



**Emer™ PRD Replacement for
EIDorado National Bus
CNG Fuel Systems
ENP-736
May 28, 2020**

1. Introduction

Agility Fuel Solutions LLC (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 (NHTSA 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 ElDorado National-California buses containing recalled Emer™ PRDs as original equipment manufacturer (OEM) equipment.

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:

240329-01 - Roofpack, Front	240329-02 - Roofpack, Rear
240329-03 - Roofpack, Front	240329-04 - Roofpack, Rear
240329-05 - Roofpack, Rear	240329-06 - Roofpack, Rear
240329-08 - Roofpack, Rear	240329-11 - Roofpack, Rear

3. Tools and Supplies Required

Fall protection equipment	Safety glasses
Safety ladder	Defueling hose with nozzle**
NGV1 fuel receptacle adapter*	Microfiber towels
Swagelok® preswage tool	(2) 7/8-in. combination wrenches, short†
Parker® O-lube O-ring lube	Foam mat or tarp
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
Blue paint marker	Zip lock bag (<i>NOTE: supplied by Agility with bulk replacement PRD shipment—use for PRD return</i>)
Camera / phone camera	
Flashlight	

*may be required for defueling on some FMMs

**If not provided at CNG fueling facility

†If short wrenches are unavailable, cut the open end of wrenches down to 6-in. long.

3.1. PRD retrofit kits

NOTICE

Before beginning work, verify proper quantity of correct Agility® PRDs are on hand.

Agility® PRD p/n 10306997 and corresponding fuel system quantities are as follows:

Agility® fuel system p/n	PRD QTY required
240329-01	4
240329-02	4
240329-03	4
240329-04	4
240329-05	4
240329-06	4
240329-08	2
240329-11	2

4. Parts Location Identification

Refer to the appropriate fuel system illustration to locate the affected Emer™ PRDs in fuel system plumbing. *Figures 1, 2 and 3*

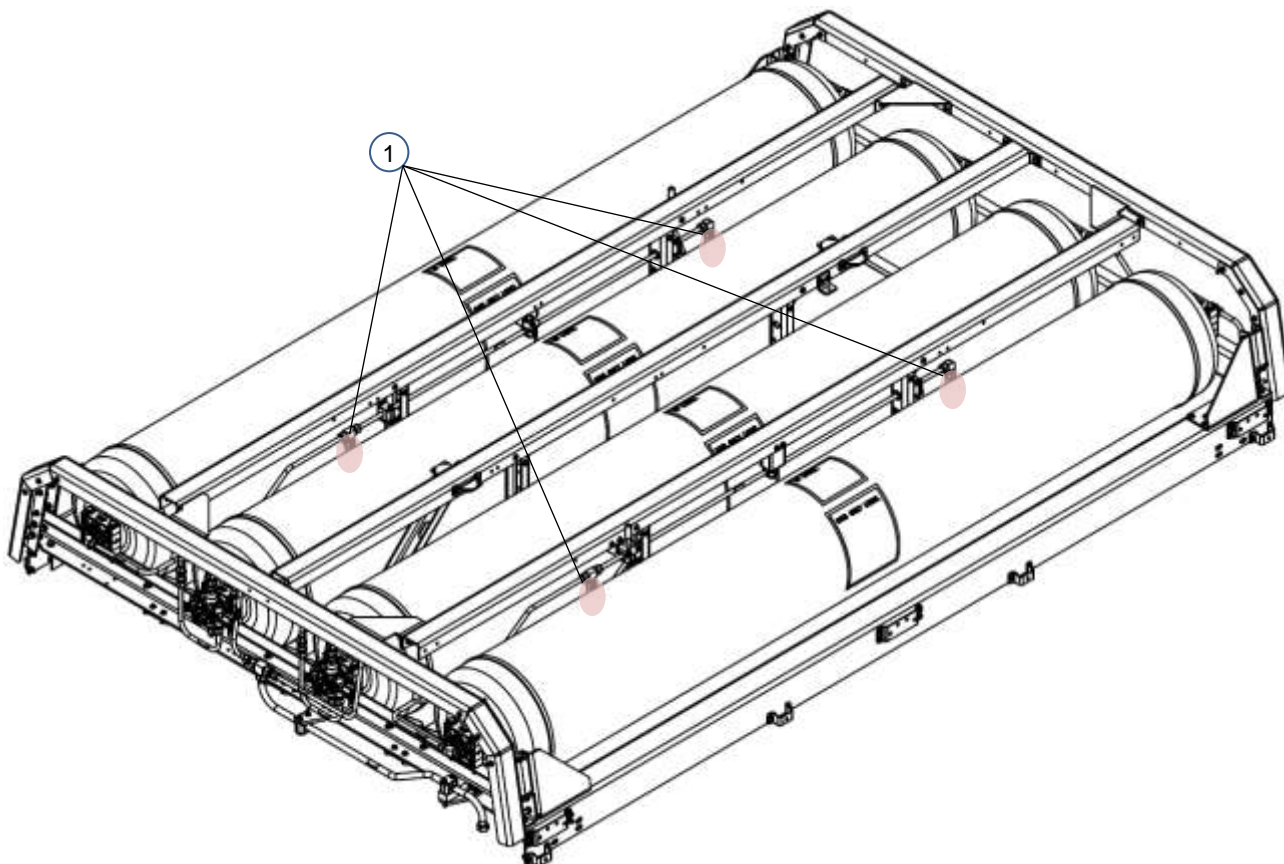


Figure 1.

Locations of Emer™ PRDs (1) in front pod fuel system cylinder plumbing. NOTE: Roof pack doors omitted for clarity.

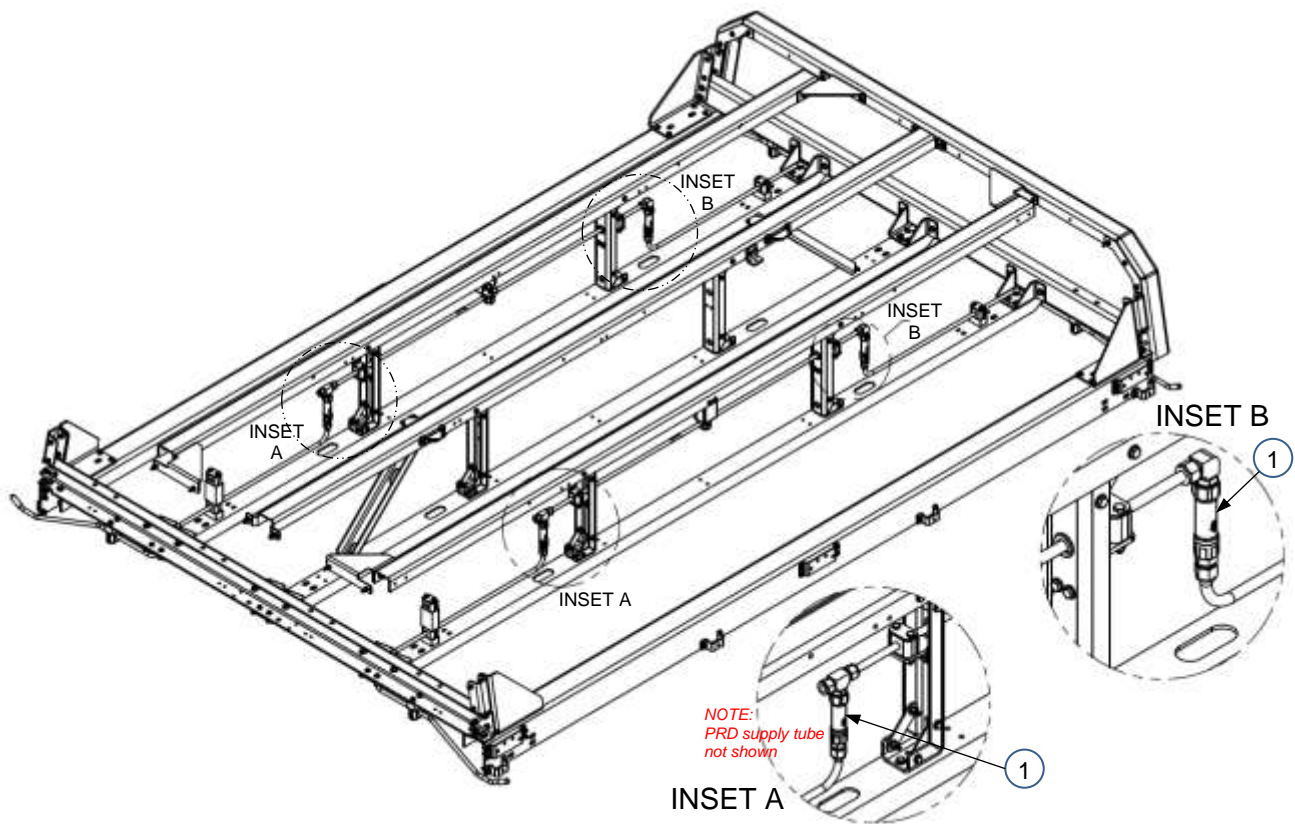


Figure 2.
Locations of Emer™ PRDs (1) in rear fuel system plumbing – three and four cylinder pods.
NOTE: Cylinders not shown for clarity.

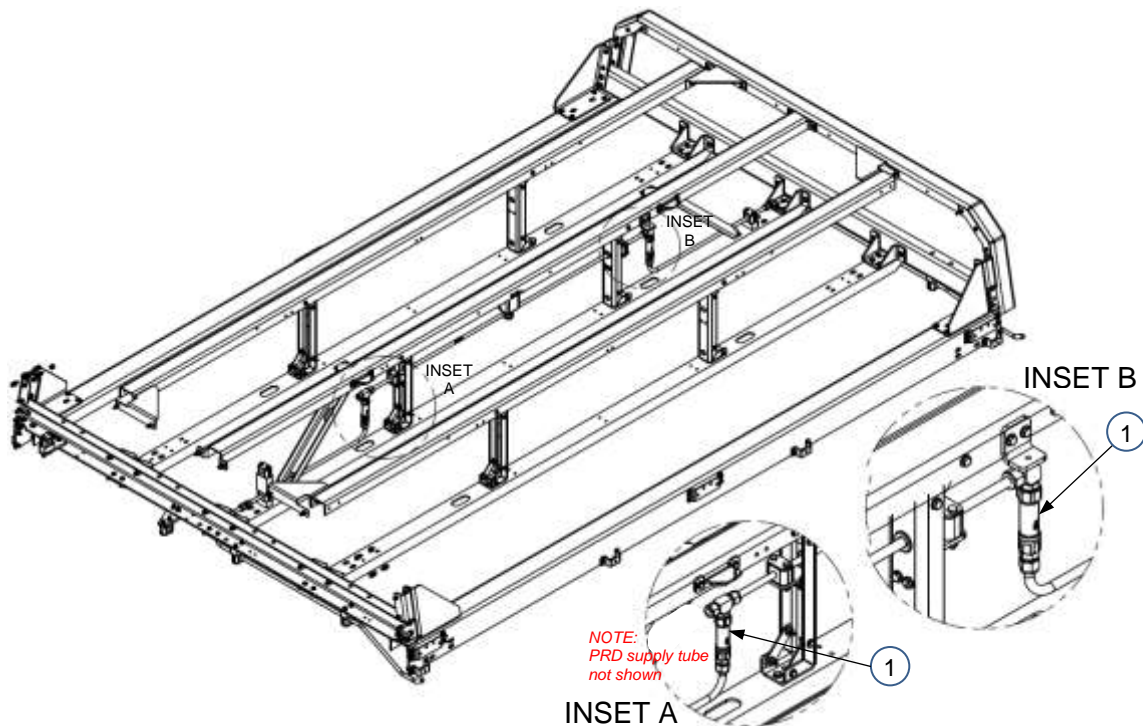
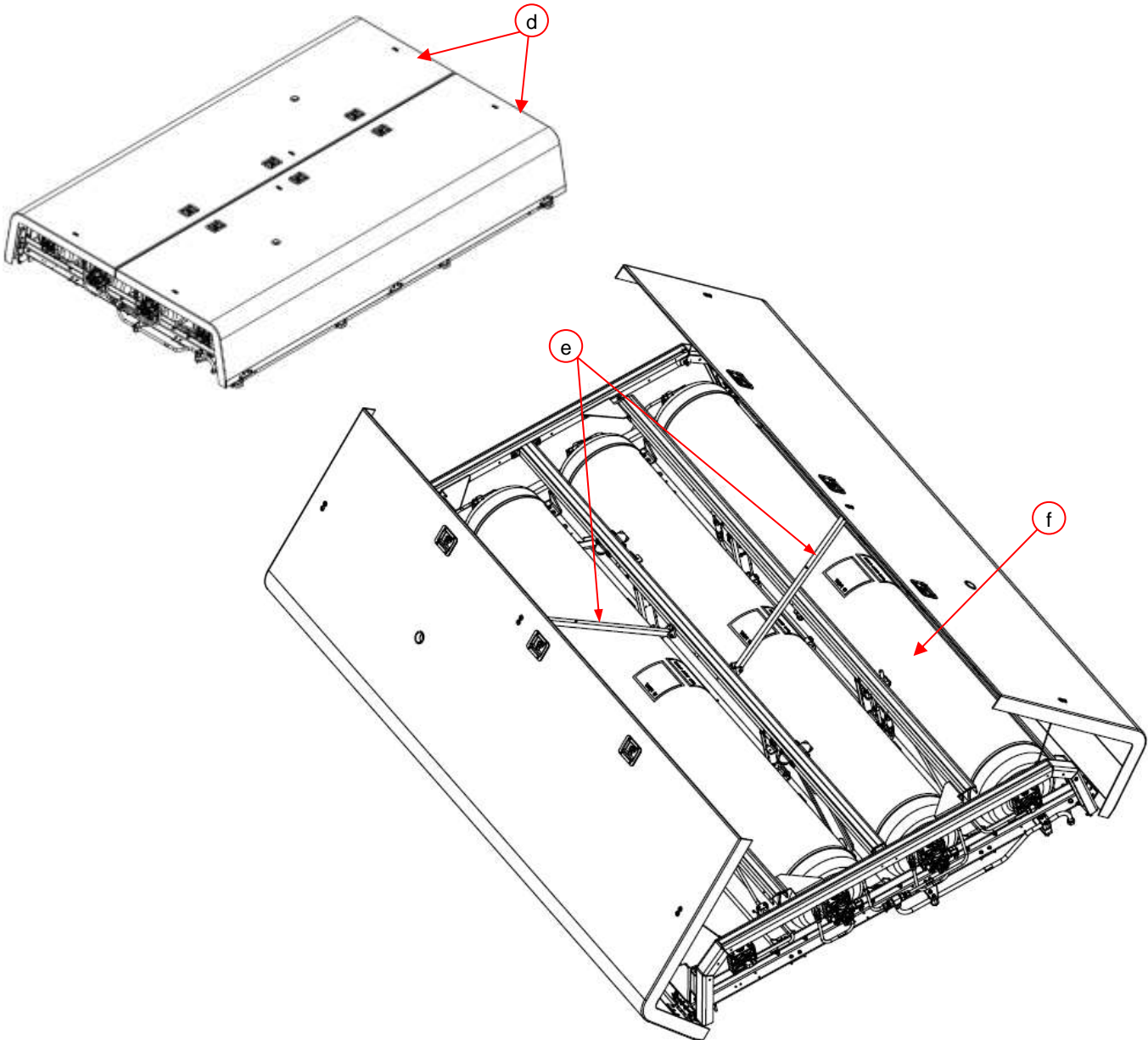


Figure 3.
Locations of Emer™ PRDs (1) in rear fuel system plumbing – two cylinder pods.
NOTE: Cylinders not shown for clarity.




5. Corrective Action / Procedure

5.1. Preliminary Safety Preparation

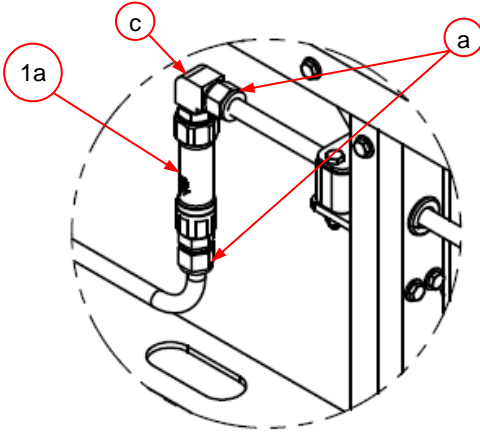


1	<p>⚠ WARNING</p> <ol style="list-style-type: none"> 1. Confirm all workers present are wearing appropriate personal protective equipment (PPE) including but not limited to eye protection, gloves, high visibility vests, etc. 2. Set parking brake and secure vehicle with wheel chocks (<i>not shown</i>). 		2	<p>⚠ WARNING</p> <p>Attach a lock and tag (<i>not shown</i>) to block vehicle ignition.</p>	
WHAT			WHAT		
WHY	Worker safety.		WHY	Prevent vehicle start during repair procedure.	
3	<p>⚠ WARNING</p> <p>Secure a safety ladder in either of the following locations:</p> <ol style="list-style-type: none"> A. Inside bus hatch opening B. Rear of bus exterior 				
WHAT					
WHY	Worker safety.				

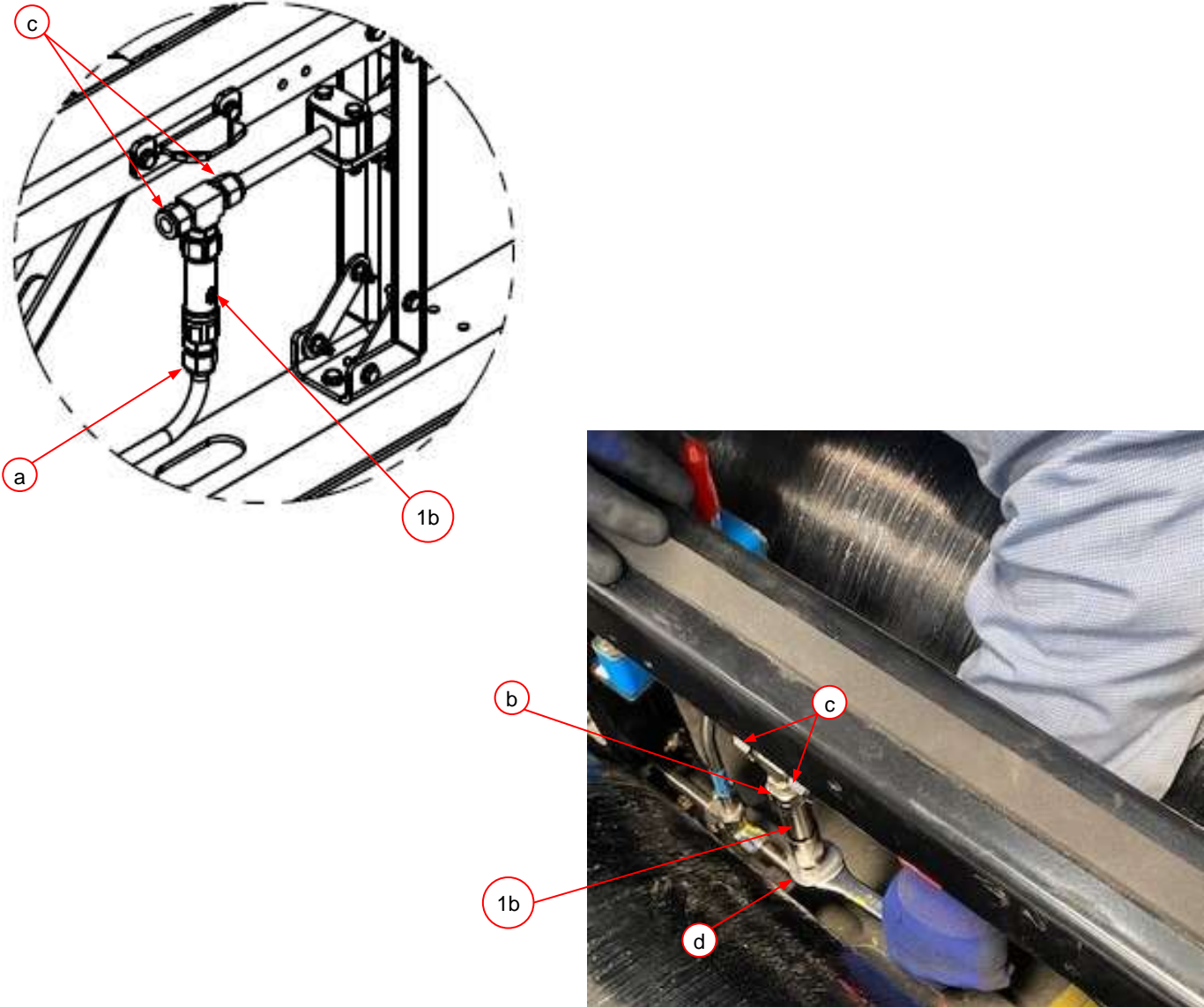
4	<p>1. Open fuel system roof pod doors (d).</p> <p>⚠ WARNING</p> <p>2. Secure fall protection equipment (<i>not shown</i>) to facility fall restraint attachment scaffolding.</p> <p>⚠ WARNING</p> <p>3. Secure doors open with prop bars (e). Refer to vehicle OEM instructions.</p> <p>⚠ WARNING</p> <p><i>Always reattach fall restraint PPE when resuming work on the roof mount portion of the fuel system.</i></p> <p>c Cylinder coating is fragile. When working on and around cylinders (f), do not: a) allow objects such as tools to contact cylinders, b) wear hard or sharp edged objects including belt buckles, c) walk or stand on cylinders.</p> <p>c Use a foam mat or tarp to protect cylinders.</p>	 <p>The diagram illustrates the process of opening and securing the fuel system roof pod doors. It shows a perspective view of the roof pod with doors (d) being opened. A prop bar (e) is used to secure the doors open. The internal structure of the roof pod is shown, including the cylinders (f) and the roof mount portion of the fuel system. Red arrows point to the specific components labeled d, e, and f.</p>
WHY	Worker safety.	

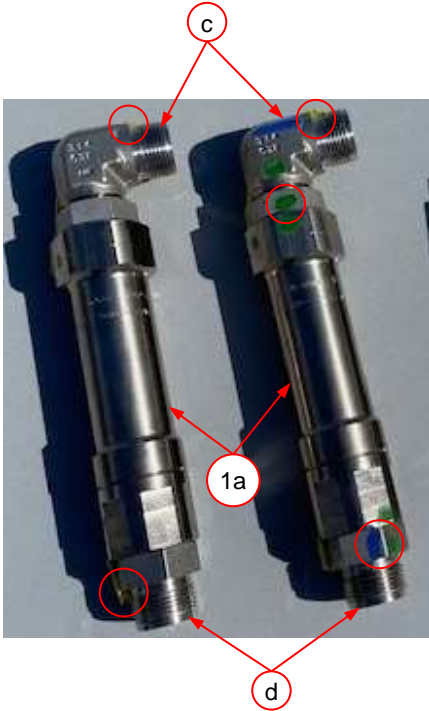

5.2. Prior to defueling

WHAT	1	 WARNING Verify all cylinder valves are open.		
	WHY	Ensure cylinders can be properly defueled.		
WHAT	2	Check fuel system high pressure gauge to verify amount of fuel in the system. Refer to vehicle OEM operations manual. IMPORTANT: If vehicle has no fuel onboard, proceed to Step 4.		
	WHY			
WHAT	3	<i>If not already defueled:</i> Defuel bus according to local facility regulations and procedure. <i>If required:</i> Use defuel hose kit.  WARNING Only trained CNG fuel systems technicians may perform defueling.	4	 WARNING Relieve any remaining system pressure by slowly opening the fuel system bleed valve. Refer to vehicle OEM operations manual.
	WHY	PRD supply tubes to be removed are pressurized “live” lines.	WHY	



5.3. Remove Emer™ PRDs

1a	<p>1. Use a 7/8-in. wrench (b) to loosen nut fittings (a) on 90-degree positionable elbow fitting (c) of each Emer™ PRD (1a) so equipped.</p>	
WHAT	<p>c Cylinder coating is fragile. When working on and around cylinders (f), do not: a) allow objects such as tools to contact cylinders, b) wear hard or sharp edged objects including belt buckles, c) walk or stand on cylinders.</p> <p>2. Remove each PRD (1a) with the 90-degree positionable elbow as an assembly.</p>	 
WHY		

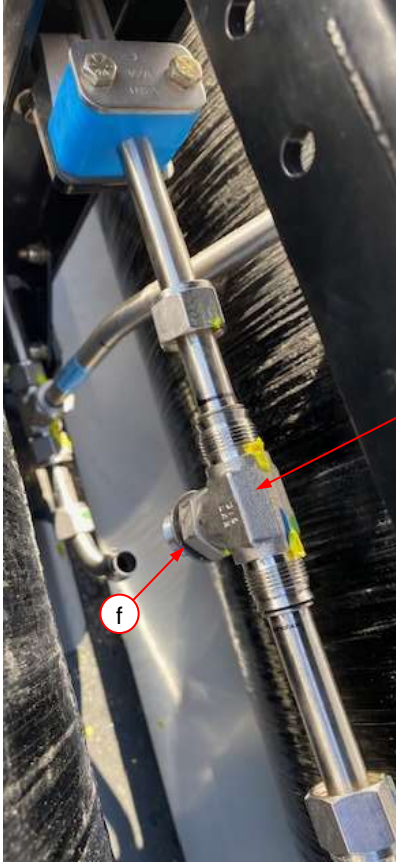
1b	<p>1. Use two short (approx. 6-in. long) 7/8-in. wrenches (d) to loosen each Emer™ PRD (1) from positionable tee nut fitting (a) in tight areas.</p>	
WHAT	<p>c Cylinder coating is fragile. When working on and around cylinders (f), do not: a) allow objects such as tools to contact cylinders, b) wear hard or sharp edged objects including belt buckles, c) walk or stand on cylinders.</p> <p>2. Loosen nut fittings (c) from each end of positionable tee fitting (b).</p> <p>3. Remove each PRD (1b).</p>	
WHY		

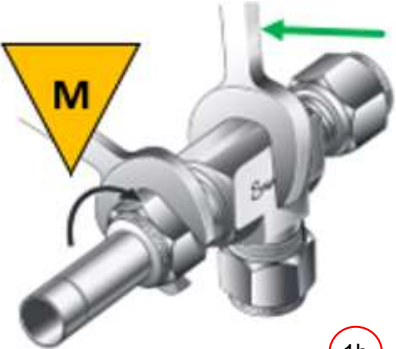


<p>WHAT</p>	<p>2</p> <ol style="list-style-type: none"> 1. Use a pair of wrenches to remove 90-degree positionable elbow fittings (c) from all Emer™ PRDs (1a) so equipped. 2. Use a pair of wrenches to remove 90-degree positionable tee fittings (not shown) from all Emer™ PRDs. 3. Use Swagelok Snoop® and a microfiber towel to remove previously applied Torque Seal (circles) from all fittings. <p>NOTICE</p> <p><i>Retain 90-degree elbow fittings (c) and straight fittings (d).</i></p> <p>Inspect each O-ring for damage; replace O-rings as necessary.</p>		<p>3</p> <p>Place all removed Emer™ PRDs (1) 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"> 1. Fleet 2. VIN 3. Fuel system s/n 	
<p>WHY</p>	<p>PRD O-ring fittings will be reused.</p>		<p>WHY</p> <ol style="list-style-type: none"> 1. Bag helps prevent PRD contamination. 2. Agility is collecting all PRDs removed; return material authorization (RMA) instructions appear below. 	


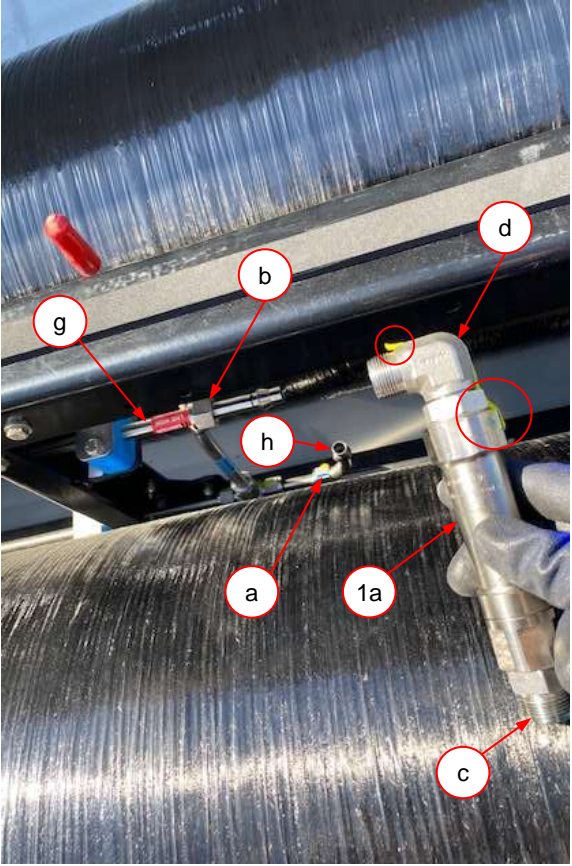
5.4. Install replacement Emer™ PRDs

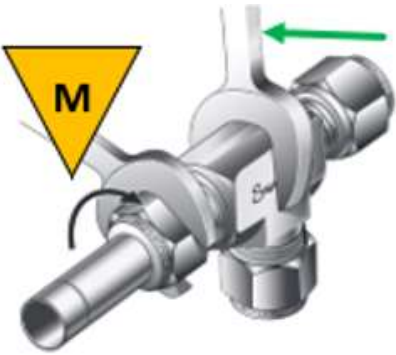

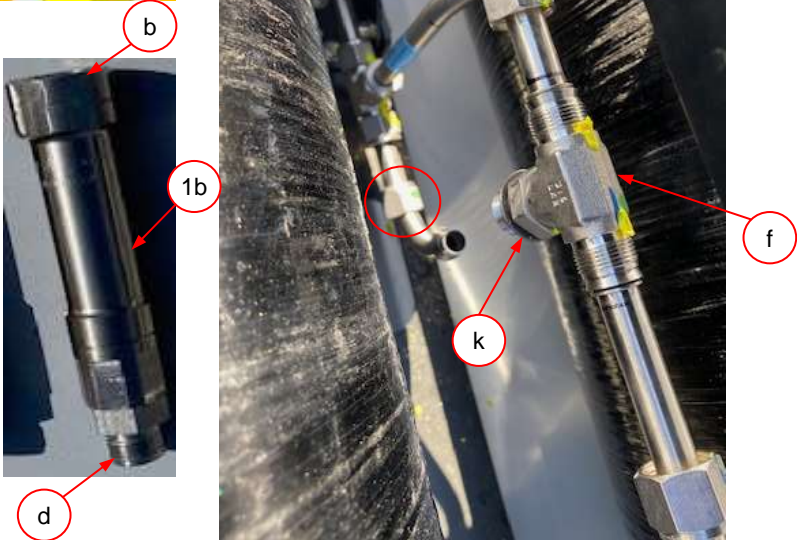
1a	<p>1. Inspect O-rings (<i>not visible</i>) on 90-degree positionable elbow fittings and straight fittings removed during Section 5.3. Step 2 (<i>not shown</i>).</p> <p> Replace any damaged O-rings as necessary.</p> <p> 2. Apply a light film of Parker® O-lube O-ring lube to O-rings (<i>not visible</i>) on 90-degree positionable elbow fittings and straight fittings (<i>not shown</i>).</p>	
WHY		

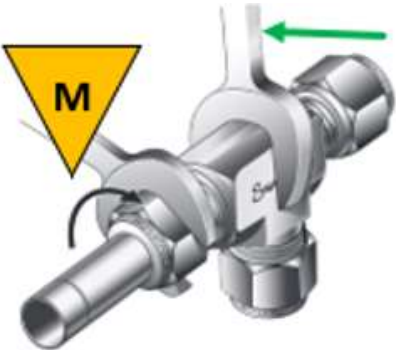


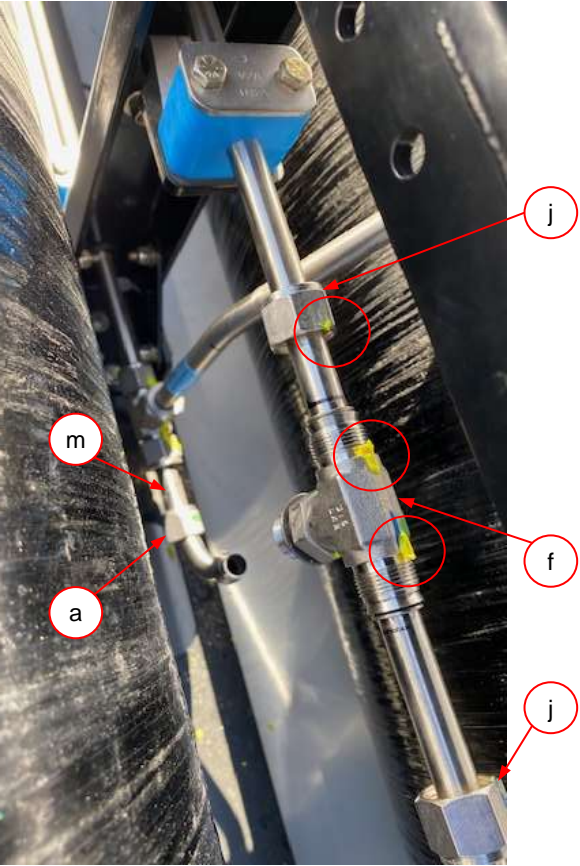
1b	<div data-bbox="197 152 569 357"> <p>M</p> <p>Always use a backing wrench on the main fitting or PRD while using a wrench to install another fitting.</p> </div> <div data-bbox="197 357 569 535"> <p>1. Install 90-degree positionable elbow fitting (c), on each replacement PRD (1a), as required.</p> </div> <div data-bbox="197 535 569 649"> <p>c Torque 90-elbow fitting (c) to 52 ft-lbs (70.5Nm).</p> </div> <div data-bbox="197 649 569 763"> <p>2. Install straight fitting (d) on each replacement PRD (1a) and (1b).</p> </div> <div data-bbox="197 763 569 876"> <p>c Torque straight fitting (d) to 52 ft-lbs (70.5Nm).</p> </div> <div data-bbox="197 876 569 1006"> <p>⚠ WARNING Arrow engraved on each PRD must point down.</p> </div>	<div data-bbox="1029 185 1428 535"> </div> <div data-bbox="903 568 1323 1315"> </div> <div data-bbox="1428 763 1617 1088"> </div>
WHY		


1c	<p>WHAT</p> <p>▼_c 1. Use Swagelok Snoop® and a microfiber towel to remove previously applied Torque Seal (<i>not visible</i>) from tee fittings (e).</p> <p>2. Inspect O-rings (<i>not visible</i>) on straight fittings removed from PRDs in Step 1b (<i>not shown</i>) and O-rings (f) on tee fittings (e).</p> <p>▼_c Replace any damaged O-rings as necessary.</p> <p>▼_c 3. Apply a light film of Parker™ O-lube O-ring lube to O-rings (<i>not shown</i>) on straight fittings and O-rings (f) tee fittings (e).</p>	
WHY		

1d	<p>M <i>Always use a backing wrench on the main fitting or PRD while using a wrench to install another fitting.</i></p> <p>c 1. Use Swagelok Snoop® and a microfiber towel to remove previously applied Torque Seal (<i>not visible</i>) from all and tubes.</p> <p>2. Install straight fitting (d) on each replacement PRD (1b).</p> <p>c <i>Torque straight fitting (d) to 52 ft-lbs (70.5Nm).</i></p> <p>⚠ WARNING <i>Arrow engraved on each PRD must point down.</i></p>	  
WHY		

2a	<p>c</p> <ol style="list-style-type: none"> 1. Use Swagelok Snoop[®] and a microfiber towel to remove previously applied Torque Seal from all fittings and tubes. 2. Install straight elbow fitting (d) of each replacement PRD (1a) on PRD supply tube (h) using nut fitting (a). 3. Install 90-degree elbow fitting (c) of each replacement PRD (1a) on PRD supply tube (g) using nut fitting (b). <p>⚠ WARNING <i>Arrow engraved on each PRD must point down.</i></p> <p>NOTICE <i>Tighten nut fittings finger tight.</i></p>	<div data-bbox="898 250 1075 571">  <p>PRD</p> <p>Arrow must be facing down</p> </div> <div data-bbox="1104 214 1671 1075">  </div>
WHY		


2b	<p>M <i>Always use a backing wrench on the main fitting or PRD while using a wrench to install another fitting.</i></p> <p>c 1. Use Swagelok Snoop® and a microfiber towel to remove previously applied Torque Seal (circles) from all fittings and tubes.</p> <p>2. Install top port (a) replacement PRD (1b) on bottom port (k) of tee fitting (f).</p> <p>⚠ WARNING <i>Arrow engraved on each PRD must point down.</i></p> <p>c <i>Torque PRD (1b) at tee fitting bottom port (k) to 52 ft-lbs (70.5Nm).</i></p> <p>NOTICE <i>Tighten nut fittings finger tight.</i></p>	  
WHY		


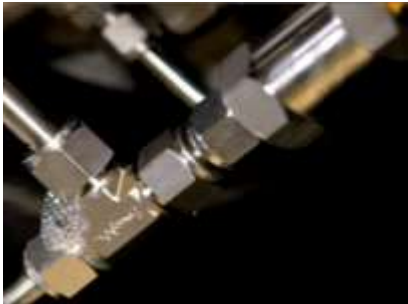
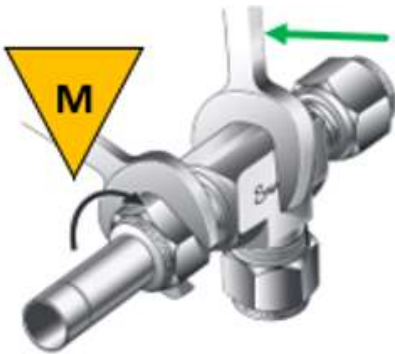
2c	<p>M</p> <p>Always use a backing wrench on the main fitting or PRD while using a wrench to install another fitting.</p> <p>c</p> <ol style="list-style-type: none"> 1. Use Swagelok Snoop[®] and a microfiber towel to remove previously applied Torque Seal (circles) from all fittings and tubes. 2. Align PRD vent tube (m) with PRD straight connector install nut fitting (a) on PRD straight connector (d). 3. Reinstall nut fittings (j) on tee fitting (f). <p>NOTICE</p> <p>Tighten nut fittings finger tight; fittings will be torqued at a later step.</p>	   
WHY		






3	 Use two wrenches to tighten all nut fittings according to Appendix A.				
WHAT					
WHY					





5.5. System Leak Check Procedure



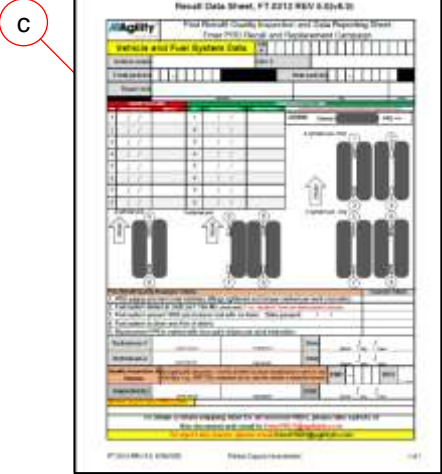
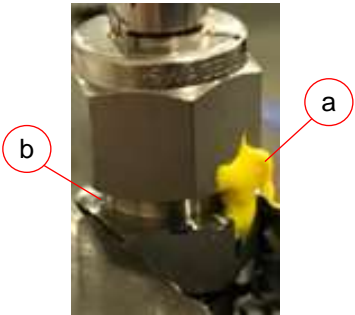
1	<p>1. Turn fuel system 1/4-turn manual shut off valve to the OPEN position.</p> <p>⚠ WARNING</p> <p>2. Select the appropriate CNG fuel nozzle and/or adaptor for the fuel fill receptacle (<i>not visible</i>).</p> <p>3. Remove fuel fill receptacle dust cap.</p> <p>4. Begin fueling vehicle with CNG using a regulated fuel supply.</p> <p>⚠</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>	
WHY	Test fuel system integrity.	

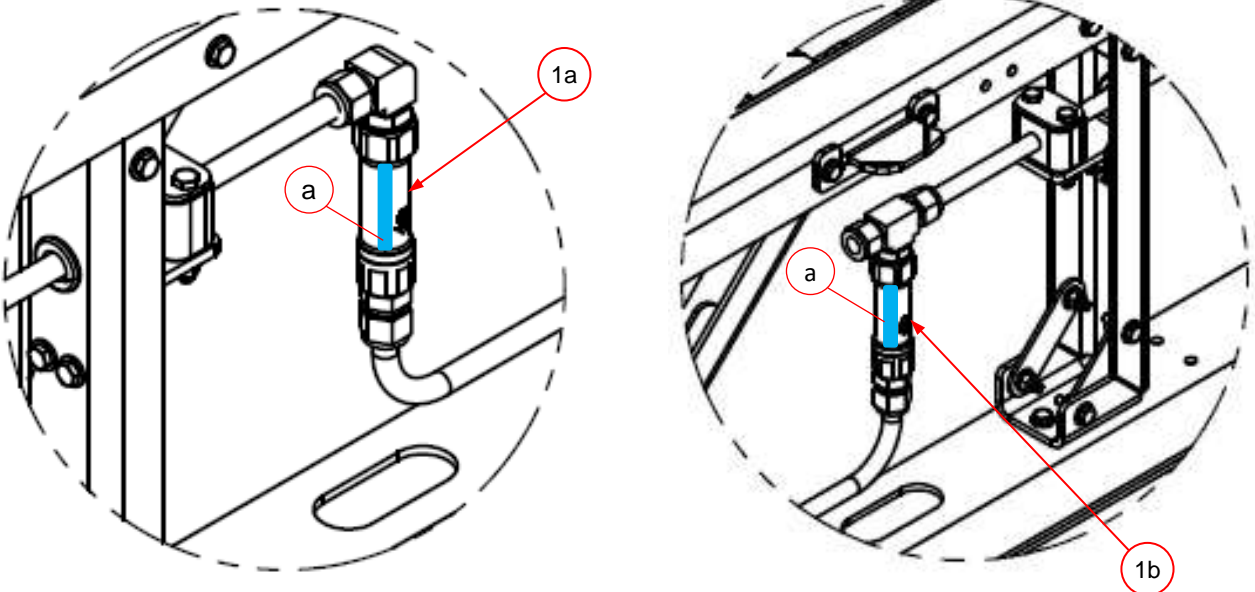
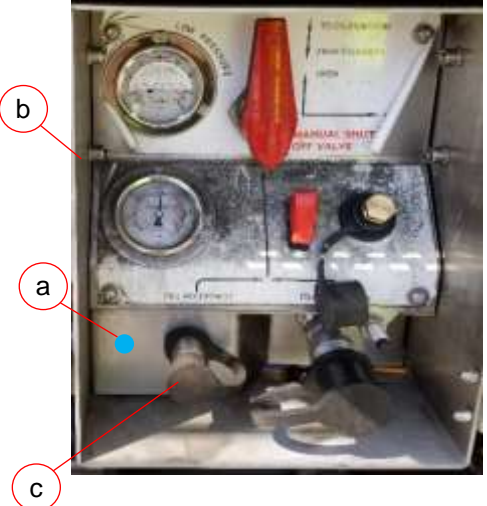
2	<p>Monitor fuel system high pressure gauge to verify when system pressure reaches 500 psi to 510 psi (3.45MPa to 3.52MPa) and stop pressurization.</p> <p><i>Refer to vehicle OEM operations manual.</i></p> <p>⚠ WARNING</p> <p><i>1. If a hissing sound is heard coming from fuel system fittings during 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>		3	<p>c</p> <p>Leak test all fuel and PRD tubes and fitting connections using Swagelok Snoop[®] leak detection solution or equivalent.</p>	
WHAT			WHAT		
	<p>Subjects fuel system to partial operating pressure.</p>		WHY	<p>Approved leak detection solution for visual inspection of system leaks.</p>	

4	<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>		5	<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>	
WHAT			WHAT		
WHY			WHY		
6	<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 A.</i></p>		7	<p>Repeat Steps 1 and 2 to repressurize the system.</p>	
WHAT			WHAT		
WHY			WHY		


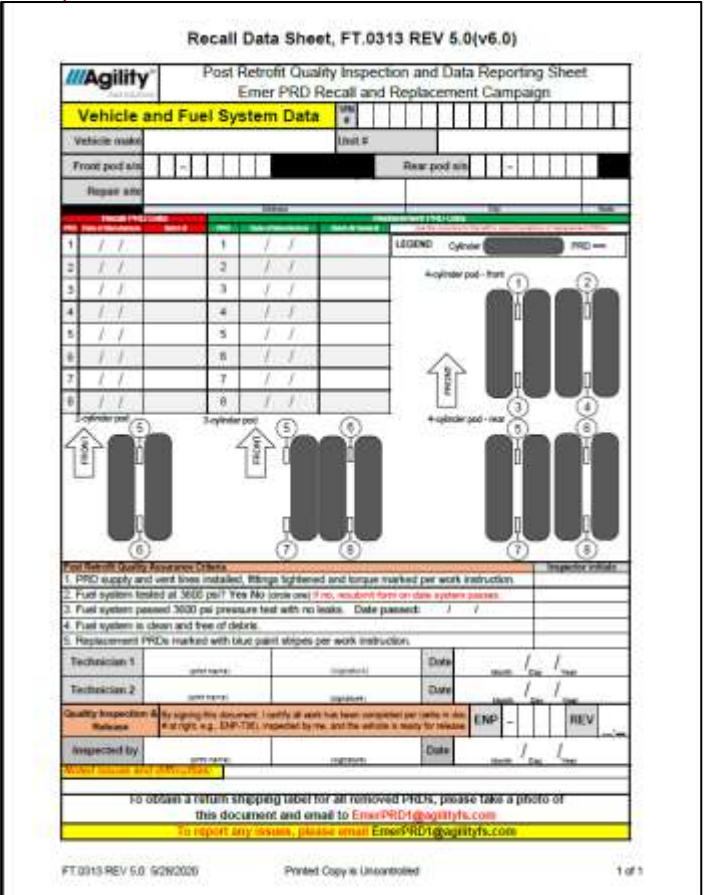
8	WHAT Spray leaking fitting again with Swagelok Snoop® or equivalent and allow at least 10 minutes to elapse before checking for bubble formation.		9	WHAT  If leaking fitting is fixed, proceed to test any remaining fitting connections.	
WHY			WHY		
10	⚠ WARNING If leak is not fixed, the fuel system 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	 Spray new fitting junction with Swagelok Snoop® or equivalent to retest for leaks.		15	Turn fuel system 1/4-turn manual shut off valve counter-clockwise to the OPEN position.	
WHAT			WHAT		
WHY			WHY	Allow fuel into system.	
16	 Repeat pressure test procedure stopping the fill when fuel system pressure reaches 2000 psi to 2100 psi (13.79MPa to 14.48MPa).		17	 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.	
WHAT			WHAT		
WHY	Subjects fuel system to partial operating pressure.		WHY	Subjects fuel system to full operating pressure.	
18	 <i>If fuel system is leak free or if defueling is required, close flow valve on CNG dispenser nozzle (not shown) and carefully disconnect fill nozzle (not shown) from fuel fill receptacle.</i>		19	Replace dust cap on fuel fill receptacle.	
WHAT			WHAT		
WHY			WHY	Vehicle will not start if dust cap is not in place.	

20 WHAT	If not open, turn fuel system 1/4-turn manual shut off valve counter-clockwise to the OPEN position.		21	 Clean Swagelok Snoop® or equivalent from the fuel system.	
WHY	Allow gas to flow throughout fuel system.		WHY	Customer satisfaction.	
22 WHAT	 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.		23	Apply Torque Seal (a) to all fitting junctions (b).	
WHY	Verify safe and proper fuel system pressure specification.			System quality specification.	

24	<p>c</p> <p>Use a blue paint marker to mark a stripe (a) on all replacement PRDs (1a) and (1b).</p>		
WHAT			
WHY	Quick visual confirmation the repair has been performed.		
26	<p>c</p> <p>Use a blue paint marker to mark a dot (a) on the FMM faceplate (b) on the bare metal surface to the left of the fuel fill receptacle (c).</p>		<p>27</p> <p>c</p> <p>Verify all FMM and fuel system roof pod doors are properly closed.</p> <p>⚠ WARNING</p> <p>Refer to vehicle OEM instructions.</p>
WHAT			
WHY	Quick visual confirmation the repair has been performed.		

5.6. Reporting and Return Procedure

<p>1</p> <p>WHAT</p>	<p>1. Use form FT.0313 (c) to record the date of manufacture (a) and batch number (b) and the location of each replacement PRD (1), 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>		<p>c</p> 
<p>WHY</p>	<p>Required for replacement PRD 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 154 1207 227">  </div> <div data-bbox="1123 227 1530 812"> <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.	

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	---
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.
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.

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:

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