



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

ENP-735

May 4, 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) 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® 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:

25518000 - Roof Mount, 156 DGE, 2084 L, 8 Tanks, Gillig, Type 4

25520000 - Roof Mount, 185 DGE, 2474 L, 8 Tanks, Gillig, Type 4

25522000 - Roof Mount, 126 DGE, 1692 L, 8 Tanks, Type 4, Gillig

3. Tools and Supplies Required

| | |
|-------------------------------|---|
| Fall protection equipment | Safety glasses |
| Safety ladder | Defueling hose with nozzle** |
| NGV1 fuel receptacle adapter* | Shop towels |
| Swagelok® preswage tool | Combination wrenches |
| Socket wrenches | Swagelok® Snoop leak detection solution |
| Permanent marker | Agility® reporting form FT.0313 |
| Torque seal marker | Agility go-nogo gauge, p/n TD 400394 |
| Camera / phone camera | Zip lock bag (<i>NOTE: supplied by Agility with bulk replacement PRD shipment—use for PRD return</i>) |
| Flashlight | |

*may be required for defueling on some FMMs

**If not provided at CNG fueling facility

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:

| Fuel system p/n | QTY required Kit, Retrofit, Gillig, 120" tanks PRD Retrofit, p/n 25519031 | QTY required Kit, Retrofit, Gillig, 85" tanks PRD Retrofit, p/n 25519030 |
|-----------------|--|---|
| 25518000 | 1 | 1 |
| 25519000 | 1 | 1 |
| 25520000 | 2 | n/a |
| 25521000 | 2 | n/a |
| 25522000 | n/a | 2 |

Verify proper part composition and quantity for each kit 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 | 10602157 | Decal, System, Danger Live High Pressure PRD Line | 4 |
| 7 | 10602442 | Decal, PRD Vent Line, Caution | 8 |
| 8 | 10700370 | Dual Clamp Tie, 19.20-in Long, .025-in. Stud Dia. | 2 |
| 9 | 10701508 | Tube Clamp Kit, 1/2-in., Double Mounting Hole, -40F to 212F | 6 |
| 10 | 10702022 | P-Clip, 3/8-in., Rubber Clamp (10mm) | 2 |
| 11 | 10702147 | P-Clip, 1/2-in., Rubber Clamp | 2 |
| 12 | 20100436 | Spacer, 0.100 in., Tube Clamp, Twin, 1/2-in., Single Mounting Hole | 6 |
| 13 | 25519028 | Tube Subassembly, 25519420, PRD to Vent | 1 |
| 14 | 25519029 | Tube Subassembly, 25519421, PRD To Vent | 1 |
| 15 | 25519037 | Tube Subassembly, 25519429, PRD to Vent | 1 |
| 16 | 25519038 | Tube Subassembly, 25519430, PRD To Vent | 1 |
| 17* | 25519039 | Hardware, Retrofit Kit | 1 |
| 18 | 25519123 | Bracket, tube clamp | 2 |
| 19 | 25519416 | Tube, Formed, HP Fuel, 1/2-in. X .049-in., Tee to PRD | 2 |

*Not shown

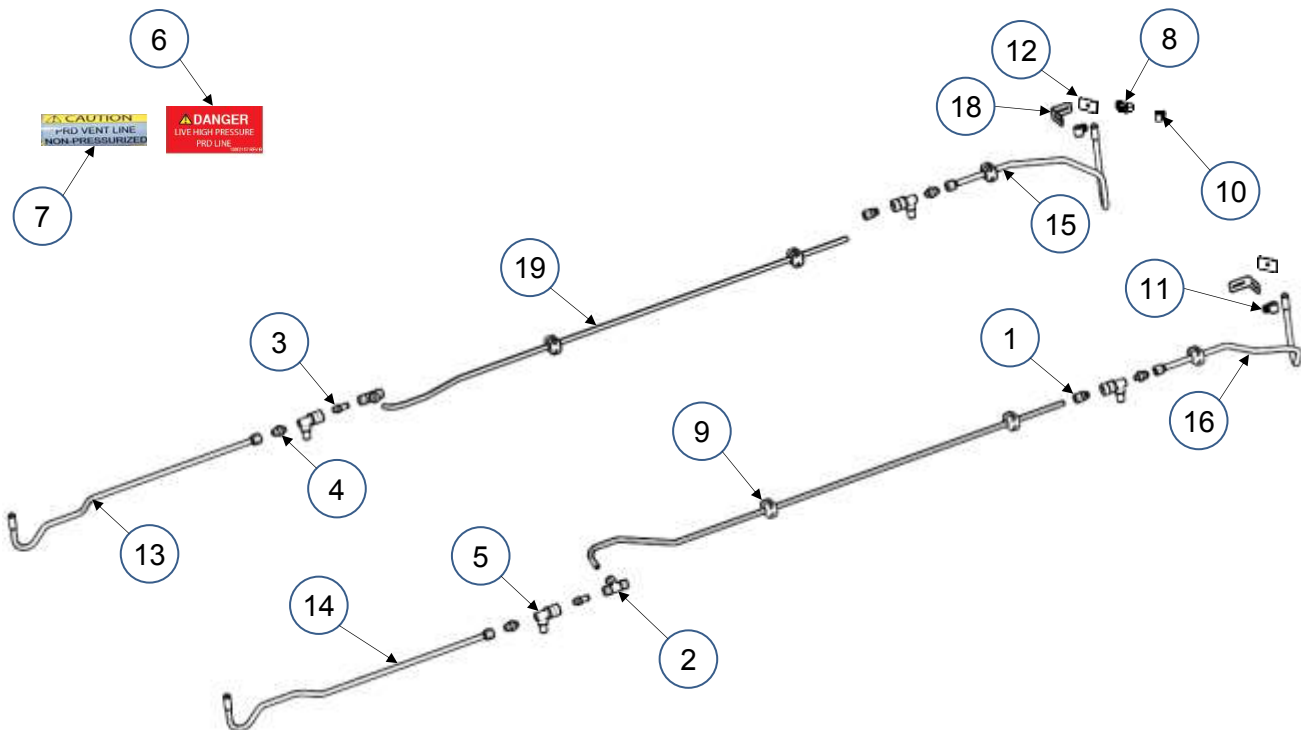


Figure 1.
Kit, Retrofit, Gillig, 120" tanks PRD Retrofit, p/n 25519031.

| 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 | 10602157 | Decal, System, Danger Live High Pressure PRD Line | 4 |
| 7 | 10602442 | Decal, PRD Vent Line, Caution | 8 |
| 8 | 10700370 | Dual Clamp Tie, 19.20-in Long, .025-in. Stud Dia. | 2 |
| 9 | 10701508 | Tube Clamp Kit, 1/2-in., Double Mounting Hole, -40F to 212F | 6 |
| 10 | 10702022 | P-Clip, 3/8-in., Rubber Clamp (10mm) | 2 |
| 11 | 10702147 | P-Clip, 1/2-in., Rubber Clamp | 2 |
| 12 | 20100436 | Spacer, 0.100 in., Tube Clamp, Twin, 1/2-in., Single Mounting Hole | 6 |
| 13 | 25519026 | Tube Subassembly, 25519414, PRD to Vent | 1 |
| 14 | 25519027 | Tube Subassembly, 25519415, PRD To Vent | 1 |
| 15 | 25519037 | Tube Subassembly, 25519429, PRD to Vent | 1 |
| 16 | 25519038 | Tube Subassembly, 25519430, PRD To Vent | 1 |
| 17* | 25519039 | Hardware, Retrofit Kit | 1 |
| 18 | 25519123 | Bracket, tube clamp | 2 |
| 19 | 25519417 | Tube, Formed, HP Fuel, 1/2-in. X .049-in., Tee to PRD | 2 |

*Not shown

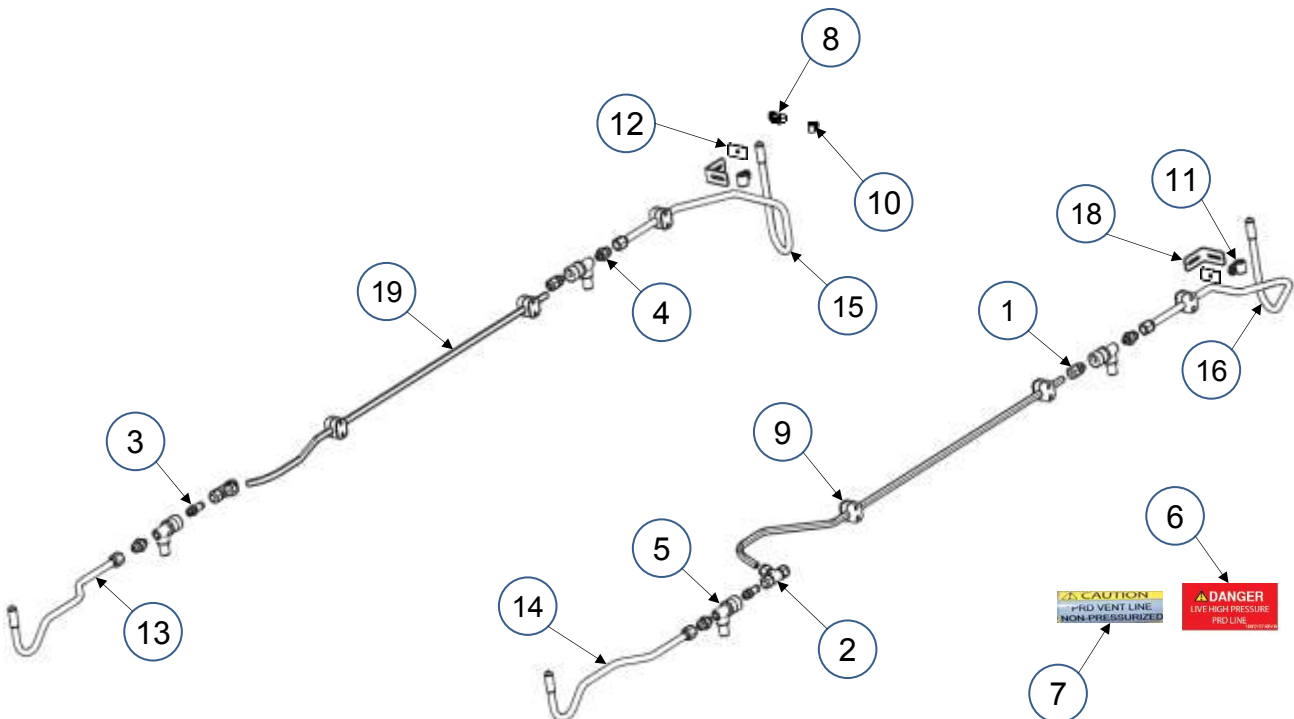


Figure 2.
Kit, Retrofit, Gillig, 85" tanks PRD Retrofit, p/n 25519030

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 and 4*

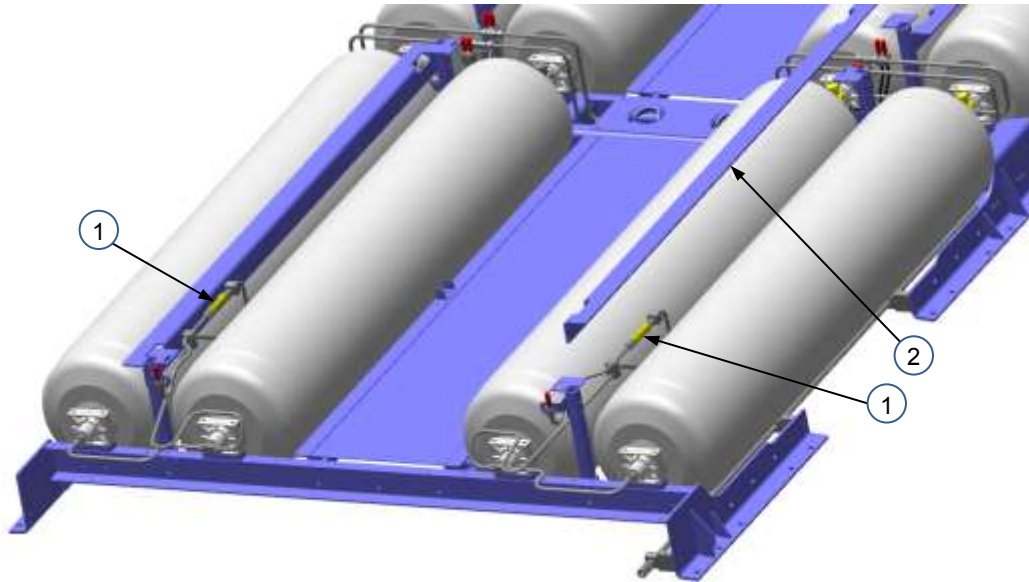


Figure 3.

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

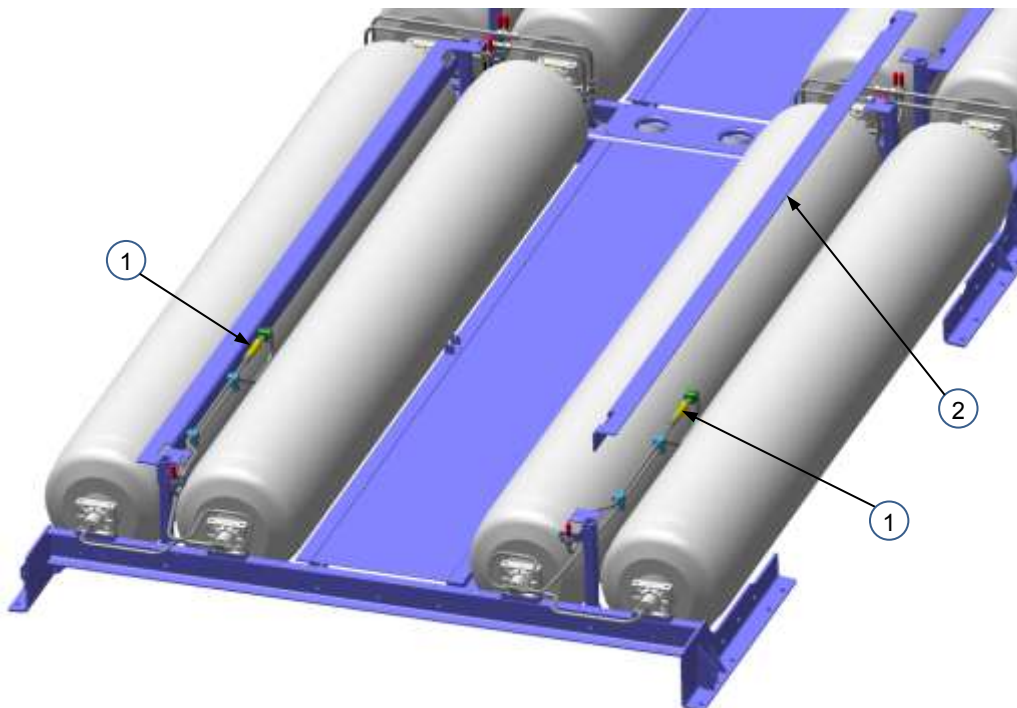


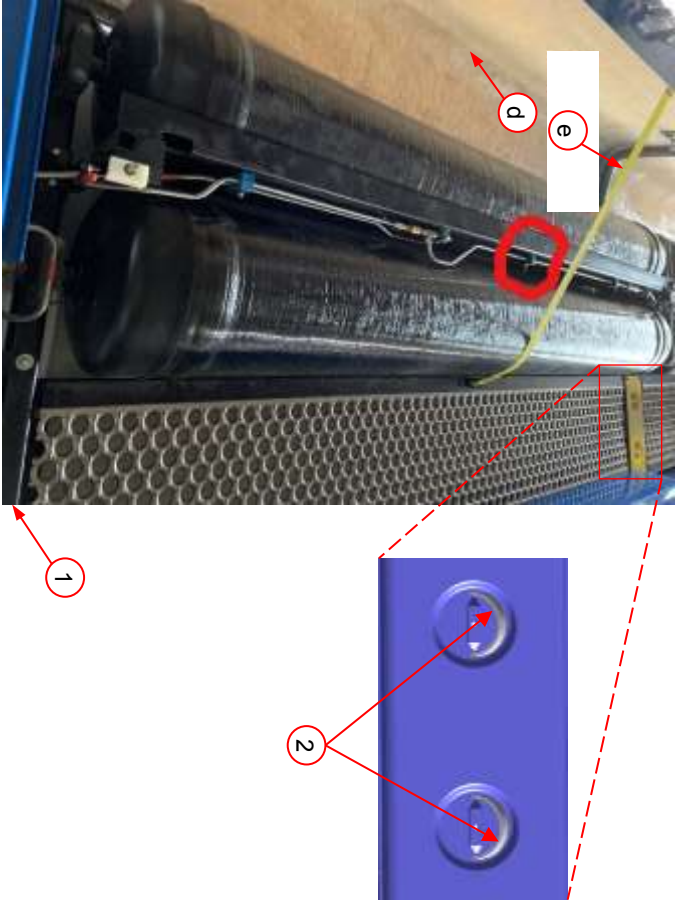
Figure 4.

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


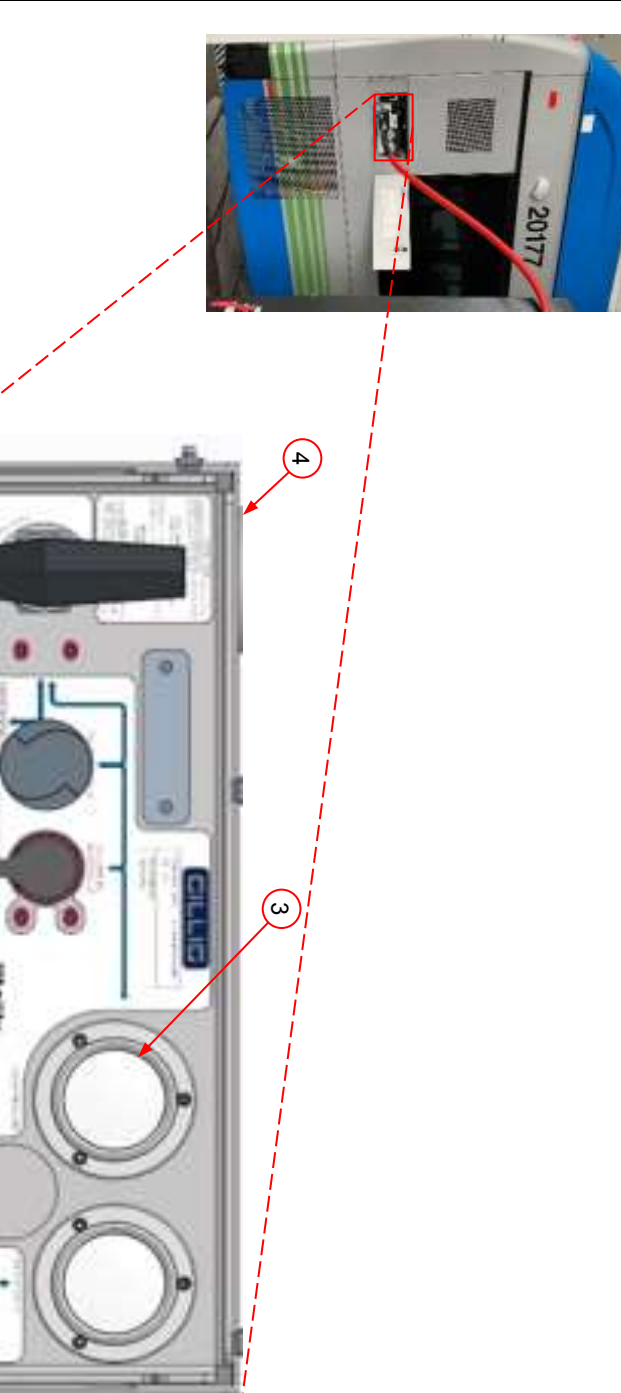
5. Corrective Action / Procedure

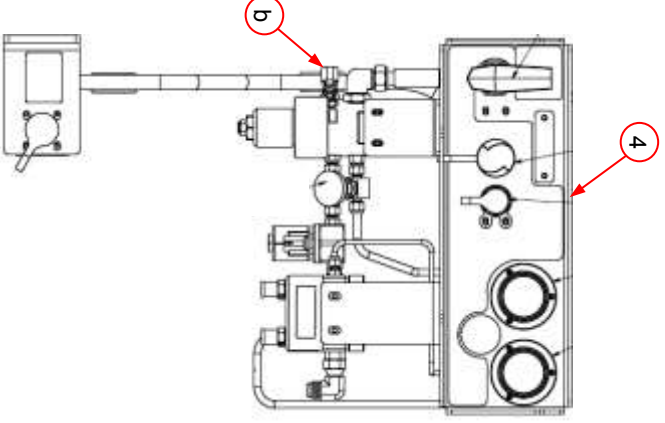
5.1. Preliminary Safety Preparation

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

| | | | |
|---|---|------------------------------------|---|
| 4 | <p>1. Open fuel system roof pod doors (d).</p> <p>WARNING</p> <p>2. 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>4. Always reattach fall PPE when resuming work on the roof mount portion of the fuel system.</p> | <p>WHY</p> <p>OSHA compliance.</p> |  |
|---|---|------------------------------------|---|

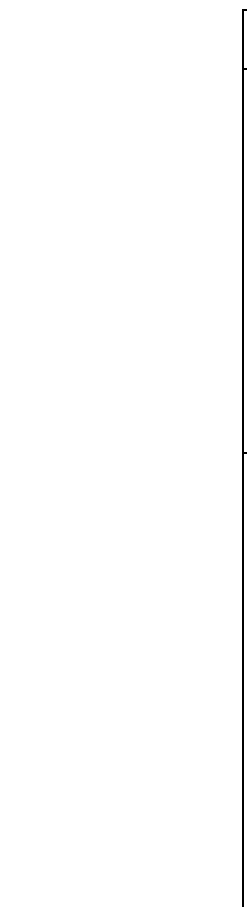
5.2. Prior to defueling

| | | |
|-----|---|--|
| 1 | <p>WARNING</p> <p>Verify all eight cylinder valves (circled) are open.</p> |  |
| WHY | <p>Ensure cylinders can be properly defueled.</p> | |
| 2 | <p>Check high pressure gauge (3) on fuel management module (FMM) (4) to verify amount of fuel in the system.</p> <p>IMPORTANT: If vehicle has no fuel onboard, proceed to Step 10.</p> |  |
| WHY | | |

| | | |
|---|--|---|
| <p>3</p> | <p>WHAT</p> <p><i>If not already defueled:</i> Defuel bus according to local facility regulations and procedure. <i>If required:</i> use defuel hose kit.</p> <p>WARNING</p> <p><i>Only trained CNG fuel systems technicians may defueling.</i></p> <p>NOTICE</p> <p><i>If required:</i> Use appropriate defuel nozzle adapter.</p> | <p>WHY</p> <p>PRD supply tubes to be removed are pressurized "live" lines.</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>The diagram shows a cross-section of a fuel system component, likely a fuel manifold or control unit. It features several circular ports and a complex internal structure. Two callouts are present: '4' points to a bleed valve on the right side, and 'b' points to a specific fitting or connection point on the left side of the main assembly.</p> | | |

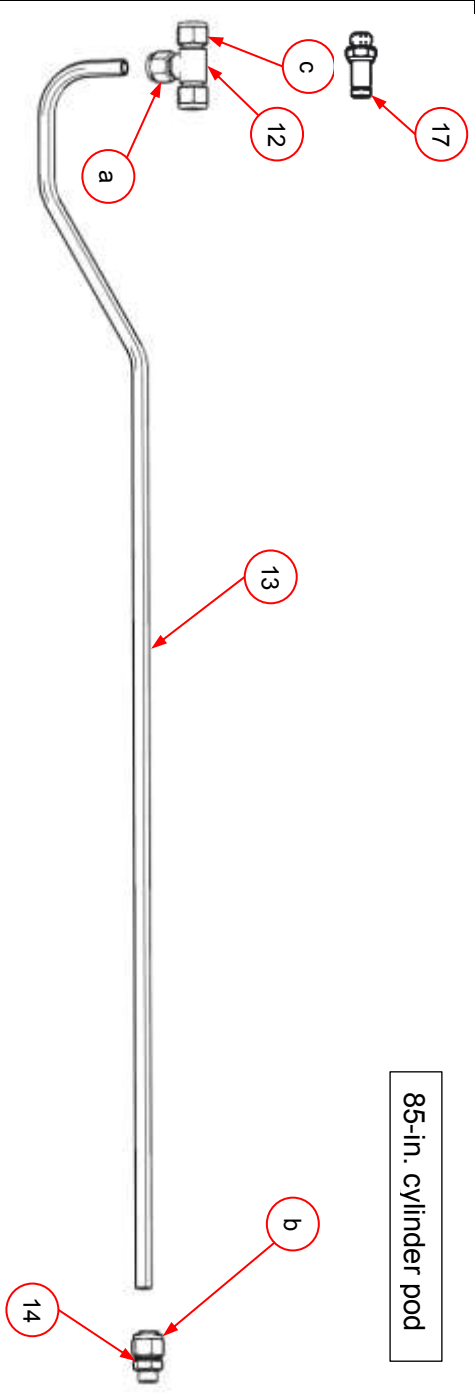
5.3. Remove Emer PRDs

| WHY | WHAT |
|---------------------------------------|--|
| <p>Protect cylinders from damage.</p> | <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>1</p> <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> <div style="border: 2px solid blue; padding: 5px; margin: 10px 0;"> <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. </div> <p>3. Carefully remove PRD plumbing from each PRD bracket (9) as an assembly including Emer™ PRDs (d).</p> <p>4. Repeat for all plug end cylinders on all foof mount pods.</p> </div> <div style="width: 50%;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>NOTE: 85-in. cylinder end shown; 120-in. similar.</p> </div> </div> </div> |

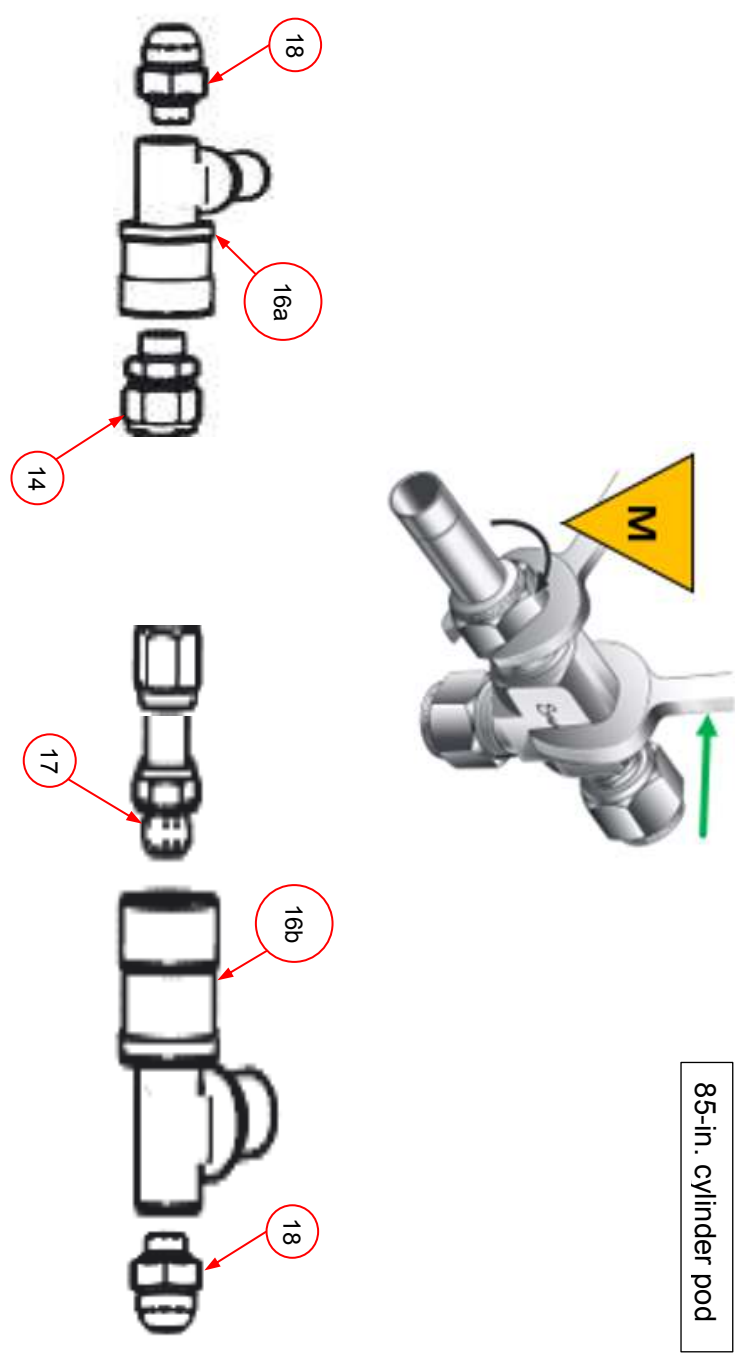
| | | |
|--|---|---|
| 2 | <p>Use a pair of wrenches to remove all Emer™ PRDs (d) from PRD vent tubes (5a) and (5b).</p> <p>NOTICE <i>Dispose of PRD vent tubes (5a) and (5b) according to facility guidelines.</i></p> | <p>PRD vent tubes will not be reused.</p> |
|  | | |
| 3 | <p>Place all removed Emer™ PRDs in zip lock bag provided with bulk retrofit kit shipment.</p> <p>NOTICE <i>Place only PRDs from one vehicle in each zip lock bag.</i> <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> | <p>1. Bag helps prevent PRD contamination. 2. Agility is collecting all PRDs removed; return material authorization (RMA) instructions appear below.</p> |
| | | |

5.4. Install PRD retrofit kits

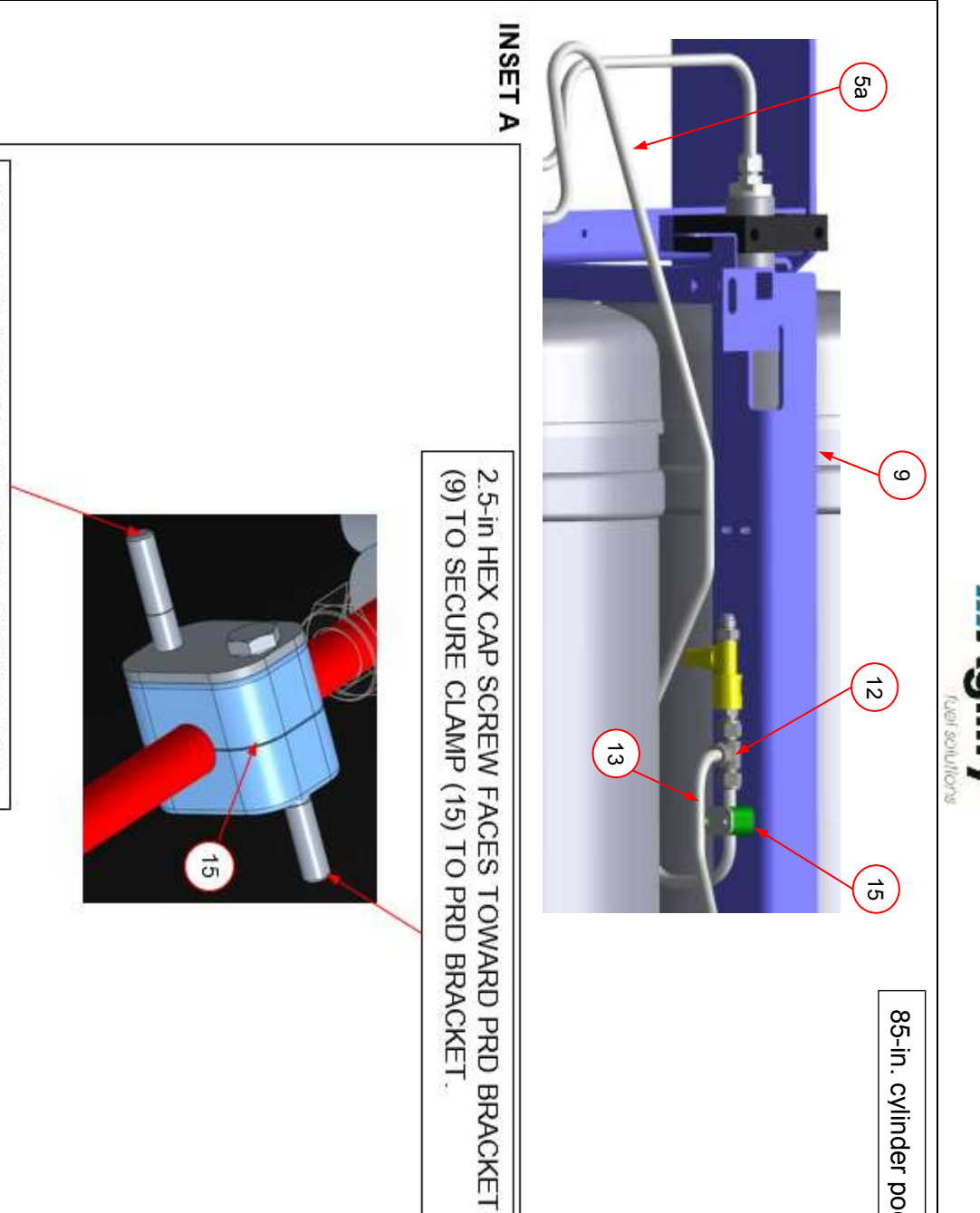
5.4.1. Kit, Retrofit, Gilling, 85" tanks PRD Retrofit, p/n 25519030, installation instructions

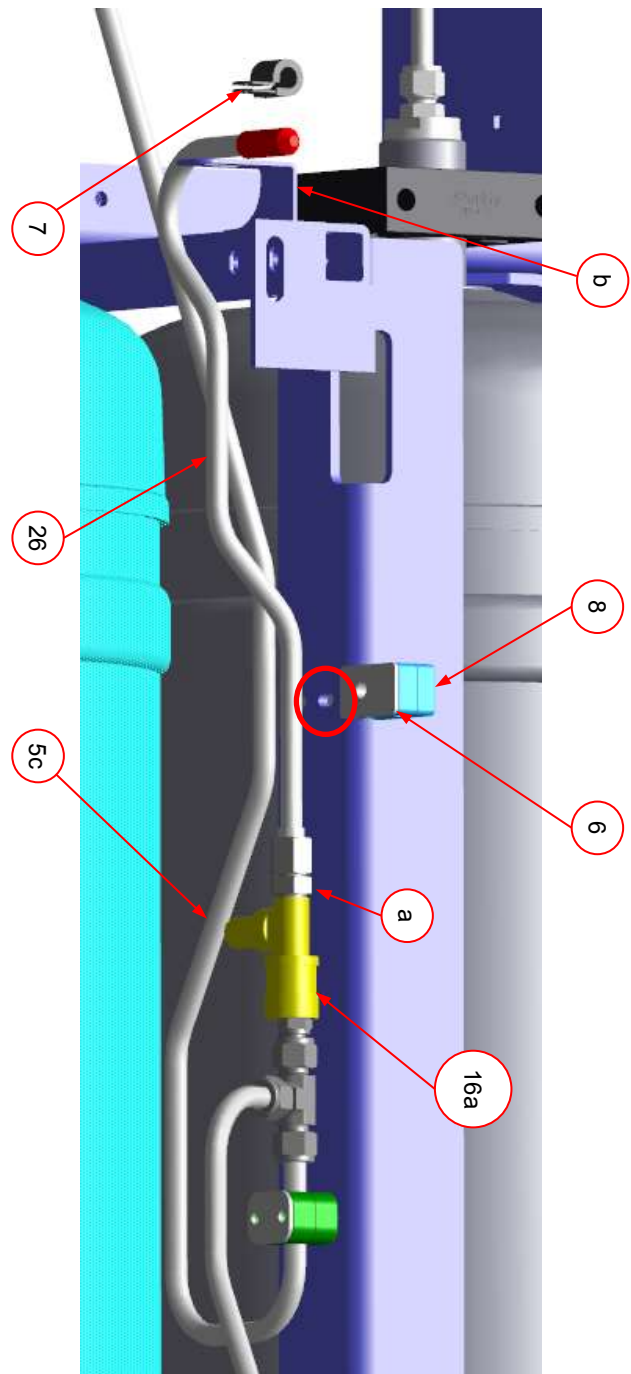
| | | |
|--|--|---|
| 1 | <p>1. Install ferrules (<i>not visible</i>) and nut (a) from tee fitting (12), p/n 10200208, on PRD tube, (13), p/n 25519417.</p> <p>2. Install ferrules (<i>not visible</i>) and nut (b) from tube fitting (14), p/n 10200065, on PRD tube, (13).</p> <p>3. Install ferrules (<i>not visible</i>) and nut (c) from tee fitting (12), p/n 10200208, on tube adapter fitting, (17), p/n 10200238.</p> |  |
| <p>NOTICE</p> <p>Refer to Appendix A: <i>WI 0197 Manual Swaging of Swagelok Fittings.</i></p> | | |
| WHY | | |

| | |
|---|---|
| <p>2</p> <ol style="list-style-type: none"> 1. Install tee fitting (12), p/n 10200208, on PRD tube, (13), p/n 25519417. <p>NOTICE</p> <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), p/n 25519417. 3. Secure tube clamps (15) to two locations (circled) on PRD bracket (9) using clamp kit fasteners as shown in INSET A. <p>NOTICE</p> <p><i>To ease component installation, do not tighten fasteners completely; fasteners will be torqued at a later step.</i></p> | <p>WHY</p> <p>Support PRD vent lines.</p> |
| <p>85-in. cylinder pod</p> <p>INSET A</p> <p>1.5-in HEX CAP SCREW FACES AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</p> <p>2.5-in HEX CAP SCREW FACES TOWARD PRD BRACKET (9) TO SECURE CLAMP (15) TO PRD BRACKET.</p> | |

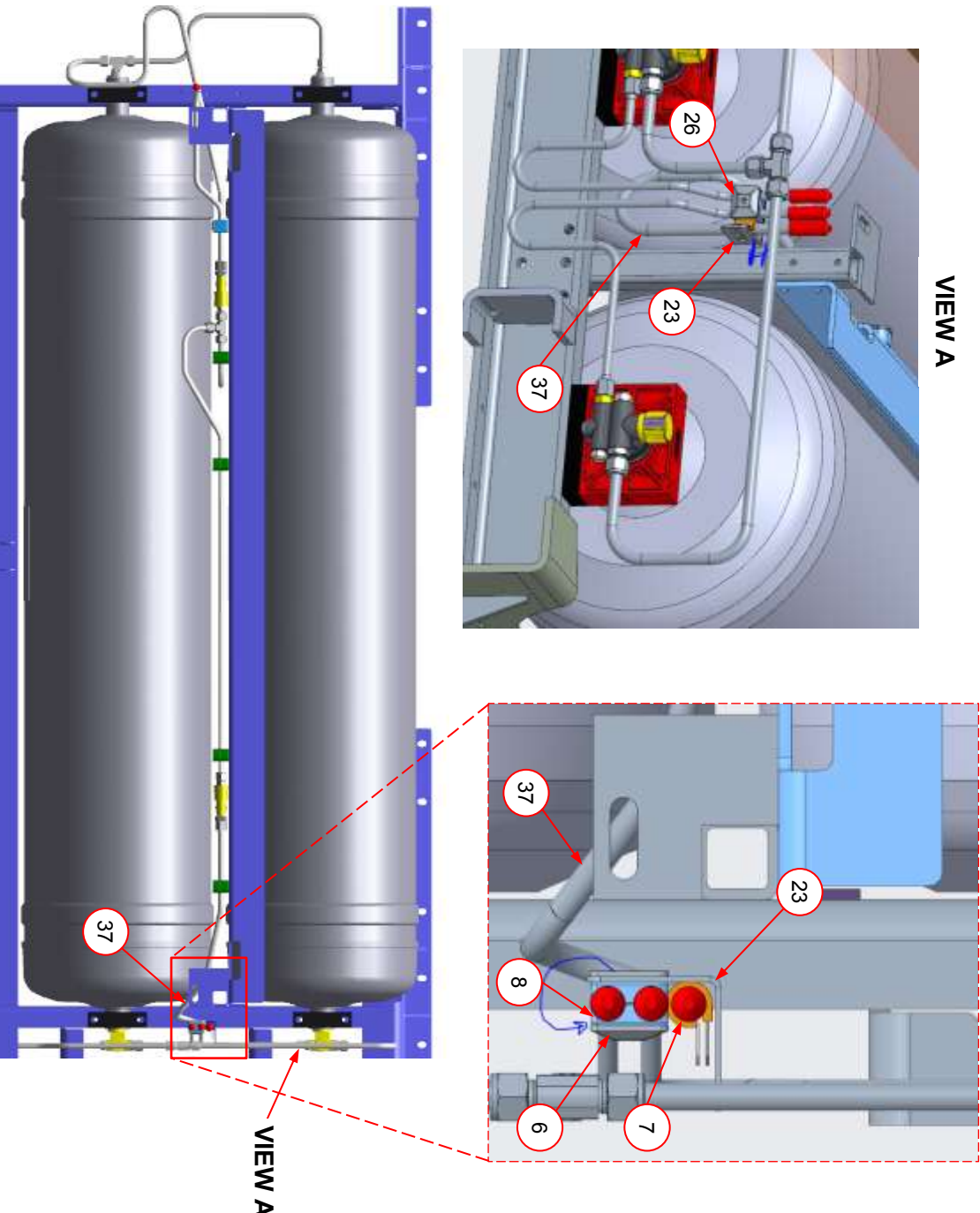
| 3 | WHAT | WHY |
|--|---|-----|
| <p>M</p> <p>Always use a backing wrench on the main fitting while using a wrench to install another fitting.</p> | <ol style="list-style-type: none"> 1. Install tube adapter fitting (17), p/n 10200238 on VTI PRD (16b), p/n 10300513. <ul style="list-style-type: none"> ⚠ Torque fitting (17) to 26 ft-lbs (35.25Nm) 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. <ul style="list-style-type: none"> ⚠ Torque fittings (18) to 18.5 ft-lbs (25Nm). 4. Install tube fitting (14), p/n 10200065, on VTI PRD (16a), p/n 10300513. <ul style="list-style-type: none"> ⚠ Torque fitting (14) to 45 ft-lbs (61Nm). | |
| <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="border: 1px solid black; padding: 5px; margin-left: 20px;">85-in. cylinder pod</div> </div> | | |

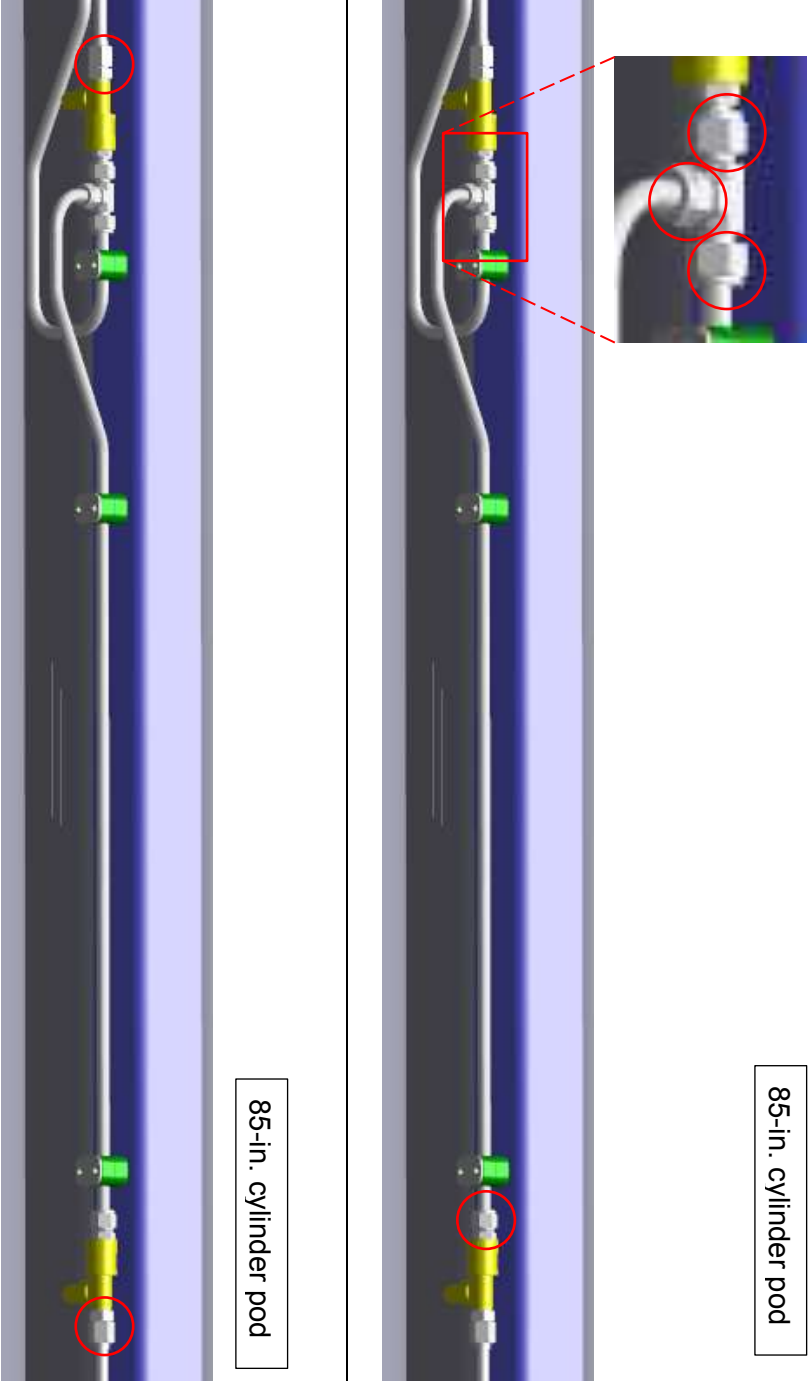
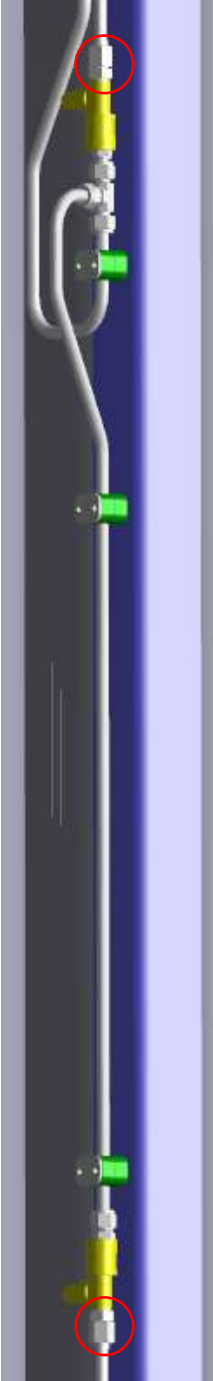
| | | |
|-----|---|----------------------------|
| 4 | <p>1. Install VTI PRD (16a) assembly inlet fitting (a) on PRD supply tube (13) at tee fitting (12).</p> <p>2. Install VTI PRD outlet fitting (16b) on straight end of PRD supply tube (13).</p> <p>NOTICE</p> <p><i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p> | <p>85-in. cylinder pod</p> |
| WHY | | |



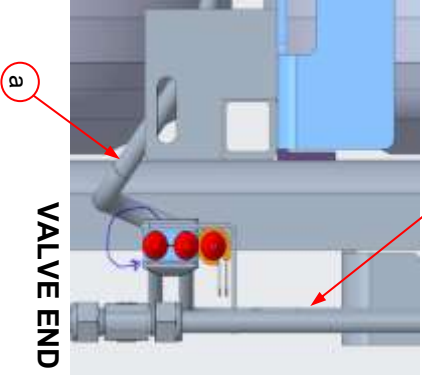
| | |
|--|--|
| <p>5</p> <ol style="list-style-type: none"> 1. Install PRD supply tube (5a) on PRD supply tube (13) at tee fitting (12). 2. Install tube clamp kit (15), p/n 10701508, on PRD supply tube, (5a). 3. Insert one 1.5-in. hex cap screw, p/n 10760200-0150, and one 2.5-in. hex cap screw, p/n 10760200-0120, 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 (<i>not shown</i>) on each hex cap screw inserted in previous sub step. 5. Secure PRD supply tube (5a) to PRD bracket (9). <p>NOTICE <i>Tighten fasteners finger tight; fasteners will be torqued at a later step.</i></p> | <p>85-in. cylinder pod</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>1.5-in HEX CAP SCREW FACES AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</p> |
| <p>WHY</p> | |

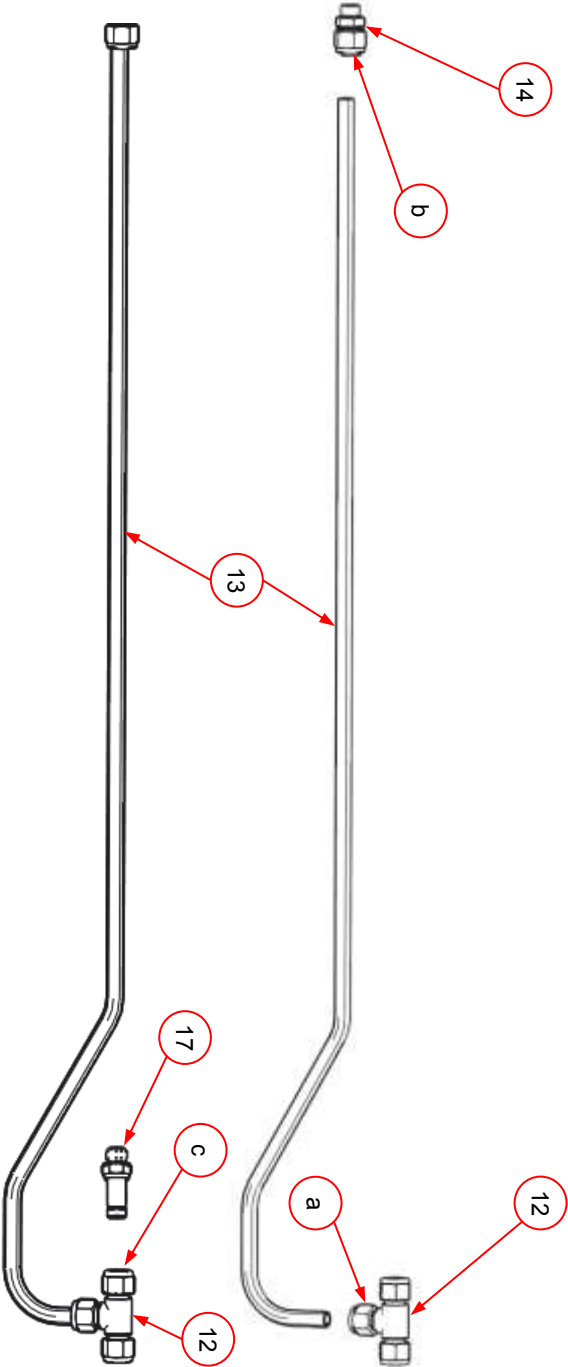
| | | |
|--|---|------|
| 6a | <p>1. Install PRD vent tube (26), p/n 25519026, on PRD (16a) fitting (a).</p> <p>NOTICE</p> <p>Tighten nut fitting finger tight; fittings will be tightened at a later step.</p> <p>2. Slip dual tube clamp (8), on PRD vent tube (26), and on PRD vent tube (5a).</p> <p>3. Use 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> <p>NOTICE</p> <p>Tighten fasteners finger tight; fasteners will be torqued at a later step.</p> | WHY |
|  <p>85-in. cylinder pod</p> | | WHAT |





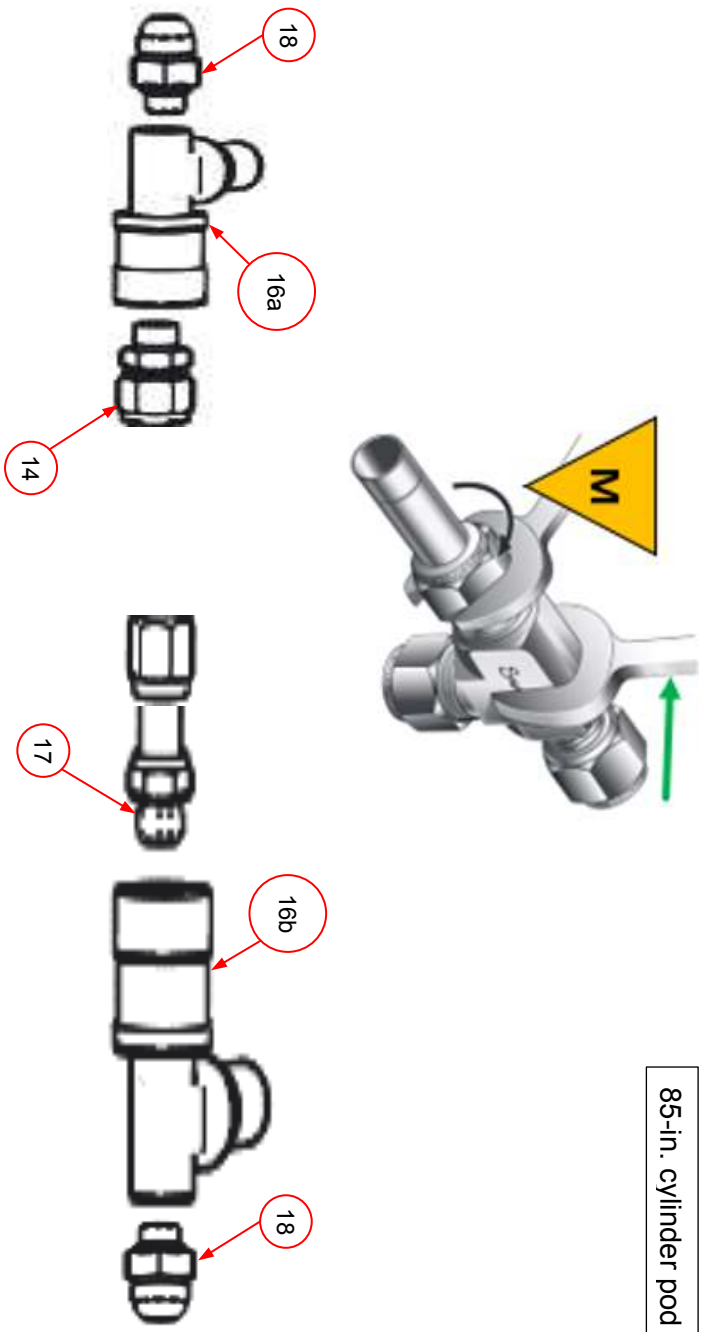
| | | |
|-----------|---|-------------|
| <p>6b</p> | <p>1. Install PRD vent tube (37), p/n 25519037, on PRD (16b) fitting (a).</p> <p>NOTICE</p> <p>Tighten nut fitting (b) finger tight; fitting will be tightened at a later step.</p> <p>2. Slip tube clamp kit (15), on PRD vent tube (37).</p> <p>3. Insert 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.</p> <p>4. 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>5. Secure PRD vent tube (37) to PRD bracket (9) at hole.</p> <p>NOTICE</p> <p>Tighten fasteners finger tight; fasteners will be torqued at a later step.</p> | <p>WHY</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>1.5-in. HEX CAP SCREW FACES AWAY FROM PRD BRACKET TO CAPTURE CLAMP (15).</p> | <p>WHAT</p> |

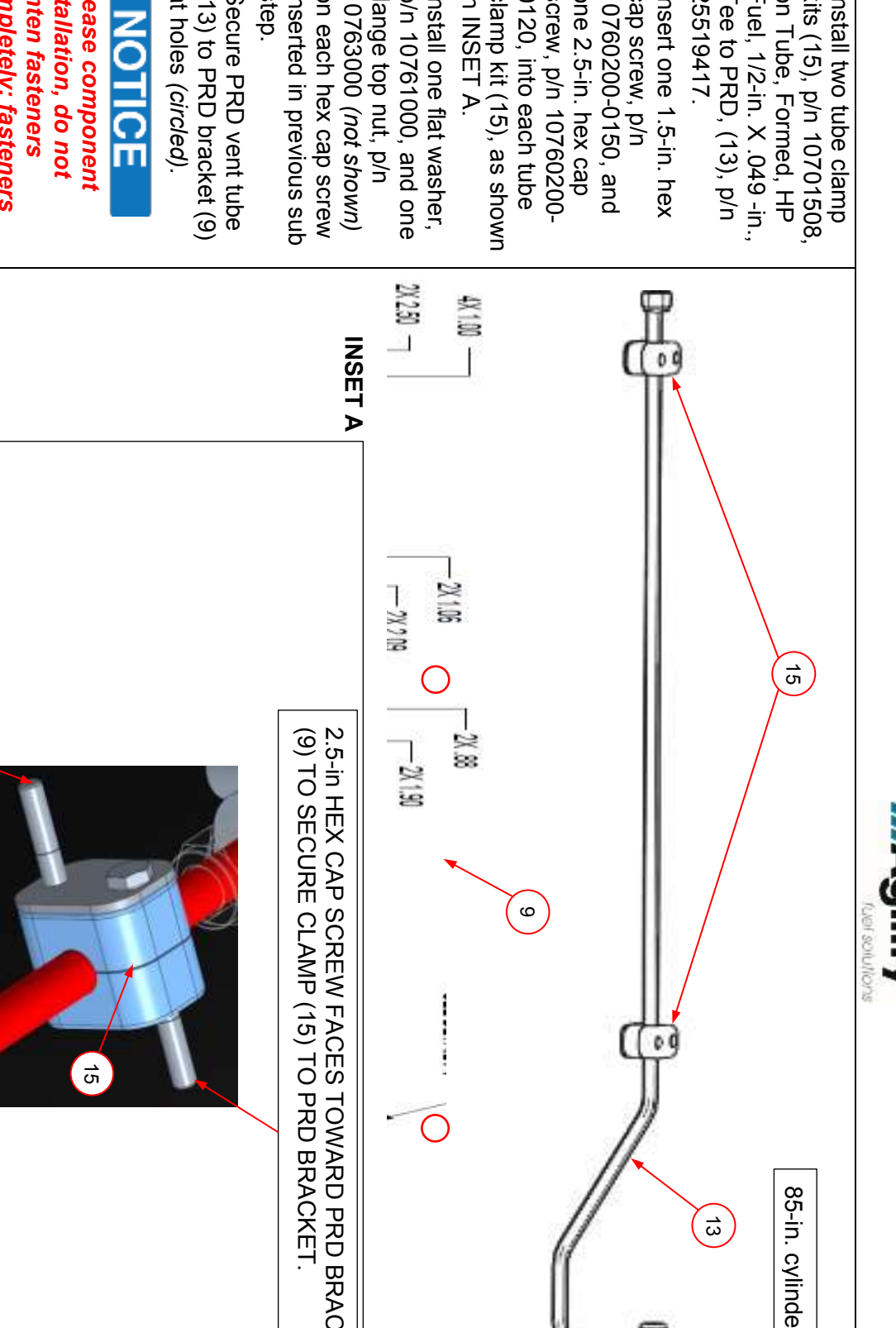
| | | |
|--|--|-----------------------|
| 7 | <p>1. Install tube clamp bracket (23), p/n 25519123 and one* 25519123 and one* spacer, p/n 20100436, on existing double tube clamp (8) using the double tube clamp fasteners and spacer (26), p/n 20100436.</p> <p>2. Install P-clip (7), p/n 10702147, on PRD 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> <p><i>*Additional spacers are provided in the retrofit kit if required.</i></p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> | WHY |
|  <p>VIEW A</p> <p>85-in. cylinder pod</p> <p>VIEW A</p> | | System specification. |

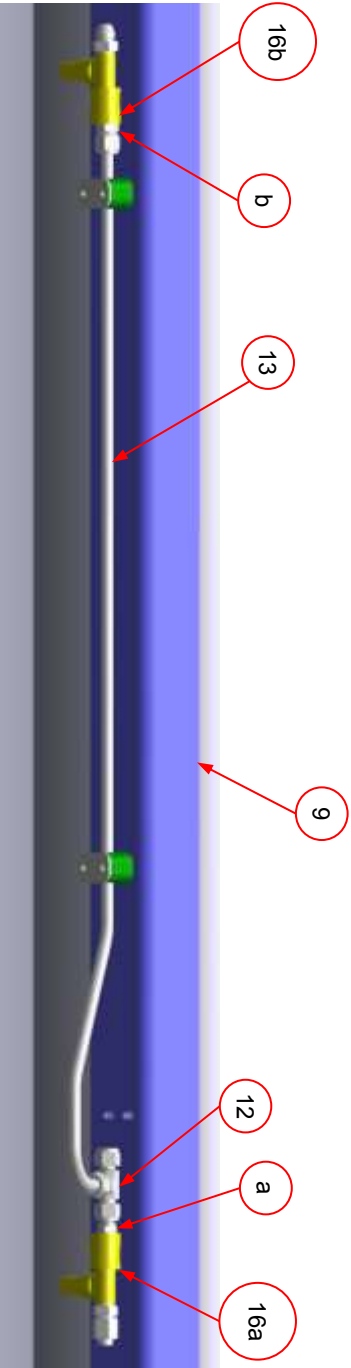
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| <p>8a</p> <p>⚠ Use two wrenches to tighten 1/2-in. Swagelok fittings at four locations (circled). Tighten 1/2-in. Swagelok fittings per Appendix B W1.0441.</p> |  <p>85-in. cylinder pod</p> |
| <p>WHY</p> <p>System specification.</p> | <p>8b</p> <p>⚠ Use two wrenches to tighten SAE/JIC fittings at two locations (circled). Tighten SAE/JIC fittings to 45 ft-lbs (61Nm).</p> |
| <p>WHY</p> <p>System specification.</p> |  <p>85-in. cylinder pod</p> |

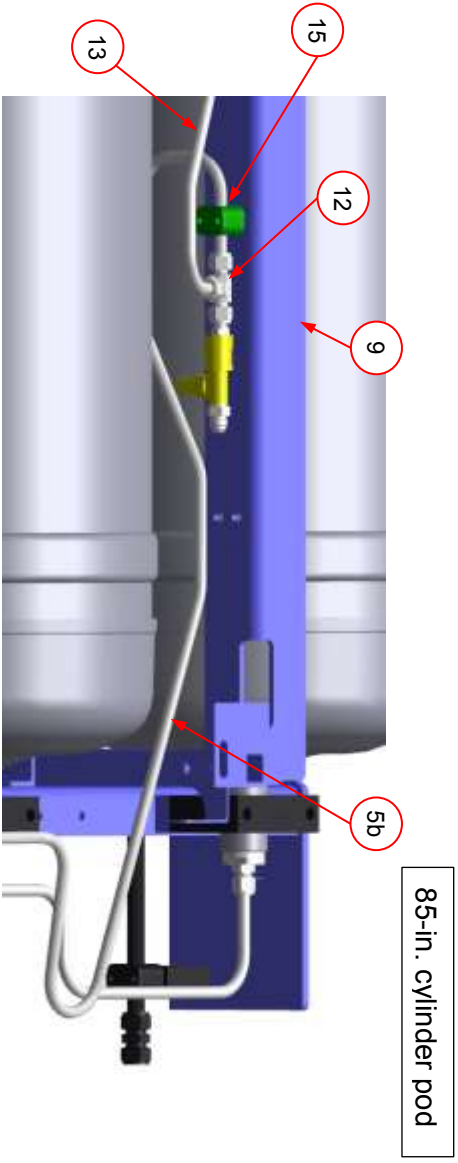
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| <p>9</p> <p>c Tighten clamp fasteners at all clamp locations (<i>circled</i>). Tighten fasteners to 8 ft-lbs (11Nm).</p> <p>WHAT</p> |  <p>85-in. cylinder pod</p> |
| <p>System specification.</p> <p>WHY</p> | <p>WHY</p> |
| <p>10</p> <p>c 1. Verify 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</p> <p>If required: Adjust tube clips and clamps as required and repeat Step 10.</p> <p>WHAT</p> |  <p>PLUG END</p>  <p>85-in. cylinder pod</p> <p>VALVE END</p> |
| <p>Prevent fuel line damage.</p> <p>WHY</p> | <p>WHY</p> |

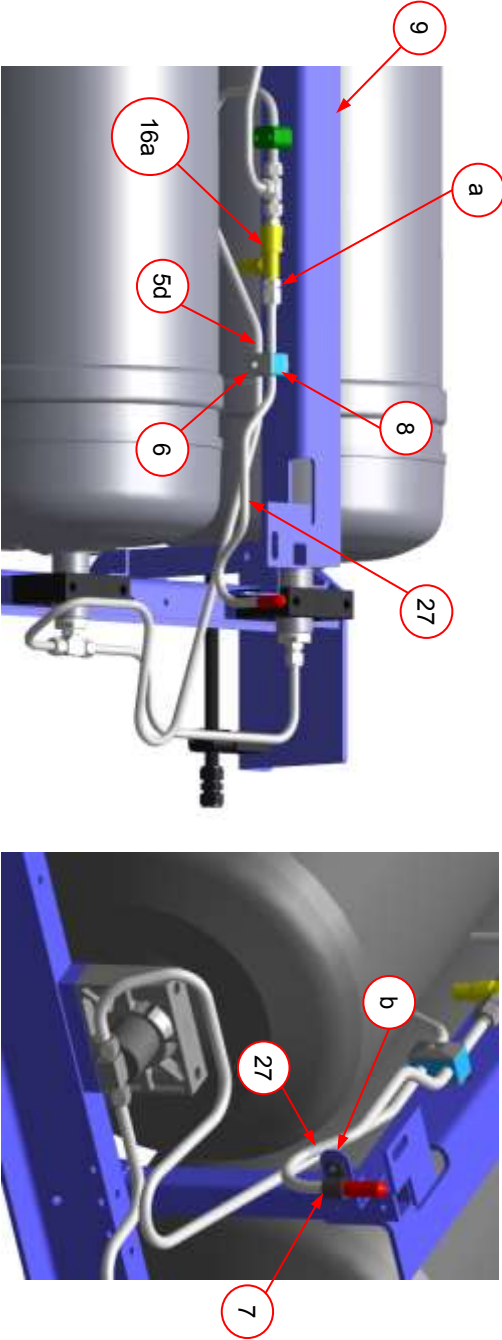
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| 11 | <p>1. Install ferrules (<i>not visible</i>) and nut (a) from tee fitting (12), p/n 10200208, on PRD vent tube, (13), p/n 25519417.</p> <p>2. Install ferrules (<i>not visible</i>) and nut (b) from tube fitting (14), p/n 10200065, on straight 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: W1.0197 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> |  |
| WHY | | |

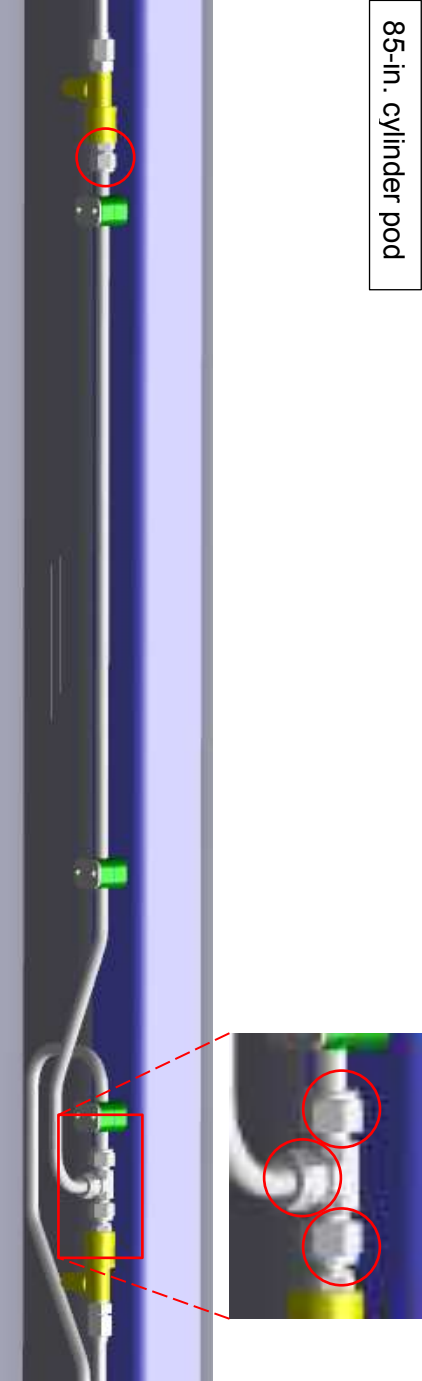
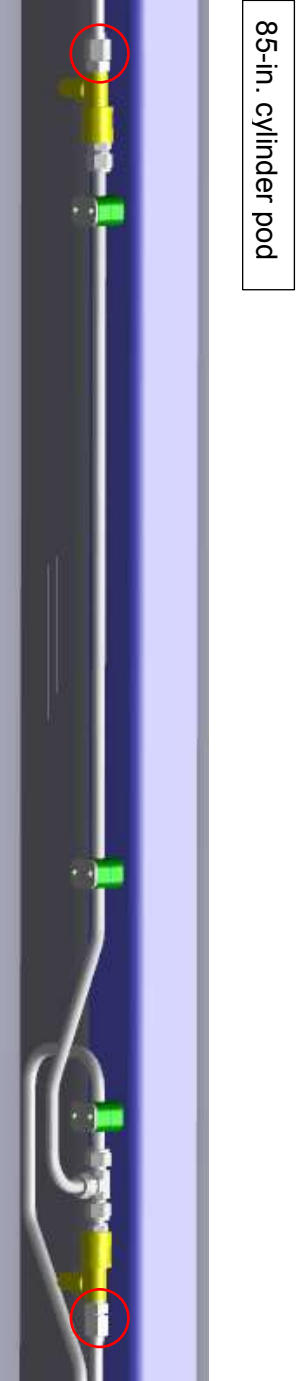
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| <p>12  Always use a backing wrench on the main fitting while using a wrench to install another fitting.</p> | <p>WHAT</p> <p>5. Install tube adapter fitting (17), p/n 10200238 on VTI PRD (16b), p/n 10300513.  Torque fitting (17) to 26 ft-lbs (35.25Nm)</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.  Torque fittings (18) to 18.5 ft-lbs (25Nm).</p> <p>8. Install tube fitting (14), p/n 10200065, on VTI PRD (16a), p/n 10300513.  Torque fitting (14) to 45 ft-lbs (61Nm).</p> |
| <p>WHY</p> |  <p style="text-align: center;">85-in. cylinder pod</p> |

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| <p>13</p> <ol style="list-style-type: none"> 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. 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. 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 holes (circled). <p>NOTICE</p> <p><i>To ease component installation, do not tighten fasteners completely; fasteners will be torqued at a later step</i></p> <p>WHY Support PRD vent lines.</p> |  <p>85-in. cylinder pod</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>1.5-in HEX CAP SCREW FACES AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</p> |
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| 14 | <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</p> <p><i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p> | WHY |
| <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">85-in. cylinder pod</div>  | | WHAT |

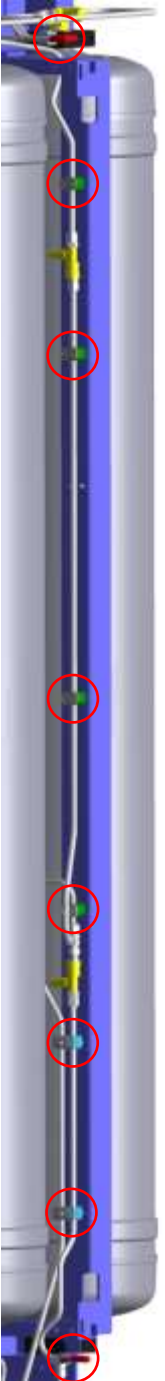
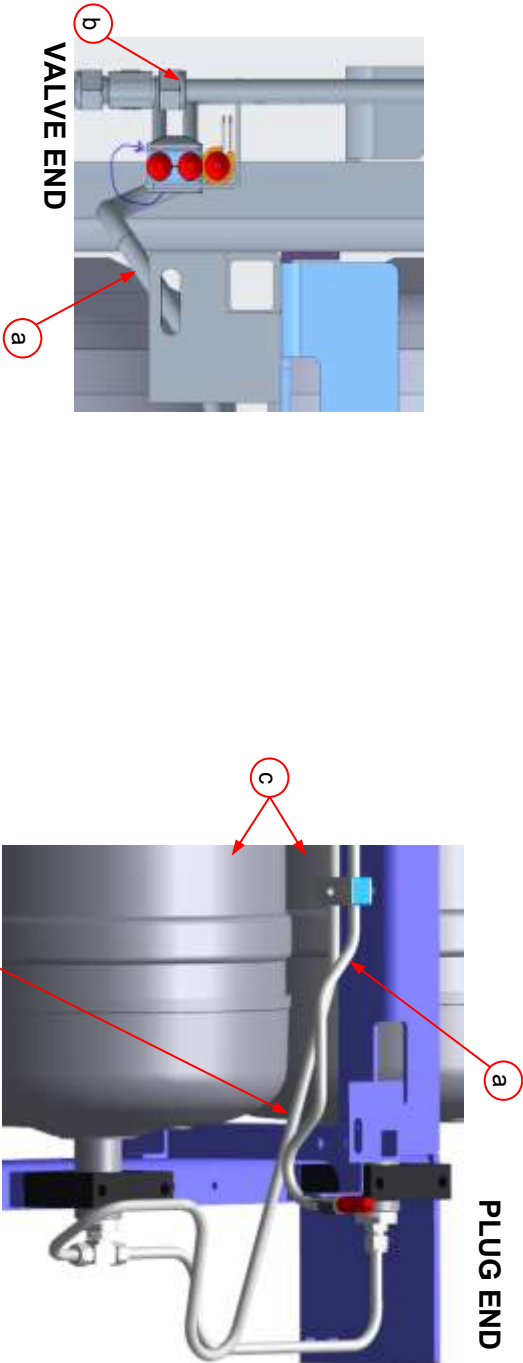
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| <p>15</p> | <p>1. Install PRD supply tube (5b) on PRD supply tube (13) at tee fitting (12).</p> <p>NOTICE</p> <p><i>Tighten fitting finger tight; fitting will be tightened at a later step.</i></p> <p>2. Install tube clamp kit (15), p/n 10701508, on PRD supply tube, (5b).</p> <p>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.</p> <p>4. 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 previously.</p> <p>5. Secure PRD supply tube (5b) to PRD bracket (9).</p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight.</i></p> | <p>WHY</p> |
| <p>INSET A</p>  <p>85-in. cylinder pod</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 (9) TO CAPTURE CLAMP (15).</p> | | <p>WHAT</p> |

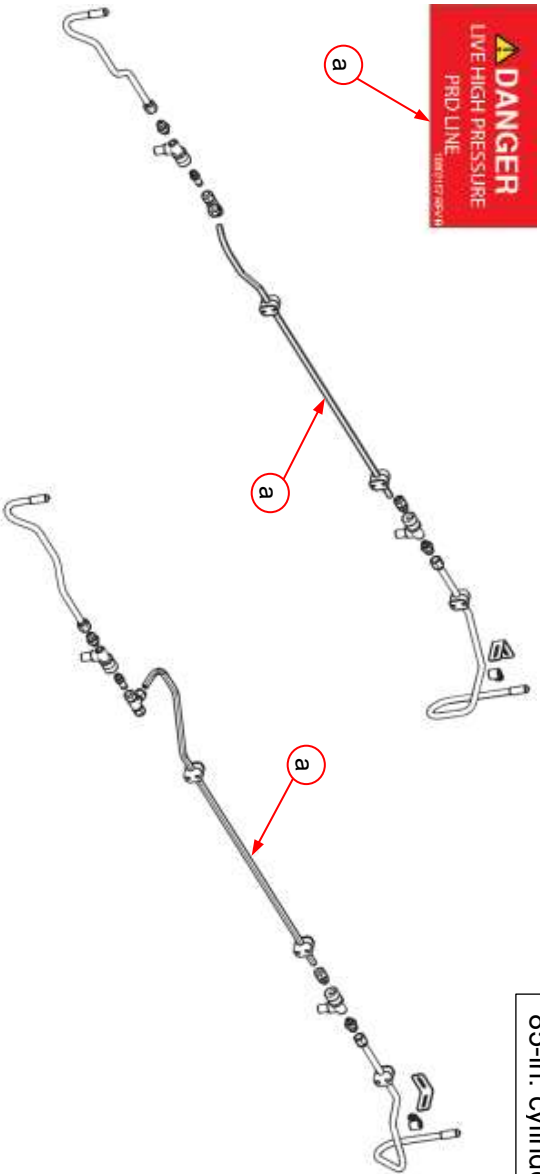
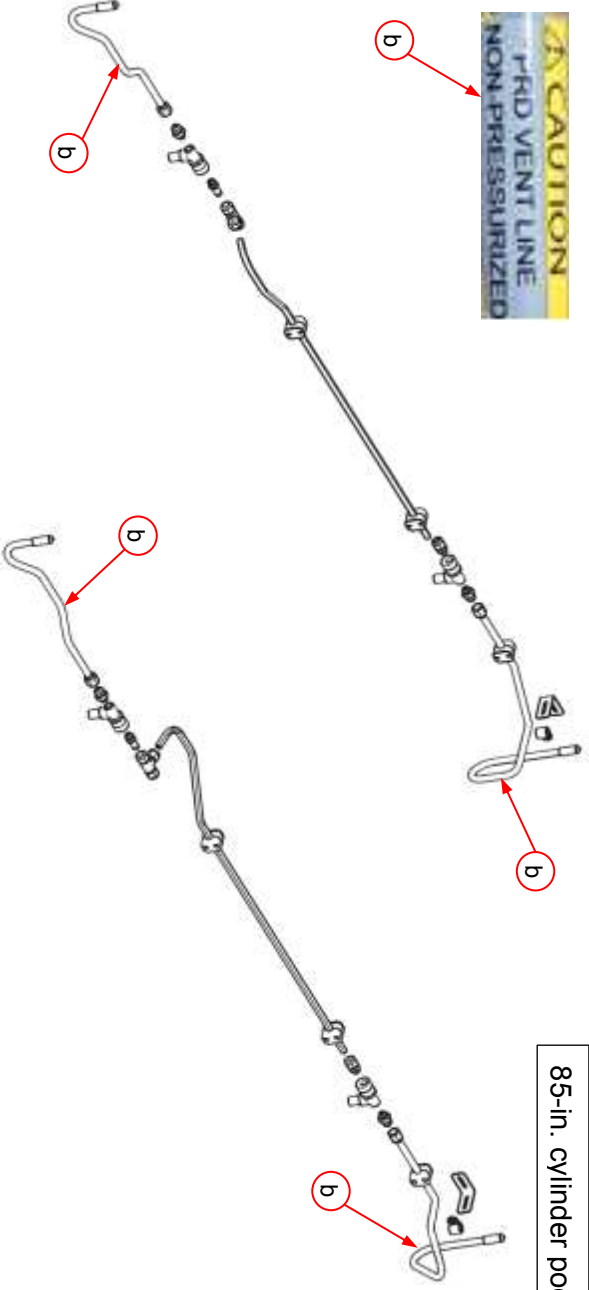
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| 16 | <p>1. Install PRD vent tube (27), p/n 25519027, on PRD (16a) fitting (a).</p> | <p>85-in. cylinder pod</p> |
| | <p>NOTICE</p> <p><i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p> <ol style="list-style-type: none"> Use dual tube clamp, (8) and plate (6), to secure PRD supply tube (5d) to PRD vent tube (27). Slip P-clip (7) on PRD vent tube (27). Attach P-clip (7) to P-clip bracket (b) using existing fasteners (not visible). <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be torqued at a later step.</i></p> |  |
| WHY | | |

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| 17 a | <p>c Use two wrenches to tighten 1/2-in. Swagelok fittings at four locations (circled). Tighten 1/2-in. Swagelok fittings per Appendix B W1.0441.</p> | <p>85-in. cylinder pod</p>  |
| WHY | System specification. | |
| 17 b | <p>c Use two wrenches to tighten SAE/JIC fittings at two locations (circled). Tighten SAE/JIC fittings to 45 ft-lbs (61Nm).</p> | <p>85-in. cylinder pod</p>  |
| WHY | System specification. | |

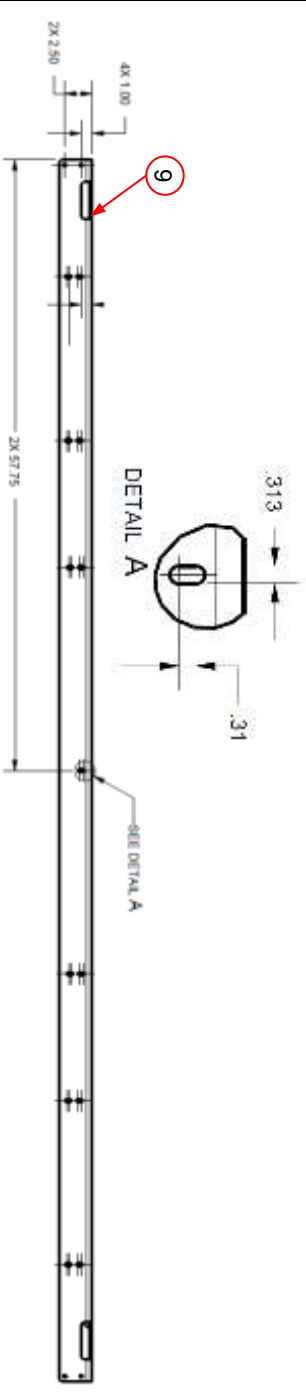
85-in. cylinder pod

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| <p>18</p> | <p>1. Install tube clamp bracket (23), p/n 25519123, and one* spacer, p/n 20100436, on existing double tube clamp (7) using double tube clamp fasteners (not shown).</p> <p>2. Install P-clip (8), 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><i>*Additional spacers are provided in the retrofit kit if required.</i></p> <p>NOTICE <i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> | <p>WHY</p> <p>PRD vent tubes may need to be adjusted for clearance.</p> |
| <p>The diagram illustrates the retrofit process on an 85-inch cylinder pod. The main view, labeled 'VIEW A', shows the internal structure with a red tube clamp bracket (23) being installed on a double tube clamp (7). A PRD vent tube (37) is also visible. A detailed inset view shows the P-clip (8) being secured to the bracket (23) with a hex cap screw, flat washer, and flange top nut. The PRD vent tube (37) is shown passing through the assembly.</p> | | |

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| <p>19</p> <p>⚠ Tighten fasteners at all clamp and clip locations (<i>circled</i>). Tighten fasteners to 8 ft-lbs (11Nm).</p> <p>WHAT</p> |  <p>85-in. cylinder pod</p> |
| <p>20</p> <p>⚠ 1. Verify clearance between PRD vent tubes (a) and live high pressure PRD supply tubes (b) is 3/8-in. minimum.</p> <p>⚠ 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>WHAT</p> |  <p>85-in. cylinder pod</p> <p>PLUG END</p> <p>VALVE END</p> |
| <p>WHY</p> <p>Prevent fuel line damage.</p> | |

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| <p>21</p> <p>c Apply two Decal, System, Danger Live High Pressure PRD Line (a), p/n 10602157, to PRD supply tubes as indicated.</p> |  <p>85-in. cylinder pod</p> |
| <p>22</p> <p>c Apply four Decal, PRD Vent Line, Caution (b), p/n 10602442, to midpoint of PRD vent tubes as indicated.</p> |  <p>85-in. cylinder pod</p> |
| <p>WHY</p> <p>Operator and first responder safety.</p> | |

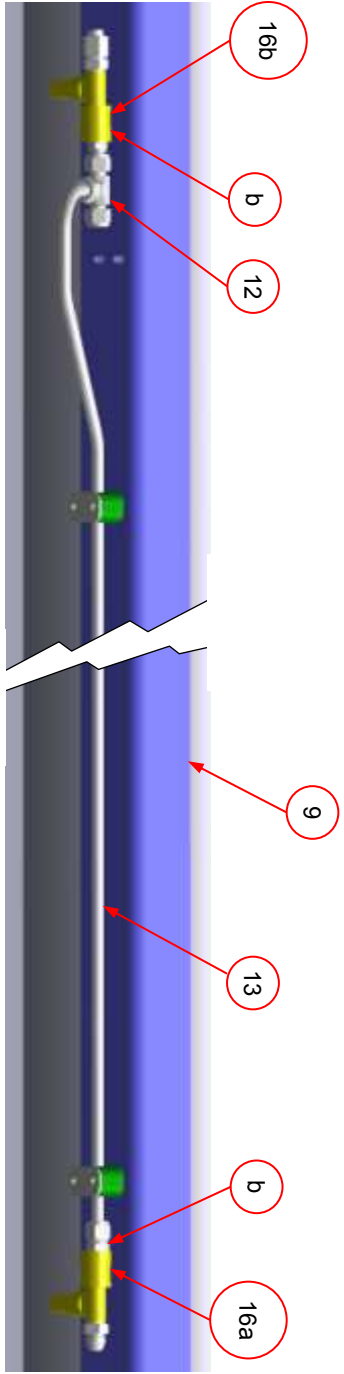
5.4.2. Kit, Retrofit, Gillig, 120" tanks PRD Retrofit, p/n 25519031, installation instructions

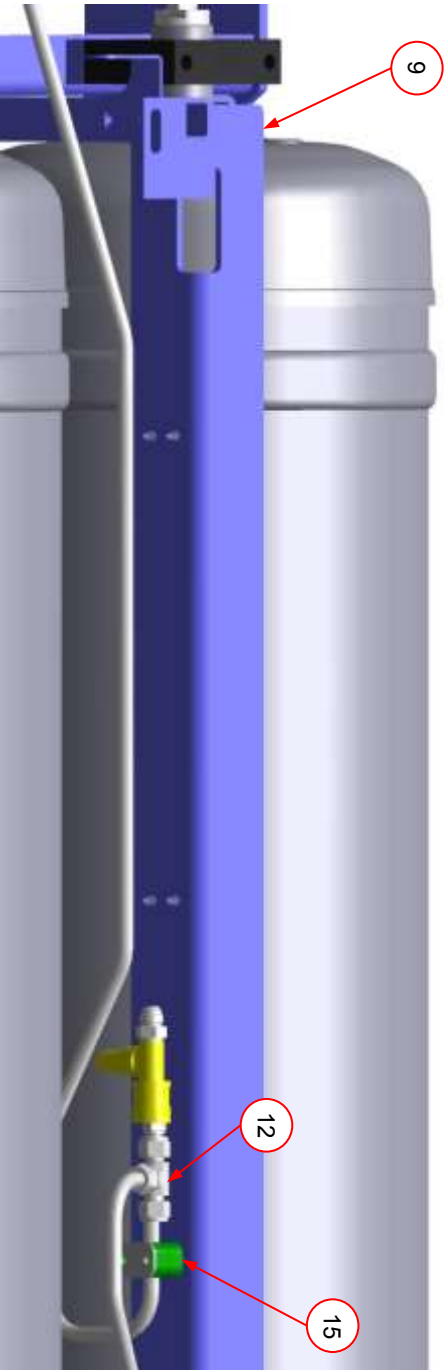
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| 1 | <p>Use a 5/16-in. drill bit to drill one mounting hole at the midpoint (DETAIL A) of each of the 120-in. PRD brackets (9).</p> <p>NOTICE</p> <p><i>While drilling, carefully place a section of a wood 2x4 behind the hole location to prevent cylinder damage.</i></p> | <p>NOTE: All dimensions provided in inches.</p>  <p>120-in. cylinder pod</p> |
| WHY | <p>Additional mounting holes are required to secure clamps to support PRD vent system.</p> | |

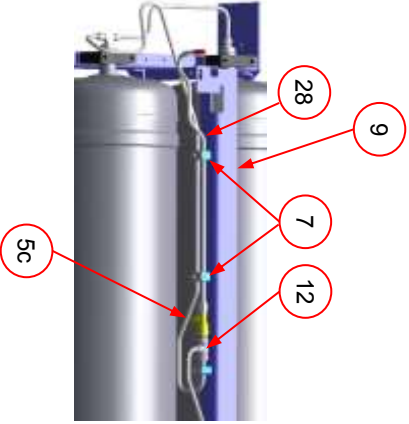
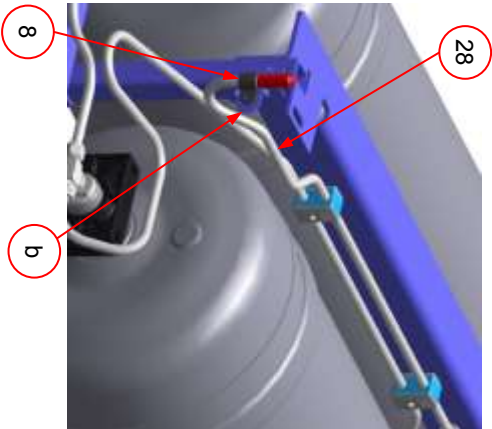
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| <p>2</p> <ol style="list-style-type: none"> 1. Install ferrules (<i>not visible</i>) and nut (a) from tee fitting (12), p/n 10200208, on PRD vent tube (13), p/n 25519416. 2. Install ferrules (<i>not visible</i>) and nut (b) from tube fitting (14), p/n 10200065, on straight end of PRD vent tube (13). 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. 4. Install tee fitting (12), p/n 10200208, on PRD vent tube, (13), p/n 25519416. <p>NOTICE</p> <p><i>Refer to Appendix A: W1.0197 Manual Swaging of Swagelok Fittings.</i></p> <p>NOTICE</p> <p><i>Tighten fitting finger tight; fittings will be tightened at a later step.</i></p> | <p style="text-align: right;">120-in. cylinder pod</p> |
| <p>WHY</p> | |

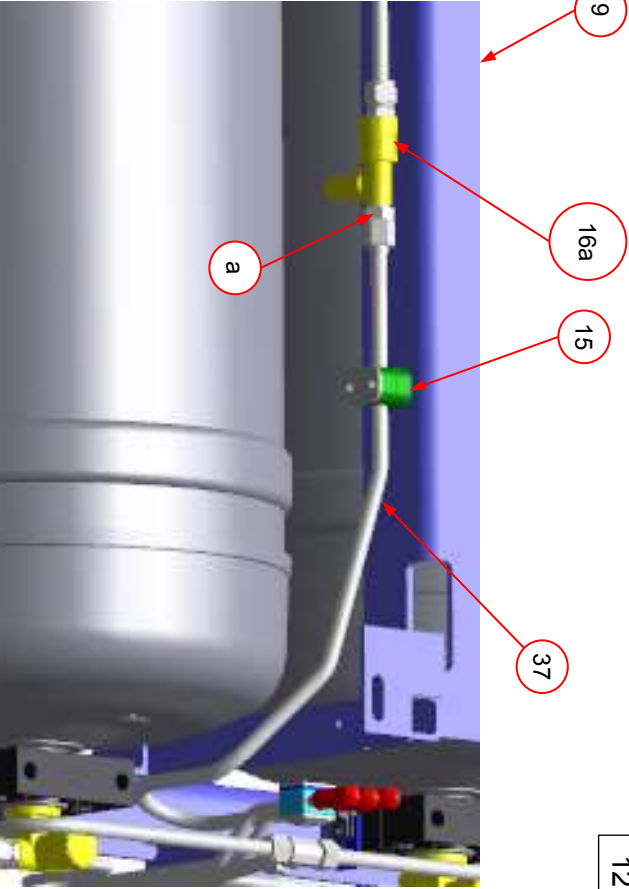
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| <p>3</p> | <p>1. Install two tube clamp kits (15), p/n 10701508, from retrofit kit on PRD tube, (13), p/n 25519417.</p> <p>2. Insert one 1.5-in. hex cap screw (a), p/n 10760200-0150, and one 2.5-in. hex cap screw (b), p/n 10760200-0120, into each tube clamp kit (15), as shown in INSET A.</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 holes (<i>circled</i>).</p> <p>NOTICE</p> <p><i>To ease component installation, do not tighten fasteners completely; fasteners will be tightened at a later step.</i></p> | |
| <p>Support PRD vent lines.</p> | <p>WHY</p> | |


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| <p>4</p> <p>M</p> <p>Always use a backing wrench on the main fitting while using a wrench to install another fitting.</p> | <p>1. Install tube adapter fitting (17), p/n 10200238 on VTI PRD (16b), p/n 10300513.</p> <p>⚠ Torque fitting (17) to 26 ft-lbs (35.25Nm)</p> <p>2. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513.</p> <p>3. Install straight fitting (18), p/n 10200563, on VTI PRD (16a), p/n 10300513.</p> <p>⚠ Torque fittings (18) to 18.5 ft-lbs (25Nm).</p> <p>4. Install tube fitting (14), p/n 10200065, on VTI PRD (16a), p/n 10300513.</p> <p>⚠ Torque fitting (14) to 45 ft-lbs (61Nm).</p> | <p>120-in. cylinder pod</p> |
| <p>WHY</p> | <p>WHAT</p> | |

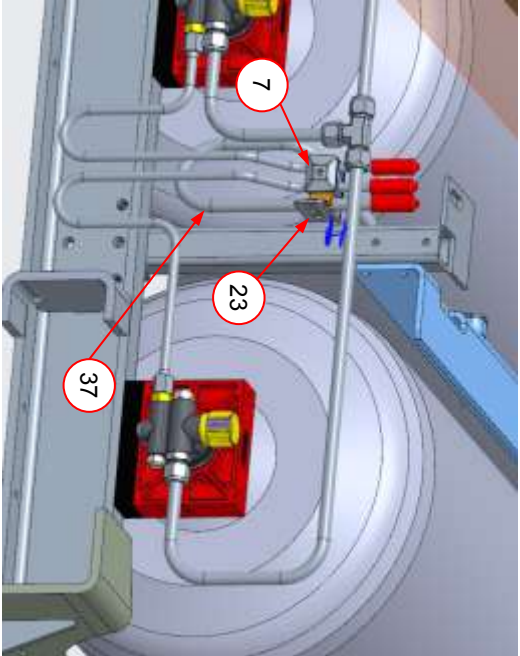
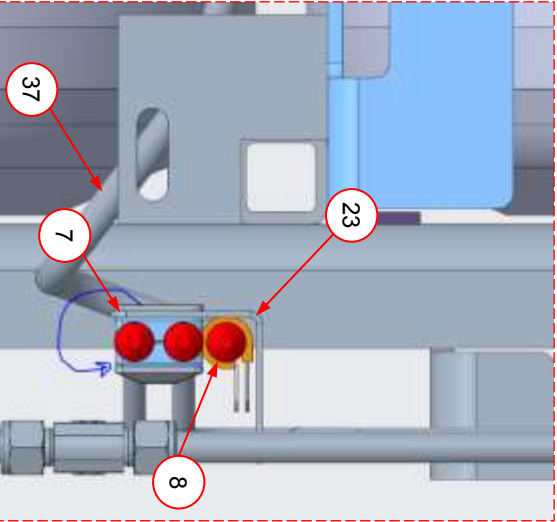
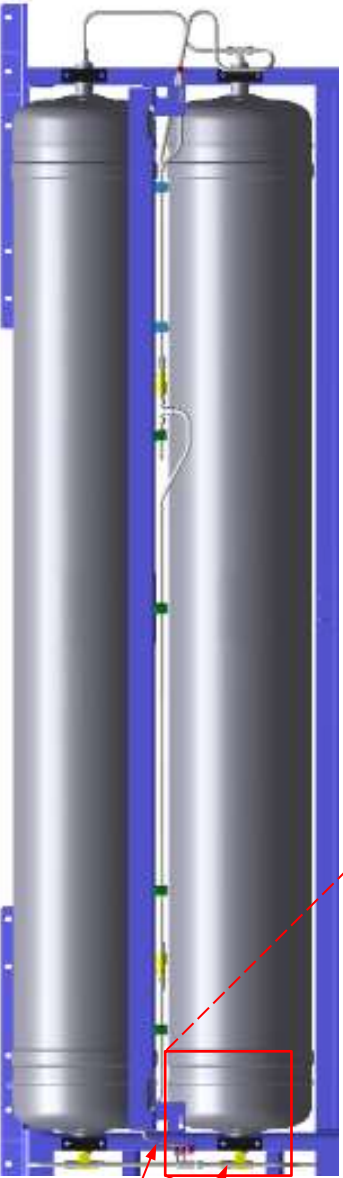
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| 5 | <p>1. Install VTI PRD (16a) assembly inlet fitting (a) on PRD supply tube (13) at tee fitting (12).</p> <p>2. Install VTI PRD (16b) outlet fitting (b) on straight end of PRD supply tube (13).</p> <p>NOTICE</p> <p><i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p> |  <p>120-in. cylinder pod</p> |
| WHY | | |


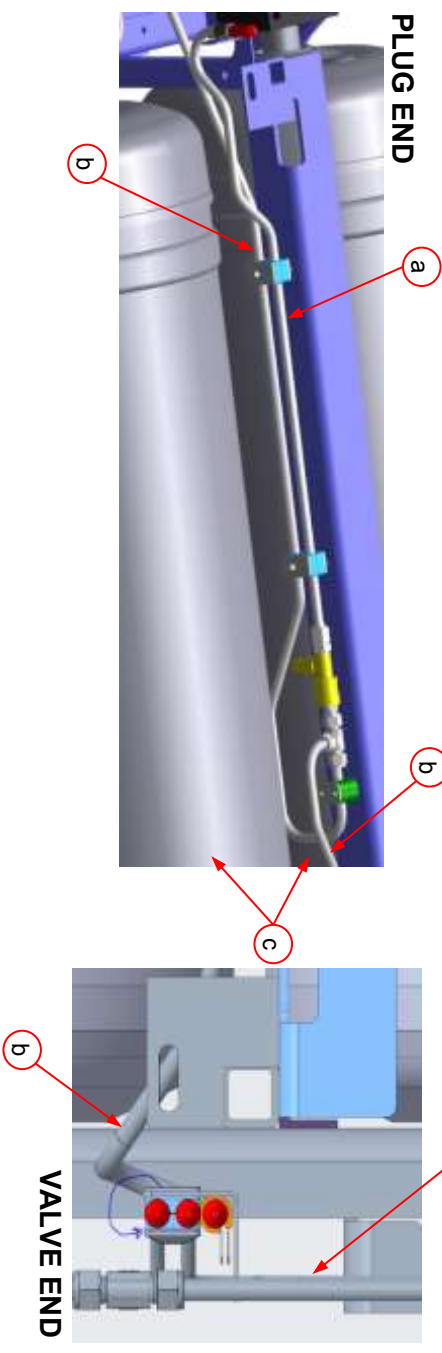
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| 6a | <p>1. Install PRD vent supply tube (5d) on tee fitting (12).</p> <p>NOTICE</p> <p><i>Tighten fittings finger tight; fittings will be tightened at a later step.</i></p> <p>2. Reinstall tube clamp kit (15) on PRD vent supply tube (5d).</p> <p>3. Use tube clamp kit fasteners (not visible) from to secure clamp to PRD bracket (9).</p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> | <div data-bbox="1289 1619 1338 1927" style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">120-in. cylinder pod</div>  |
| WHY | | |

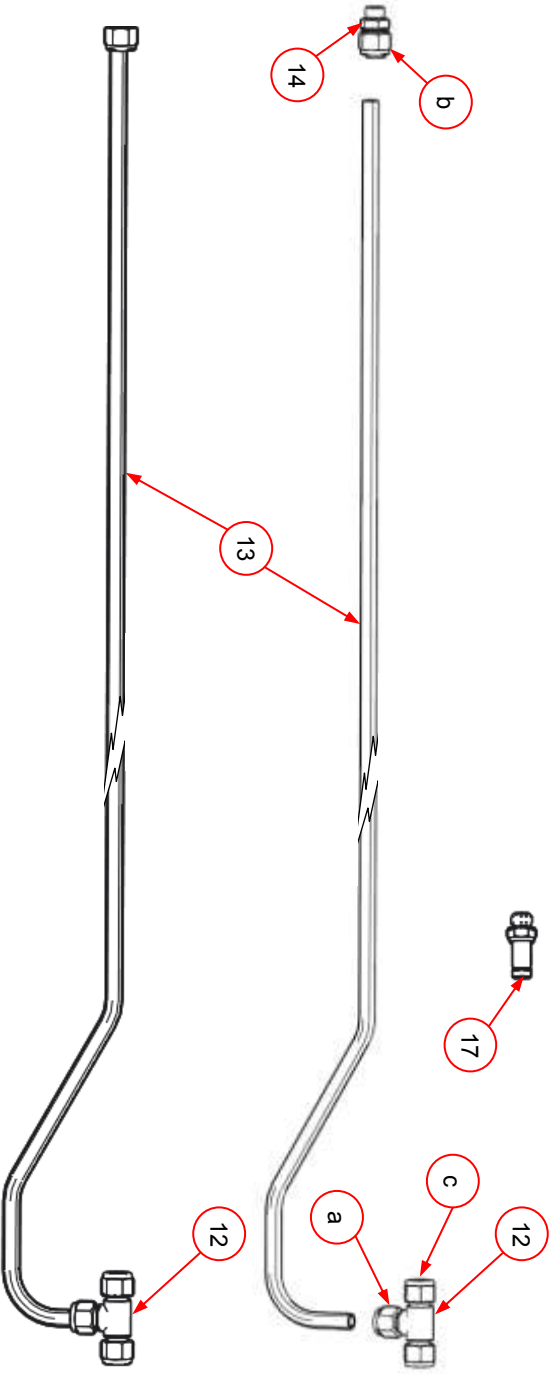
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| 6b | <p>1. Install PRD vent tube (28), p/n 25519028, on tee fitting (12).</p> <p>NOTICE</p> <p><i>Tighten fittings finger tight; fittings will be tightened at a later step.</i></p> <p>2. Install two Tube Clamp Kits, 1/2-in., Double Mounting Hole (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 (not visible) from to secure clamps to PRD bracket (9).</p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> | WHY |
| 120-in. cylinder pod |  | WHY |
| 6c | <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> | WHY |
| 120-in. cylinder pod |  | WHY |

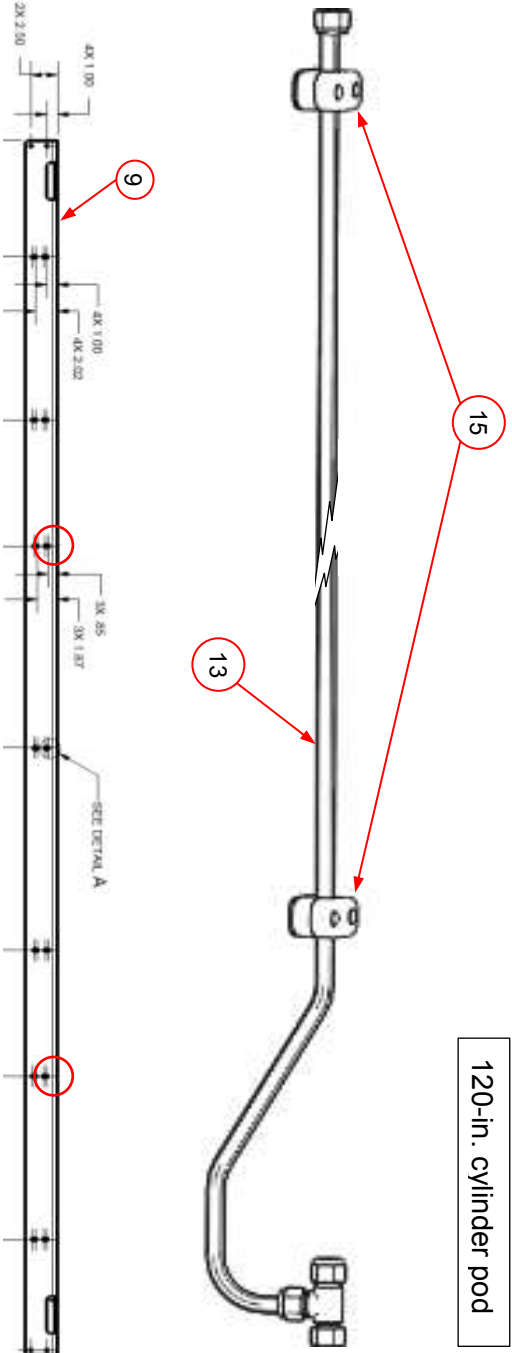
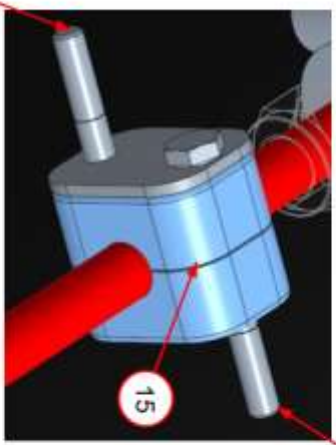
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| <p>7</p> | <p>1. Install nut fitting of PRD vent tube (37) on VT1 PRD (16a) outlet fitting (a).</p> <p>NOTICE</p> <p><i>Tighten fitting finger tight; fitting will be tightened at a later step.</i></p> <p>2. Install tube clamp kit (15), p/n 10701508, on PRD vent tube (37).</p> <p>3. Use tube clamp kit (15) fasteners (<i>not visible</i>) from to secure clamp to PRD bracket (9).</p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> | <div data-bbox="1388 1638 1437 1942" style="border: 1px solid black; padding: 2px; width: fit-content; margin-left: auto;">120-in. cylinder pod</div>  |
| <p>WHY</p> | | |

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| 8 | <p>1. Use two wrenches to tighten SAE / JIC fitting nuts (a).</p> <p>⚠️ Torque fittings to ft-lbs (Nm).</p> <p>2. Tighten all 1/2-in. Swagelok fittings (b).</p> <p>⚠️ Tighten per Appendix B WI.0441.</p> |  <p>120-in. cylinder pod</p> |
| WHY | System specification. | |

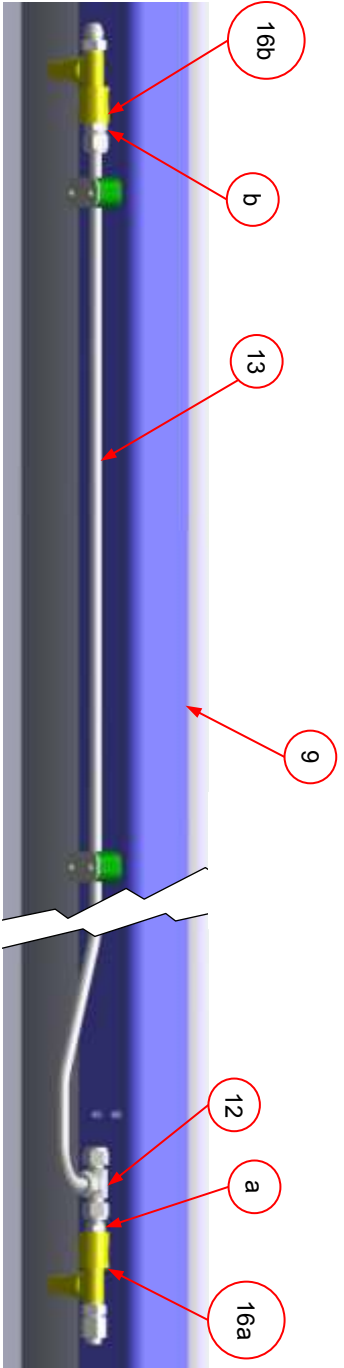
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| <p>9</p> | <p>1. Install tube clamp bracket (23), p/n 25519123, and one* spacer, p/n 20100436, existing double tube clamp (7).</p> <p>2. Slip P-clip (8), p/n 10702147, on PRD vent tube (37), p/n 25519037.</p> <p>3. Install P-clip (8) on tube clamp 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.</p> <p><i>*Additional spacers are provided in the retrofit kit if required.</i></p> <p>NOTICE Tighten fasteners finger tight; fasteners will be tightened at a later step.</p> <p>System specification.</p> | <p>WHY</p> |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p style="text-align: center;">VIEW A</p> </div> <div style="width: 45%; border: 1px dashed red; padding: 5px;">  <p style="text-align: center;">120-in. cylinder pod</p> </div> </div> <div style="margin-top: 20px;">  <p style="text-align: center;">VIEW A</p> </div> | | |

| | | |
|---|--|---|
| <p>10</p> <p>c Tighten clamp fasteners at all clamp locations (<i>circled</i>). Tighten fasteners to 8 ft-lbs (11Nm).</p> | <p>WHAT</p> <p>System specification.</p> |  <p>120-in. cylinder pod</p> |
| <p>11</p> <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 If required: Adjust clamps as required and repeat Step 46.</p> | <p>WHAT</p> <p>Prevent fuel line damage.</p> |  <p>PLUG END</p> <p>120-in. cylinder pod</p> <p>VALVE END</p> |

| | | |
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| <p>12</p> | <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 vent tube (13), p/n 25519416. 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). 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. 4. Install tee fitting (12), p/n 10200208, on PRD vent tube, (13), p/n 25519416. <p>NOTICE</p> <p><i>Refer to Appendix A: W1.0197 Manual Swaging of Swagelok Fittings.</i></p> <p>NOTICE</p> <p><i>Tighten fitting finger tight; fitting will be tightened at a later step.</i></p> | <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">120-in. cylinder pod</div>  |
| <p>WHY</p> | | |

| | | |
|---|---|---|
| 13 | <p>1. Install two tube clamp kits (15), p/n 10701508, from retrofit kit on PRD tube, (13), p/n 25519417.</p> <p>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.</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 holes (<i>circled</i>).</p> | <p>WHY</p> <p>Support PRD vent lines.</p> |
| <p style="text-align: right;">120-in. cylinder pod</p>  <p style="text-align: center;">INSET A</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="803 1060 909 1942" style="border: 1px solid black; padding: 5px;"> <p>2.5-in HEX CAP SCREW TOWARD PRD BRACKET (9) TO SECURE CLAMP (15) TO PRD BRACKET.</p> </div> <div data-bbox="422 1123 755 1564" style="border: 1px solid black; padding: 5px;">  </div> <div data-bbox="251 724 349 1459" style="border: 1px solid black; padding: 5px;"> <p>1.5-in HEX CAP SCREW AWAY FROM PRD BRACKET (9) TO CAPTURE CLAMP (15).</p> </div> </div> | | |
| <p style="text-align: center;">NOTICE</p> <p><i>To ease component installation, do not tighten fasteners completely; fasteners will be torqued at a later step.</i></p> | | |

| | | | | |
|----|---|--|-----|--|
| 14 | M | <p>Always use a backing wrench on the main fitting while using a wrench to install another fitting.</p> <ol style="list-style-type: none"> 1. Install tube adapter fitting (17), p/n 10200238 on VTI PRD (16b), p/n 10300513. <p>Torque fitting (17) to 26 ft-lbs (35.25Nm)</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>Torque fittings (18) to 18.5 ft-lbs (25Nm).</p> <ol style="list-style-type: none"> 4. Install tube fitting (14), p/n 10200065, on VTI PRD (16a), p/n 10300513. <p>Torque fitting (14) to 45 ft-lbs (61Nm).</p> | WHY | |
|----|---|--|-----|--|

| | | |
|-----|---|--|
| 15 | <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</p> <p><i>Tighten fittings finger tight; fittings will be torqued at a later step.</i></p> |  <p>120-in. cylinder pod</p> |
| WHY | | |

120-in. cylinder pod

- 16
 a
1. Install PRD vent supply tube (5d) on tee fitting (12).

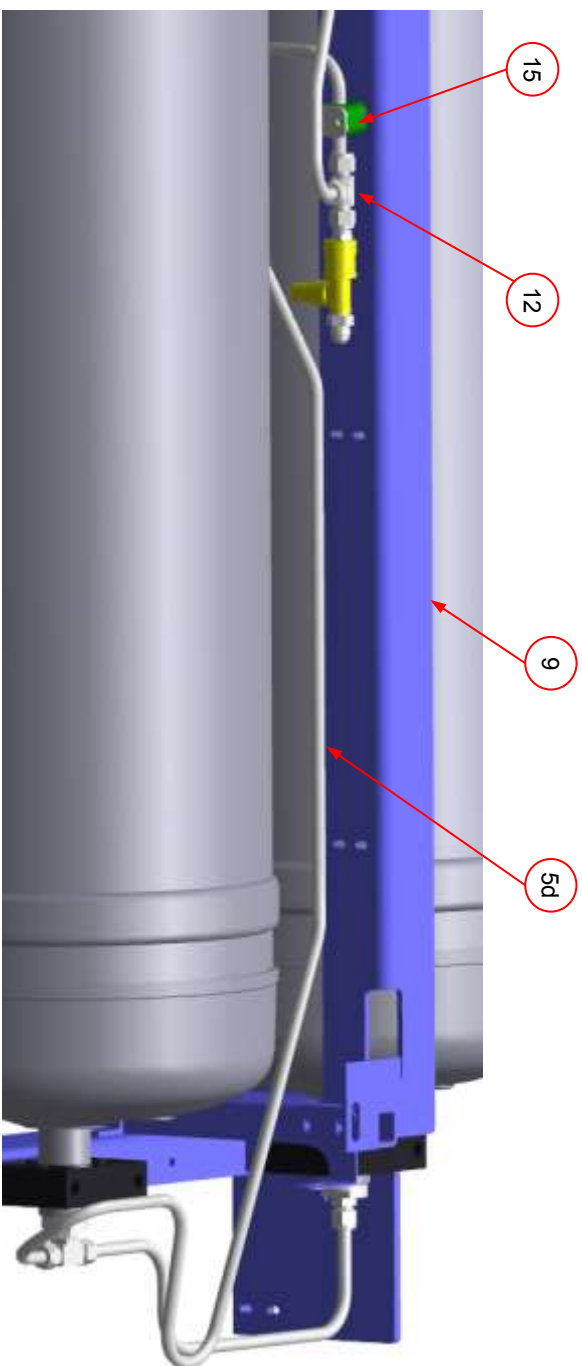
NOTICE

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

2. Reinstall tube clamp kit (15) on PRD vent supply tube (5d).
3. Use tube clamp kit fasteners (*not visible*) from to secure clamp to PRD bracket (9).

NOTICE

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



WHY

120-in. cylinder pod

1. Install PRD vent tube (29), p/n 25519027, on VTI PRD (16b) fitting (a).

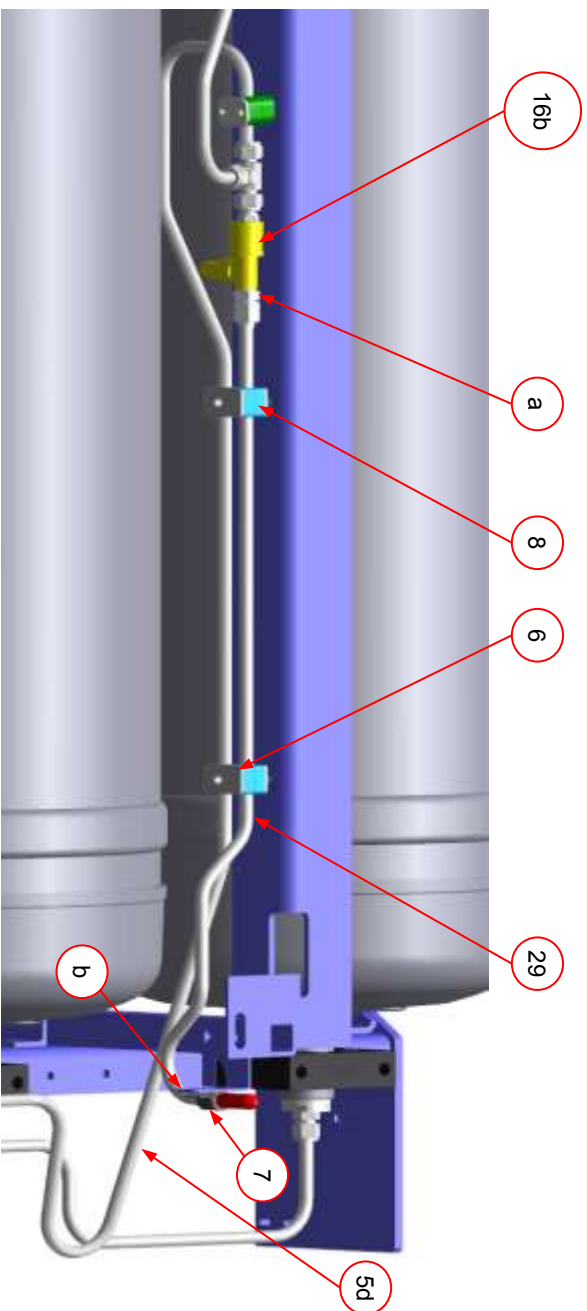
NOTICE

Tighten nut fitting finger tight; fittings will be tightened at a later step.

2. Slip two dual tube clamps (8) and two spacers, p/n (not shown) on PRD vent tube (29), and on PRD supply tube (5d).
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).
4. Slide P-clip (7) on PRD vent tube (29) and use existing fastener to secure P-clip (7) to P-clip bracket (b).

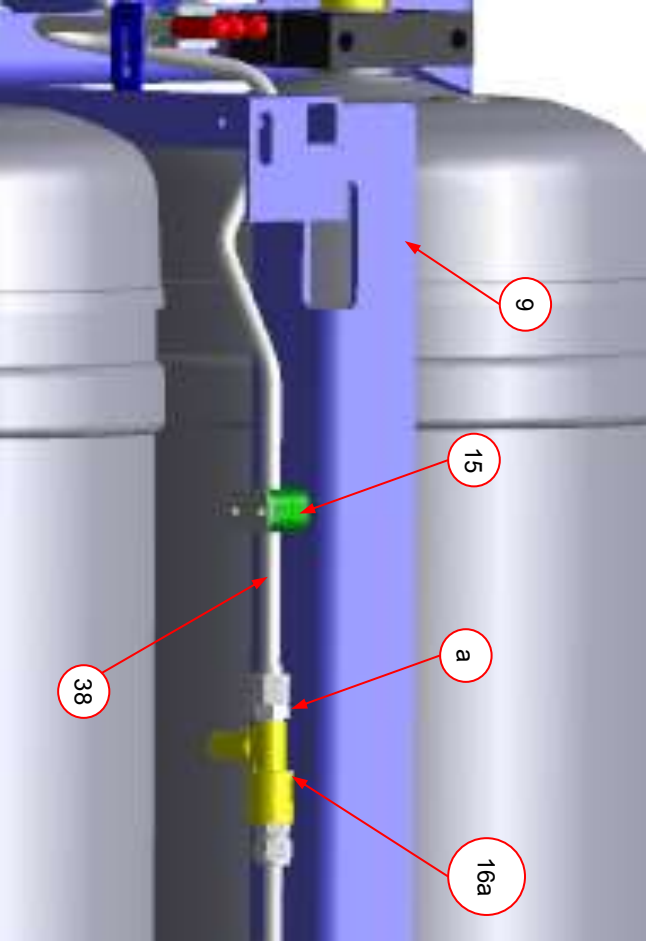
NOTICE

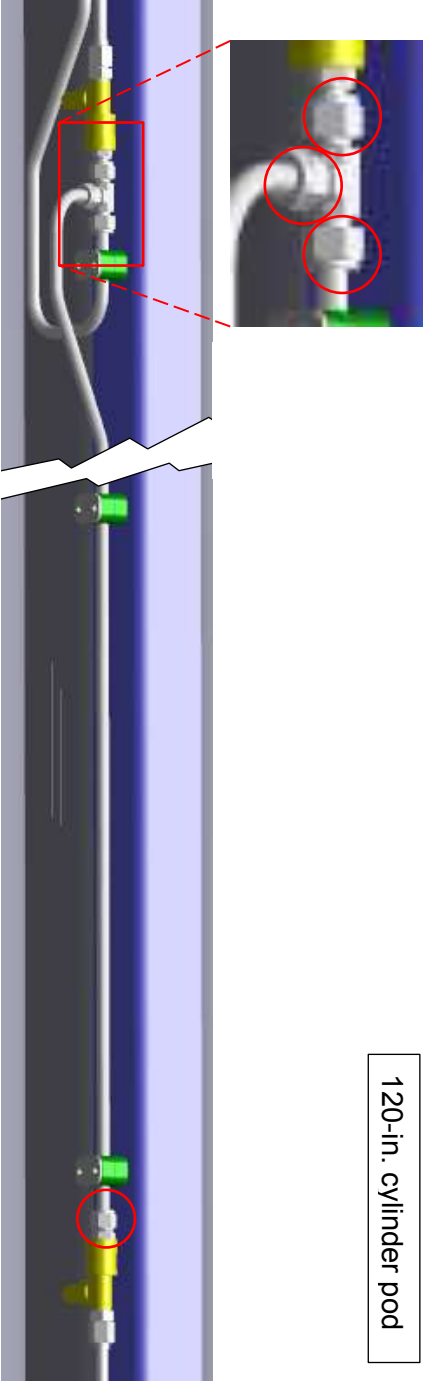
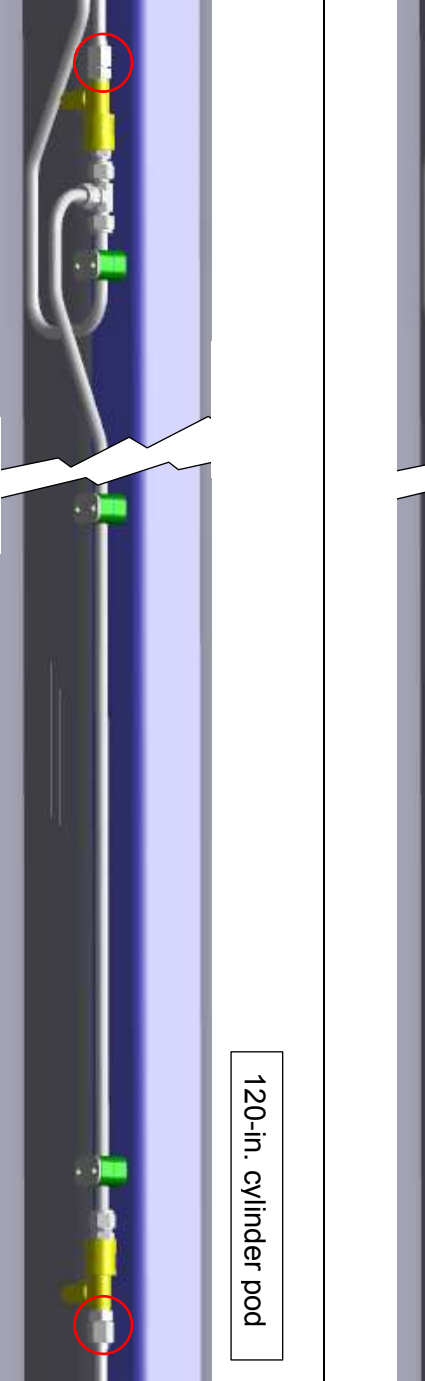
Tighten fasteners finger tight; fasteners will be torqued at a later step.



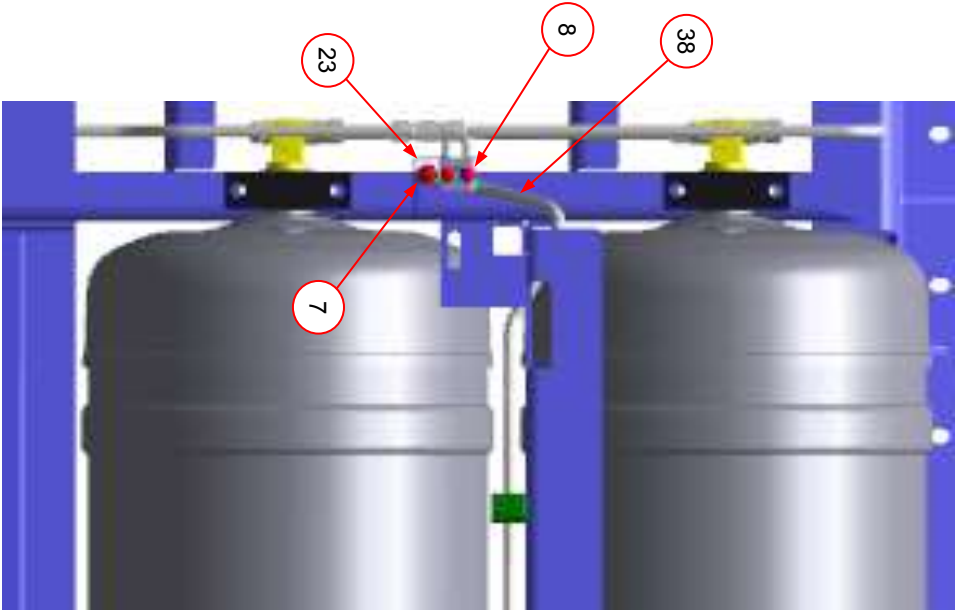
| | | |
|---------|--|-----------------------------|
| 16 b | <p>1. Install PRD vent tube (29), p/n 25519027, on VTI PRD (16b) fitting (a).</p> <p>NOTICE</p> <p>Tighten nut fitting finger tight; fittings will be tightened at a later step.</p> <ol style="list-style-type: none"> 2. Slip two dual tube clamps (8) and two spacers, p/n (not shown) on PRD vent tube (29), and on PRD supply tube (5d). 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). 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>NOTICE</p> <p>Tighten fasteners finger tight; fasteners will be torqued at a later step.</p> | <p>120-in. cylinder pod</p> |
| WHY | | |


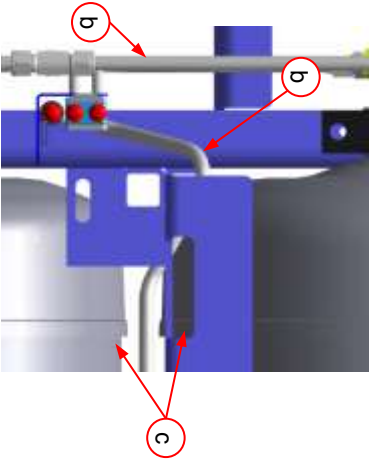
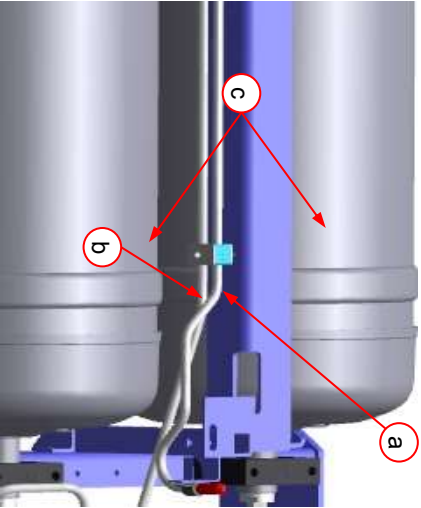
120-in. cylinder pod

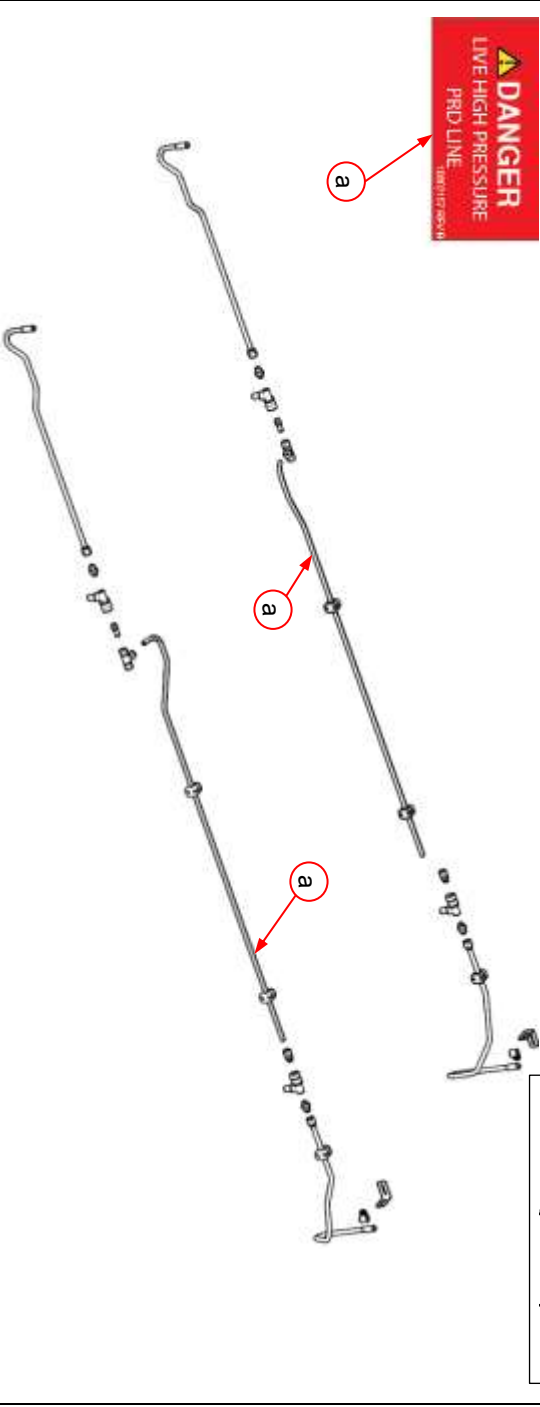
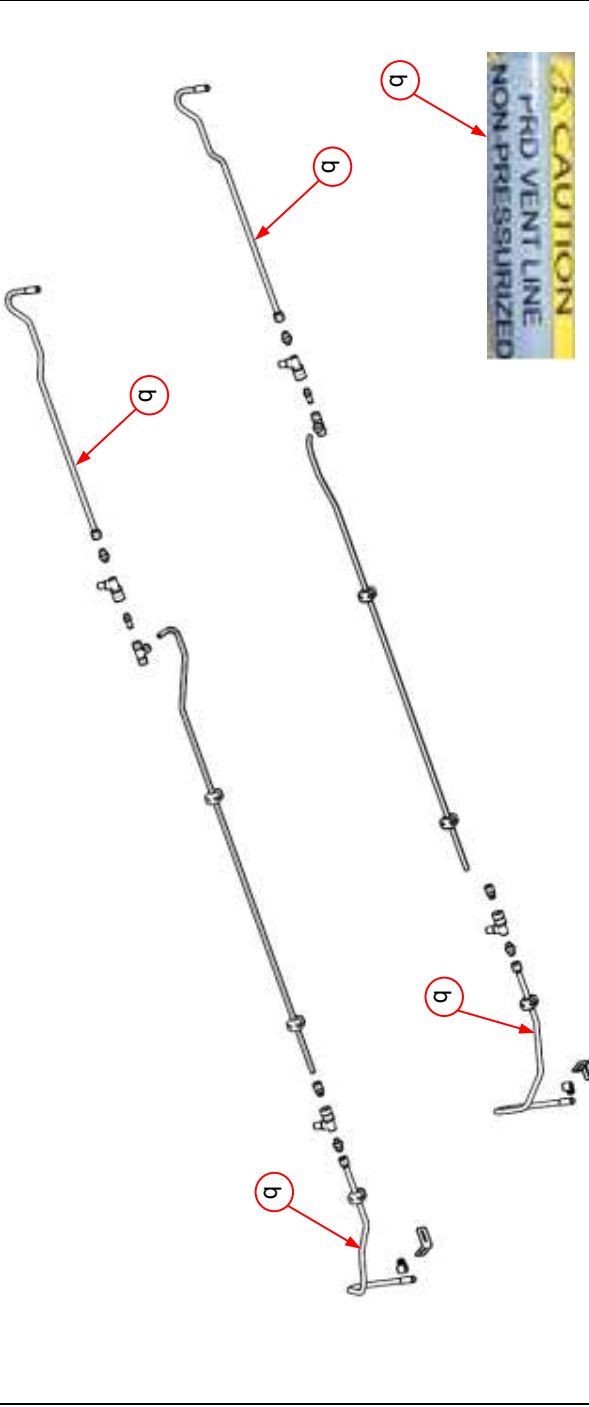
| | | |
|------------|---|---|
| <p>17</p> | <p>1. Install nut fitting of PRD vent tube (38) on VT1 PRD (16a) outlet fitting (a).</p> <p>NOTICE</p> <p><i>Tighten fitting finger tight; fitting will be tightened at a later step.</i></p> <p>2. Install tube clamp kit (15), p/n 10701508, on PRD vent tube (38).</p> <p>3. Use tube clamp kit (15) fasteners (not visible) from to secure clamp to PRD bracket (9).</p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> |  |
| <p>WHY</p> | | |

| | |
|---|--|
| <p>18</p> <p>C Use two wrenches to tighten 1/2-in. Swagelok fittings at four locations (circled). Tighten 1/2-in. Swagelok fittings per Appendix B W1.0441.</p> <p>WHAT</p> <p>System specification.</p> <p>WHY</p> |  <p>120-in. cylinder pod</p> |
| <p>19</p> <p>C Use two wrenches to tighten SAE/JIC fittings at two locations (circled). Tighten SAE/JIC fittings to 45 ft-lbs (61Nm).</p> <p>WHAT</p> <p>System specification.</p> <p>WHY</p> |  <p>120-in. cylinder pod</p> |

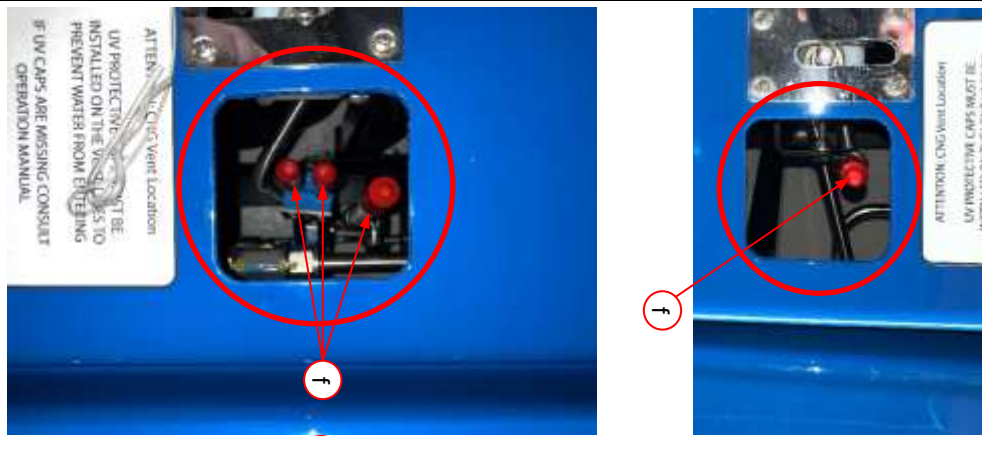

120-in. cylinder pod

| | | |
|-----|---|---|
| 20 | <p>1. Install tube clamp bracket (23), p/n 25519123, on existing double tube clamp (7) and one* spacer, p/n 20100436 (<i>not shown</i>).</p> <p>2. Slip P-clip (8), p/n 10702147, on PRD vent tube (38), p/n 25519038.</p> <p>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.</p> <p><i>*Additional spacers are provided in the retrofit kit if required.</i></p> <p>NOTICE</p> <p><i>Tighten fasteners finger tight; fasteners will be tightened at a later step.</i></p> |  |
| WHY | <p>System specification.</p> | |

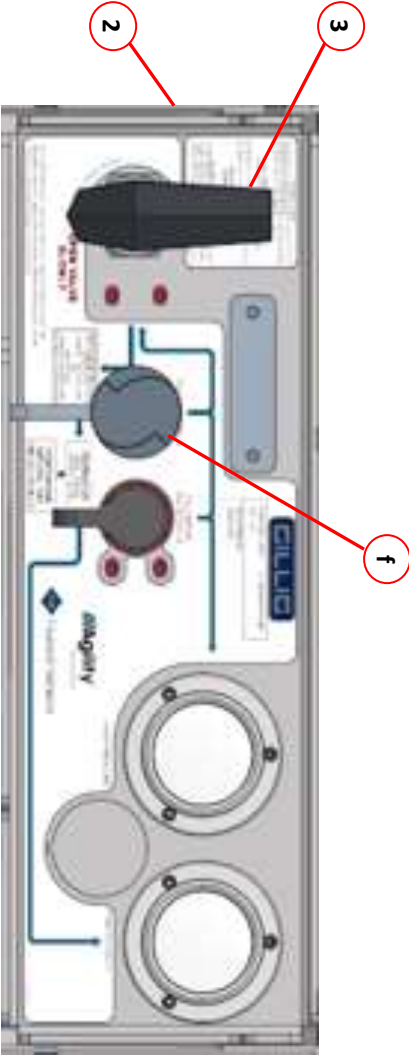
| | | | |
|-----------|---|---|---|
| <p>21</p> | <p>c Tighten clamp fasteners at all clip and clamp locations (circled). Tighten fasteners to 8 ft.-lbs (11Nm).</p> | <p>System specification.</p> |  <p>120-in. cylinder pod</p> |
| <p>22</p> | <p>c 1. Verify clearance between PRD vent tubes (a) and live high pressure PRD supply tubes (b) is 3/8-in. minimum.</p> <p>2. Verify clearance c between all system plumbing and cylinders (c) is 3/8-in. minimum.</p> <p>NOTICE If required: Adjust clamps as required and repeat Step 23.</p> | <p>Prevent fuel line and cylinder damage.</p> | <p>VALVE END</p>  <p>120-in. cylinder pod</p> <p>PLUG END</p>  |

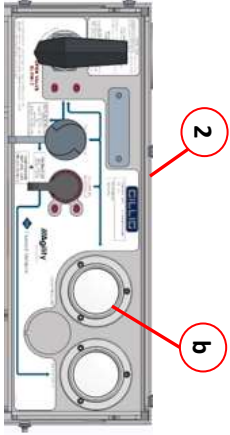

| | |
|--|---|
| <p>23</p> <p>c Apply quantity four Danger Live High Pressure PRD Line (a), p/n 10602157, to PRD supply tubes as indicated.</p> |  <p>120-in. cylinder pod</p> |
| <p>24</p> <p>c Apply quantity four Decal, PRD Vent Line, Caution (b), p/n 10602442, to midpoint of PRD vent tubes as indicated.</p> |  <p>120-in. cylinder pod</p> |
| <p>WHY</p> <p>Operator and first responder safety.</p> | <p>WHY</p> <p>Operator and first responder safety.</p> |



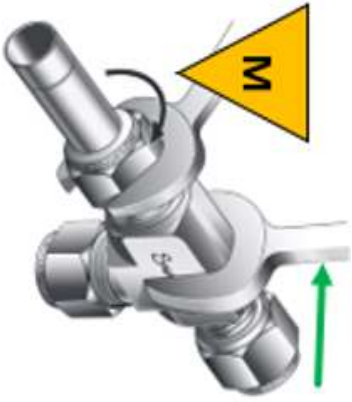
5.4.3. Check PRD vent tube outlet clearance


| | | |
|-----|---|--|
| 1 | <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 (circled).</p> <p>3. Visually verify proper clearance between valve end PRD vent tube caps (f) and door opening (circled).</p> <p>WARNING</p> <p>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> |  |
| 2 | <p>Repeat Step 1 for each roof pod door.</p> |  |
| WHY | <p>Verify proper PRD vent tube position.</p> | <p>WHY</p> <p>Verify proper PRD vent tube position.</p> |
| WHY | <p>Verify proper PRD vent tube position.</p> | <p>WHY</p> <p>Verify proper PRD vent tube position.</p> |


5.5. System Leak Check Procedure

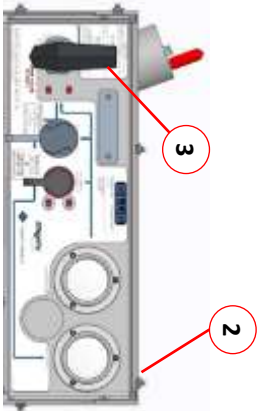
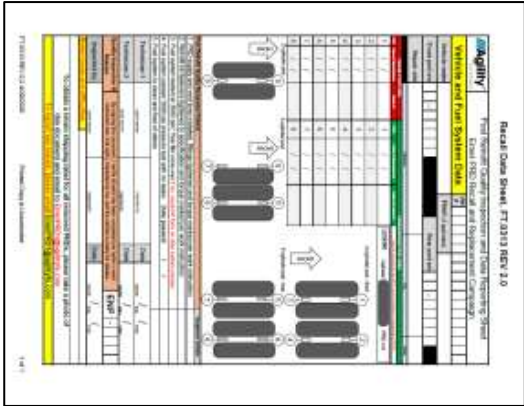
| | | |
|------|---|--|
| 1 | <p>1. Turn 1/4-turn manual shut off valve (3) on the FMM (2) to the OPEN position.</p> <p>WARNING</p> <p>2. Select the appropriate CNG fuel nozzle and/or adaptor for the FMM (2) fuel fill receptacle (not visible).</p> <p>3. Remove fuel fill receptacle dust cap (f).</p> <p>4. Begin fueling the vehicle with CNG using a regulated fuel supply.</p> <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>The diagram shows a control panel for a CNG fueling system. It features a manual shut-off valve labeled '3', a fuel fill receptacle dust cap labeled 'f', and a fuel meter labeled '2'. The panel also includes a 'CNG' label and a 'Agility' logo.</p> |
| WHAT | | |
| WHY | Test fuel system integrity. | |

| | | |
|--|--|---|
| <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><i>1. If a hissing sound is heard coming from fuel system fittings during filling, stop the fill immediately.</i></p> <p><i>2. Try to isolate the sound and spray Swagelok Snoop® on the suspected location to check for bubble formation.</i></p> | <p>WHY</p> <p>Subjects fuel system to partial operating pressure.</p> |
|  | | |
| <p>3</p> | <p>WHAT</p> <p>C Leak test all fuel and PRD tubes and fitting connections using Swagelok Snoop® leak detection solution or equivalent.</p> | <p>WHY</p> <p>Approved leak detection solution for visual inspection of system leaks.</p> |
|  | | |

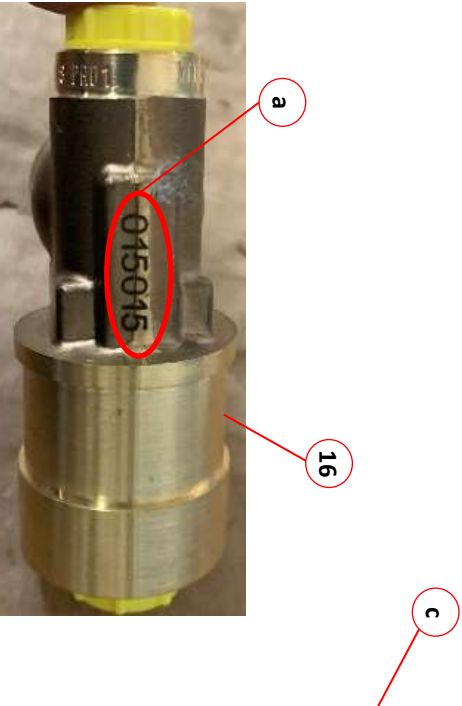
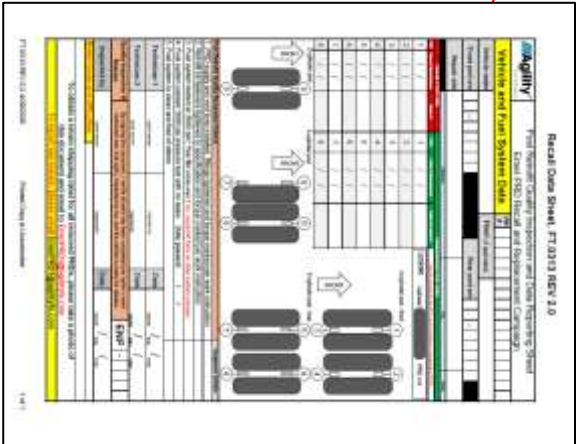
| | | | |
|---|---|--|---|
| <p>4</p> <p>WHAT</p> <p>1. Begin at one end the of the fuel system and work methodically to spray all fuel line fittings with Swagelok Snoop® or equivalent.</p> <p>2. Allow at least 10 minutes to elapse before checking the integrity of fitting connections.</p> |  | <p>5</p> <p>WHAT</p> <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 OEM procedure to defuel system.</i></p> |  |
| <p>6</p> <p>WHAT</p> <p>Re-tighten leaking fitting(s) discovered during Step 5.</p> <p>⚠ C</p> <p><i>1. For JIC fittings, refer to p/n specific tightening instructions.</i></p> <p><i>2. For compression fittings, tighten fitting according to Appendix B.</i></p> |  | <p>7</p> <p>WHAT</p> <p>Repeat Steps 1 and 2 to repressurize the system.</p> | <p>WHY</p> |
| <p>WHY</p> | <p>WHY</p> | <p>WHY</p> | <p>WHY</p> |

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

| | | | |
|--|--|---|--|
| <p>14</p> <p>C</p> <p>Spray new fitting junction with Swagelok Snoop[®] or equivalent to retest for leaks.</p> | | <p>15</p> <p>Turn FMM 1/4-turn manual shut off valve (3) counterclockwise to the OPEN position.</p> | |
| <p>16</p> <p>C</p> <p>Repeat pressure test procedure stopping the fill when fuel system pressure reaches 2000 psi to 2100 psi (13.79MPa to 14.48MPa).</p> | | <p>17</p> <p>C</p> <p>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.</p> |  |
| <p>WHY</p> <p>Subjects fuel system to partial operating pressure.</p> | | <p>WHY</p> <p>Subjects fuel system to full operating pressure.</p> | |
| <p>18</p> <p>C</p> <p><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></p> | | <p>19</p> <p>Replace dust cap (f) on FMM (2) fuel fill receptacle (a).</p> | |
| <p>WHY</p> | | <p>WHY</p> <p>Vehicle will not start if dust cap is not in place.</p> | |

| | | | |
|---|---|---|---|
| <p>20</p> <p>WHAT</p> <p><i>If not open, turn FMM (2) 1/4-turn manual shut off valve (3) counterclockwise to the OPEN position.</i></p> |  | <p>21</p> <p>WHAT</p> <p><i>Clean Swagelok Snoop® or equivalent from the fuel system.</i></p> <p><i>Customer satisfaction.</i></p> | <p>WHY</p> <p>Customer satisfaction.</p> |
| <p>22</p> <p>WHAT</p> <p><i>When the pressure test is completed successfully, use form FT. 0313 (c) to record the result and the date on which the fuel system passed the 3600 psi test.</i></p> |  | <p>23</p> <p>WHY</p> <p>Apply Torque Seal to all fitting junctions.</p> <p>System quality specification.</p> | <p>WHY</p> <p>Verify safe and proper fuel system pressure specification.</p> |

5.6. Reporting and Return Procedure

| | | |
|-----|---|--|
| 1 | <p>1. Use form FT.0313 (c) to record the serial number (a) and the location of each VTI replacement PRD (16), p/n 10300513, within the fuel system.</p> <p>2. Inspect fuel system repairs per the quality assurance criteria specified in FT.0313.</p> <p>NOTICE</p> <p><i>Use a flashlight to aid serial number identification in low light.</i></p> <p>3. Use a camera or camera phone to take a photo of completed form FT.0313 (c).</p> <p>4. Submit photo of completed form FT.0313 (c) to the email address indicated on the form to receive a Return Material Authorization (RMA) shipping label.</p> |   |
| WHY | <p>Required for retrofit kit component and repair tracking and, if applicable, installer reimbursement.</p> | |

| | | |
|-----|--|--|
| 2 | <p>Repeat Section 5. Corrective Action / Procedure for all vehicles subject to the Emer™ PRD recall on hand until all repairs are complete.</p> | |
| 3 | <p>C</p> <ol style="list-style-type: none"> 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. <i>If possible:</i> reuse the box in which the replacement PRDs were shipped. 2. Apply RMA label obtained from Agility® to the box. 3. Use a permanent marker to write RMA number on exterior of each shipping box. | |
| WHY | | |
| WHY | <p>Required for repair return tracking and, if applicable, installer reimbursement.</p> | |


















Appendix A. WI.0197 Manual Swaging of Swagelok Fittings

Standard Work Instruction

Manual Swaging of Swagelok Fittings

Scope: Manual swaging of Swagelok fittings onto:




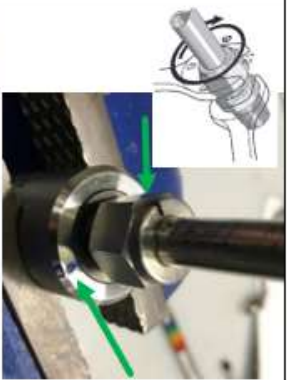

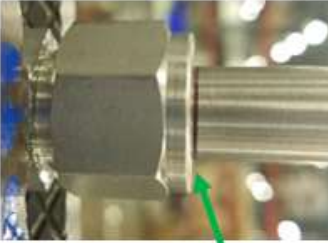


- 1/4", 3/8" and 1/2" OD tubing (Steps 1-10)
- Swagelok port connectors and port adaptors (Steps 4-10 only)

| | | | |
|--|--|---|--|
| <p>1</p> <p>WHAT</p> <p></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></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> "P"</p> <p> "SWAGELOK"</p> |
| <p>3</p> <p>WHAT</p> <p></p> <p>Install nut and ferrules onto the tube. Verify that they are in the proper order and orientation.</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></p> <p>Swaging surface</p> <p>Threads</p>  |
| <p>WHY</p> <p>This is critical for proper swage strength and leak-tightness.</p> | <p>front ferrule</p> <p>back ferrule</p> <p>nut</p> | <p>WHY</p> <p>A damaged or dirty swaging die could lead to damage to the ferrule or nut.</p> | <p></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>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 damaged or worn, which could prevent the tube from being swaged properly.</p>  <p></p> |
| <p>WHY</p> <p>If tube is not fully seated, ferrules will be swaged in incorrect location on tube.</p> <p></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 damaged or worn, which could prevent the tube from being swaged properly.</p> | <p></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)

| | | | |
|---|---|---|--|
| <p>7</p> <p>WHAT</p> <p>Mark the nut and die with a fine-tipped sharpie at the 6 o'clock position.</p> <p></p> |  | <p>8</p> <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></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> | <p>9</p> <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> <p></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>10</p> <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></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> |  |



Standard Work Instruction

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)

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 | --- |

Standard Work Instruction

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)

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 3. Nut, then back ferrule, then front ferrule | Mixed parts could leak. Missing, mis-located and mis-oriented parts could leak. |
| 3. Tube into die | 1. Die is clean and smooth 2. Tube bottomed out in die 3. Turn nut to hand tight | Dirty or worn dies do not work properly. The tube must be fully inserted into the die. 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 2. Stop at 9 o'clock 3. DMT line fully showing | Incorrect turns could cause a leak. Provides visual aid to finish turning. Verify swage is complete |
| 6. Remove tube | 1. Gently rock tube back and forth | Too much force means the die is worn. |



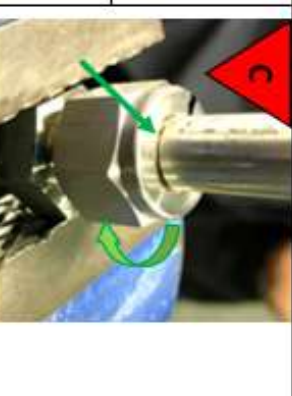
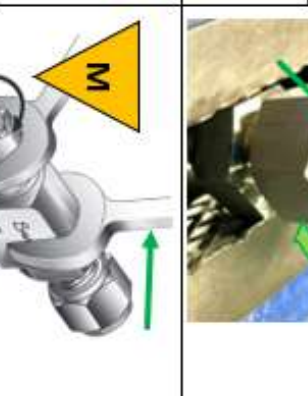
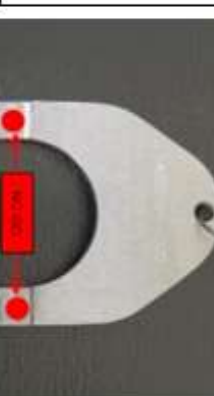

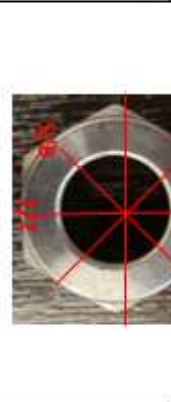
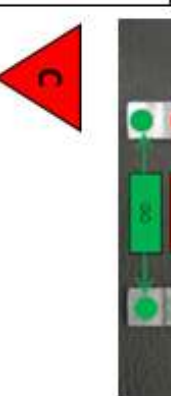
Appendix B. WI.0441 Tightening of tube fittings



Tightening of Tube Fittings

Scope: Tightening of 1/2" Swagelok fittings, port connectors and port adaptors.
 Note: "Substitute from WI.0198"

Standard Work Instruction

| | | | |
|---|---|--|--|
| <p>1</p> <p>Install swaged tube into fitting. Verify that both nut and fitting have same manufacturer markings.</p>  |  | <p>2</p> <p>Tighten nut (by hand or with wrench) until top of nut is aligned with the bottom of the DMT mark.</p> |  |
| <p>WHY</p> <p>Swagelok/Parker fittings and nuts are NOT interchangeable.</p> | <p>WHY</p> <p>This line shows the nut's correct starting location prior to tightening.</p> | <p>WHY</p> <p>Put a "backing wrench" on the adjacent fitting. Note: some products require holding a different component - this will be noted in the product-specific work instructions.</p> |  |
| <p>WHAT</p> <p>Mark across nut and fitting with blue paint pen</p> | <p>WHAT</p> <p>The backing wrench prevents the fitting from rotating. This ensures that the nut is NOT under-tightened.</p> | <p>WHAT</p> <p>Note: some products require holding a different component - this will be noted in the product-specific work instructions.</p> | <p>WHAT</p> <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>WHY</p> <p>The marks are needed for step 5 and inspection.</p> | <p>WHY</p> <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>WHY</p> <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> |  |
| <p>5</p> <p>Using the blue marks as a visual reference, turn nut between 1/2 and 5/8 of a turn</p>  |  | <p>6</p> <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> |  |
| <p>WHY</p> <p>If the nut is turned less than 1/2 turn, it may pass a leak test, but leak later in the field.</p> | <p>WHY</p> <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>WHY</p> <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> | |

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

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. |
| | 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. |

6. Warranty Information

This procedure is covered under warranty. Standard repair time (SRT) is 6.0 hours. Please refer to Warranty Manual, ENP-067, for warranty reimbursement procedures.

For parts and support, contact Agility Fuel Solutions Customer Care: +1 949 267 7745, toll free: +1 855 500 2445 or parts@agilityfs.com

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| Revision | Description | Author | Approved By | Date |
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| -- | Initial Release | C. Grasso | CCG Team | 05/04/2020 |
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