TECHNICAL SERVICE BULLETIN

Bulletin No.: TSB-046

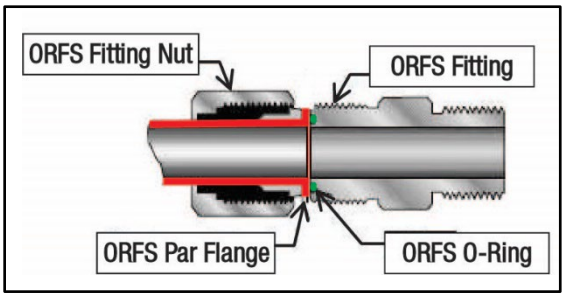
Date: **May 22, 2023**

Subject: **VP ¾" and 1" Fuel Line Leaks**

Models: **2022 MY Quantum 40 Series VP Trailers**

Background

Quantum Virtual Pipeline (VP) trailers use 1" fuel pipes (trunk lines) to connect all the cylinders to the fill manifold. These 1" fuel pipes are welded pipe assemblies that are connected to adjacent fuel pipes using an O-Ring Face Seal (ORFS) connection. Depending on the fuel pipe construction, these welded fuel pipes may incorporate the fitting side that contains the O-ring, the Parflange® side that mates to the fitting or both components built into the same welded fuel pipe assembly.



Condition

These 1" fuel pipe ORFS joints in the VP Trailer trunk pipes may develop leaks and continue to leak even after replacement of the O-ring seal.

Cause

A number of issues have been found that can affect the integrity of this 1" ORFS joint. Any Quantum VP trailer built in the 2022 model year may have been built with one or more of the suspect products indicated below.

- **O-ring:** The O-rings used in some of the 1" ORFS joints have been found to be made of the incorrect material, the O-rings received from the supplier were mixed with O-rings that did not meet material specifications.
  Also, some 1" O-rings were marked with paint dots for identification; The correct O-rings should not have any paint dots, this paint dot itself can result in a leak concern depending on its location on the O-ring. Note that O-Rings without paint dots may still be the wrong material and are suspect.

- **ORFS Fitting:** A number of the 1" ORFS fittings have been found to have incorrect O-ring groove dimensions. If this O-ring groove is too shallow or too deep the O-ring may be damaged or may be unable to seal properly. Some 1" ORFS fittings were also found to have surface finish damage that may affect the ability of the joint to seal properly.

- **ORFS Parflange®:** A number of the 1" and ¾" Parflange® surfaces have been found to be improperly made resulting in surface finishes that do not mate properly to the ORFS fitting.
  Note: The Parflange® issue is the only concern discussed in this bulletin that applies to the ¾" ORFS joint leaks.

TECHNICAL SERVICE BULLETIN

Correction

If a leak is detected in a 1” ORFS joint, replace the O-ring in the leaking joint and carefully inspect the fitting and Parflange® surface in the leaking joint for defects.
It is recommended to replace the O-rings in all the 1” ORFS joints on the affected trailer regardless of if they are presently leaking or not.
See attached instructions for inspection and repair procedures.

Any 117997-021 O-rings in Quantum VP Trailer O-ring service kits that were received or refilled between December 2021 and January 2023, should have the 117997-021 O-rings discarded and replaced with new product prior to any service work being completed under this bulletin.

Labor Time

Estimated labor times:

Labor OP: TSB046-01	Labor Op Desc.: 1” ORFS O-Ring Replacement, All	Time: 6.0 Hrs
Labor OP: TSB046-02	Labor Op Desc.: Pipe, Riser Replace, ea.	Time: 2.0 Hrs
Labor OP: TSB046-03	Labor Op Desc.: Pipe, Trunk Inter, LWR, R&R, Add: for each additional inter pipe	Time: 2.0 Hrs Time: 0.6 Hrs
Labor OP: TSB046-04	Labor Op Desc.: Pipe, Trunk R&R, First/One pipe Add: for each additional trunk pipe	Time: 12.0 Hrs Time: 2.0 Hrs
Labor OP: TSB046-05	Labor Op Desc.: 3/4” ORFS O-Ring Replacement, All Add: for PRV pipe Replacement	Time: 1.5 Hrs Time: 1.0 Hrs

* All labor times include time for all needed panel R&R operations.

Special Tools
The following special tool will be needed to properly verify the O-Ring groove depth of the 1” ORFS fittings.

Parker tool: PN: 702649, 1” ORFS O-Ring depth gauge

Contact Information:

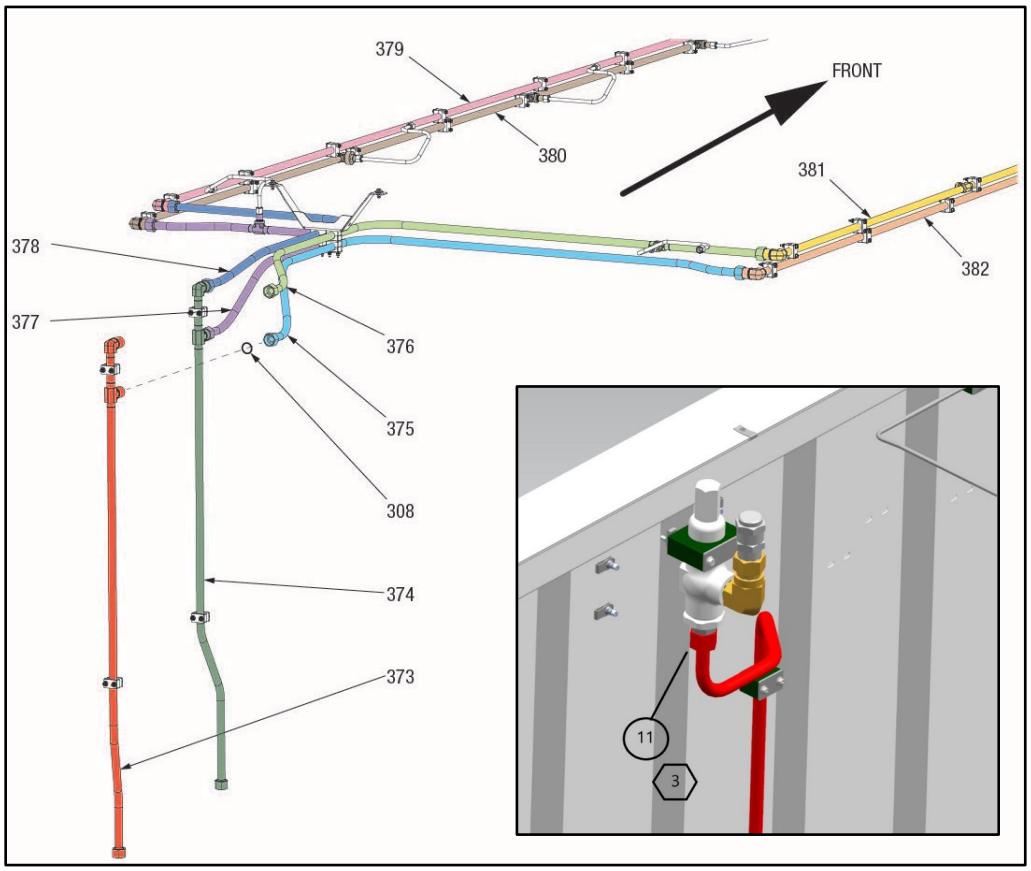
E-Mail: QTService@qtww.com
Phone: U.S. 800.816.8691
Outside U.S. 949.930.3411

TECHNICAL SERVICE BULLETIN

Parts Information

Description	Item Number	Part Number	Qty
O-RING- ORFS-16, LOW TEMP	308	117997-021	10 ea
PIPE ASM- RISER, RH, 40'	373	120041	A/R
PIPE ASM- RISER, LH, 40'	374	120039	A/R
PIPE ASM- TRUNK, INTER, RH, LOWER, 40'	375	119882	A/R
PIPE ASM- TRUNK, INTER, RH, UPPER, 40'	376	119883	A/R
PIPE ASM- TRUNK, INTER, LH, LOWER, 40'	377	119876	A/R
PIPE ASM- TRUNK, INTER, LH, UPPER, 40'	378	119881	A/R
PIPE ASM- TRUNK, LH, UPPER, 40'	379	119721	A/R
PIPE ASM- TRUNK, LH, LOWER, 40'	380	119722	A/R
PIPE ASM- TRUNK, RH, UPPER, 40'	381	119724	A/R
PIPE ASM- TRUNK, RH, LOWER, 40'	382	119723	A/R
O-RING- ORFS-12, LOW TEMP	N/A	117997-018	A/R
PIPE ASM- PRV INLET, 40', VP, W/FM	11 (inset pict)	120869	A/R

Some common replacement pipe assemblies are being shipped to local distributors where the largest volumes of trailers operate. Replacement pipe assemblies may not be readily available due to shipping delays and or product availability.
Pipe assembly item numbers 379-382 are built to order and are not inventoried.



TECHNICAL SERVICE BULLETIN

Application

The following trailer serial numbers are suspect and covered under this bulletin.
If a trailer not identified on this bulletin is found to have one of the defects listed, contact Quantum Warranty or Service Department prior to repairs being completed.

51210327	18220359	28220393	29220423	44220453
52210328	18220360	28220394	39220424	44220454
02220329	19220361	29220395	32220425	44220455
03220330	19220362	30220396	40220426	45220456
04220331	19220367	29220397	33220427	45220457
04220332	20220368	29220398	34220428	45220458
05220335	20220369	30220399	34220429	45220459
06220336	21220370	30220400	35220430	46220460
07220337	21220371	30220401	36220431	46220461
08220338	21220372	30220402	37220432	46220462
11220339	22220373	31220403	38220433	46220463
12220340	22220374	31220404	38220434	47220464
12220341	22220375	31220405	38220435	47220465
06220342	23220376	32220406	38220436	47220466
07220343	23220377	32220407	40220437	47220467
15220344	23220378	32220408	39220438	47220468
16220345	24220379	33220409	39220439	49220469
16220346	24220380	33220410	41220440	49220470
12220347	24220381	33220411	43220441	49220471
13220348	25220382	35220412	41220442	49220472
13220349	25220383	36220413	41220443	50220473
13220350	25220384	34220414	41220444	50220474
14220351	25220385	34220415	39220445	50220475
14220352	26220386	35220416	42220446	50220476
14220353	26220387	35220417	42220447	51220477
15220354	26220388	36220418	44220448	51220478
16220355	27220389	36220419	42220449	51220479
17220356	27220390	37220420	43220450	51220480
17220357	27220391	37220421	43220451	52220481
18220358	28220392	39220422	43220452	52220482

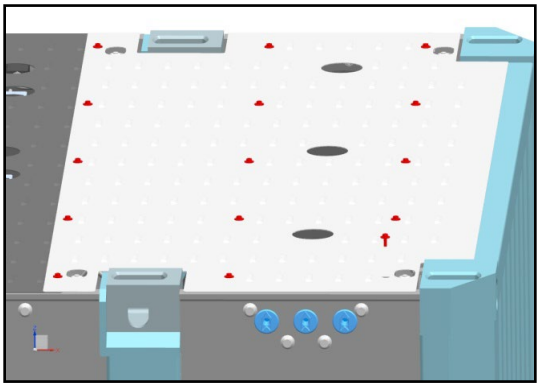
TECHNICAL SERVICE BULLETIN

Inspection and repair procedures

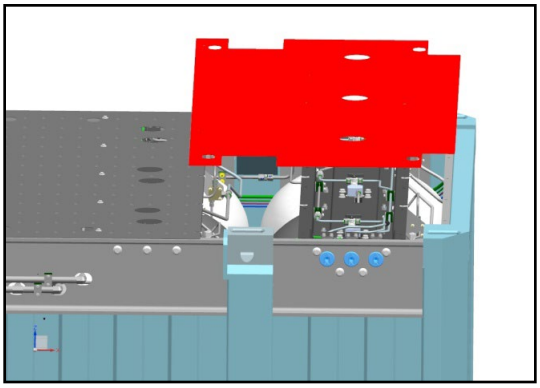
The following procedure may be used for O-ring replacement or replacement of the pipe assemblies.

O-ring Replacement

1. Remove and retain the fasteners securing the three rear roof panels.



2. Mark the roof panels to indicate its position on the trailer. Remove and retain the roof panel.



3. Disassemble the leaking fitting making sure to capture the O-ring for later inspection if needed.
4. Inspect the Parflange® surface of the joint being serviced. Refer to Parflange® Inspection in this document.
5. Inspect the ORFS Fitting of the joint being serviced. Refer to ORFS Fitting Inspection in this document.
6. Clean the Parflange® and ORFS fitting face, lubricate and install a new O-ring.

TECHNICAL SERVICE BULLETIN

7. Loose fit all connections finger tight on the pipe being serviced. Use care during assembly to ensure the O-ring is not damaged or displaced during assembly.

8. Loose fit any pipe support clamps or brackets, once all supporting components are in position tighten bolts. Refer to Table 1 for the proper torque specification.

9. Using a back up wrench as required, tighten the fitting being serviced. Refer to Table 2 for the proper torque specification.

Table 1

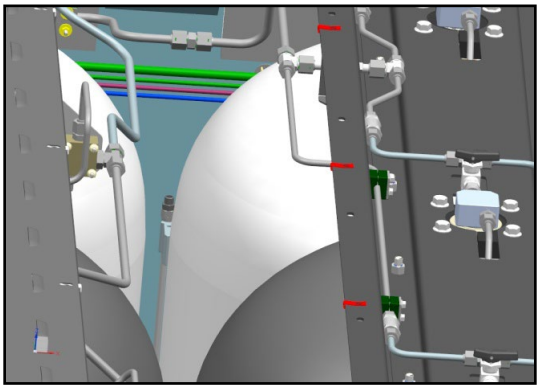
Additional Torque Specifications	Torque value
Trunk pipe bulkhead nut	58 lb.ft (79 Nm)
Pipe clamp (3/4" and 1") mounting bolts	74 lb.in (10 Nm)
Intermediate trunk pipe support bracket bolts	24 lb.ft (32 Nm)

Table 2

Fitting Torque Specifications	Torque value
1" ORFS fitting nut	117 lb.ft (158 Nm)
¾" ORFS fitting nut	89 lb.ft (121 Nm)
½" ORFS fitting nut	113 lb.ft (58 Nm)

10. Pressurize pipes that were serviced and check for leaks at all disturbed fittings.

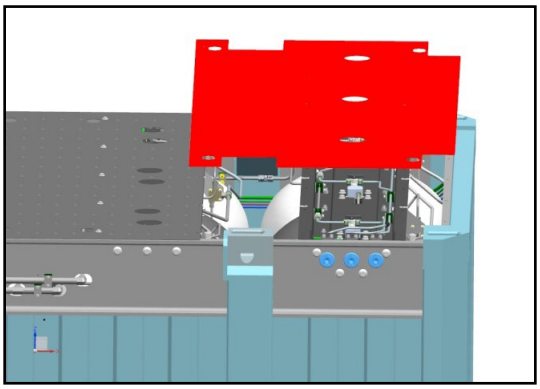
11. Verify all U-Nuts are in place for the roof panels, install new U-Nuts as needed.



TECHNICAL SERVICE BULLETIN

12. Locate the roof panel that was marked during removal for the position being installed. Place the roof panel in the position and align as needed.

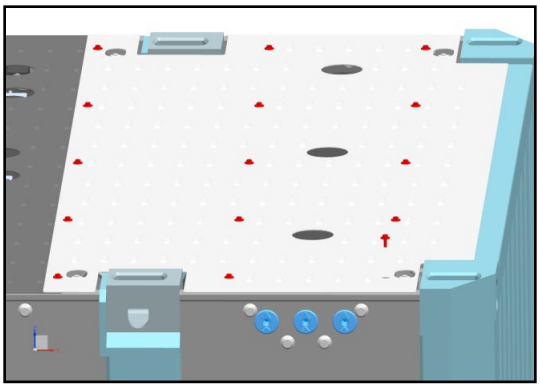
    IMPORTANT: Use care when positioning the panels, when sliding the panels across the cross members the edge of the roof panel can catch and knock off the U-Nuts.
    Where panels overlap, the forward panel should always be on top of the panel to the rear.



13. Loose fit all the roof panel fasteners; be sure to replace any fasteners that may have been missing prior to disassembly.

14. For Steel Roof Panels, starting in the center and working towards outside.
    Tighten fasteners to 22 lb.ft (30 Nm.)

    For Aluminum Roof Panels, starting in the center and working towards the outside
    Tighten fasteners to 24 lb.ft (33 Nm.)



TECHNICAL SERVICE BULLETIN

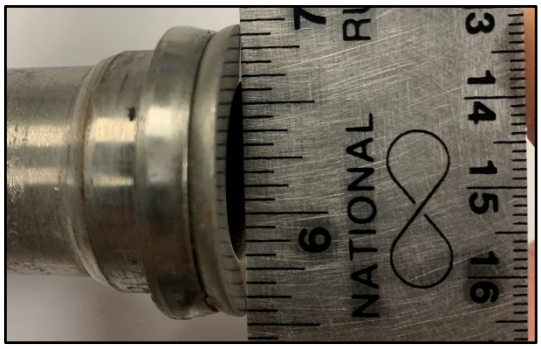
Parflange® Inspection

Clean the flange surface to be inspected.

Inspect the O-ring that was removed from the fitting, if the O-ring appears to be damaged due to excessive compression carefully examine the fitting O-ring groove for proper fit. If the O-ring appears to be extruded carefully inspect the Parflange® surface for irregularities.

Inspect the surface for the following conditions:

- **Flatness**: Lay a small straight edge across the surface of the Parflange®, if the surface of the Parflange® is visibly concave or convex the pipe assembly should be replaced



- **Uneven Flange Thickness**: Slide the nut away from the Parflange® surface and view the Parflange® from the side, if the flange surface is visibly uneven the pipe assembly should be replaced.

The overall Parflange® thickness should also be inspected, if the Parflange® thickness is even but appears thin compared to similar Parflange® assemblies being inspected, the pipe assembly must be replaced.

TECHNICAL SERVICE BULLETIN

- **Irregular Flange Surface**: Visually inspect the Parflange® surface, if the Parflange® surface is visibly uneven or the witness marks from the fitting indicate intermittent contact to the Parflange® face, the pipe assembly should be replaced.

- **Rough Flange Surface**: Visually inspect the Parflange® surface, if the Parflange® surface is visibly rough or shows signs of pitting or galling, the pipe assembly should be replaced.

TECHNICAL SERVICE BULLETIN

ORFS Fitting Inspection

Clean the fitting face surface to be inspected.

Inspect the O-ring that was removed from the fitting, if the O-ring appears to be damaged due to excessive compression carefully examine the fitting O-ring groove for proper fit. If the O-ring appears to be extruded carefully inspect the Parflange® surface for irregularities.

Inspect the surface for the following conditions:

- **Damage**: Inspect the surface of the fitting for any obvious damage or debris that may affect the sealing area of the fitting or the ability of the fitting to properly seat.

  Damage to the outer edge of the fitting face may not directly affect the sealing area, but it may not allow the Parflange® to properly seat against the fitting face and seal.

  If any damage is observed, replace the pipe assembly.

- **O-ring Groove Depth**: Inspect the surface of the fitting for any obvious damage or debris that may affect the use of the tool for gauging the O-ring protrusion from the fitting.

1. Remove the O-ring if still present and clean the O-ring groove in the fitting.
2. Lubricate a new O-ring with Krytox® oil and install the new O-ring in the fitting. Verify the O-ring is properly seated in the O-ring groove.
3. Rub your finger across the top of the O-ring, if the O-ring will not remain in place and falls out of the O-ring groove, the O-ring groove in the fitting is improperly formed. Replace the pipe assembly.
4. Using the Parker O-ring protrusion gauge as illustrated below, verify the O-ring protrusion is in the correct range. If a gap is observed, replace the pipe assembly.