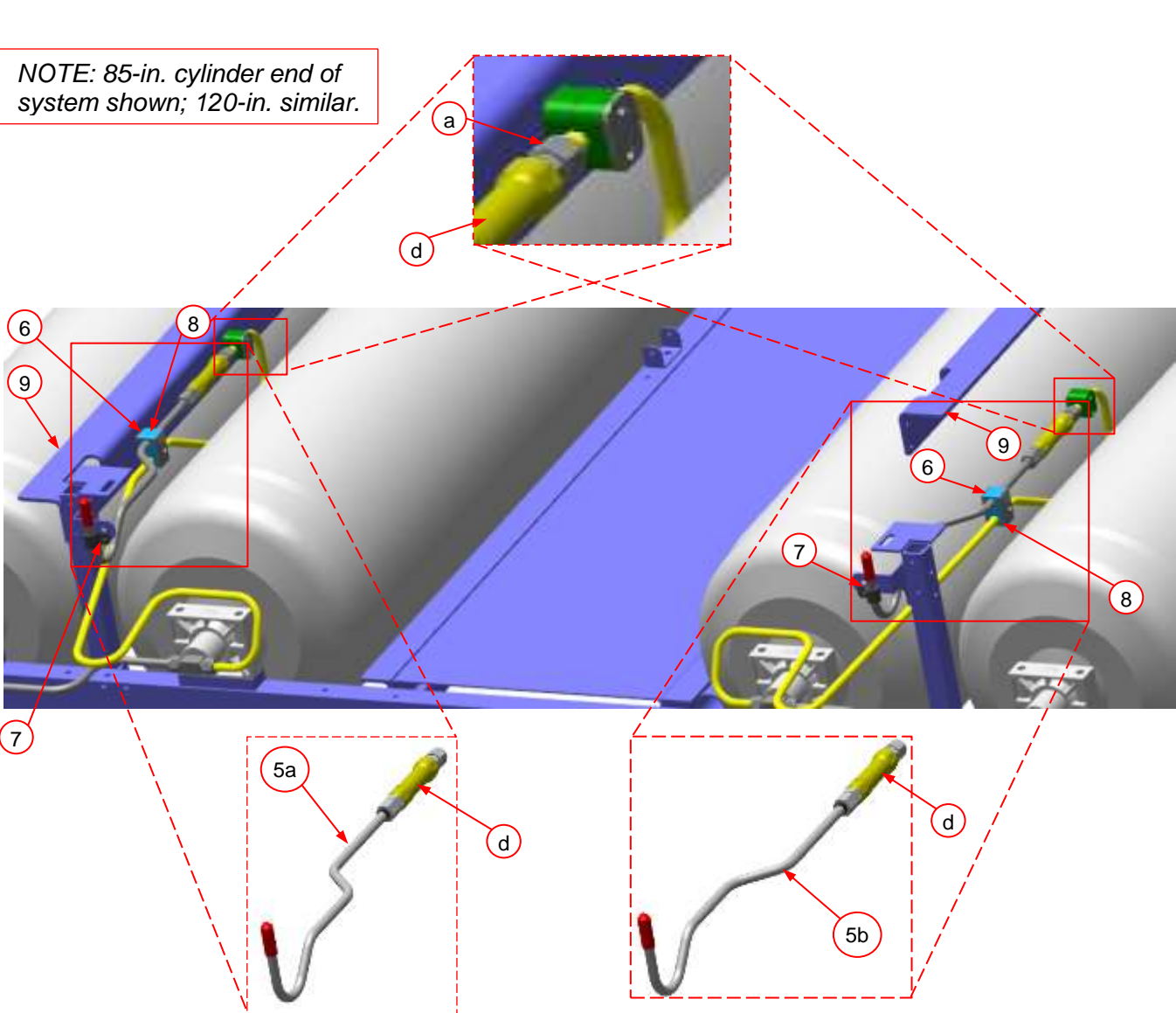
4	<p>NOTICE</p> <p><i>Remove and replace one PRD at a time to avoid system contamination.</i></p> <p>1. Use a 15/16-in. angled open end wrench (Tekton[®] p/n WAE83024) (a) OR a modified 1/2-in. drive 24mm deep socket (b) and ratchet to remove PRD (1) from valve (3).</p> <p>NOTICE</p> <p><i>Avoid contact with pressure transducer (d).</i></p> <p>2. Place PRD (1) removed in a zip lock bag.</p> <p>NOTICE</p> <p><i>Place only PRDs from one vehicle in each zip lock bag.</i></p> <p><i>Bag must be labeled with the following:</i></p> <ol style="list-style-type: none"> 1. Fleet 2. VIN 3. Fuel system s/n 	
WHY		<p>Agility[®] collects all PRDs removed.</p>

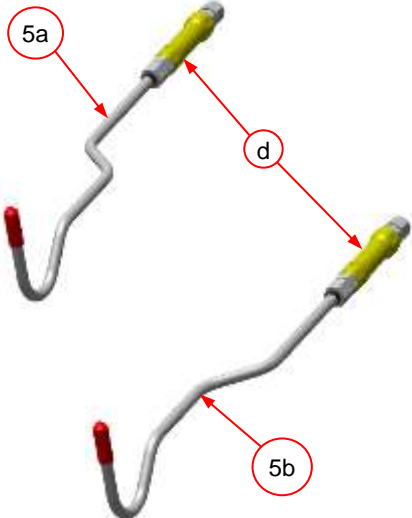
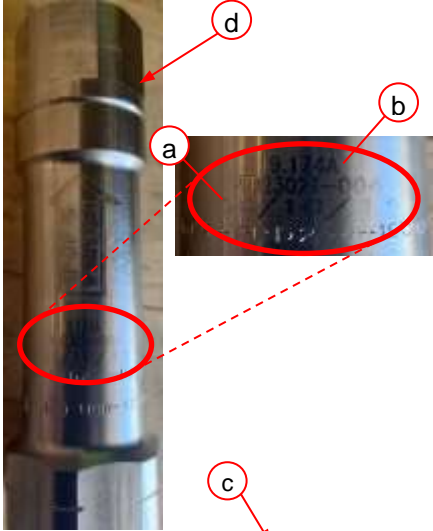
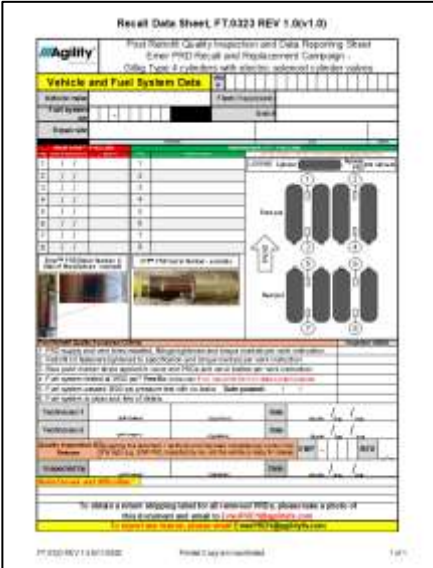
5	<p>WHAT</p>	<ol style="list-style-type: none"> 1. Use Swagelok® Snoop® a microfiber towel to clean and inspect valve body (3) PRD port threads and O-ring surfaces (<i>not visible</i>). 2. Use Swagelok® Snoop® and a microfiber towel to remove old Torque Seal from fitting junction (<i>not shown</i>). <p>▼ c</p> <ol style="list-style-type: none"> 3. Apply a light film of Parker® O-lube O-ring lube to replacement PRD (5) O-ring (4). 4. Verify O-ring (4) is properly seated. <p>▼ c</p> <ol style="list-style-type: none"> 5. Apply Loctite® 276 to PRD (5) threads (a). 	
	<p>WHY</p>	<p>Emer™ specification.</p>	

<div>6</div> <div>WHAT</div>	<p>Install PRD (5) on valve body (3) using a 15/16-in. angled open end wrench (Tekton® p/n WAE83024) (a) or a modified 1/2-in. drive 24mm deep socket (b) and ratchet (<i>not shown</i>).</p> <p>Torque PRD (5) to 30Nm (22 ft-lbs).</p>		<div>7</div> <div>WHAT</div>	<ol style="list-style-type: none"> 1. Move jamb nut (b) to base (c) of elbow fitting (7). 2. Use a wrench to install elbow fitting (7) on PRD (1). 3. Use a wrench to hold PRD (1) at PRD flats (a). 4. Position elbow fitting (7) to line up with PRD vent tube (<i>not shown</i>). 5. Tighten elbow fitting jam nut (b). <p>Torque elbow fitting jam nut (b) to 45 ft-lbs (61Nm).</p>	
<div>WHY</div>	<p>System specification.</p>		<div>WHY</div>	<p>System specification.</p>	

8	<p>Use a pair of wrenches to install PRD vent tube (6) nut fitting (a) on elbow fitting (7).</p> <p>⚠</p> <p>Torque elbow fitting (7) jam nut (b) to 45 ft-lbs (61Nm).</p>		9	<p>Repeat Steps 1 through 8 until all eight valve end PRDs have been replaced.</p> <p>NOTICE</p> <p>Do not tighten PRD vent tube clamps (8); clamps will be tightened later.</p>	
WHY	System specification.		WHY		

5.4. Remove Emer™ remote PRDs, Emer™ p/n PRD2302T-004

1	<p>1. Use two wrenches to loosen nut fittings (a) on each Emer™ PRD (d).</p> <p>2. Use wrenches to remove fasteners securing the following items:</p> <ul style="list-style-type: none"> A. P-clip (7) B. Dual tube clamp (8) C. Plate (6) <p> Retain all clips, clamps, plates and fasteners for reuse.</p> <p>NOTICE</p> <ul style="list-style-type: none"> ▪ Support PRD and PRD vent assembly while removing clips and clamps. ▪ Use caution to avoid contact with cylinders or PRD supply tube (f). <p>3. Carefully remove Emer™ PRDs (d) and PRD vent tubes (5a) and (5b) from each PRD bracket (9) as complete assemblies.</p> <p>4. Repeat for all plug end cylinders on all roof mount pods.</p>	<p><i>NOTE: 85-in. cylinder end of system shown; 120-in. similar.</i></p> 
WHY	<p>Protect cylinders from damage.</p>	

<p>2</p> <p>WHAT</p>	<p>Use a pair of wrenches to remove all Emer™ PRDs (d) from PRD vent tubes (5a) and (5b).</p> <p>NOTICE</p> <p><i>Dispose of PRD vent tubes (5a) and (5b) according to facility guidelines.</i></p>		<p>3</p> <p>WHAT</p>	<p>c Use form FT.0323 (c) to record the following data for each Emer™ PRD (d) removed:</p> <p>A. Date of Manufacture (a)</p> <p>B. Batch number (b)</p>	
<p>WHY</p>	<p>PRD vent tubes will not be reused.</p>		<p>WHY</p>	<p>Required for retrofit kit component and repair tracking and, if applicable, installer reimbursement.</p>	

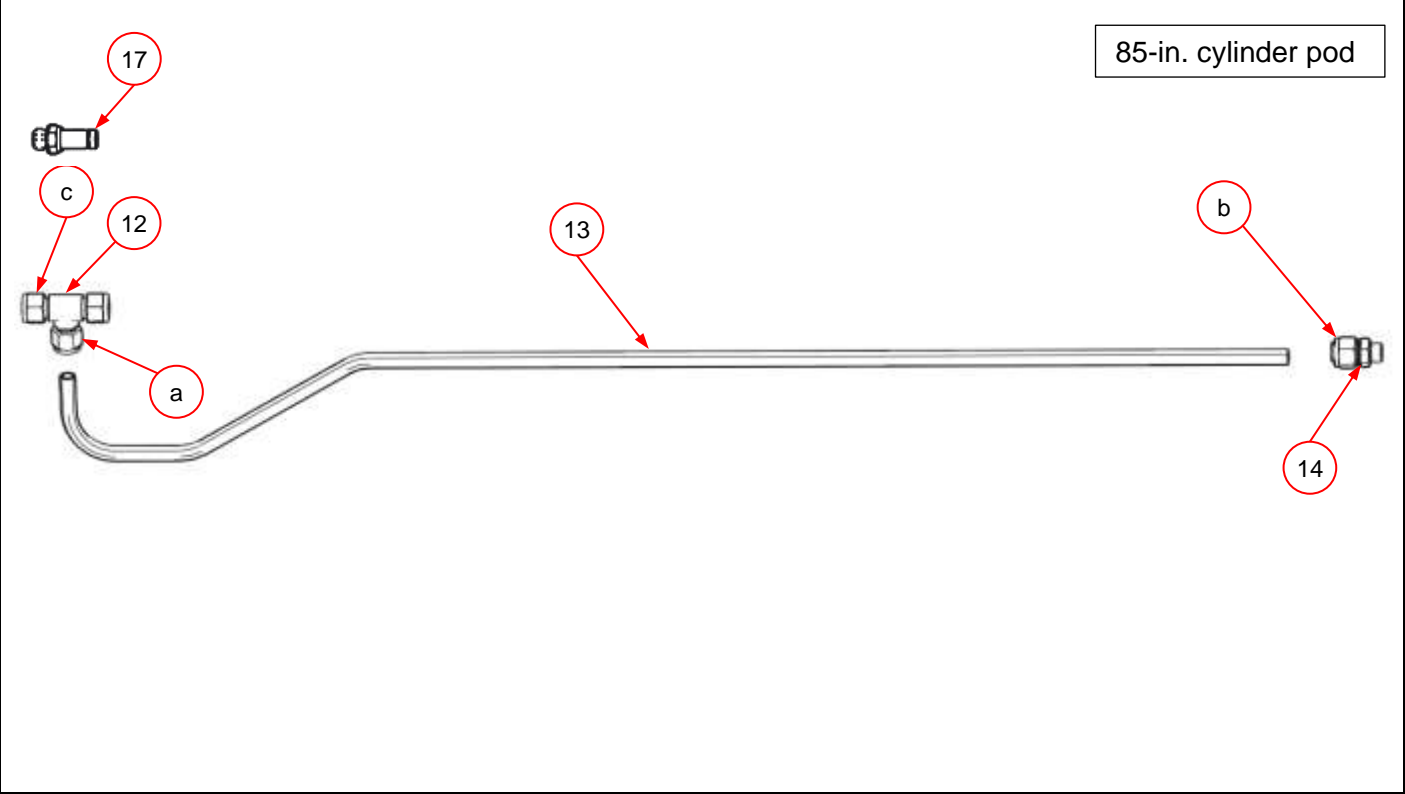
4	<p>Place all removed Emer™ PRDs in zip lock bag provided with bulk retrofit kit shipment.</p> <p>NOTICE</p> <p><i>Place only PRDs from one vehicle in each zip lock bag.</i></p> <p><i>Bag must be labeled with the following:</i></p> <ol style="list-style-type: none"> <i>1. Fleet</i> <i>2. VIN</i> <i>3. Fuel system s/n</i> 				
WHAT	<p>1. Bag helps prevent PRD contamination.</p> <p>2. Agility is collecting all PRDs removed; return material authorization (RMA) instructions appear below.</p>				

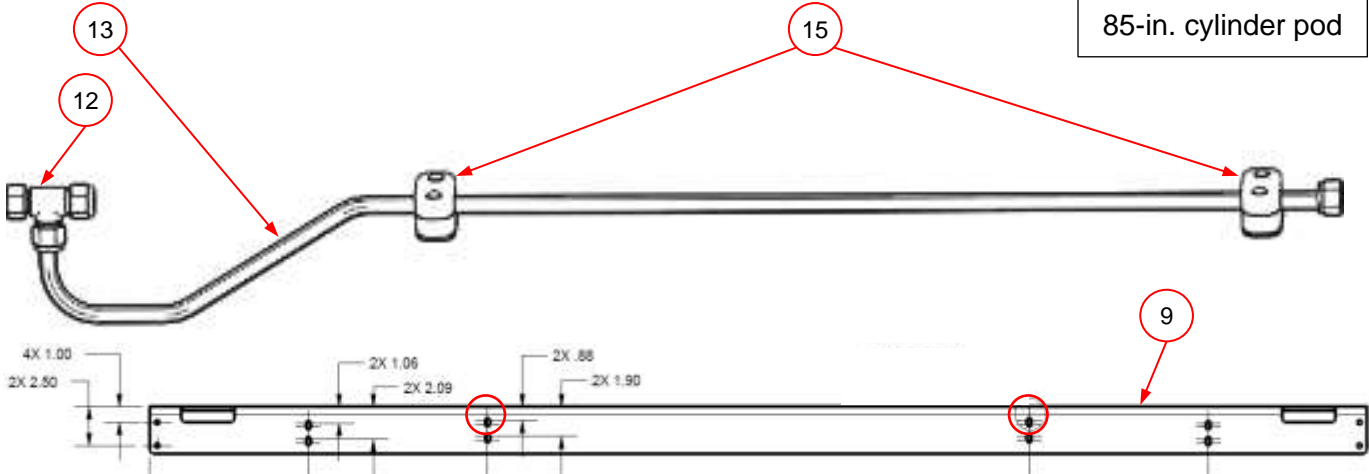
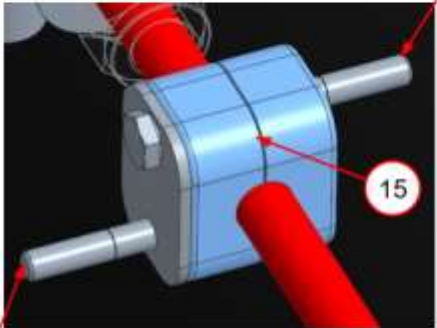
5.5. Install PRD retrofit kits

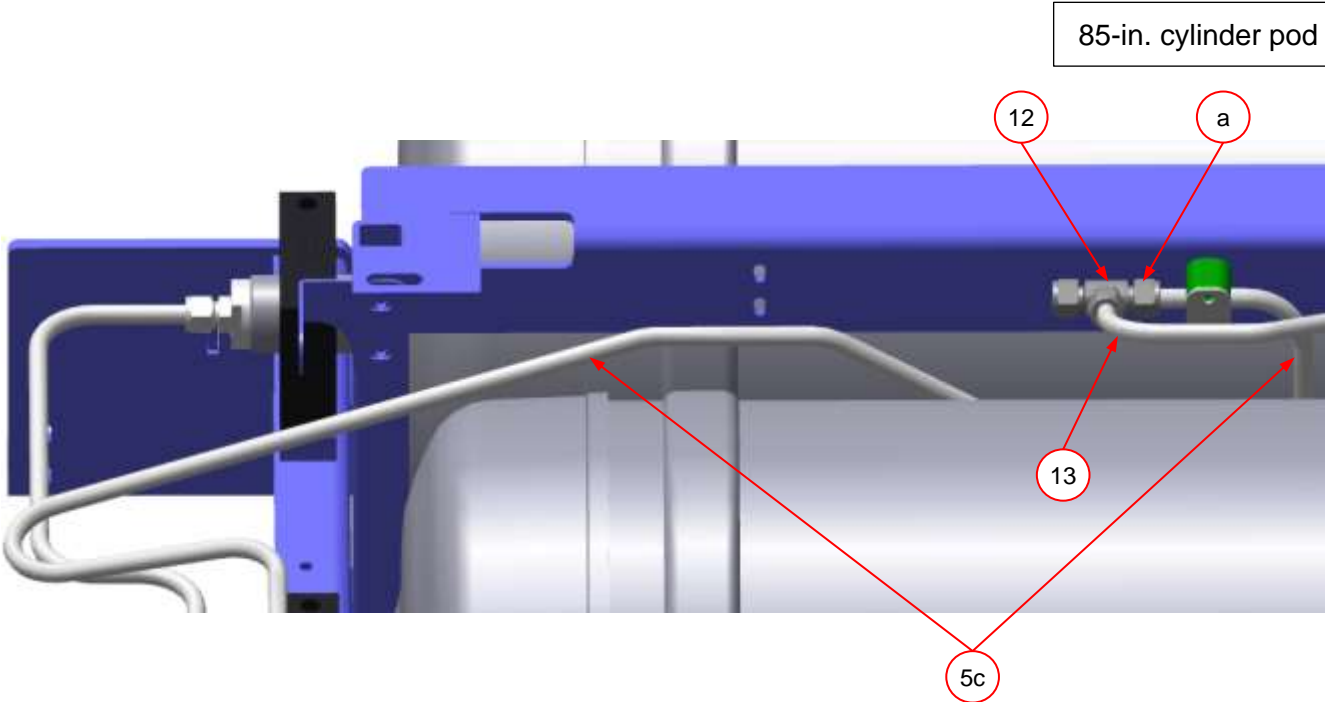
5.5.1. Kit, Retrofit, Gillig, 85" tanks PRD Retrofit, p/n 25519030, installation instructions

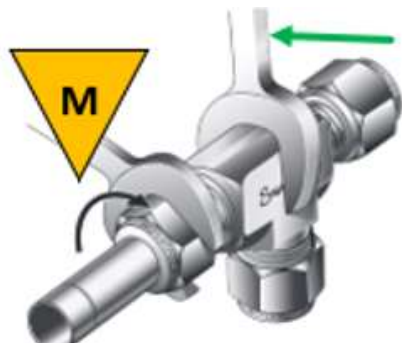
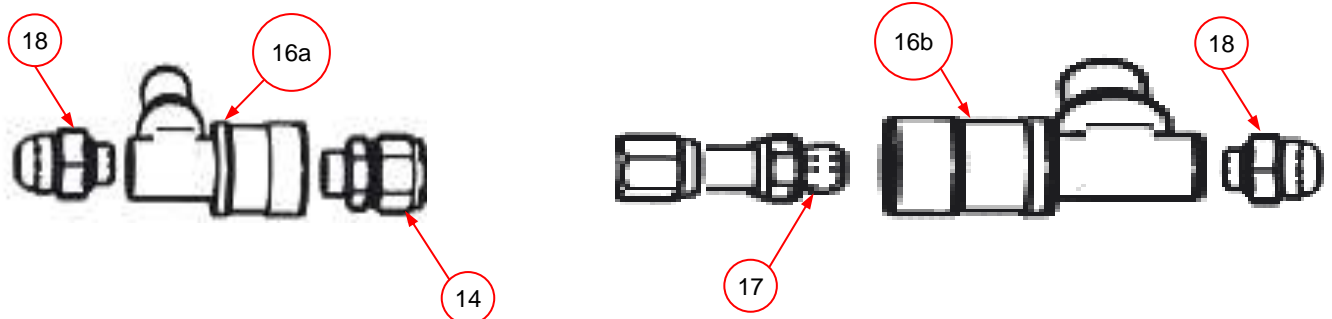
NOTICE

Always perform installation steps in the order specified.

<div>1</div> <div>WHAT</div>	<ol style="list-style-type: none"> 1. Install ferrules (<i>not visible</i>) and nut (a) from tee fitting (12), p/n 10200208, on PRD tube, (13), p/n 25519417. 2. Install ferrules (<i>not visible</i>) and nut (b) from tube fitting (14), p/n 10200065, on PRD tube, (13). 3. Install ferrules (<i>not visible</i>) and nut (c) from tee fitting (12), p/n 10200208, on tube adapter fitting, (17), p/n 10200238. <div>NOTICE</div> <p>Refer to Appendix A: WI.0197 Manual Swaging of Swagelok Fittings.</p>	
<div>WHY</div>		

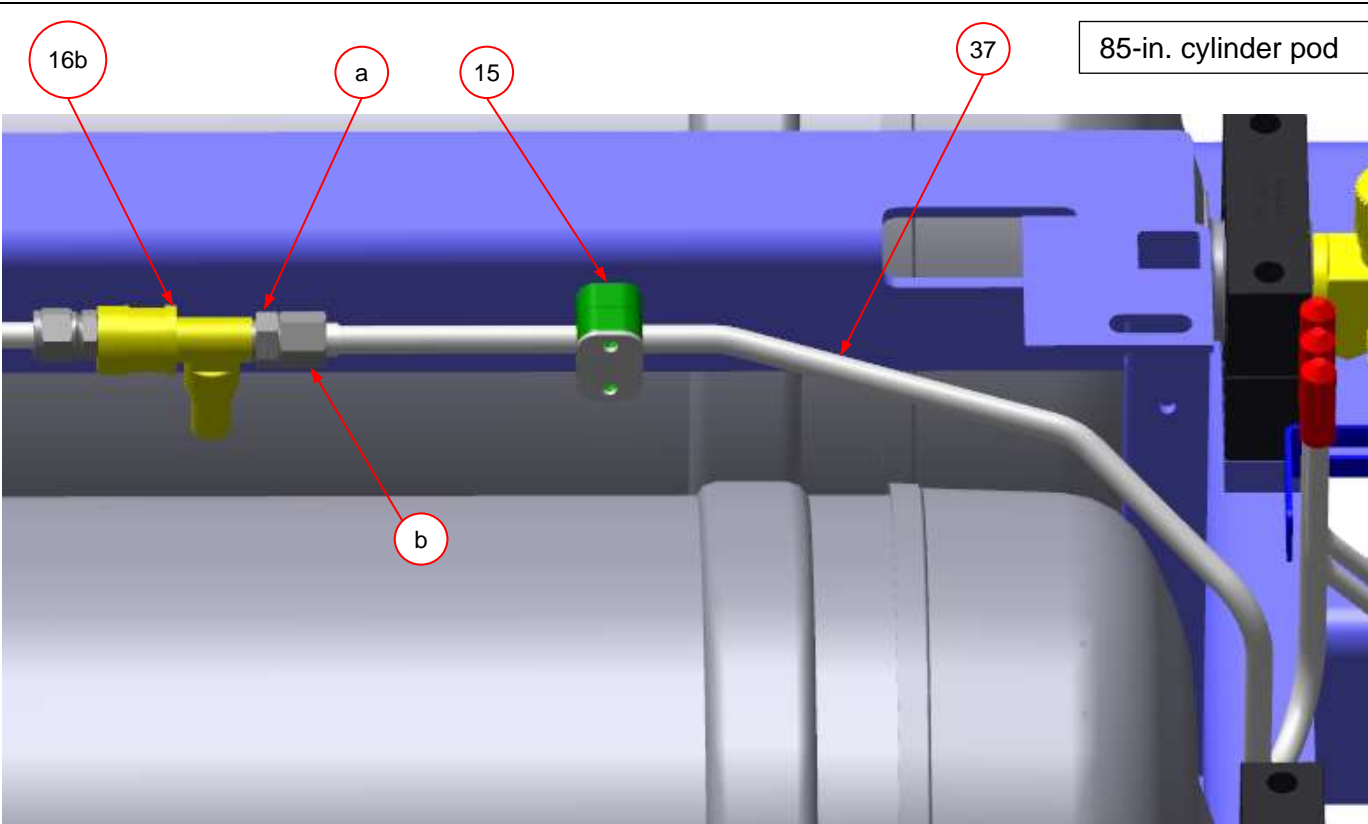
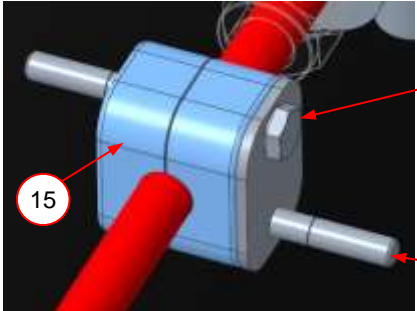
<div>2</div> <div>WHAT</div> <div>WHY</div>	<ol style="list-style-type: none"> 1. Install tee fitting (12), p/n 10200208, on PRD tube, (13). <div style="background-color: #0056b3; color: white; padding: 5px; text-align: center; font-weight: bold;">NOTICE</div> <p><i>Tighten fitting finger tight; fittings will be tightened at a later step.</i></p> <ol style="list-style-type: none"> 2. Install two tube clamp kits (15), p/n 10701508, on PRD tube, (13). 3. Insert one 1.5-in. hex cap screw (a), p/n 10760200-0150, and one 2.5-in. hex cap screw (b), p/n 10760200-0120, into each tube clamp kit (15), as shown in INSET A. 4. Install one flat washer, p/n 10761000, and one flange top nut, p/n 10763000 (not shown) on each hex cap screw inserted. 5. Secure clamps (15) at existing holes (circled) on PRD bracket (9). <div style="background-color: #0056b3; color: white; padding: 5px; text-align: center; font-weight: bold;">NOTICE</div> <p><i>To ease component installation, leave fasteners loose.</i></p> <p>Support PRD vent lines.</p>	 <p>85-in. cylinder pod</p> <p>13</p> <p>12</p> <p>15</p> <p>9</p> <p>4X 1.00</p> <p>2X 2.50</p> <p>2X 1.06</p> <p>2X 2.09</p> <p>2X .88</p> <p>2X 1.90</p> <p>INSET A</p> <p>2.5-in HEX CAP SCREW FACES TOWARD PRD BRACKET (9) TO SECURE CLAMP (15) TO PRD BRACKET.</p>  <p>15</p> <p>1.5-in HEX CAP SCREW FACES AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</p>
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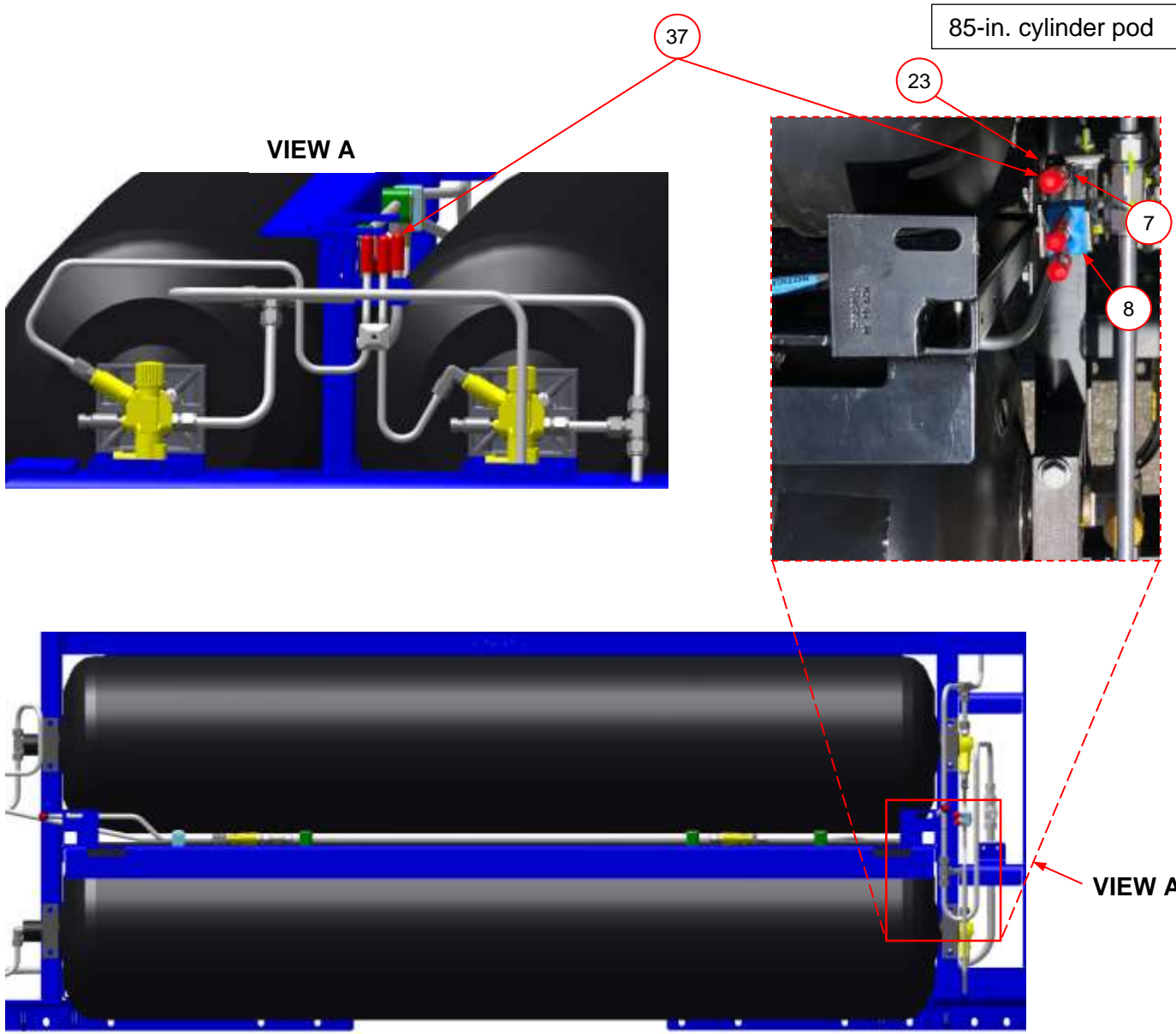
3	<p>Install PRD supply tube (5c) nut fitting (a) at tee fitting (12) of PRD tube (13).</p> <p>NOTICE</p> <p><i>Tighten fitting finger tight; fitting will be torqued at a later step.</i></p>	
WHY		

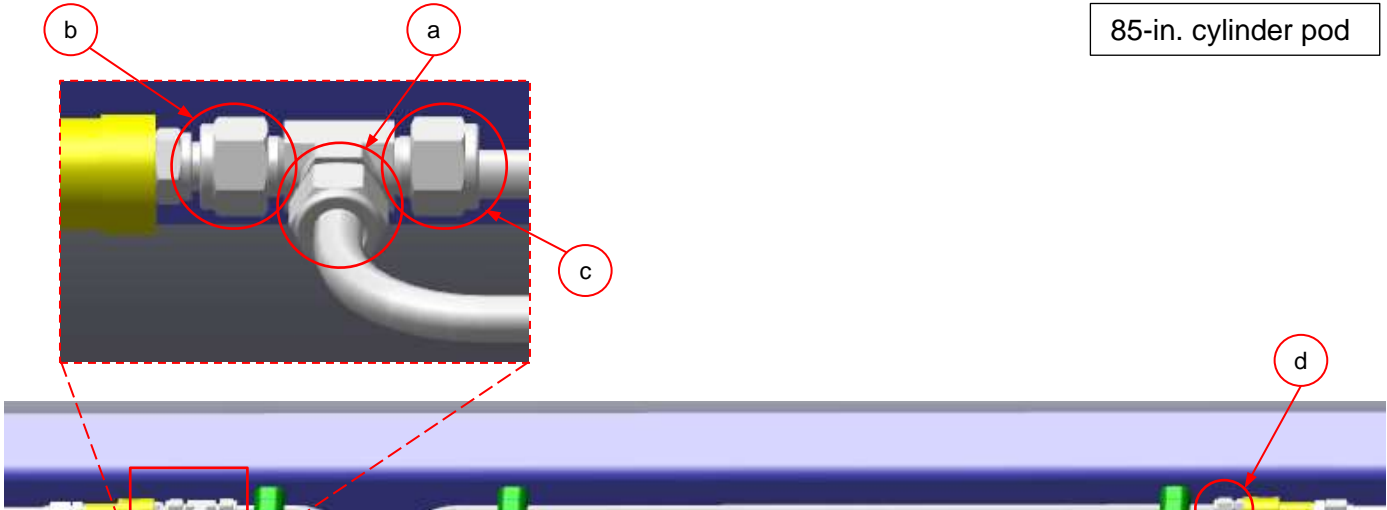

4	<div data-bbox="197 188 564 389"> <p>M</p> <p>Always use a backing wrench on the main fitting while using a wrench to install another fitting.</p> </div> <div data-bbox="197 397 564 527"> <p>1. Install tube adapter fitting (17), p/n 10200238 on VTI PRD (16b), p/n 10300513.</p> </div> <div data-bbox="197 535 564 641"> <p>c</p> <p>Torque fitting (17) to 26 ft-lbs (35.25Nm)</p> </div> <div data-bbox="197 649 564 779"> <p>2. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513.</p> </div> <div data-bbox="197 787 564 917"> <p>3. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513.</p> </div> <div data-bbox="197 925 564 1031"> <p>c</p> <p>Torque fittings (18) to 18.5 ft-lbs (25Nm).</p> </div> <div data-bbox="197 1039 564 1177"> <p>4. Install tube fitting (14), p/n 10200065, on VTI PRD (16a), p/n 10300513.</p> </div> <div data-bbox="197 1185 564 1274"> <p>c</p> <p>Torque fitting (14) to 45 ft-lbs (61Nm).</p> </div>	<div data-bbox="1029 227 1428 568">  </div> <div data-bbox="1654 235 1944 297"> <p>85-in. cylinder pod</p> </div> <div data-bbox="598 633 1921 950">  </div>
WHY		

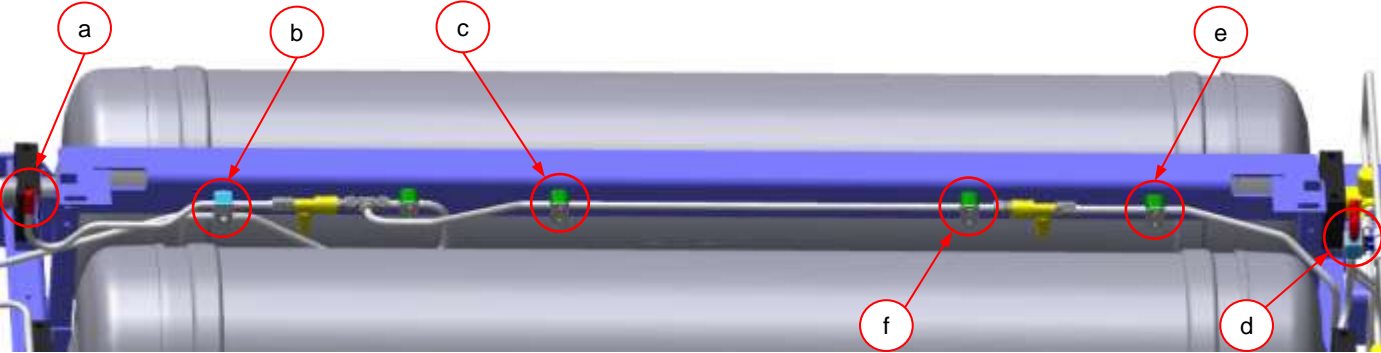
5	<p>1. Install VTI PRD (16a) assembly inlet fitting (a) on PRD supply tube (13) at tee fitting (12).</p> <p>2. Install VTI PRD outlet fitting (16b) on straight fitting (b) on other end of PRD supply tube (13).</p> <p>NOTICE <i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p> <p>PRD ports (c) must be oriented 90° down from the flow of system tubing as shown.</p>	<p>85-in. cylinder pod</p>
WHAT	WHY	

6a	<p>1. Install PRD vent tube (26), p/n 25519026, on PRD (16a) fitting (a).</p> <div>NOTICE</div> <p><i>Tighten nut fitting finger tight; fittings will be tightened at a later step.</i></p>	<div>85-in. cylinder pod</div> <p>The diagram shows a 3D perspective view of a mechanical assembly. A white PRD vent tube (26) is connected to a yellow fitting (a) on a blue plate (6). A dual tube clamp (8) is shown securing the tube. A P-clip (7) is attached to the tube and secured to a bracket (b). A red circle highlights a hole in the blue plate (6). Other components labeled include 5c, 16a, and 7.</p>
WHAT	<p>2. Slip dual tube clamp (8), on PRD vent tube (26), and on PRD vent tube (5a).</p> <p>3. Use dual tube clamp (8) fasteners (<i>not visible</i>) to secure plate (6) and PRD vent tube (26), to PRD bracket (9) at hole (<i>circled</i>).</p> <p>4. Slide P-clip on PRD vent tube (26) and use existing fastener to secure P-clip (7) to P-clip bracket (b).</p> <div>NOTICE</div> <p><i>Tighten fasteners finger tight; fasteners will be torqued at a later step.</i></p>	
WHY		

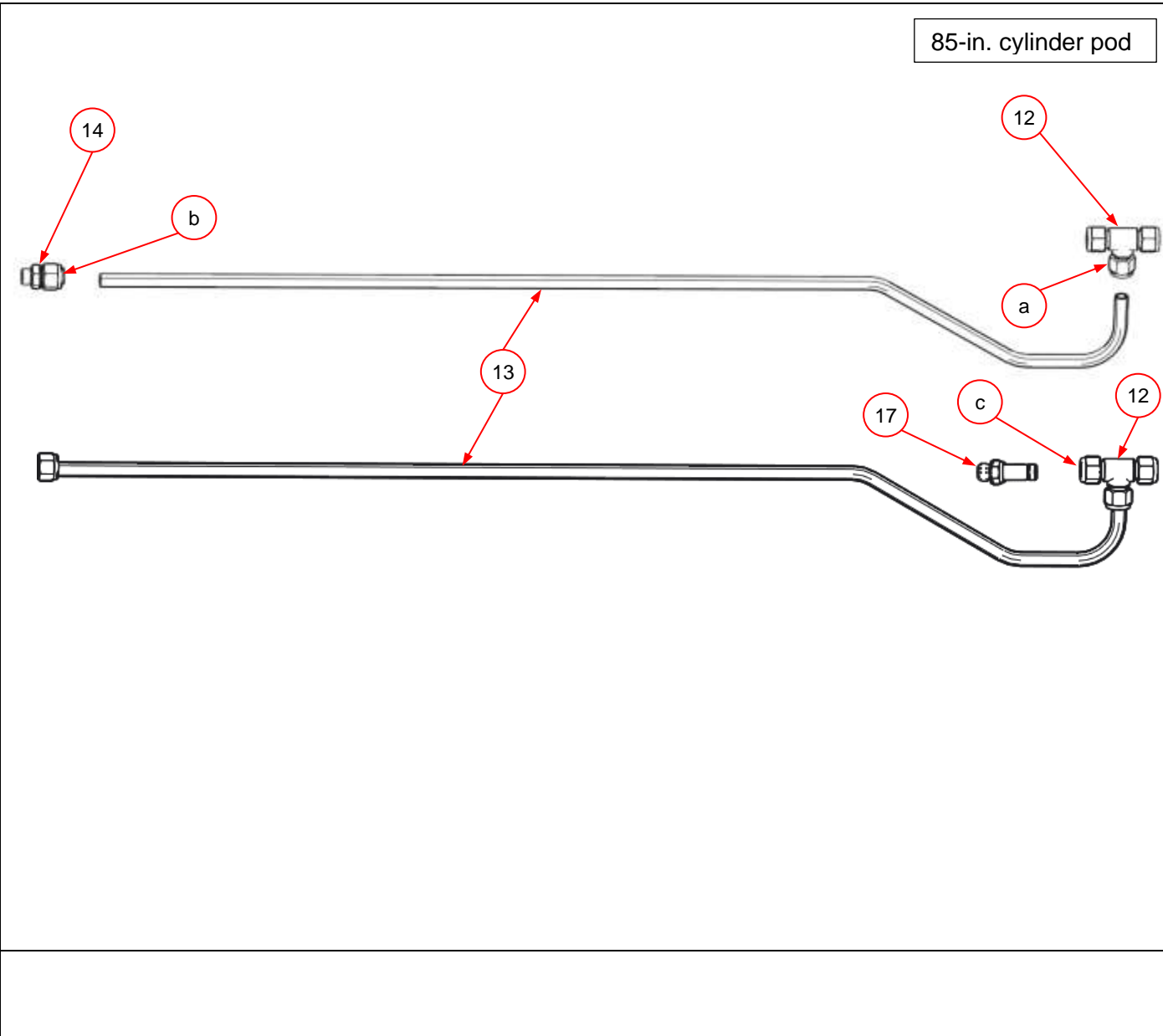
6b	<ol style="list-style-type: none"> 1. Install PRD vent tube (37), p/n 25519037, on PRD (16b) fitting (a). 		85-in. cylinder pod
WHAT	<p>NOTICE</p> <p><i>Tighten nut fitting (b) finger tight; fitting will be tightened at a later step.</i></p> <ol style="list-style-type: none"> 2. Slip tube clamp kit (15), on PRD vent tube (37). 3. Insert one 1.5-in. hex cap screw, p/n 10760200-0150, and one 2.5-in. hex cap screw, p/n 10760200-0120, into each tube clamp kit (15), as shown in INSET A. 4. Install one flat washer, p/n 10761000, and one flange top nut, p/n 10763000 (not shown) on each hex cap screw inserted in previous sub step. 5. Secure PRD vent tube (37) to PRD bracket (9) at existing hole. <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be torqued at a later step.</i></p>		
WHY		<p>INSET A</p>  <p>2.5-in. HEX CAP SCREW FACES TOWARD PRD BRACKET (9) TO SECURE CLAMP (15) TO PRD BRACKET.</p> <p>1.5-in. HEX CAP SCREW FACES AWAY FROM PRD BRACKET TO CAPTURE CLAMP (15).</p>	

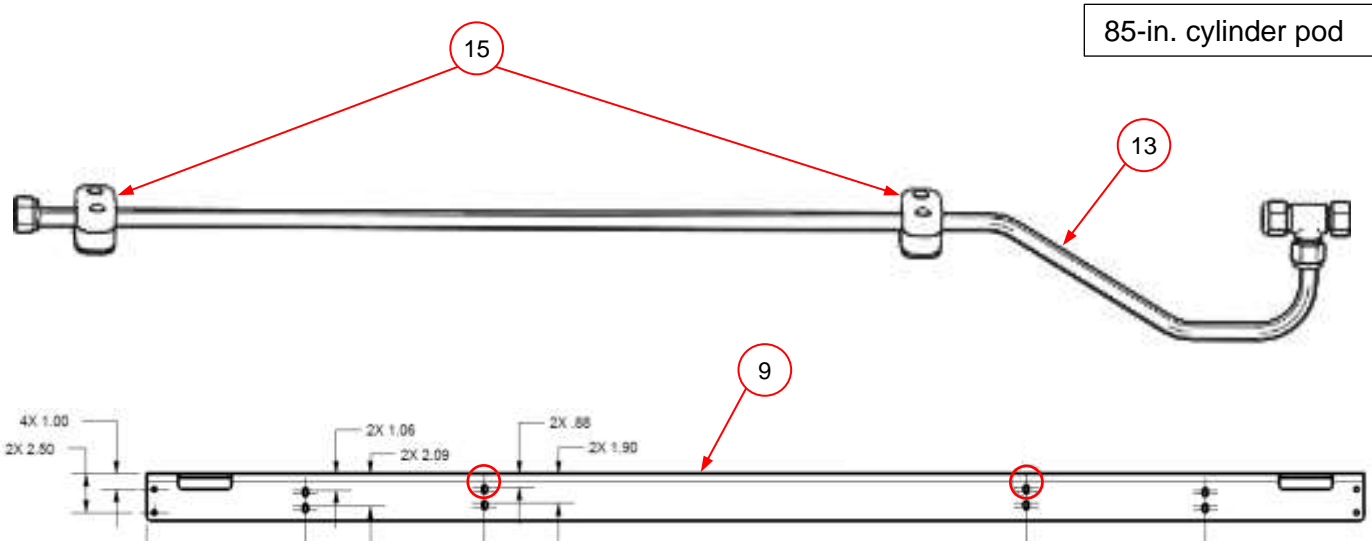
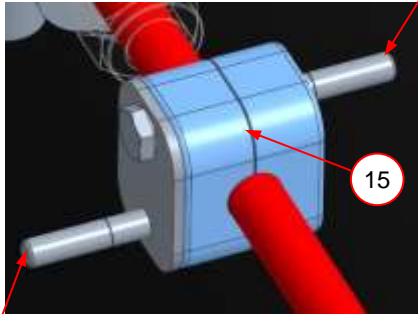
<p>7</p> <p>WHAT</p>	<ol style="list-style-type: none"> 1. Install tube clamp bracket (23), p/n 25519123, on existing double tube clamp (8) using the double tube clamp fasteners. 2. Install P-clip (7), p/n 10702147, on PRD vent tube (37), p/n 25519037, and secure to bracket (23), p/n 25519123 using one hex cap screw, p/n 10760200-0100, one flat washer, p/n 10761000, and one flange top nut, p/n 10761300. <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p>	 <p>85-in. cylinder pod</p> <p>VIEW A</p> <p>VIEW A</p>
<p>WHY</p>	<p>System specification.</p>	

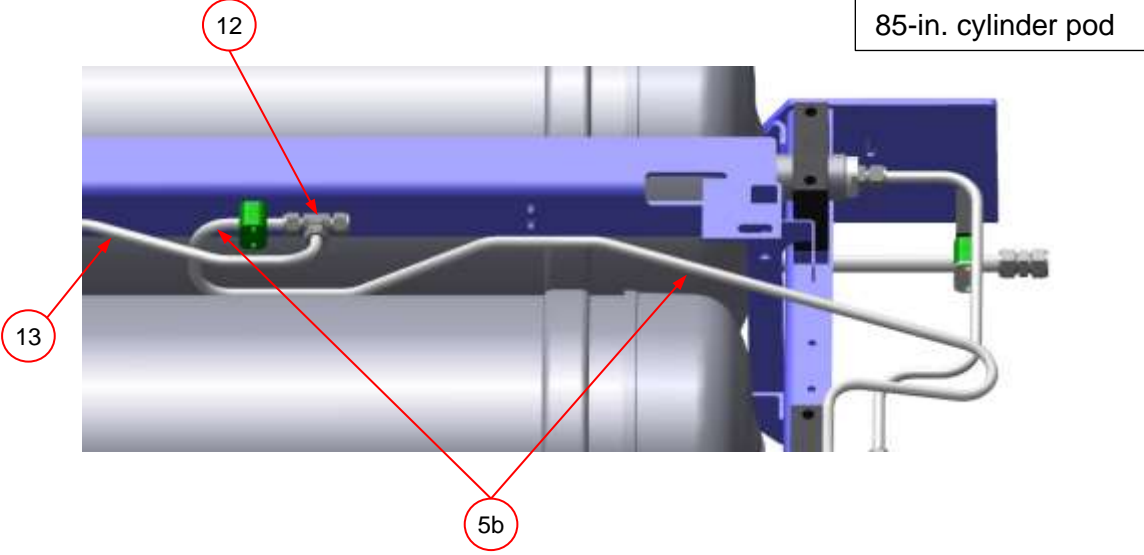
8a	<p>c Use two wrenches to tighten 1/2-in. Swagelok® fitting nuts indicated in the following sequence:</p> <ol style="list-style-type: none"> 1. (a) 2. (b) 3. (c) 4. (d) <p>Tighten 1/2-in. Swagelok® fittings per Appendix B WI.0441.</p>	<p>85-in. cylinder pod</p> 
WHY	System specification.	
8b	<p>c Use two wrenches to tighten SAE / JIC fitting nuts at the locations indicated in the following sequence:</p> <ol style="list-style-type: none"> 1. (e) 2. (f) <p>Tighten SAE / JIC fittings to 45 ft-lbs (61Nm).</p>	<p>85-in. cylinder pod</p> 
WHY	System specification.	

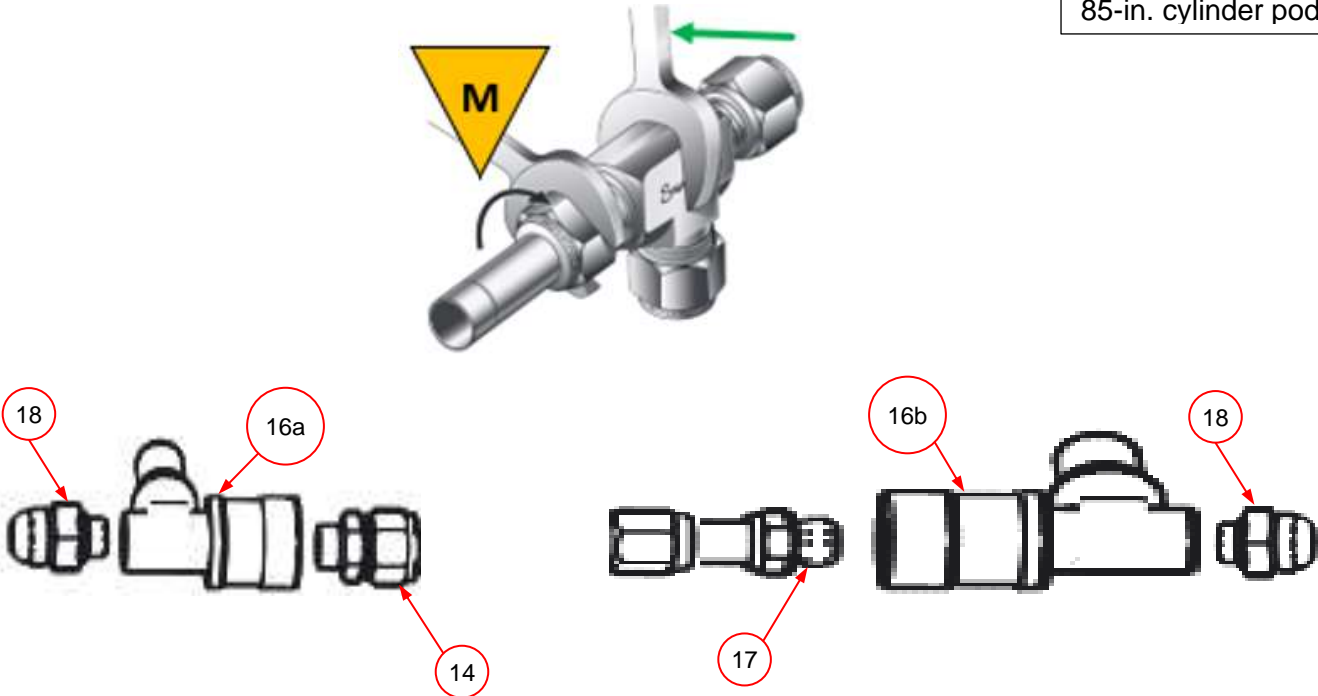
9	<p>c Tighten clamp fasteners at all clamp locations (<i>circled</i>) using the following sequence:</p> <ol style="list-style-type: none"> 1. (a) 2. (b) 3. (c) 4. (d) 5. (e) 6. (f) <p><i>Tighten fasteners to 8 ft-lbs (11Nm).</i></p>	<p>85-in. cylinder pod</p> 
WHAT		


10	<p>c 1. Verify clearance between PRD vent tubes (a), live high pressure PRD vent tubes (b), and fuel tubes (c) is 3/8-in. minimum.</p> <p>c 2. Verify clearance between all system plumbing and cylinders (c) is 3/8-in. minimum.</p> <p>NOTICE</p> <p><i>If required: Adjust tube clips and clamps as required and repeat Step 10.</i></p>	<div data-bbox="1659 212 1944 256" data-label="Text"> <p>85-in. cylinder pod</p> </div> <div data-bbox="596 277 1060 367" data-label="Text"> <p><i>NOTE: Plug end shown for reference; valve end similar</i></p> </div> <div data-bbox="793 363 1667 769" data-label="Image"> </div>
WHY	Prevent fuel line damage.	

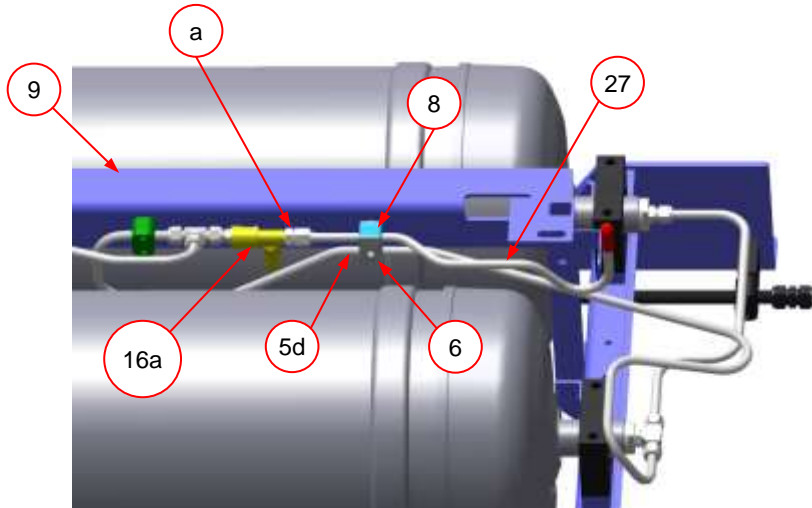
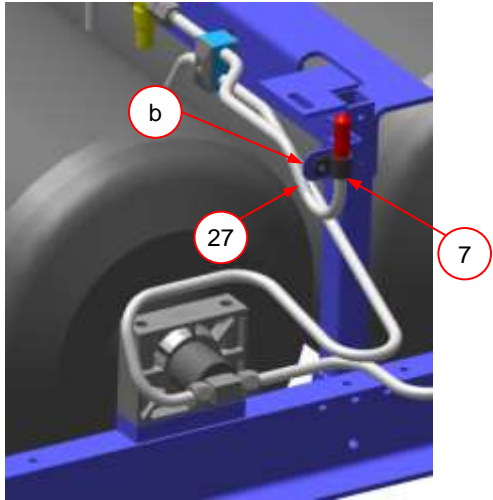
11	<p>1. Install ferrules (<i>not visible</i>) and nut (a) from tee fitting (12), p/n 10200208, on PRD vent tube, (13), p/n 25519417.</p> <p>2. Install ferrules (<i>not visible</i>) and nut (b) from tube fitting (14), p/n 10200065, on straight end of PRD vent tube (13).</p> <p>3. Install ferrules (<i>not visible</i>) and nut (c) from tee fitting (12), p/n 10200208, on tube adapter fitting, (17), p/n 10200238.</p> <p>NOTICE Refer to Appendix A: WI.0197 Manual Swaging of Swagelok Fittings.</p> <p>4. Install tee fitting (12), p/n 10200208, on PRD vent tube (13), p/n 25519417.</p> <p>NOTICE Tighten fitting finger tight; fittings will be tightened at a later step.</p>	 <p>The diagram illustrates the assembly of a PRD vent tube. It shows two parallel horizontal tubes. The top tube is labeled 13 and has a tee fitting (12) at its right end. A nut (a) is shown being installed on the top tube. The bottom tube is labeled 17 and has a tube adapter fitting (17) at its right end. A nut (c) is shown being installed on the bottom tube. A tee fitting (12) is also shown at the right end of the bottom tube. A tube fitting (14) is shown at the left end of the top tube, with a nut (b) being installed. A label '85-in. cylinder pod' is located in the top right corner. Red arrows point from the numbered labels (12, 13, 14, 17, a, b, c) to the corresponding components in the diagram.</p>
WHY		


12	<p>1. Install two tube clamp kits (15), p/n 10701508, on Tube, Formed, HP Fuel, 1/2-in. X .049 -in., Tee to PRD, (13), p/n 25519417.</p> <p>2. Insert one 1.5-in. hex cap screw, p/n 10760200-0150, and one 2.5-in. hex cap screw, p/n 10760200-0120, into each tube clamp kit (15), as shown in INSET A.</p> <p>3. Install one flat washer, p/n 10761000, and one flange top nut, p/n 10763000 (<i>not shown</i>) on each hex cap screw inserted in previous sub step.</p> <p>4. Secure PRD vent tube (13) to PRD bracket (9) at existing holes (<i>circled</i>).</p> <div data-bbox="201 1036 506 1084" style="background-color: #0056b3; color: white; padding: 5px; text-align: center;"> NOTICE </div> <p><i>To ease component installation, do not tighten fasteners completely; fasteners will be torqued at a later step</i></p>	<div data-bbox="583 167 1946 711">  </div> <div data-bbox="646 727 766 760"> INSET A </div> <div data-bbox="1100 735 1940 834" style="border: 1px solid black; padding: 5px;"> <p>2.5-in HEX CAP SCREW FACES TOWARD PRD BRACKET (9) TO SECURE CLAMP (15) TO PRD BRACKET.</p> </div> <div data-bbox="1163 881 1577 1192">  </div> <div data-bbox="793 1271 1478 1354" style="border: 1px solid black; padding: 5px;"> <p>1.5-in HEX CAP SCREW FACES AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</p> </div>
WHY	Support PRD vent lines.	


13	<p>Install PRD supply tube (5b) on tee fitting (12) on PRD supply tube (13).</p> <p>NOTICE</p> <p><i>Tighten fitting finger tight; fitting will be tightened at a later step.</i></p>	
WHAT	WHY	

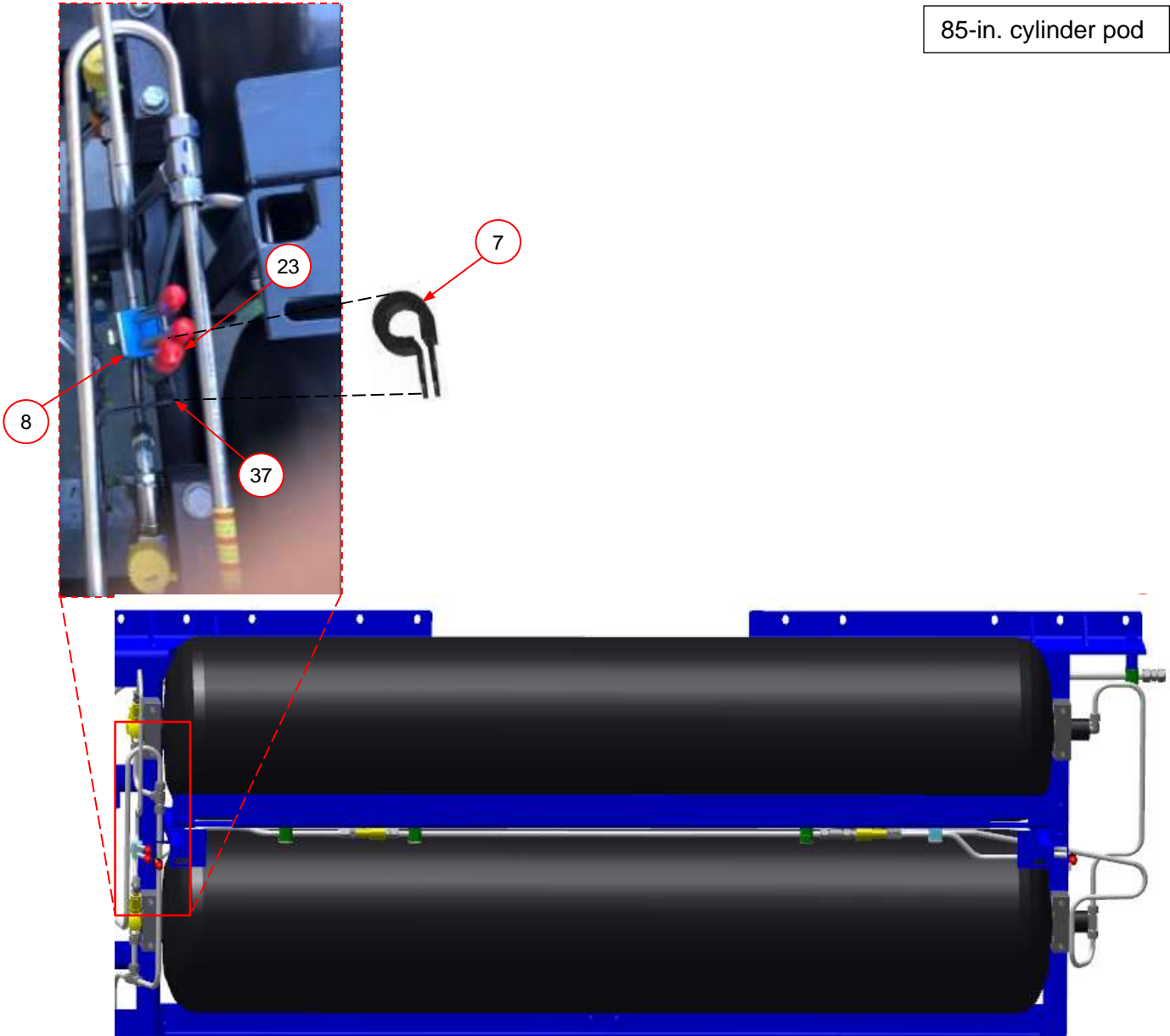
14	<p>M <i>Always use a backing wrench on the main fitting while using a wrench to install another fitting.</i></p> <p>5. Install tube adapter fitting (17), p/n 10200238 on VTI PRD (16b), p/n 10300513.</p> <p>c <i>Torque fitting (17) to 26 ft-lbs (35.25Nm)</i></p> <p>6. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513.</p> <p>7. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513.</p> <p>c <i>Torque fittings (18) to 18.5 ft-lbs (25Nm).</i></p> <p>8. Install tube fitting (14), p/n 10200065, on VTI PRD (16a), p/n 10300513.</p> <p>c <i>Torque fitting (14) to 45 ft-lbs (61Nm).</i></p>	<div data-bbox="1661 212 1942 261" style="border: 1px solid black; padding: 2px; text-align: center;">85-in. cylinder pod</div> 
WHY		

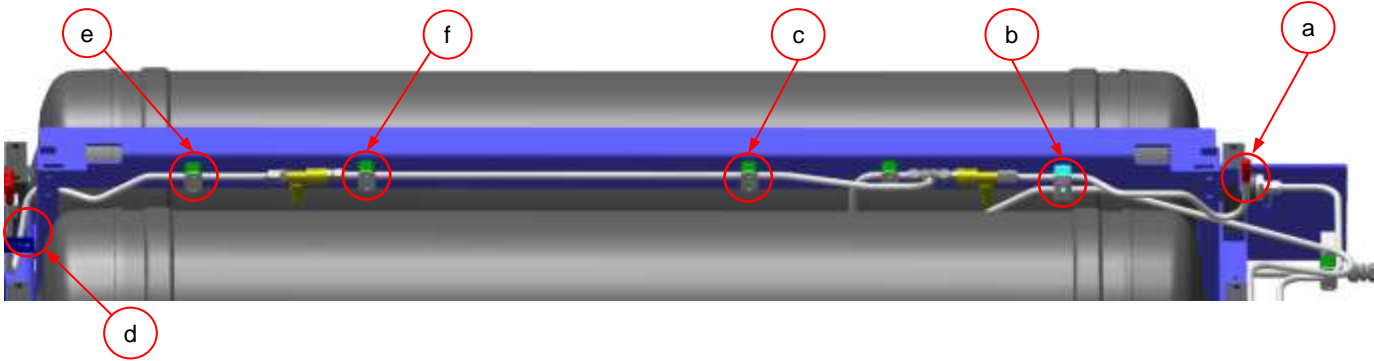
15	<ol style="list-style-type: none"> 1. Install VTI PRD (16a) assembly inlet fitting (a) on PRD supply tube (13) at tee fitting (12). 2. Install VTI PRD outlet fitting (16b) on straight fitting (b) on other end of PRD supply tube (13). 	<div data-bbox="1661 212 1942 264" style="border: 1px solid black; padding: 2px; text-align: center;">85-in. cylinder pod</div>
WHAT	<div data-bbox="195 483 506 532" style="background-color: #0056b3; color: white; padding: 5px; text-align: center;">NOTICE</div> <p><i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p> <p> <i>PRD ports (c) must be oriented 90° down from the flow of system tubing as shown.</i></p>	
WHY		

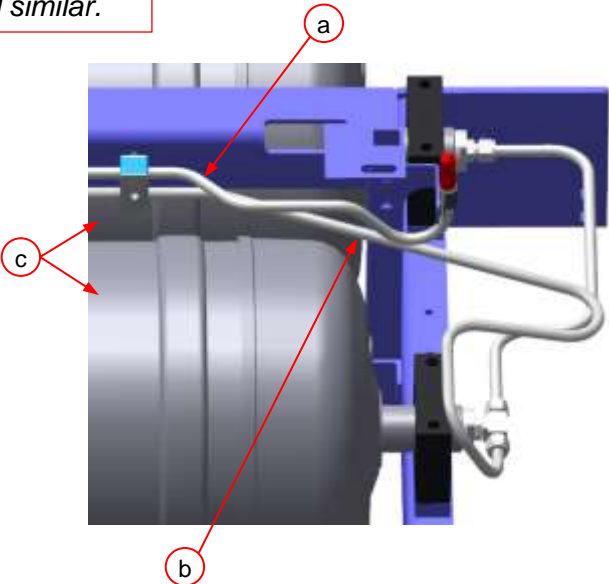
16	<p>1. Install PRD vent tube (27), p/n 25519027, on PRD (16a) fitting (a).</p>	<div data-bbox="1654 207 1942 261" data-label="Text"> <p>85-in. cylinder pod</p> </div> <div data-bbox="590 337 1396 841" data-label="Image">  </div> <div data-bbox="1438 345 1927 841" data-label="Image">  </div>
WHAT	<div data-bbox="199 305 510 358" data-label="Section-Header"> <p>NOTICE</p> </div> <p><i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p> <p>2. Use dual tube clamp, (8) and plate (6), to secure PRD supply tube (5d) to PRD vent tube (27).</p> <p>3. Secure dual tube clamp (8) to PRD bracket (9) at existing hole.</p> <p>4. Slip P-clip (7) on PRD vent tube (27).</p> <p>5. Attach P-clip (7) to P-clip bracket (b) using existing fasteners (<i>not visible</i>).</p> <div data-bbox="199 979 510 1032" data-label="Section-Header"> <p>NOTICE</p> </div> <p><i>Tighten fasteners finger tight; fasteners will be torqued at a later step.</i></p>	
WHY		

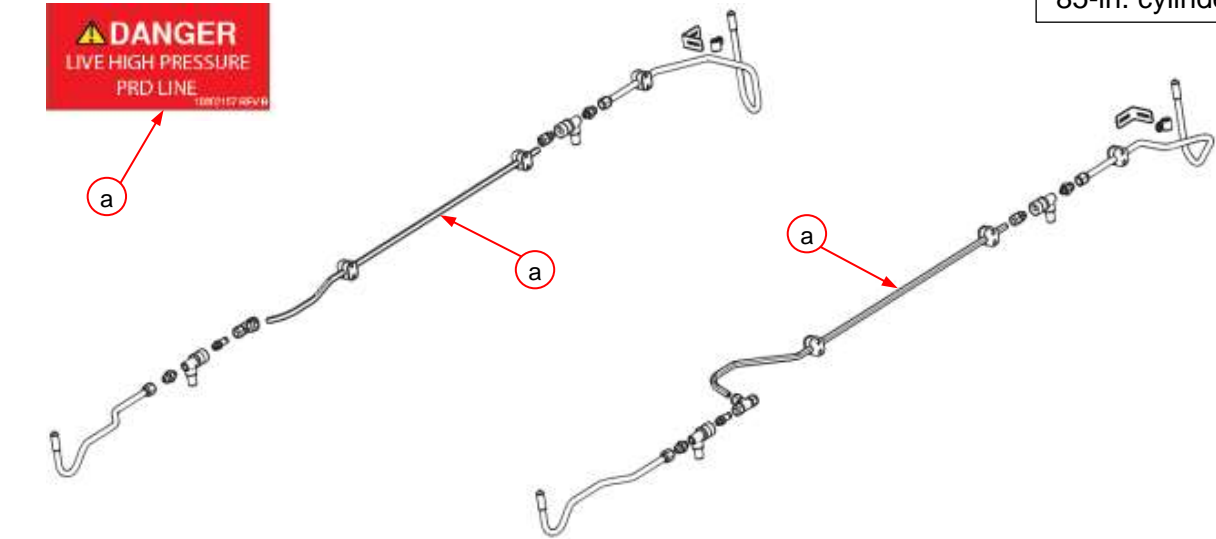
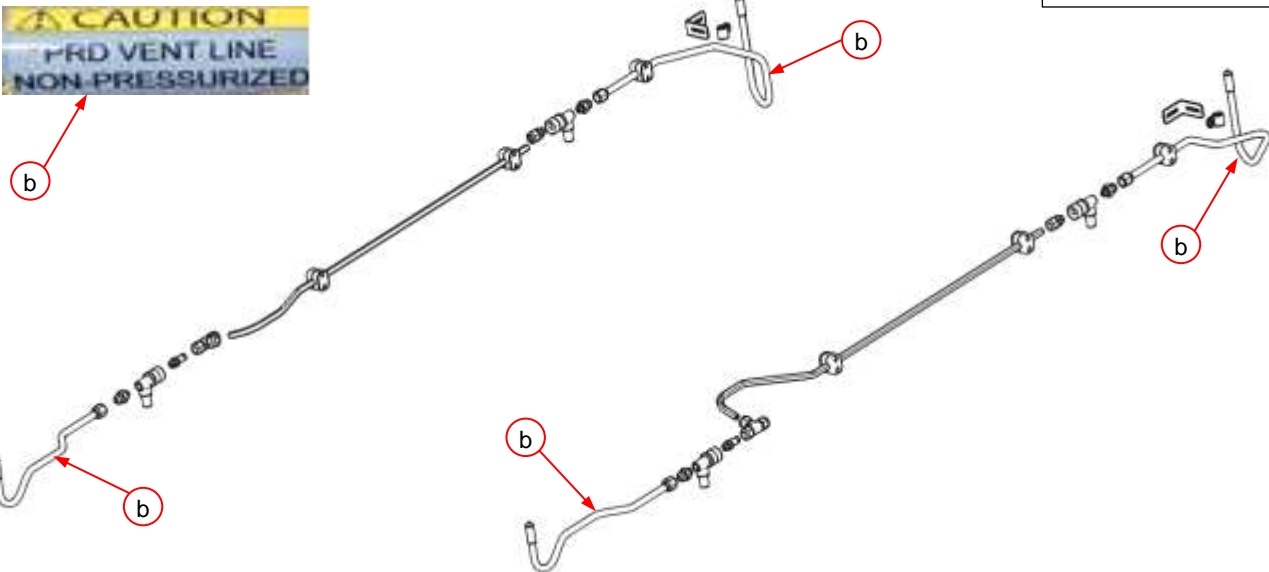
17 a	<p>c Use two wrenches to tighten 1/2-in. Swagelok® nut fittings at four locations (<i>circled</i>) in the following sequence:</p> <ol style="list-style-type: none"> 1. (a) 2. (b) 3. (c) 4. (d) <p><i>Tighten Swagelok® nut fittings per Appendix B WI.0441.</i></p>	 <p>85-in. cylinder pod</p>
WHY	System specification.	

17 b	<p>c A. Use two wrenches to tighten SAE / JIC nut fittings at two locations (<i>circled</i>) in the following sequence:</p> <ol style="list-style-type: none"> 1. (e) 2. (f) <p>Tighten SAE / JIC nut fittings to 45 ft-lbs (61Nm).</p> <p>c B. Verify vent ports of VTI PRDs (16a) and (16b) are pointed down (<i>arrows</i>).</p>	<div data-bbox="1667 207 1948 253" style="border: 1px solid black; padding: 2px; text-align: center;">85-in. cylinder pod</div> 
WHY	System specification.	

18	<p>1. Install tube clamp bracket (23), p/n 25519123, existing double tube clamp (7) using double tube clamp fasteners (<i>not shown</i>).</p> <p>2. Install P-clip (7), p/n 10702147 on PRD vent tube (37), p/n 25519037.</p> <p>3. Install P-clip (8) on tube clamp bracket (23) using one hex cap screw, p/n 10760200-0100, one flat washer, p/n 10761000, and one flange top nut, p/n 10761300.</p> <p>NOTICE <i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p>	<div data-bbox="1661 212 1948 261" data-label="Text"> <p>85-in. cylinder pod</p> </div>  <p>The diagram illustrates the installation of a tube clamp bracket (23) and P-clips (7 and 8) on a PRD vent tube (37) for an 85-inch cylinder pod. The top part of the diagram shows a close-up view of the components: a tube clamp bracket (23), a P-clip (7), and a PRD vent tube (37). A P-clip (8) is also shown being installed on the tube clamp bracket (23). The bottom part of the diagram shows a larger view of the 85-inch cylinder pod assembly, with a red box indicating the location of the PRD vent tube (37) and the tube clamp bracket (23).</p>
WHY	<p>PRD vent tubes may need to be adjusted for clearance.</p>	

19	<p>c Tighten fasteners at clamp and clip locations (<i>circled</i>) using the following sequence:</p> <ol style="list-style-type: none"> 1. (a) 2. (b) 3. (c) 4. (d) 5. (e) 6. (f) <p><i>Tighten fasteners to 8 ft-lbs (11Nm).</i></p>	<div data-bbox="1661 207 1944 261" style="border: 1px solid black; padding: 2px; text-align: center;">85-in. cylinder pod</div>  <p>The diagram shows a side view of a blue cylindrical pod assembly. Six fastener locations are circled in red and labeled with letters: 'a' is at the right end flange; 'b' is on the top rail; 'c' is on the top rail; 'd' is on the bottom rail; 'e' is on the top rail; and 'f' is on the bottom rail. Red arrows point from each letter to its corresponding circled fastener location.</p>
WHAT	<p>WHY</p> <p>System specification.</p>	

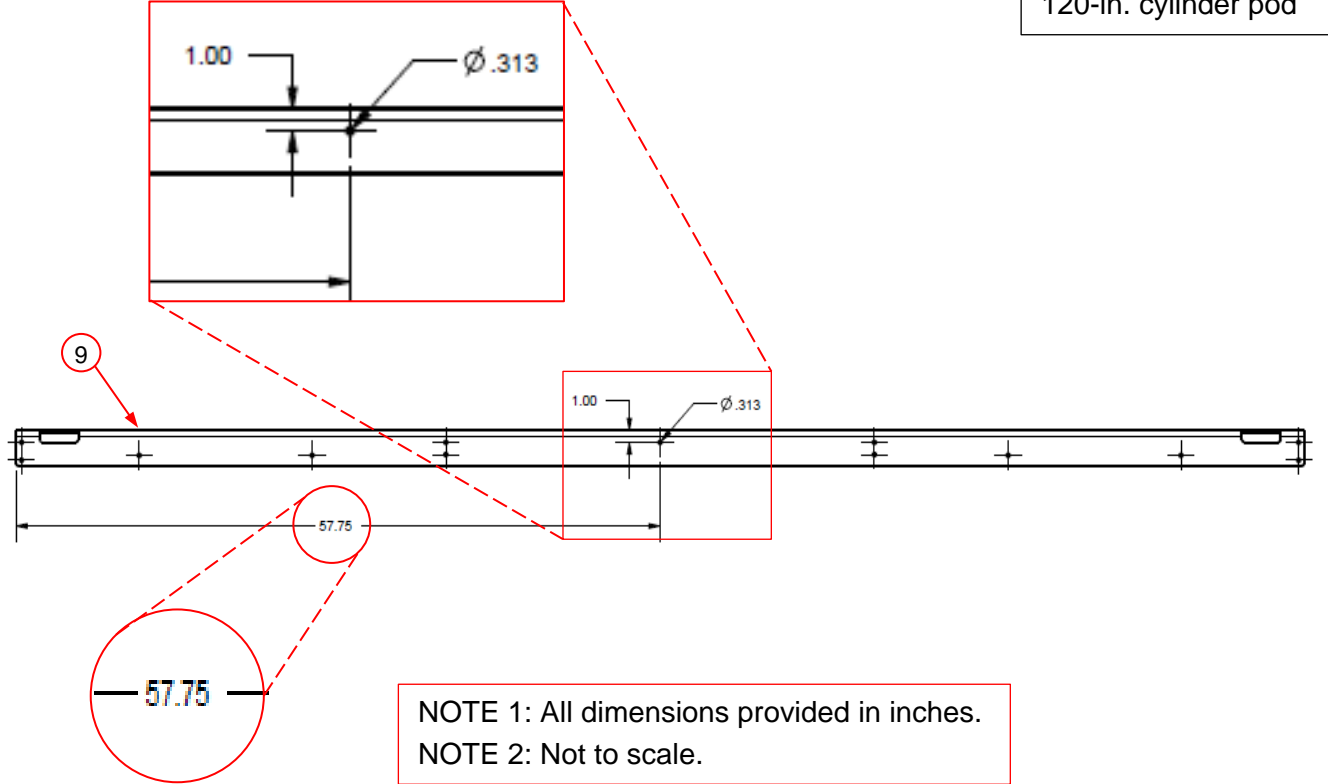
20	<p>WHAT</p> <p>c 1. Verify clearance between PRD vent tubes (a) and live high pressure PRD supply tubes (b) is 3/8-in. minimum.</p> <p>c 2. Verify clearance between all system plumbing and cylinders (c) is 3/8-in. minimum.</p> <p>NOTICE <i>If required: Adjust clamps as required and repeat Step 20.</i></p>	<p><i>NOTE: Plug end shown for reference; valve end similar.</i></p>  <p>85-in. cylinder pod</p>
WHY	Prevent fuel line damage.	

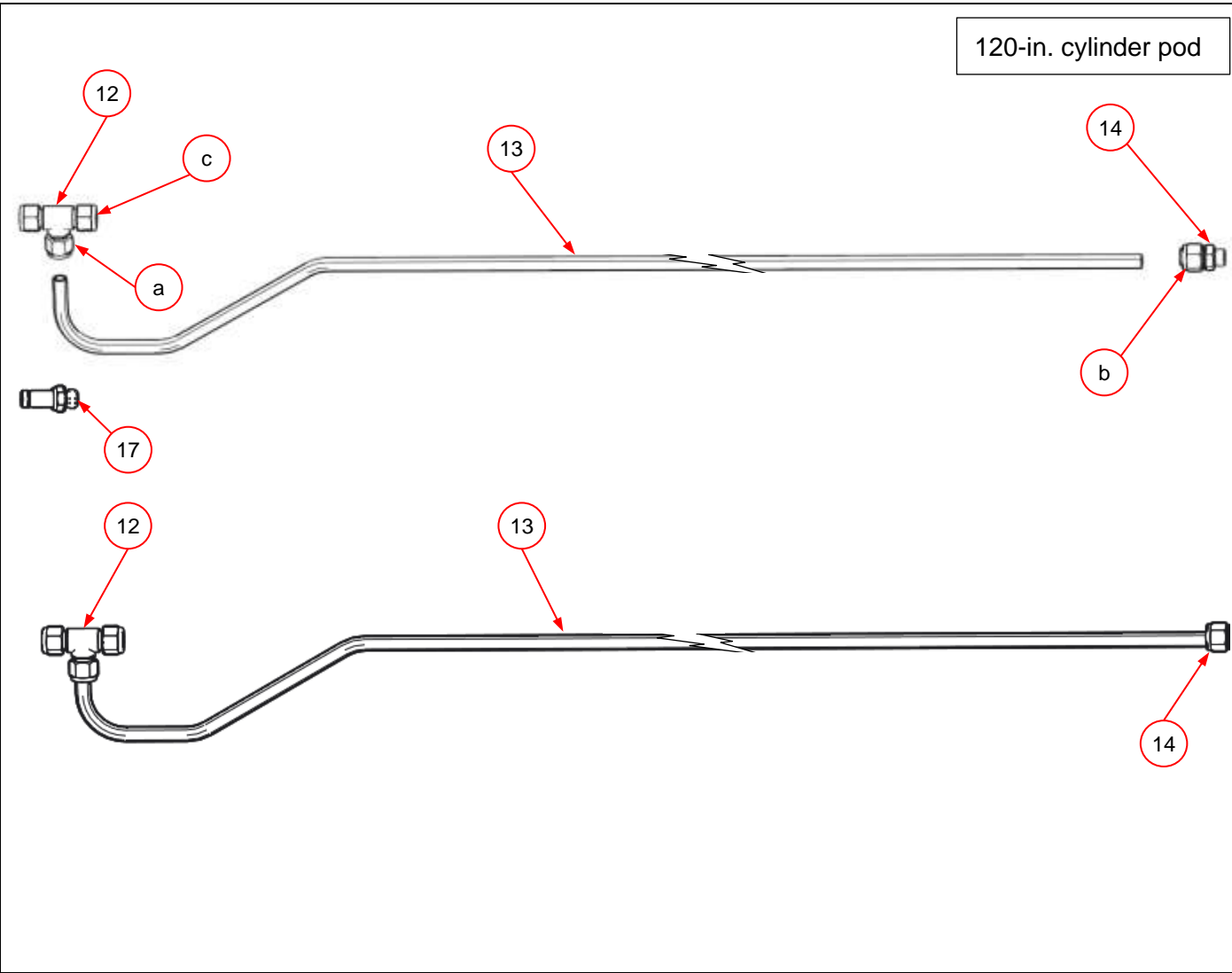
21	<p>c Apply two Decal, System, Danger Live High Pressure PRD Line (a), p/n 10602157, to PRD supply tubes as indicated.</p>	<div data-bbox="1654 175 1940 224" style="border: 1px solid black; padding: 2px; text-align: center;">85-in. cylinder pod</div> 
WHY	Operator and first responder safety.	
22	<p>c Apply four Decal, PRD Vent Line, Caution (b), p/n 10602442, to midpoint of PRD vent tubes as indicated.</p>	<div data-bbox="1654 782 1940 831" style="border: 1px solid black; padding: 2px; text-align: center;">85-in. cylinder pod</div> 
WHY	Operator and first responder safety.	

5.5.2. Kit, Retrofit, Gillig, 120" tanks PRD Retrofit, p/n 25519031, installation instructions

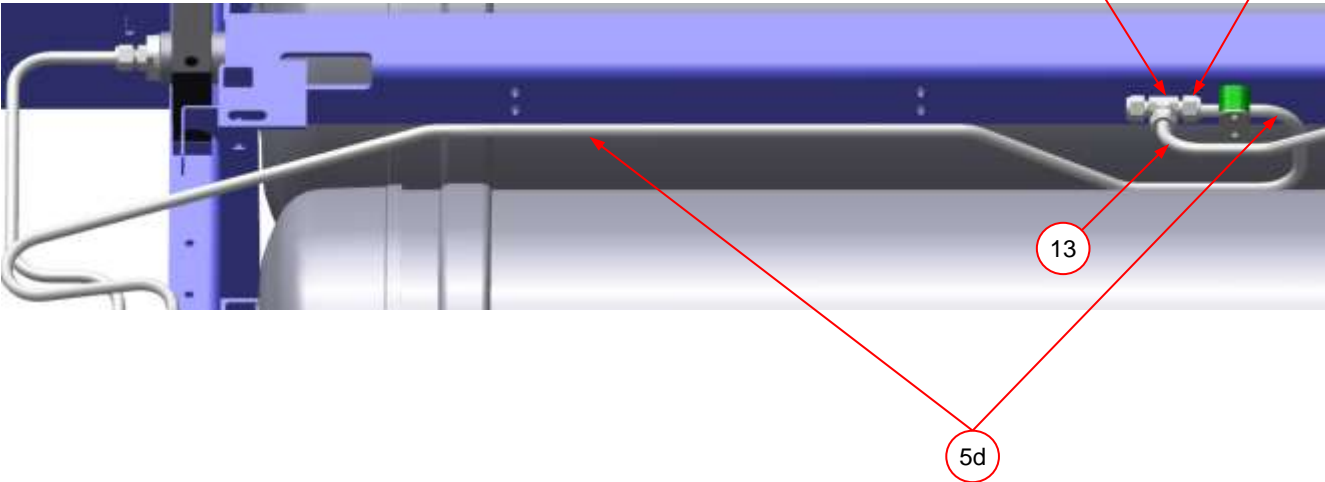
NOTICE

Always perform installation steps in the order specified.

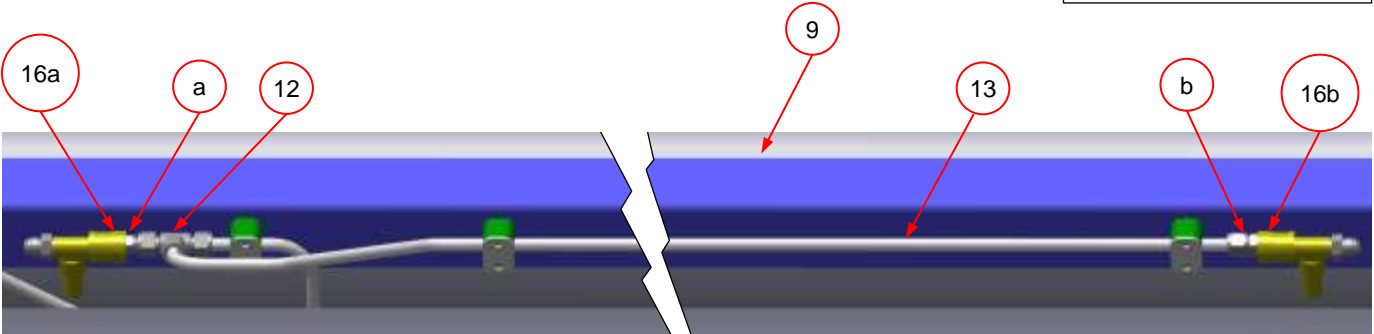
<p>1</p> <p>WHAT</p>	<p>Use a 5/16-in. drill bit to drill one mounting hole at the midpoint (DETAIL A) of each of the 120-in. PRD brackets (9).</p> <p>NOTICE</p> <p><i>While drilling, carefully place a section of a wood 2x4 behind the hole location to prevent cylinder damage.</i></p>	<div data-bbox="1640 342 1944 402" style="border: 1px solid black; padding: 5px; text-align: center;">120-in. cylinder pod</div>  <div data-bbox="1020 1049 1629 1149" style="border: 1px solid black; padding: 5px;"> <p>NOTE 1: All dimensions provided in inches.</p> <p>NOTE 2: Not to scale.</p> </div>
<p>WHY</p>	<p>Additional mounting holes are required to secure clamps to support PRD vent system.</p>	

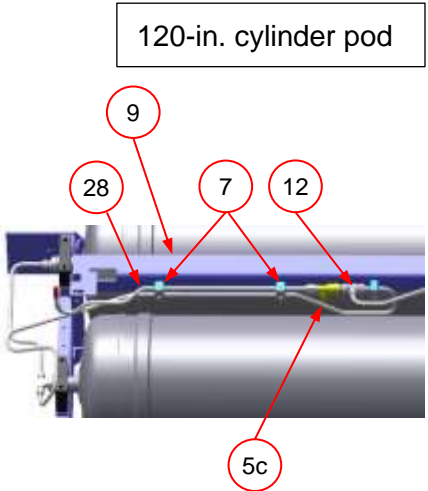
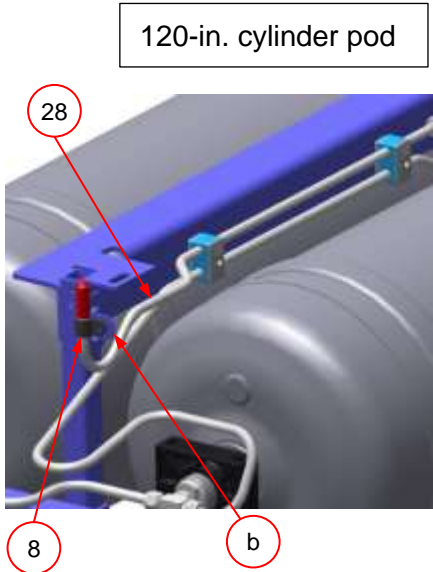
2	<p>1. Install ferrules (<i>not visible</i>) and nut (a) from tee fitting (12), p/n 10200208, on PRD vent tube (13), p/n 25519416.</p> <p>2. Install ferrules (<i>not visible</i>) and nut (b) from tube fitting (14), p/n 10200065, on straight end of PRD vent tube (13).</p> <p>3. Install ferrules (<i>not visible</i>) and nut (c) from tee fitting (12), p/n 10200208, on tube adapter fitting, (17), p/n 10200238.</p> <p>NOTICE Refer to Appendix A: WI.0197 Manual Swaging of Swagelok Fittings.</p> <p>4. Install tee fitting (12), p/n 10200208, on PRD vent tube, (13), p/n 25519416.</p> <p>NOTICE Tighten fitting finger tight; fitting will be tightened at a later step.</p>	
WHY		

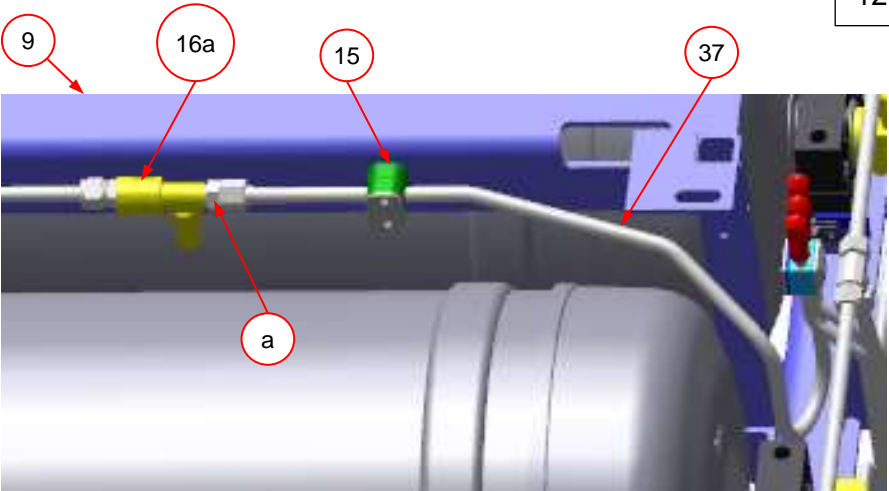
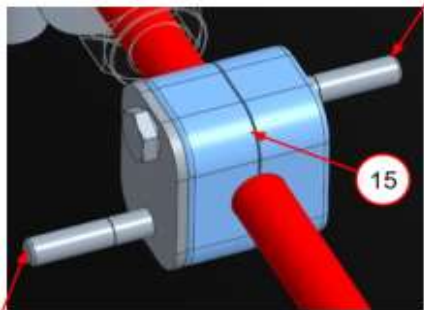
<div data-bbox="128 180 184 212">3</div> <div data-bbox="128 212 184 1421">WHAT</div>	<div data-bbox="184 180 569 1024"> <ol style="list-style-type: none"> 1. Install two tube clamp kits (15), p/n 10701508, from retrofit kit on PRD tube, (13), p/n 25519417. 2. Insert one 1.5-in. hex cap screw (a), p/n 10760200-0150, and one 2.5-in. hex cap screw (b), p/n 10760200-0120, into each tube clamp kit (15), as shown in INSET A. 3. Install one flat washer, p/n 10761000, and one flange top nut, p/n 10763000 (<i>not shown</i>) on each hex cap screw inserted in previous sub step. 4. Secure PRD vent tube (13) to PRD bracket (9) at existing holes (<i>circled</i>). </div> <div data-bbox="184 1024 569 1421"> <div data-bbox="199 1024 506 1073">NOTICE</div> <p><i>To ease component installation, do not tighten fasteners completely; fasteners will be tightened at a later step.</i></p> </div>	<div data-bbox="569 180 1967 1421"> <div data-bbox="1648 196 1948 256">120-in. cylinder pod</div> <div data-bbox="1333 203 1381 251">15</div> <div data-bbox="1228 462 1276 511">13</div> <div data-bbox="745 552 793 600">9</div> <div data-bbox="583 722 709 755">INSET A</div> <div data-bbox="1060 738 1942 836">2.5-in HEX CAP SCREW FACES TOWARD PRD BRACKET (9) TO SECURE CLAMP (15) TO PRD BRACKET.</div> <div data-bbox="1123 885 1564 1209"> <div data-bbox="1501 1047 1549 1096">15</div> </div> <div data-bbox="745 1299 1459 1380">1.5-in HEX CAP SCREW FACES AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</div> </div>
<div data-bbox="128 1299 184 1421">WHY</div>	<div data-bbox="184 1299 569 1421">Support PRD tube.</div>	

4	<p>1. Install PRD vent supply tube (5d) nut fitting (a) on tee fitting (12) on PRD tube (13).</p>	<div data-bbox="1625 204 1944 269" style="border: 1px solid black; padding: 2px; text-align: center;">120-in. cylinder pod</div> 
WHAT	<div data-bbox="201 339 506 391" style="background-color: #0056b3; color: white; padding: 5px; text-align: center;">NOTICE</div> <p><i>Tighten fitting (a) finger tight; fitting will be tightened at a later step.</i></p>	
WHY		

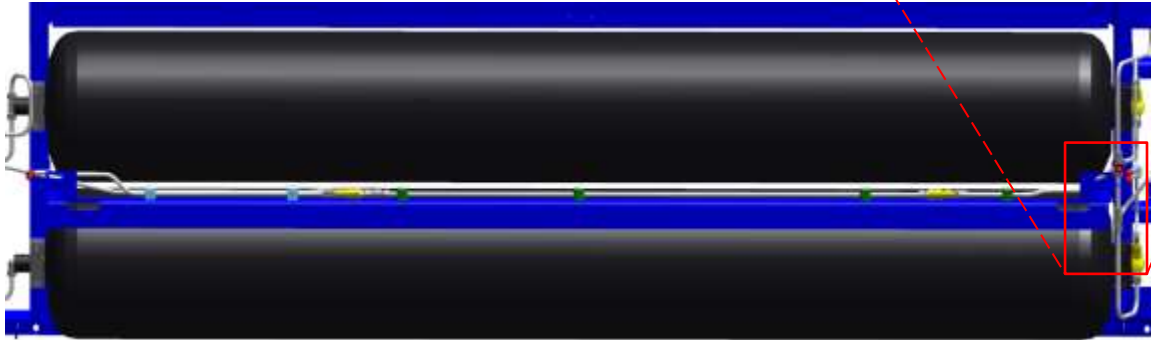
5	<div data-bbox="197 185 556 381"> <p>M <i>Always use a backing wrench on the main fitting while using a wrench to install another fitting.</i></p> </div> <div data-bbox="197 381 556 527"> <p>1. Install tube adapter fitting (17), p/n 10200238 on VTI PRD (16b), p/n 10300513.</p> </div> <div data-bbox="197 527 556 641"> <p>c <i>Torque fitting (17) to 26 ft-lbs (35.25Nm)</i></p> </div> <div data-bbox="197 641 556 787"> <p>2. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513.</p> </div> <div data-bbox="197 787 556 933"> <p>3. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513.</p> </div> <div data-bbox="197 933 556 1047"> <p>c <i>Torque fittings (18) to 18.5 ft-lbs (25Nm).</i></p> </div> <div data-bbox="197 1047 556 1193"> <p>4. Install tube fitting (14), p/n 10200065, on VTI PRD (16a), p/n 10300513.</p> </div> <div data-bbox="197 1193 556 1307"> <p>c <i>Torque fitting (14) to 45 ft-lbs (61Nm).</i></p> </div>	<div data-bbox="1648 203 1942 267"> <p>120-in. cylinder pod</p> </div> <div data-bbox="598 203 1921 868"> </div>
WHY		

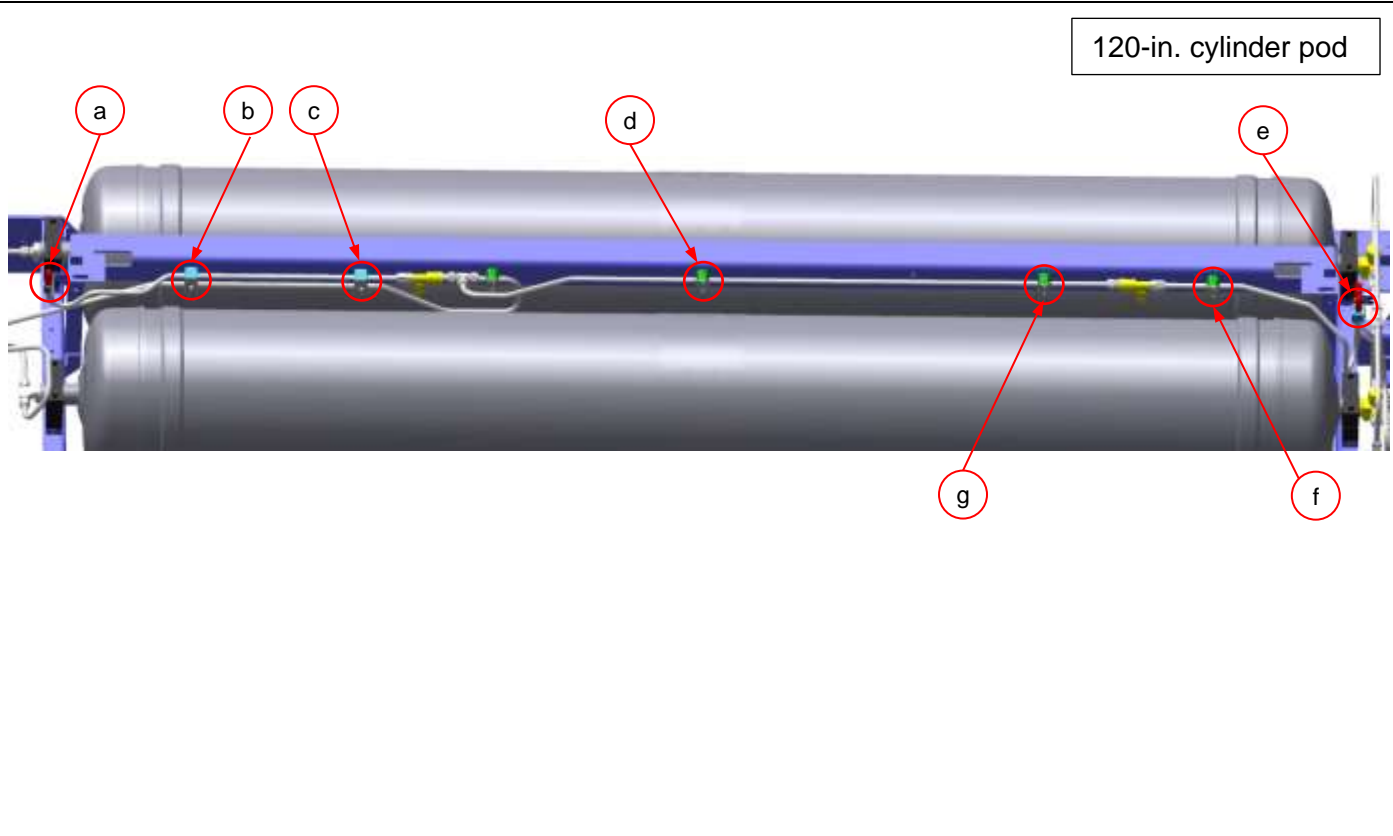
6	<p>1. Install VTI PRD (16a) assembly inlet fitting (a) on PRD supply tube (13) at tee fitting (12).</p> <p>2. Install VTI PRD (16b) outlet fitting (b) on straight end of PRD supply tube (13).</p> <p>NOTICE <i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p>	
WHY		

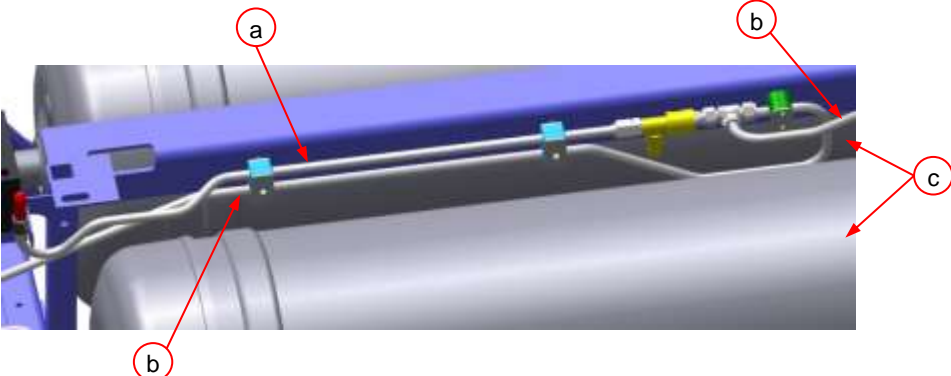
<div>WHAT</div> <div>WHY</div>	<div>7</div> <div> <p>1. Install PRD vent tube (28), p/n 25519028, on tee fitting (12).</p> <p>NOTICE</p> <p><i>Tighten fittings finger tight; fittings will be tightened at a later step.</i></p> <p>2. Install two Tube Clamp Kits, 1/2-in., Double Mounting Hole (7), p/n 10701508, from retrofit kit on PRD vent tube (28), and PRD supply tube (5c).</p> <p>3. Use dual tube clamp (7) fasteners (<i>not visible</i>) from to secure clamps to PRD bracket (9) at existing holes.</p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> </div>	<div>120-in. cylinder pod</div> 	<div>8</div> <div> <p>1. Slip P-clip (8) removed earlier on PRD vent tube (28), p/n 25519028.</p> <p>2. Secure P-clip (8) to P-clip bracket (b) using existing hardware.</p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> </div>	<div>120-in. cylinder pod</div> 

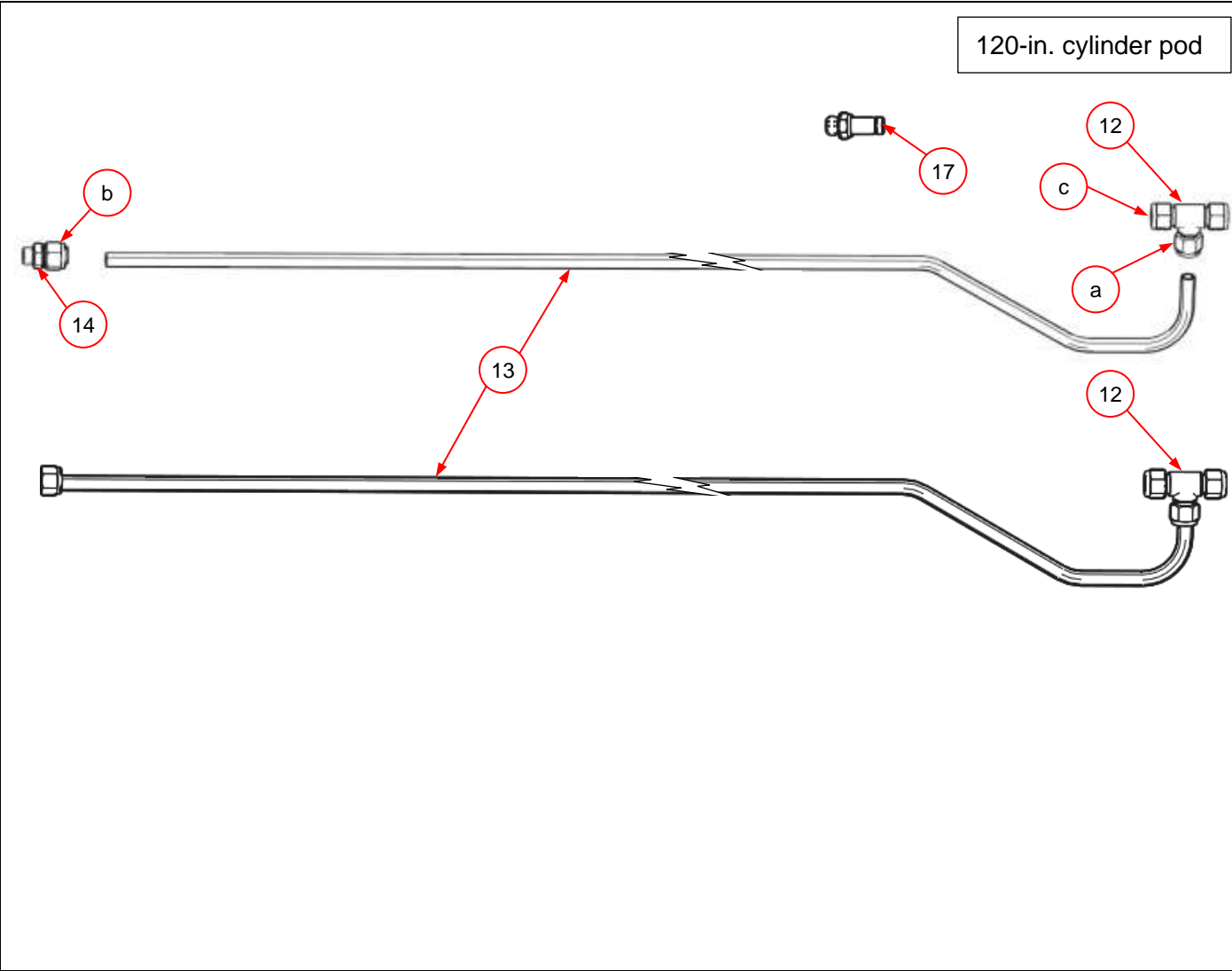
<p>9</p> <p>WHAT</p>	<ol style="list-style-type: none"> 1. Install nut fitting of PRD vent tube (37) on VTI PRD (16a) outlet fitting (a). <p>NOTICE</p> <p><i>Tighten fitting finger tight; fitting will be tightened at a later step.</i></p> <ol style="list-style-type: none"> 2. Install tube clamp kit (15), p/n 10701508, on PRD vent tube (37). 3. Use tube clamp kit (15) fasteners (<i>not visible</i>) from to secure clamp to PRD bracket (9) at existing hole using clamp kit fasteners as shown in INSET A. <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p>	<div data-bbox="1638 203 1942 267">120-in. cylinder pod</div>  <p>INSET A</p> <div data-bbox="1060 755 1911 852">2.5-in HEX CAP SCREW FACES TOWARD PRD BRACKET (9) TO SECURE CLAMP (15) TO PRD BRACKET.</div>  <div data-bbox="745 1274 1438 1372">1.5-in HEX CAP SCREW FACES AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</div>
<p>WHY</p>		

10	<p>1. Use two wrenches to tighten Swagelok[®] nut fittings in the following sequence:</p> <ol style="list-style-type: none"> (a) (b) (c) <p>Tighten Swagelok[®] fittings per Appendix B WI.0441.</p> <p>2. Use two wrenches to tighten SAE / JIC fitting nuts in the following sequence:</p> <ol style="list-style-type: none"> (d) (e) <p>Torque SAE / JIC fittings to 45 ft-lbs (61Nm).</p> <p>3. Verify vent ports (f) of VTI PRDs (16a) and (16b) are pointed down (arrows).</p>	<div data-bbox="1024 203 1417 548"> </div> <div data-bbox="1644 203 1950 269"> <p>120-in. cylinder pod</p> </div> <div data-bbox="583 565 1927 781"> </div> <div data-bbox="709 797 1291 1252"> </div> <div data-bbox="1381 797 1822 1284"> </div>
WHY	System specification.	

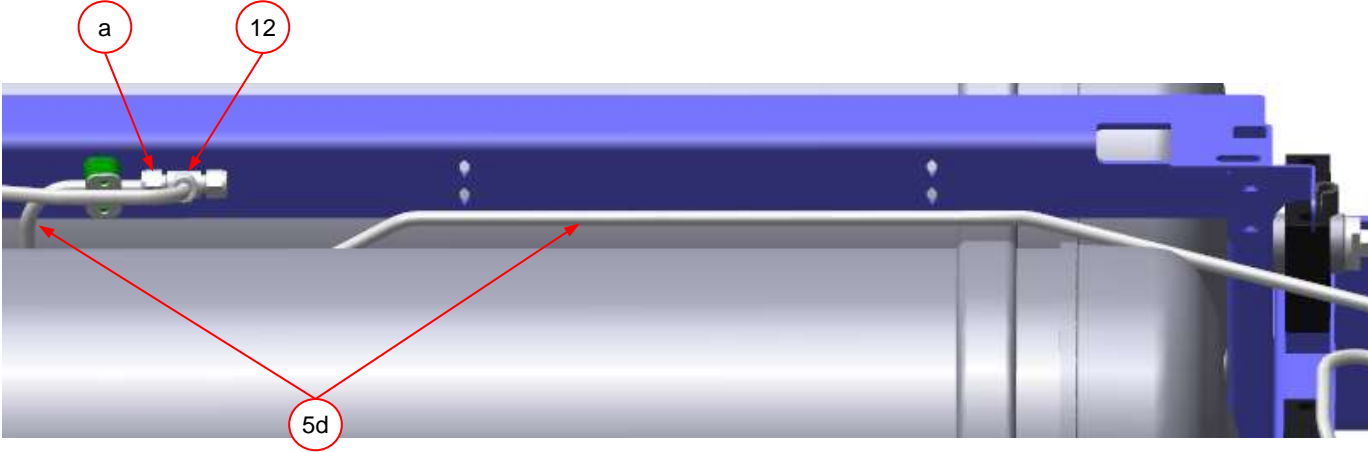
11	<p>1. Install tube clamp bracket (23), p/n 25519123, on existing double tube clamp (8) using double tube clamp fasteners (<i>not shown</i>).</p> <p>NOTICE <i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> <p>2. Slip P-clip (7), p/n 10702147, on PRD vent tube (37), p/n 25519037.</p> <p>3. Install P-clip (7) on tube clamp bracket (23), p/n 25519123, using one hex cap screw, p/n 10760200-0100, one flat washer, p/n 10761000, and one flange top nut, p/n 10761300.</p>	<p>120-in. cylinder pod</p>  <p>The diagram shows a long, black, horizontal cylinder pod mounted on a blue frame. A red dashed box on the right end of the pod indicates the area shown in the inset image. The inset image is a close-up of the right end of the pod, showing a metal bracket (23) attached to a tube (37). A P-clip (7) is shown on the tube, and a double tube clamp (8) is also visible. Red arrows point from the callout numbers to their respective parts.</p>
WHY	System specification.	

12	<p>c Tighten clamp fasteners at all clamp locations (<i>circled</i>) using the following sequence:</p> <ol style="list-style-type: none"> 1. (a) 2. (b) 3. (c) 4. (d) 5. (e) 6. (f) 7. (g) <p>Tighten fasteners to 8 ft-lbs (11Nm).</p>	
WHY	<p>System specification.</p> <p>NOTICE</p> <p>Proper tightening sequence is crucial to fuel system integrity.</p>	

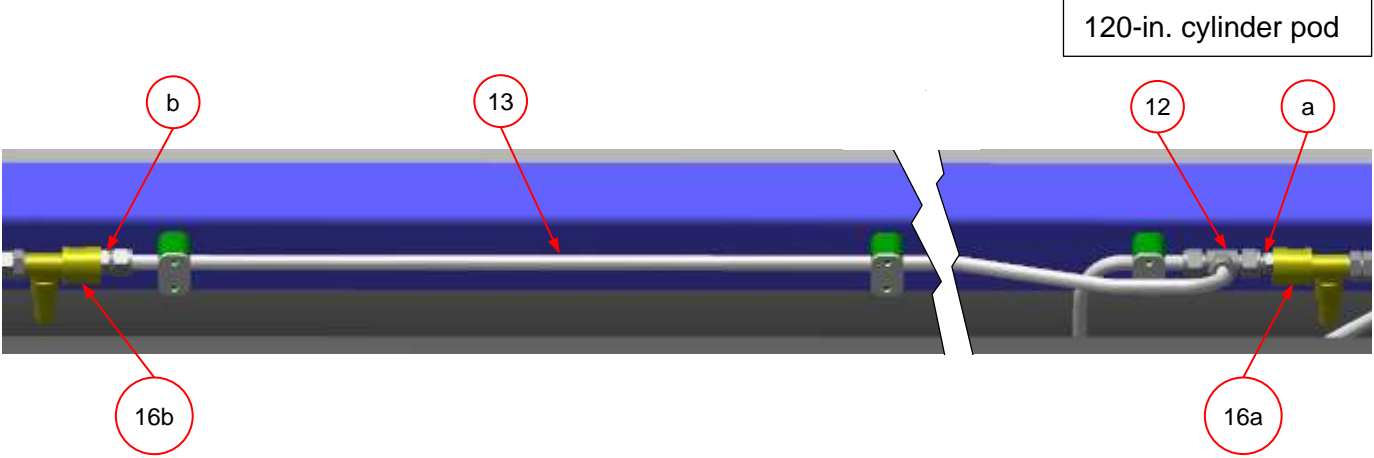
13	<p>c 1. Verify clearance between PRD vent tubes (a) and live high pressure PRD vent tubes (b) is 3/8-in. minimum.</p> <p>c 2. Verify clearance between all system plumbing and cylinders (c) is 3/8-in. minimum.</p> <p>NOTICE <i>If required: Adjust clamps as necessary and repeat Step 13.</i></p>	<p><i>NOTE: Plug end shown for reference; valve end similar.</i></p> <p>120-in. cylinder pod</p> 
WHY	Prevent fuel line damage.	

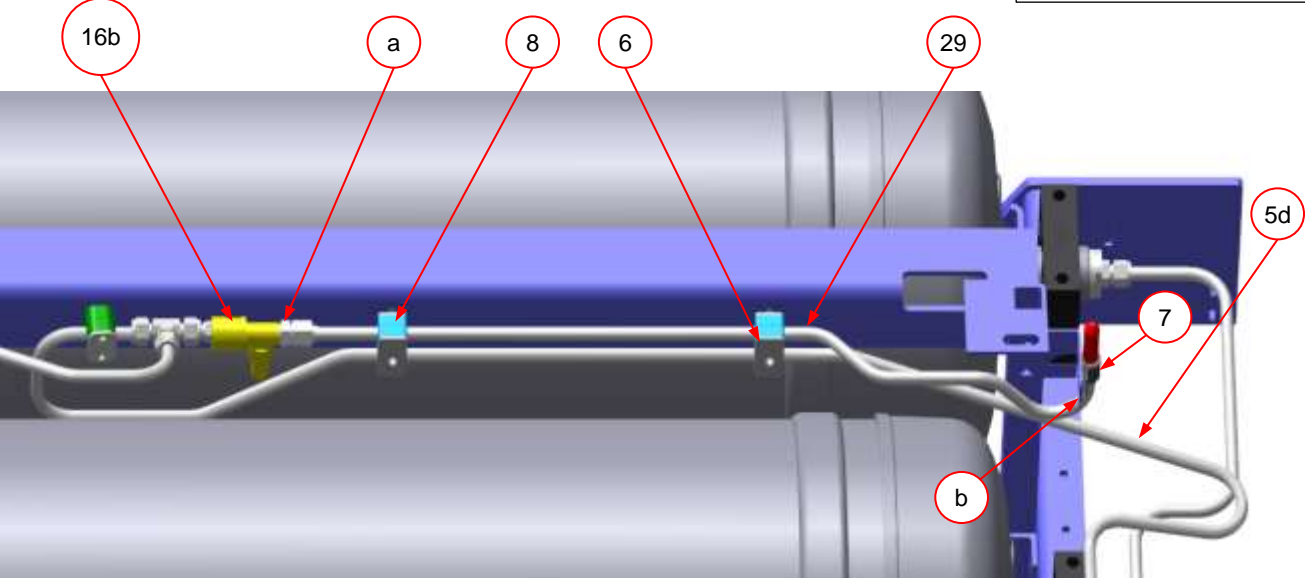
14	<p>1. Install ferrules (<i>not visible</i>) and nut (a) from tee fitting (12), p/n 10200208, on PRD vent tube (13), p/n 25519416.</p> <p>2. Install ferrules (<i>not visible</i>) and nut (b) from tube fitting (14), p/n 10200065, on straight end of PRD vent tube (13).</p> <p>3. Install ferrules (<i>not visible</i>) and nut (c) from tee fitting (12), p/n 10200208, on tube adapter fitting, (17), p/n 10200238.</p> <p>NOTICE Refer to Appendix A: WI.0197 Manual Swaging of Swagelok Fittings.</p> <p>4. Install tee fitting (12), p/n 10200208, on PRD vent tube, (13), p/n 25519416.</p> <p>NOTICE Tighten fitting finger tight; fitting will be tightened at a later step.</p>	 <p>The diagram illustrates the assembly of a PRD vent tube system. It features two horizontal tubes, labeled 13, which are connected to a 120-in. cylinder pod at the right end. The top tube (13) is connected to a tee fitting (12) via a nut (a). The bottom tube (13) is connected to a tee fitting (12) via a nut (c). A tube adapter fitting (17) is connected to the top tube (13) via a nut (b). A tube fitting (14) is connected to the bottom tube (13) via a nut (c). The diagram also shows a 120-in. cylinder pod at the right end, which is connected to the tee fittings (12) via nuts (a) and (c).</p>
WHY		

<div data-bbox="128 155 184 698">15</div> <div data-bbox="128 698 184 1427">WHAT</div>	<div data-bbox="184 155 569 1023"> <ol style="list-style-type: none"> 1. Install two tube clamp kits (15), p/n 10701508, from retrofit kit on PRD tube, (13), p/n 25519417. 2. Insert one 1.5-in. hex cap screw (a), p/n 10760200-0150, and one 2.5-in. hex cap screw (b), p/n 10760200-0120, into each tube clamp kit (15), as shown in INSET A. 3. Install one flat washer, p/n 10761000, and one flange top nut, p/n 10763000 (<i>not shown</i>) on each hex cap screw inserted in previous sub step. 4. Secure PRD vent tube (13) to PRD bracket (9) at existing holes (<i>circled</i>). </div> <div data-bbox="184 1023 569 1427"> <div data-bbox="199 1031 508 1084">NOTICE</div> <p>To ease component installation, do not tighten fasteners completely; fasteners will be torqued at a later step.</p> </div>	<div data-bbox="569 155 1967 1427"> <div data-bbox="1633 183 1936 240">120-in. cylinder pod</div> <div data-bbox="583 711 709 743">INSET A</div> <div data-bbox="1060 722 1942 820">2.5-in HEX CAP SCREW FACES TOWARD PRD BRACKET (9) TO SECURE CLAMP (15) TO PRD BRACKET.</div> <div data-bbox="724 1279 1459 1380">1.5-in HEX CAP SCREW FACES AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</div> </div>
<div data-bbox="128 1427 184 1427">WHY</div>	<div data-bbox="184 1427 569 1427">Support PRD vent lines.</div>	

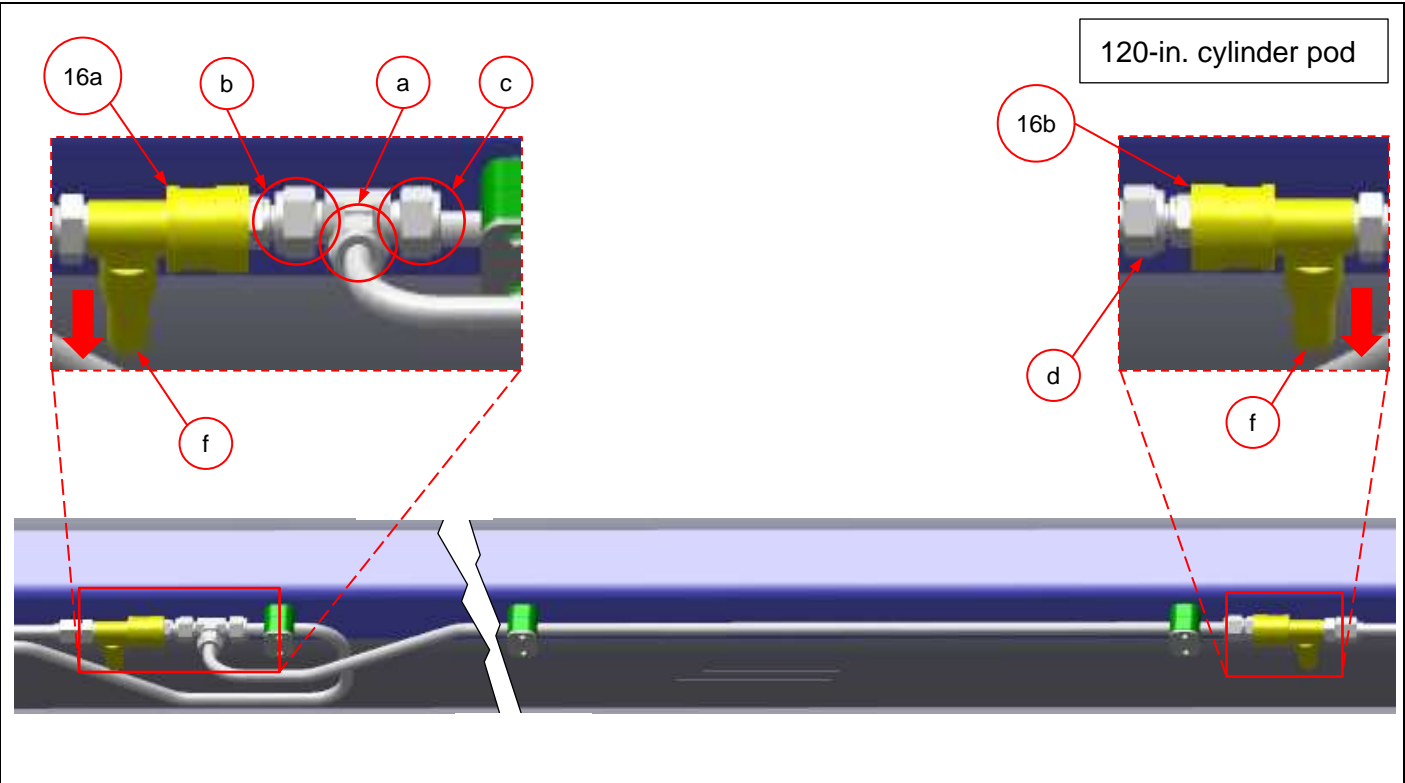
16	<p>Install PRD vent supply tube (5d) on tee fitting (12) at nut fitting (a).</p> <p>NOTICE</p> <p><i>Tighten fitting (a) finger tight; fitting will be tightened at a later step.</i></p>	<div data-bbox="1640 212 1942 272" style="border: 1px solid black; padding: 5px; text-align: center;">120-in. cylinder pod</div> 
WHY		


17	<p>M <i>Always use a backing wrench on the main fitting while using a wrench to install another fitting.</i></p> <ol style="list-style-type: none"> 1. Install tube adapter fitting (17), p/n 10200238 on VTI PRD (16b), p/n 10300513. <p>C <i>Torque fitting (17) to 26 ft-lbs (35.25Nm)</i></p> <ol style="list-style-type: none"> 2. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513. 3. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513. <p>C <i>Torque fittings (18) to 18.5 ft-lbs (25Nm).</i></p> <ol style="list-style-type: none"> 4. Install tube fitting (14), p/n 10200065, on VTI PRD (16a), p/n 10300513. <p>C <i>Torque fitting (14) to 45 ft-lbs (61Nm).</i></p>	<div data-bbox="1640 207 1944 261" style="border: 1px solid black; padding: 5px; text-align: center;">120-in. cylinder pod</div>
WHY		

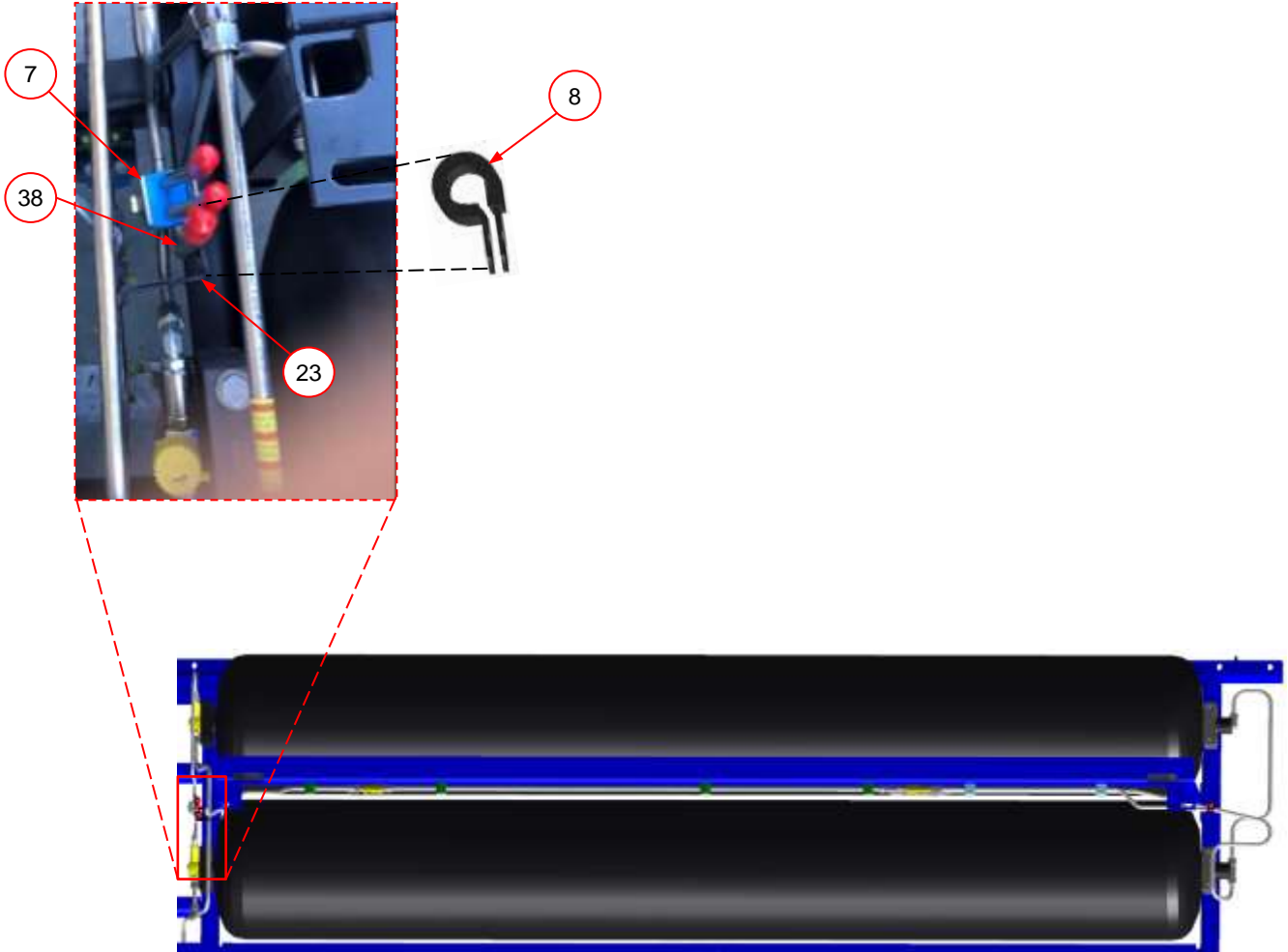
18	<p>1. Install VTI PRD (16a) assembly inlet fitting (a) on PRD supply tube (13) at tee fitting (12).</p> <p>2. Install VTI PRD (16b) outlet fitting (b) on straight end of PRD supply tube (13) nut fitting.</p> <p>NOTICE <i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p>	
WHY		

19	<p>1. Install PRD vent tube (29), p/n 25519027, on VTI PRD (16b) fitting (a).</p> <p>NOTICE <i>Tighten nut fitting finger tight; fittings will be tightened at a later step.</i></p> <p>2. Slip two dual tube clamps (8) on PRD vent tube (29), and on PRD supply tube (5d).</p> <p>3. Use dual tube clamp (8) fasteners (not visible) to secure two clamps (8) and two plates (6), to PRD bracket (9) at hole (circled).</p> <p>4. Slide P-clip (7) on PRD vent tube (29) and use existing fastener to secure P-clip (7) to P-clip bracket (b).</p> <p>NOTICE <i>Tighten fasteners finger tight; fasteners will be torqued at a later step.</i></p>	<div data-bbox="1654 224 1913 256">120-in. cylinder pod</div> 
WHY		

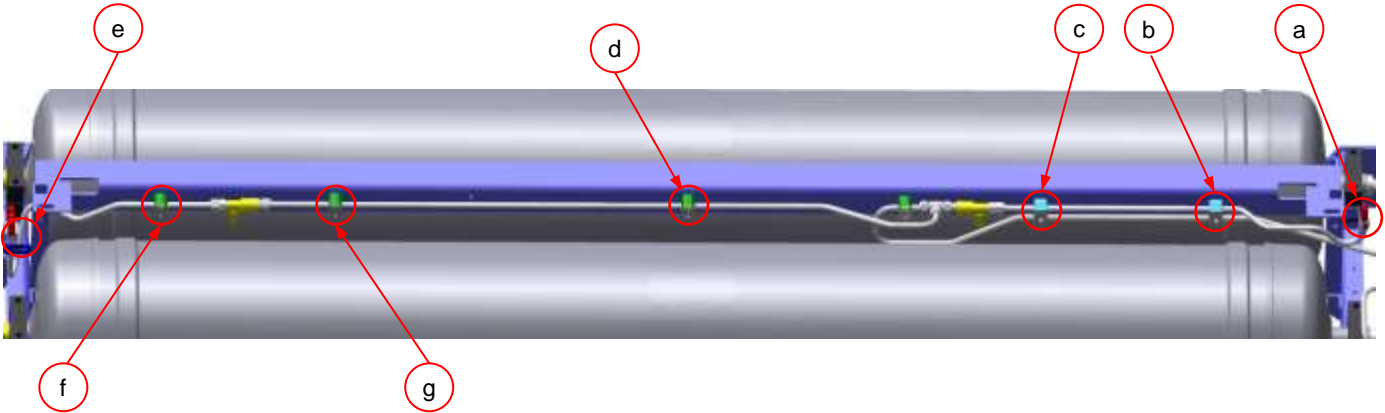
20	<div data-bbox="197 186 541 324"> <p>1. Install nut fitting (b) of PRD vent tube (38) on VTI PRD (16a) outlet fitting (a).</p> </div> <div data-bbox="197 337 541 500"> <p>NOTICE</p> <p><i>Tighten fitting finger tight; fitting will be tightened at a later step.</i></p> </div> <div data-bbox="197 503 541 747"> <p>2. Install tube clamp kit (15), p/n 10701508, on PRD vent tube (38).</p> <p>3. Use tube clamp kit (15) fasteners (<i>not visible</i>) from to secure clamp to PRD bracket (9).</p> </div> <div data-bbox="197 755 541 917"> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> </div>	<div data-bbox="1640 207 1942 267" style="border: 1px solid black; padding: 5px; text-align: center;">120-in. cylinder pod</div> <div data-bbox="699 240 1635 764"> </div>
WHY		

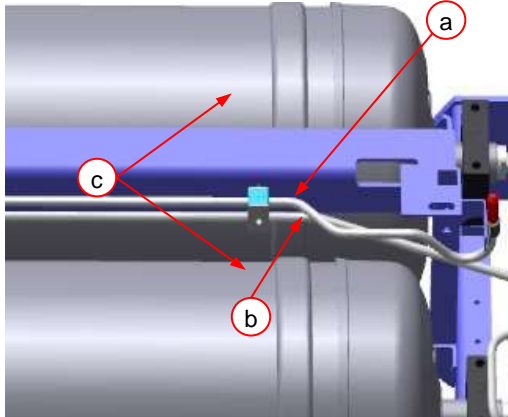
21	<div data-bbox="199 186 546 673"> <p>c A. Use two wrenches to tighten 1/2-in. Swagelok® nut fittings at four locations in the following sequence:</p> <ol style="list-style-type: none"> 1. (a) 2. (b) 3. (c) 4. (d) <p>Tighten 1/2-in. Swagelok® nut fittings per Appendix B WI.0441.</p> </div> <div data-bbox="199 698 546 836"> <p>c B. Verify vent ports (f) of VTI PRDs (16a) and (16b) are pointing down (arrows).</p> </div> <div data-bbox="128 860 569 964"> <p>WHY System specification.</p> </div>	
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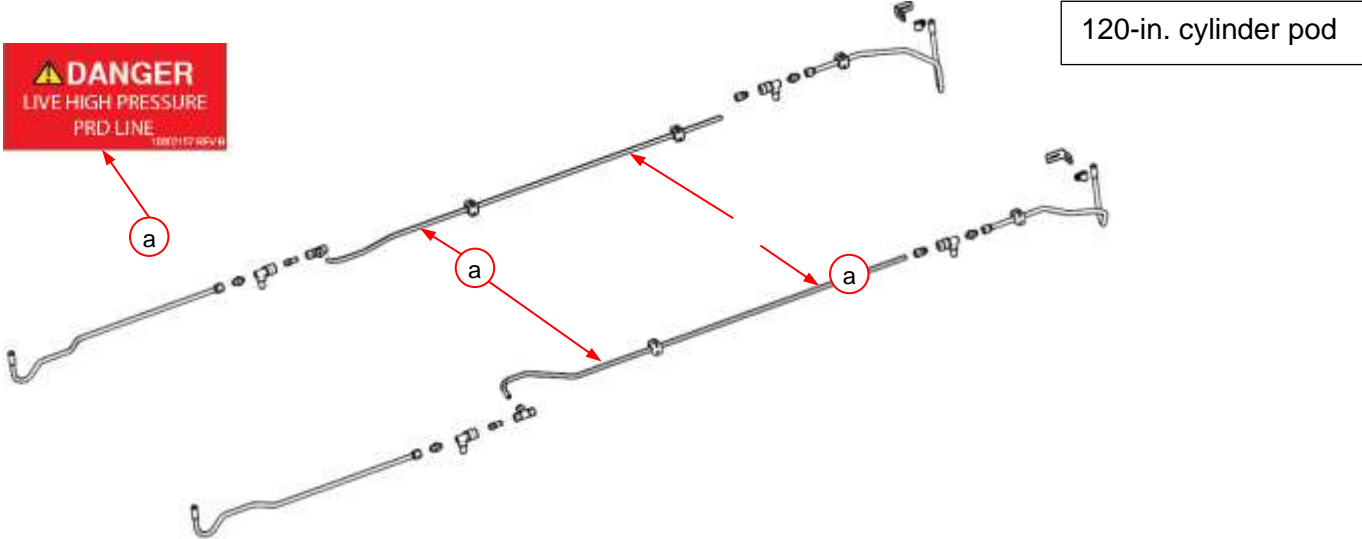
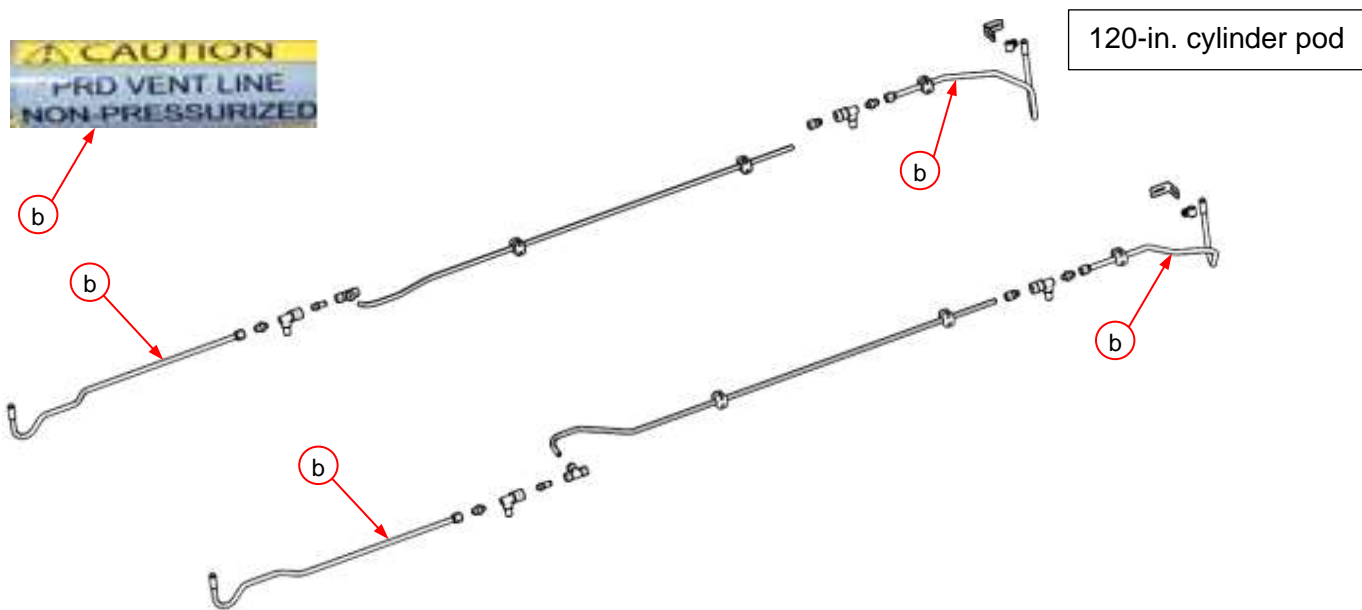
22	<p>c Use two wrenches to tighten SAE / JIC fittings at two locations (<i>circled</i>) in the following sequence:</p> <ol style="list-style-type: none"> 1. (a) 2. (b) <p>Tighten SAE / JIC fittings to 45 ft-lbs (61Nm).</p>	<div data-bbox="1646 212 1950 266" style="border: 1px solid black; padding: 2px; text-align: center;">120-in. cylinder pod</div> 
WHY	System specification.	

23	<ol style="list-style-type: none"> 1. Install tube clamp bracket (23), p/n 25519123, on existing double tube clamp (7) using double tube clamp fasteners (<i>not shown</i>). 2. Slip P-clip (8), p/n 10702147, on PRD vent tube (38), p/n 25519038. 3. Install P-clip (8) on tube clamp bracket (23), p/n 25519123 using one hex cap screw, p/n 10760200-0100, one flat washer, p/n 10761000, and one flange top nut, p/n 10761300. 	<div data-bbox="1640 212 1944 272" style="border: 1px solid black; padding: 5px; text-align: center;">120-in. cylinder pod</div> 
WHY	System specification.	


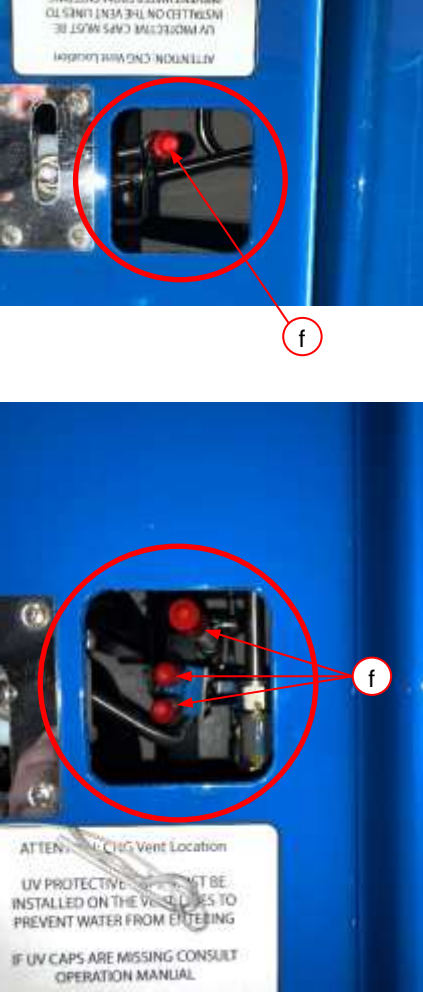
NOTICE
Tighten fasteners finger tight; fasteners will be tightened at a later step.

24	<p>c Tighten clamp fasteners at all clip and clamp locations (<i>circled</i>) using the following sequence:</p> <ol style="list-style-type: none"> 1. (a) 2. (b) 3. (c) 4. (d) 5. (e) 6. (f) 7. (g) <p><i>Tighten fasteners to 8 ft-lbs (11Nm).</i></p>	<p>120-in. cylinder pod</p> 
WHY	<p>System specification.</p> <p>NOTICE</p> <p><i>Proper tightening sequence is crucial to fuel system integrity.</i></p>	

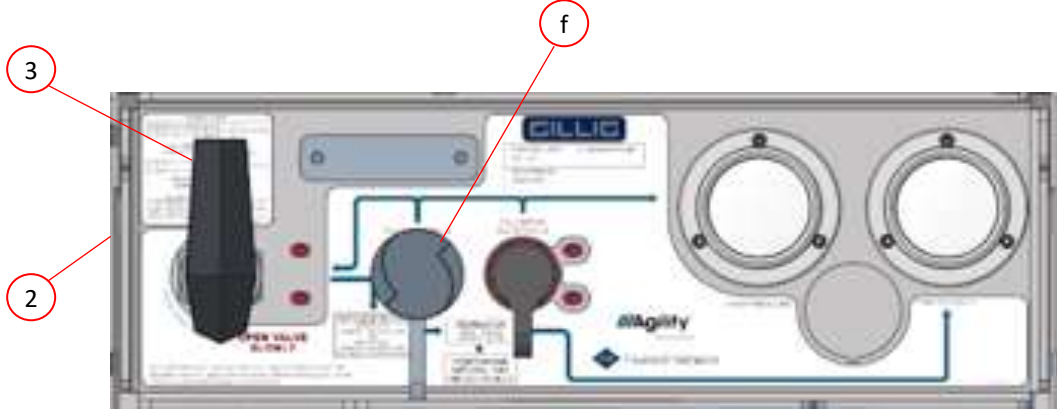
25	<div><div><div><div></div><div>c</div></div><div>1. Verify clearance between PRD vent tubes (a) and live high pressure PRD supply tubes (b) is 3/8-in. minimum.</div></div><div><div><div></div><div>c</div></div><div>2. Verify clearance between all system plumbing and cylinders (c) is 3/8-in. minimum.</div></div><div><div>NOTICE</div><div>If required: Adjust clamps as required and repeat Step 25.</div></div></div>	<div>120-in. cylinder pod</div>
WHAT	<div><div><div><div></div><div>a</div></div><div><div></div><div>b</div></div><div><div></div><div>c</div></div></div></div>	
WHY	<div>Prevent fuel line and cylinder damage.</div>	

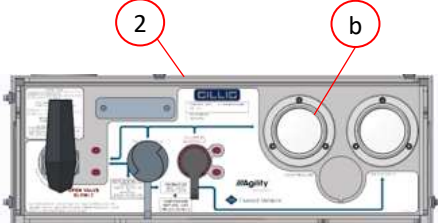

26	<p>c Apply quantity four Decal, System, Danger Live High Pressure PRD Line (a), p/n 10602157, to PRD supply tubes as indicated.</p>	 <p>120-in. cylinder pod</p>
WHY	Operator and first responder safety.	
27	<p>c Apply quantity four Decal, PRD Vent Line, Caution (b), p/n 10602442, to midpoint of PRD vent tubes as indicated.</p>	 <p>120-in. cylinder pod</p>
WHY	Operator and first responder safety.	


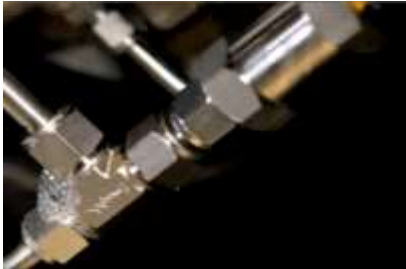
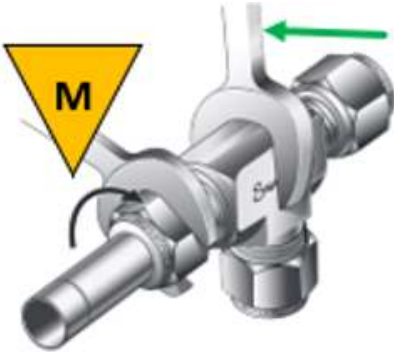
5.6. Check PRD vent tube outlet clearance







<p>1</p> <p>WHAT</p>	<p> 1. Gently close one fuel system roof pod door.</p> <p>2. Visually verify proper clearance between plug end PRD vent tube cap (f) and door opening (<i>circled</i>).</p> <p>3. Visually verify proper clearance between valve end PRD vent tube caps (f) and door opening (<i>circled</i>).</p> <p>⚠ WARNING PRD vent tubes cannot protrude above the top of the pod door.</p> <p>If PRD vent tube caps protrude above the pod door opening, fuel system plumbing must be adjusted to achieve proper clearance.</p> <p>NOTICE Verify all PRD vent tube caps are installed.</p>		<p>2</p> <p>WHAT</p>	<p>Repeat Step 1 for each roof pod door.</p>
<p>WHY</p>	<p>Verify proper PRD vent tube position.</p>		<p>WHY</p> <p>Verify proper PRD vent tube position.</p>	


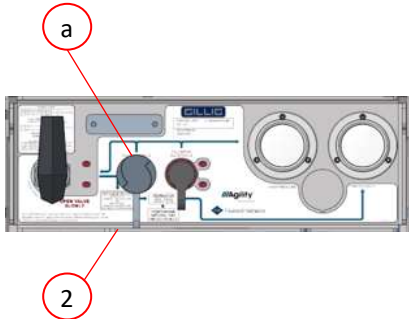
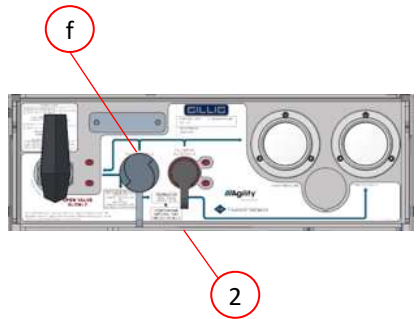
5.7. System Leak Check Procedure

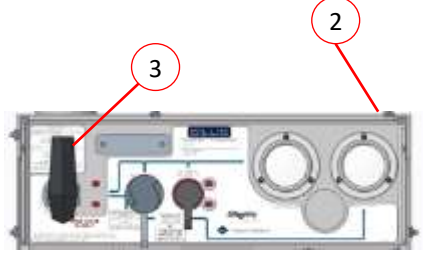
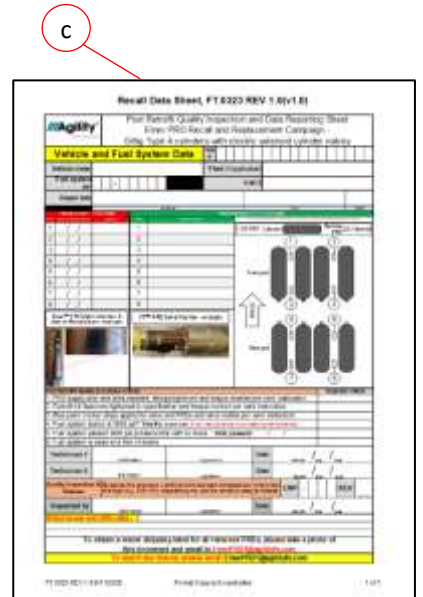
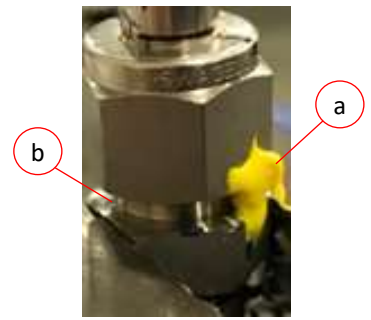
<p>1</p> <p>WHAT</p>	<ol style="list-style-type: none"> 1. Turn 1/4-turn manual shut off valve (3) on the FMM (2) to the OPEN position. <p>⚠ WARNING</p> <ol style="list-style-type: none"> 2. Select the appropriate CNG fuel nozzle and/or adaptor for the FMM (2) fuel fill receptacle (not visible). 3. Remove fuel fill receptacle dust cap (f). 4. Begin fueling the vehicle with CNG using a regulated fuel supply. <p>⚠ c</p> <p><i>Open nozzle valve slowly and regulate gas delivery to prevent connector from icing and reducing or blocking fuel flow.</i></p> <p>⚠ WARNING</p> <p><i>Follow all local and facility fueling regulations and procedures.</i></p>	
<p>WHY</p>	<p>Test fuel system integrity.</p>	

<p>2</p> <p>WHAT</p>	<p>Monitor FMM (2) high pressure gauge (b) to verify when system pressure reaches 500 psi to 510 psi (3.45MPa to 3.52MPa) and stop pressurization.</p> <p>⚠ WARNING</p> <p>1. If a hissing sound is heard coming from fuel system fittings during filling, stop the fill immediately.</p> <p>2. Try to isolate the sound and spray Swagelok Snoop[®] on the suspected location to check for bubble formation.</p>		<p>3</p> <p>WHAT</p>	<p>c</p> <p>Leak test all fuel and PRD tubes and fitting connections using Swagelok Snoop[®] leak detection solution or equivalent.</p>	
<p>WHY</p>	<p>Subjects fuel system to partial operating pressure.</p>		<p>WHY</p>	<p>Approved leak detection solution for visual inspection of system leaks.</p>	

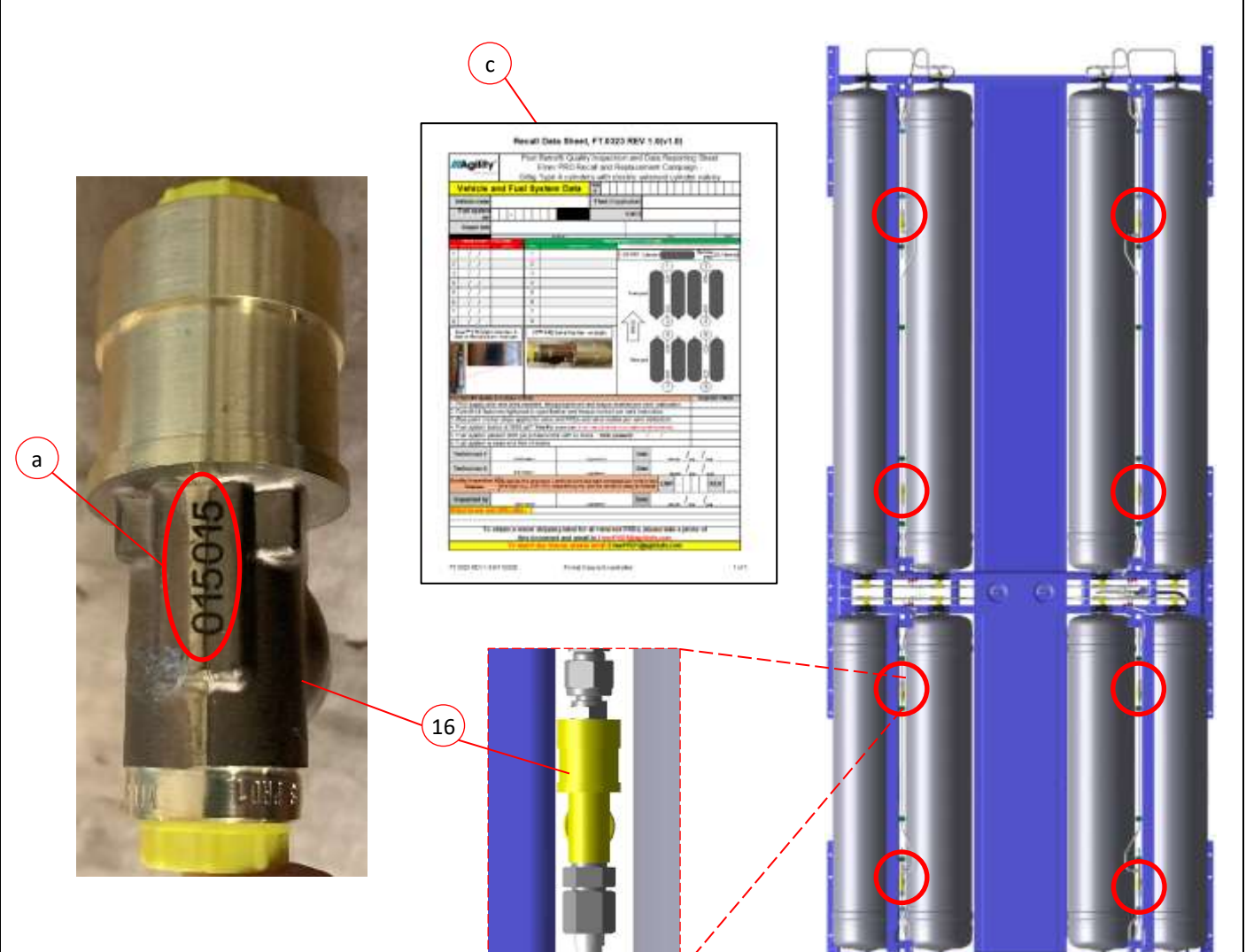
<div>4</div> <div>WHAT</div>	<ol style="list-style-type: none"> 1. Begin at one end the of the fuel system and work methodically to spray all fuel line fittings with Swagelok Snoop[®] or equivalent. 2. Allow at least 10 minutes to elapse before checking the integrity of fitting connections. 		<div>5</div> <div>WHAT</div> <p>If a leak is audible or icing, condensation, foam, or bubbles appear at a fitting connection the fitting connection must be inspected.</p> <p>⚠ WARNING <i>Fuel system must be defueled prior to investigating any leak. Refer to Agility[®] publication ENP-729 to defuel system.</i></p>	
<div>WHY</div>			<div>WHY</div>	
<div>6</div> <div>WHAT</div>	<p>Re-tighten leaking fitting(s) discovered during Step 5.</p> <p>⚠ C</p> <ol style="list-style-type: none"> 1. For JIC fittings, refer to p/n specific tightening instructions. 2. For compression fittings, tighten fitting according to Appendix B. 		<div>7</div> <div>WHAT</div> <p>Repeat Steps 1 and 2 to repressurize the system.</p>	
<div>WHY</div>			<div>WHY</div>	

8 WHAT	Spray leaking fitting again with Swagelok Snoop® or equivalent and allow at least 10 minutes to elapse before checking for bubble formation.		9 WHAT	 If leaking fitting is fixed, proceed to test any remaining fitting connections.	
WHY			WHY		
10 WHAT	 WARNING If leak is not fixed, the fuel system must be defueled to replace the fitting.  Perform OEM defuel procedure.		11 WHAT	Inspect tubing, fittings, ferrules, and nuts at the site of the leak for perforations, cracks, assembly defects, or other damage.  Any damaged components must be replaced.	
WHY			WHY		
12 WHAT	Replace any related components at the fitting junction as required.  Follow fitting installation directions in Appendix 2.		13 WHAT	Repressurize fuel system by repeating Step 1 and Step 2.	
WHY			WHY		

14	WHAT	c Spray new fitting junction with Swagelok Snoop® or equivalent to retest for leaks.		15	WHAT	Turn FMM 1/4-turn manual shut off valve (3) counterclockwise to the OPEN position.	
	WHY				WHY	Allow fuel into system.	
16	WHAT	c Repeat pressure test procedure stopping the fill when fuel system pressure reaches 2000 psi to 2100 psi (13.79MPa to 14.48MPa).		17	WHAT	c Repeat pressure test procedure stopping the fill when fuel system pressure reaches 3600 psi to 3700 psi (24.8MPa to 25.5MPa) and repeat leak checking all connections until the entire fuel system is confirmed leak free.	
	WHY	Subjects fuel system to partial operating pressure.			WHY	Subjects fuel system to full operating pressure.	
18	WHAT	c <i>If fuel system is leak free or if defueling is required, close flow valve on CNG dispense nozzle (not shown) and carefully disconnect fill nozzle (not shown) from FMM (2) fuel fill receptacle (a).</i>		19	WHAT	Replace dust cap (f) on FMM (2) fuel fill receptacle (a).	
	WHY				WHY	Vehicle will not start if dust cap is not in place.	

20	WHAT	If not open, turn FMM (2) 1/4-turn manual shut off valve (3) counterclockwise to the OPEN position.		21	c	Clean Swagelok Snoop [®] or equivalent from the fuel system.	
	WHY	Allow gas to flow throughout fuel system.		WHY		Customer satisfaction.	
22	WHAT	c When the pressure test is completed successfully, use form FT.0323 (c) to record the result and the date on which the fuel system passed the 3600 psi test.		23	c	Apply Torque Seal (a) to all fitting junctions (b).	
	WHY	Verify safe and proper fuel system pressure specification.				System quality specification.	

5.8. Reporting and Return Procedure

<p>1</p> <p>WHAT</p>	<p>c 1. Use form FT.0323 (c) to record the following data for each VTI™ replacement PRD (16):</p> <p>C. Serial number (a)</p> <p>D. Location of each VTI™ PRD (circled), within the fuel system.</p> <p>2. Inspect fuel system repairs per the quality assurance criteria specified in FT.0323.</p> <p>NOTICE</p> <p><i>Use a flashlight to aid data identification and inspection in low light.</i></p> <p>3. Use a camera or camera phone to take a photo of completed form FT.0323. (c).</p> <p>4. Submit photo of completed form FT.0323 (c) to the email address indicated on the form to receive a Return Material Authorization (RMA) shipping label.</p>	
<p>WHY</p>	<p>Required for retrofit kit component and repair tracking and, if applicable, installer reimbursement.</p>	

2	Repeat Section 5. Corrective Action / Procedure for all vehicles subject to the Emer™ PRD recall on hand until all repairs are complete.		3	<div data-bbox="1123 186 1207 259">c</div> <div data-bbox="1123 259 1530 844"> <p>1. Pack all removed PRDs (still bagged by VIN), in one box. If the quantity of PRDs is too large for a single box, use additional boxes but ship them all using the same RMA.</p> <p><i>If possible:</i> reuse the box in which the replacement PRDs were shipped.</p> <p>2. Apply RMA label obtained from Agility® to the box.</p> <p>3. Use a permanent marker to write RMA number on exterior of each shipping box.</p> </div>	
WHAT			WHAT		
WHY			WHY	Required for repair return tracking and, if applicable, installer reimbursement.	

Appendix A. WI.0197 Manual Swaging of Swagelok Fittings










Manual Swaging of Swagelok Fittings

Scope: Manual swaging of Swagelok fittings onto:

- 1/4", 3/8" and 1/2" OD tubing (Steps 1-10)
- Swagelok port connectors and port adaptors (Steps 4-10 only)

Standard Work Instruction









<p>1</p> <p>WHAT</p> <p>M</p>	<p>Place tube end fully into depth marking tool (DMT). Mark the tube with a fine-tipped Sharpie.</p>		<p>2</p> <p>WHAT</p> <p>C</p>	<p>Use magnification to verify that nut and ferrules have Swagelok markings (NOT Parker).</p>	
<p>WHY</p>	<p>The DMT line corresponds to the nut's location after swaging in step 8.</p>		<p>WHY</p>	<p>Swagelok fittings and ferrules may NOT be interchangeable with other manufacturers. They may not swage or seal properly.</p>	
<p>3</p> <p>WHAT</p> <p>C</p>	<p>Install nut and ferrules onto the tube. Verify that they are in the proper order and orientation.</p>	 <p>front ferrule back ferrule nut</p>	<p>4</p> <p>WHAT</p>	<p>At the beginning of the shift, use magnified ring light and fingertip to inspect swaging die for damage, pitting and debris. If damaged, replace the die. If dirty, clean by hand with a nylon brush and cloth.</p>	<p>Swaging surface</p> <p>Threads</p> <p>C</p> 
<p>WHY</p>	<p>This is critical for proper swage strength and leak-tightness.</p>		<p>WHY</p>	<p>A damaged or dirty swaging die could lead to damage to the ferrule or nut.</p>	
<p>5</p> <p>WHAT</p>	<p>Insert tube into swaging die. Verify that tube is bottomed out. DMT line should NOT be visible.</p>		<p>6</p> <p>WHAT</p>	<p>While holding tube in place within the pre-swaging tool, hand tighten the nut. The nut should turn freely. If the nut does not turn freely, the die (or nut) must be cleaned or replaced.</p>	
<p>WHY</p> <p>S</p>	<p>If tube is not fully seated, ferrules will be swaged in incorrect location on tube.</p>		<p>WHY</p>	<p>The tube must be held in place to prevent it from backing out during pre-swaging. If the nut does not turn freely the swaging die is likely damage or worn, which could prevent the tube from being swaged properly.</p>	<p>C</p> 


Manual Swaging of Swagelok Fittings

Scope: Manual swaging of Swagelok fittings onto:

- 1/4", 3/8" and 1/2" OD tubing (Steps 1-10)
- Swagelok port connectors and port adaptors (Steps 4-10 only)

Standard Work Instruction

7	<p>WHAT</p> <p>Mark the nut and die with a fine-tipped sharpie at the 6 o'clock position.</p> 		8	<p>WHAT</p> <p>While holding tube against the die, tighten the nut 1-1/4 turns (to the 9 o'clock position).</p> 	
	<p>WHY</p> <p>These black marks are needed to control step 8.</p>			<p>WHY</p> <p>Less than 1-1/4 turns can cause a leak.</p>	
9	<p>WHAT</p> <p>Verify DMT line on tube is fully exposed above nut. If the DMT line is not exposed, turn up to 1/8 turn more and recheck. If line is still not visible, then scrap the tube.</p> 		10	<p>WHAT</p> <p>Remove the tube from the swaging die by gently moving tube side to side. If excessive force is needed to remove the tube, the swaging die should be replaced.</p> 	
	<p>WHY</p> <p>If DMT line is not "high enough", either tube is not seated enough in DMT, OR not swaged far enough (due to hand tightening variation).</p>			<p>WHY</p> <p>Excessive force to remove the tube may indicate that the swaging die is worn, which could cause an under swaged condition.</p>	

	Manual Swaging of Swagelok Fittings Scope: Manual swaging of Swagelok fittings onto: <ul style="list-style-type: none"> 1/4", 3/8" and 1/2" OD tubing (Steps 1-10) Swagelok port connectors and port adaptors (Steps 4-10 only) 	Standard Work Instruction
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Equipment List:

Description	Manufacturer	Manufacturer's Part Number
1/4" Non-Gaugable Pre-Swaging Die	Swagelok	MS-ST-400
3/8" Non-Gaugable Pre-Swaging Die	Swagelok	MS-ST-600
1/2" Non-Gaugable Pre-Swaging Die	Swagelok	MS-ST-810
Ultra-Fine Point Permanent Black Marker	Sharpie	37001
1/4" Depth marking tool	Swagelok	MS-DMT-400
3/8" Depth marking tool	Swagelok	MS-DMT-600
1/2" Depth marking tool	Swagelok	MS-DMT-810
1.75X Ring Light	Any	---
Open-ended wrenches	Any	---
Vise	Any	---
Nylon brush	Any	---
Microfiber Cloth	Any	---



Manual Swaging of Swagelok Fittings

Scope: Manual swaging of Swagelok fittings onto:

- 1/4", 3/8" and 1/2" OD tubing (Steps 1-10)
- Swagelok port connectors and port adaptors (Steps 4-10 only)

Standard Work Instruction

Job Breakdown:

Important Steps	Key Points	Reasons Why
1. Mark tube	1. Tube bottomed out in DMT	Provide reference for swaging and tightening.
2. Install three components	2. Only Swagelok	Mixed parts could leak.
	3. Nut, then back ferrule, then front ferrule	Missing, mis-located and mis-oriented parts could leak.
3. Tube into die	1. Die is clean and smooth	Dirty or worn dies do not work properly.
	2. Tube bottomed out in die	The tube must be fully inserted into the die.
	3. Turn nut to hand tight	Correct starting point.
4. Mark nut and die	1. At 6 o'clock	Provides visual aid to start turning
5. Turn nut	1. 1-1/4 turns	Incorrect turns could cause a leak.
	2. Stop at 9 o'clock	Provides visual aid to finish turning.
	3. DMT line fully showing	Verify swage is complete
6. Remove tube	1. Gently rock tube back and forth	Too much force means the die is worn.

Appendix B. WI.0441 Tightening of tube fittings


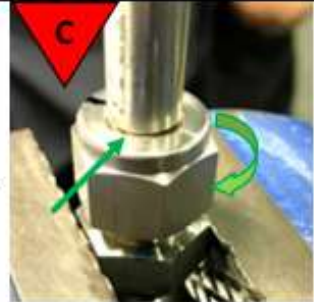
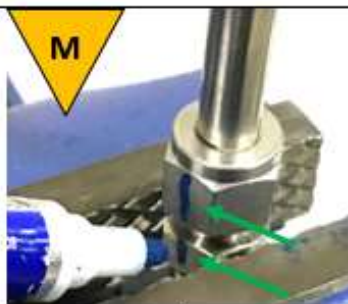
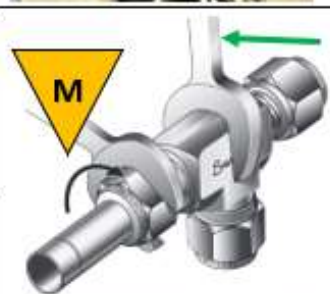

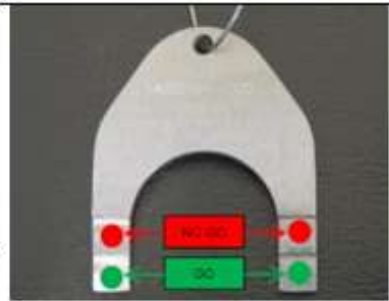



Tightening of Tube Fittings

Scope: Tightening of 1/2" Swagelok fittings, port connectors and port adaptors.

Note: "Substitute from WI.0198"

Standard Work Instruction

1	<p>Install swaged tube into fitting. Verify that both nut and fitting have same manufacturer markings.</p> <p>C</p>		2	<p>Tighten nut (by hand or with wrench) until top of nut is aligned with the bottom of the DMT mark.</p>	
WHY	<p>Swagelok/Parker fittings and nuts are NOT interchangeable.</p>		WHY	<p>This line shows the nut's correct starting location prior to tightening.</p>	
3	<p>Mark across nut and fitting with blue paint pen</p>		4	<p>Put a "backing wrench" on the adjacent fitting.</p> <p>Note: some products require holding a different component - this will be noted in the product-specific work instructions.</p>	
WHY	<p>The marks are needed for step 5 and inspection.</p>		WHY	<p>The backing wrench prevents the fitting from rotating. This ensures that the nut is NOT under-tightened.</p>	
5	<p>Using the blue marks as a visual reference, turn nut between 1/2 and 5/8 of a turn</p> <p>C</p>		6	<p>Check gap between nut and fitting with the GO-NOGO gap gage. If the GO section fits AND the NOGO section does not fit, the part is good. If the NO-GO section fits, then tighten the fitting and recheck. If the GO section does not fit, the tube must be removed and scrapped.</p>	
WHY	<p>If the nut is turned less than 1/2 turn, it may pass a leak test, but leak later in the field.</p>		WHY	<p>The gap indicates how tightly the ferrules are seated against the fitting. Too much gap will allow a leak. Not enough gap indicates too much swaging or tightening.</p>	<p>C</p>

Tightening of Tube Fittings

Scope: Tightening of 1/2" Swagelok fittings, port connectors and port adaptors.

Note: "Substitute from WI.0198"

Standard Work Instruction

7	WHAT	Add torque seal between nut and fitting (only when specifically required by customer).		8	WHAT	---
		---				---

Equipment List:

Description	Manufacturer	Manufacturer's Part Number
1/4" gap inspection gage	Agility Fuel Solutions	TBD
3/8" gap inspection gage	Agility Fuel Solutions	TBD
1/2" gap inspection gage	Agility Fuel Solutions	TD 400394
Blue paint pen	Dykem	84001
Ultra-fine tip permanent black marker	Sharpie	37001
Yellow torque seal	Dykem	83317
Open-ended wrenches	Any	---
Vise	Any	---

Job Breakdown:

Important Steps	Key Points	Reasons Why
1. Tube into fitting	1. Same manufacturers	Swagelok and Parker fittings are not interchangeable.
	2. Tube bottomed out in fitting	The tube must be fully inserted into the fitting.
	3. DMT line fully showing	Provides correct starting point.
2. Mark parts	1. Across nut and fitting	Provides visual aid to start tightening.
3. Turn nut	2. Use backing wrench	Holds everything in place to prevent leaks.
	3. 1/2 turn	Incorrect turns could cause a leak.
	4. Marks on opposite sides	Provides visual aid to finish tightening.
	5. Verify gap	Verify tightening is complete, but not too much.
4. Torque seal	1. Across nut and fitting	Shows if fitting was loosened.

Appendix A. Emer™ Instruction Manual to Replace the PRD

MOD 8.7-03 Rev01



INSTRUCTION MANUAL TO REPLACE THE PRD

GENERAL INSTRUCTIONS

Read carefully the instructions before proceeding with the replacement of the Pressure Relief Device (PRD) Temperature Activated. The maintenance described hereinafter shall be done only by the authorized workshops/operators after Emer S.p.A. approval.

Don't damage or tamper in any way the valve and its equipment.

Don't use components having damaged packaging, fallen or showing sign of collision and/or damages.

Don't make operations different from those explicitly described in this instruction manual.

All the equipment used for the hereinafter listed operations, shall be suitable to the using and calibrated (where applicable).

For what not expressly described, the indication reported within the standard ISO 19078 "Gas cylinders — Inspection of the cylinder installation, and requalification of high pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles" and the following have to be used.



Before conducting following activities it is mandatory that inside the CNG tank and the downstream systems there isn't any residual pressure. This means that the tank, the piping, etc. should be completely vented.

Pay attention not to damage the components during the following activities.

Emer S.p.A. - a Westport Fuel Systems company

Via Bormioli 19 • 25135 • Brescia • Italy - Tel +39 030 2510391 • Fax +39 030 2510392 • emer.westport.com

1. Unpack the fresh PRD keeping the plastic bag, the protective plastic cap and the main carton box.
2. Unscrew the PRD Part 2 at **Fig 1**.
3. Remove the previous O-ring from the seat at the valve body, blow compressed air into the seat of the PRD and check that the fresh PRD is having the O-ring at the proper seat.
4. Apply the sealant as specified at **Table 1** on the threads of the new PRD and screw the PRD into the threaded seat at the valve body.
5. Tighten the PRD with a dynamometric key size 24 set at a torqueing value as declared in **Table 1**.
6. Pressurize the system at min 200 bar with CNG. The pressurizing of the CNG can be done either with a back-up CNG tank or at the CNG filling station. Do not use CNG fast filling stations for pressurizing the systems. In case of multiple tanks all the tanks must be pressurized (all the PRDs present in the system should be replaced before conducting the leak test at Step No 7).
7. Check the tightness of the PRD at the sealing area of the valve using either sniffer measuring machine (preferably) or with snoop solution (in case sniffer machine is not available). With snoop solution the PRD is leak proof in case of no bubbles. If sniffer machine is used please contact Emer at emer-service@wfsinc.com specifying the technical details of machine for defining acceptance criteria.

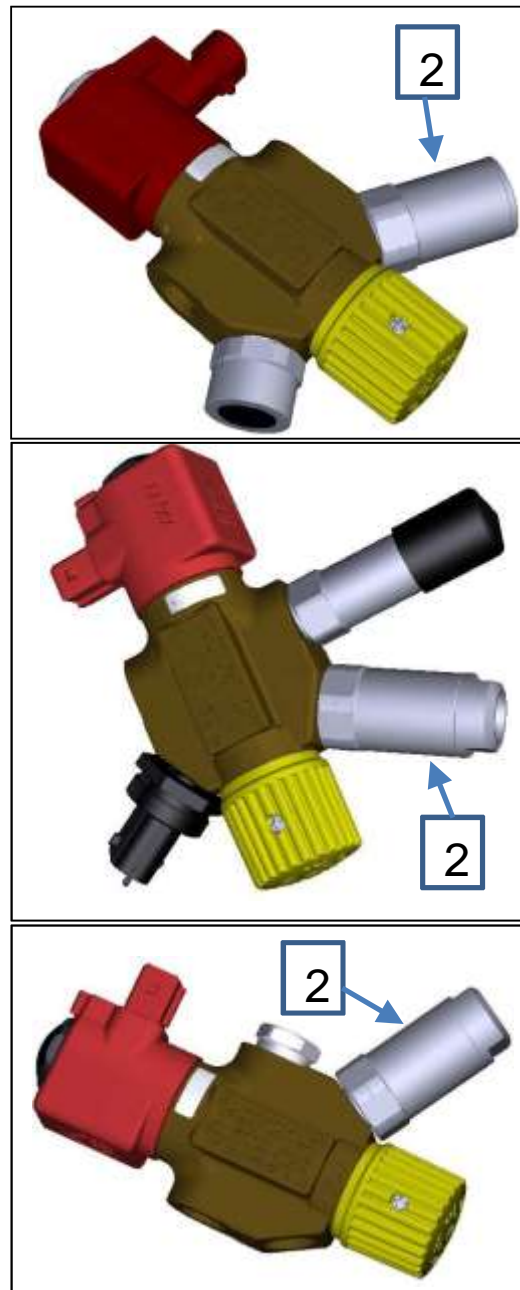


Fig 1

S. No	Tank Valve Part No	PRD Type	PRD thread	Torqueing value	Glue
1	MARK106-006	PRD100OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
2	MARK114	PRD2002T	M16x1	30±15% Nm	Loctite 276 - 4 mg
3	MARK121-004	PRD200OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
4	MARK131-003	PRD200OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
5	MARK137-001	PRD200OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
6	MARK139	PRD200OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
7	MARK147-005	PRD200OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
8	MARK147-008	PRD2102T	M16x1	60±10 Nm	Loctite 276 - 4 mg
9	MARK155-001	PRD210ORMP	M16x1	30±15% Nm	Loctite 276 - 4 mg
10	MARK156-003	PRD2102T	M16x1	60±10 Nm	Loctite 276 - 4 mg
11	MARK156-006	PRD2102T	M16x1	30±15% Nm	Loctite 276 - 4 mg
12	MARK160	PRD100OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
13	MARK163-003	PRD200OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
14	MARK169	PRD210OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
15	MARK193	PRD200OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
16	MARK199-003	PRD210OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
17	MARK199-004	PRD210OR	M16x1	30±15% Nm	Loctite 276 - 4 mg
18	MARK199-006	PRD2102T	M16x1	30±15% Nm	Loctite 276 - 4 mg
19	MARK703-002	PRD217OR	M16x1	30±15% Nm	Loctite 276 - 4 mg

Table 1

Emer S.p.A. declines any responsibility for eventual damages due to person, things or animals directly and indirectly, as a consequence of non-observation of instructions and assembly, use and maintenance directions of the component.

For every controversy concerning the execution and/or interpretation of the present contract, it is applicable the Italian Law and the place of jurisdiction is Brescia's court of justice.

In case of any assistance, contact Emer S.p.A. at emer-service@wfsinc.com

6. Warranty Information

This procedure is covered under warranty. Standard repair time (SRT) is TBA. Please refer to Warranty Manual, ENP-067, for warranty reimbursement procedures.

For parts and support, contact Agility® Customer Care:

+1 949 267 7745

+1 855 500 2445 toll free

parts@agilityfs.com

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www.agilityfuelsolutions.com

Revision	Description	Author	Approved By	Date
--	Initial Release	C. Grasso	CCG Team	06/11/2020