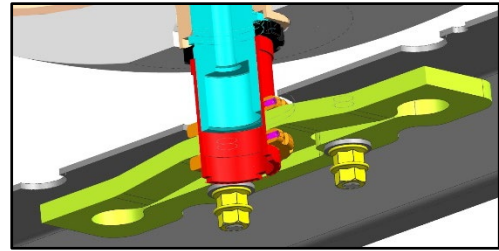


TECHNICAL SERVICE BULLETIN

Bulletin No.: TSB-049
Date: July 19, 2023
Subject: VP Trailer Flex Plate and Sleeve Wear
Models: Quantum 20', 40', 45' Virtual Pipeline Trailers

**Background**

Each CNG storage cylinder in Quantum Virtual Pipeline (VP) trailers is mounted to a fixed location at the top of the trailer.

As the cylinders are pressurized and depressurized, the overall length of the cylinder will change. This changing length in conjunction with the normal movement of the cylinder within the containment due to vibration and dynamic road inputs, requires a lower cylinder mounting system that can constantly adjust as needed.

A flex plate system has been designed to secure the bottom of the cylinders, this flex plate will allow for normal movement and displacement of the cylinder experienced in normal operating conditions.

Condition

In some cases, the sleeve on the bottom of the cylinder that the lower flex plate is secured to can become worn to the point that it fails and no longer restrains the bottom of the cylinder.

Cause

In some off highway operating environments, where unusually high levels of debris may be introduced into the container through the ventilation openings in the bottom of the container, accelerated wear between the flex plate and the sleeve may occur. This accelerated wear of these components only seems to occur where lower cylinder mountings are exposed to road splash and debris deposited from the tires. See illustration on the following pages for the affected areas of the trailer.

Correction

For severe service applications a revised flex plate assembly has been developed.

The revised flex plate assembly has a stainless steel insert to insulate the flex plate material from the aluminum sleeve. This material change should significantly reduce the accelerated wear experienced due to heavy contaminate intrusion.

In addition, the flex plate spanner nuts securing the flex plate to the sleeve have been changed to stainless steel, this will address the wear that can occur between the flex plate and the flex plate spanner nuts. This will enhance the capability of the flex plate to remain properly clamped and secured to the sleeve.

Inspect the lower cylinder mountings indicated in red by the illustration in this document, if wear is observed on any cylinder sleeve or flex plate, replace the flex and sleeve on the front outside cylinders with the revised flex plate assembly.

This revised flex plate assembly will be installed on the front three rows of cylinders, on the right-hand and left-hand sides above the tractor tires. The replacement of the flex plates in these positions will be completed at no cost to the customer, on trailers that experience concerns within the standard trailer one (1) year warranty period.

Because this wear is the result of severe operating conditions and or off highway use, this component is not covered under any extended warranty.

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Labor Time

Labor OP:

TSB-049	Labor Op Desc.: Inspection- Frt 6 Flex Plates	Time: 1.0 Hrs
VMX3006-TSB	Labor Op Desc.: Flex Plate Sleeve R&R, 107" Includes lower panel R&R	Time: 1.0 Hrs
	Add: Additional lower cover removal for access	Time: 0.2 Hrs
	Add: Broken Sleeve removal and thread repair	Time: 1.5 Hrs
	Add: Fender R&R for access	Time: 0.4 Hrs
	Add: Additional time for 102" cylinders	Time: 1.2 Hrs

Parts Information

Description	Part Number	Qty
* KIT- FLEX PLATE, 102", SEVERE SVC	121952-001	1 per cylinder
* KIT- FLEX PLATE, 107", SEVERE SVC	121952-002	1 per cylinder

* Kit includes all parts needed for typical replacement of flex plate and sleeve.

The flex plate kits needed for this update will be available beginning in Late July 2023.

Special Tools

Description	Part Number
* SKF Axial Lock Nut Socket	SKF TMFS-12
SOCKET- CYLINDER SLEEVE, VP	702603
CROW FOOT- CYLINDER SLEEVE, VP, 102"	702197
THREAD CHASER- M56 X 2	702624

The tools listed in this table are recommended to properly complete this repair.

* Tool is commercially available and is not in stock at Quantum.

Application

All Quantum 20' VP trailers Gen 1
 All Quantum 40' VP trailers Gen 1-3
 All Quantum 45' VP trailers Gen 5-7

Contact Information:

E-Mail: QTService@qtww.com
QTWarranty@qtww.com

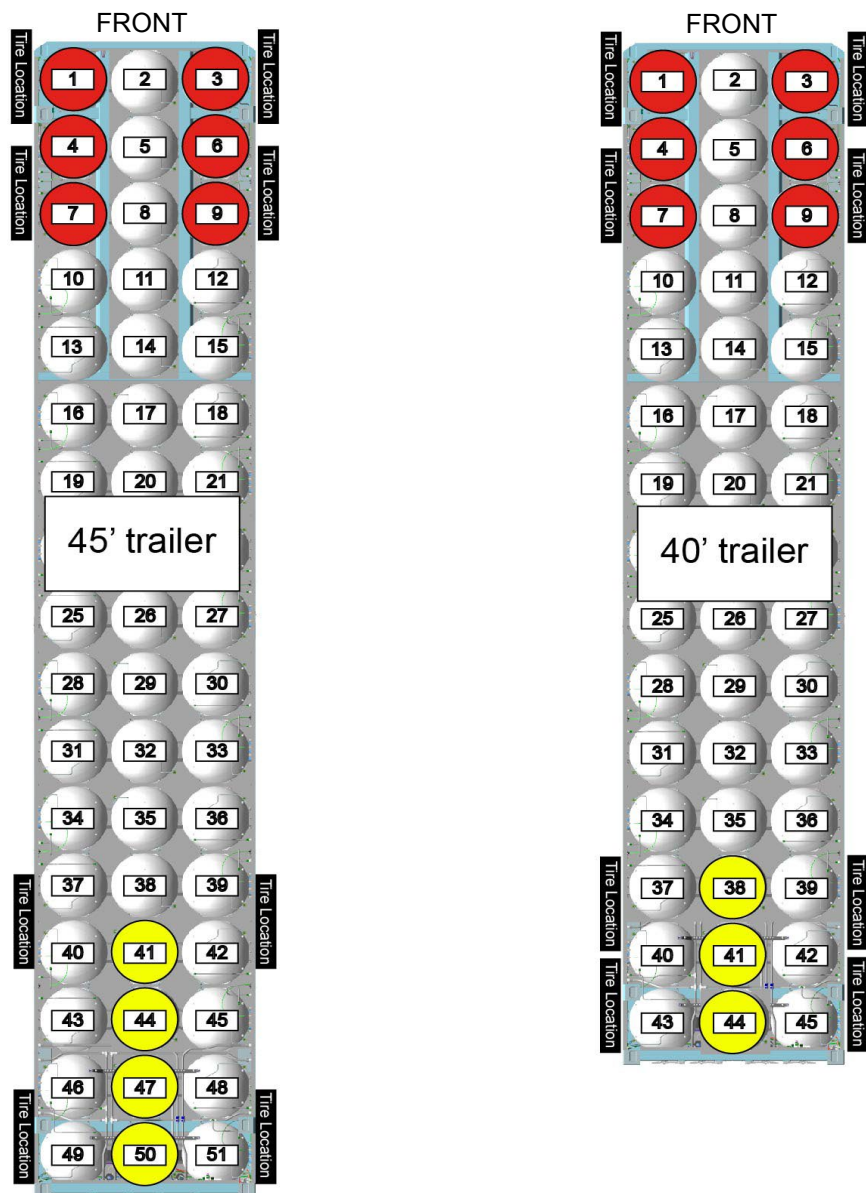
Phone: 800.816.8691

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Dirt and debris from the road is picked up by the tires and thrown into the container mountings through the vent openings in the lower panels. This continuous contaminate introduction is responsible for the accelerated wear of the components in this area.

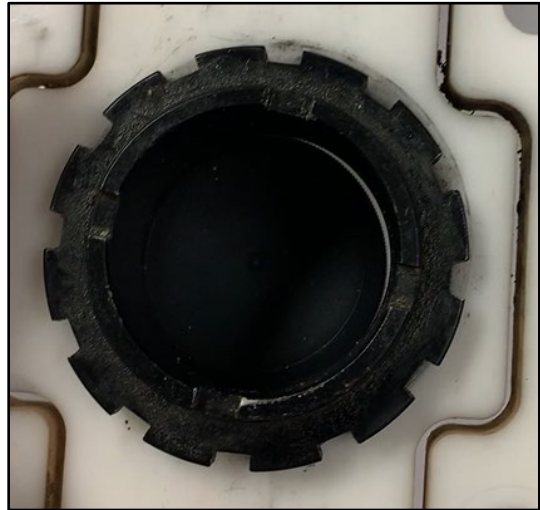
The outside cylinders in the front of the trailer (shown in red), are typically impacted by this concern due to the proximity directly above the tractor tires. To date there have been no reported wear concerns of flex plates or sleeves on the center cylinders in the front of the trailer.

The cylinders in the center of the trailer near the rear (shown in yellow) may experience accelerated wear due to splash from the trailer tires, but to a much lesser extent. The fenders on the trailer itself protect the cylinders directly above the trailer tires.



TECHNICAL SERVICE BULLETIN**Flex Plate and Sleeve Inspection**

1. Remove the lower cover assembly for the cylinder(s) being inspected.
2. Inspect for evidence of movement between the flex plate and the flex plate nut. In the picture to the right there is a witness mark on the flex plate caused by the nut due to movement.



Movement may also be detected by a black residue on the flex plate around the flex plate nut.

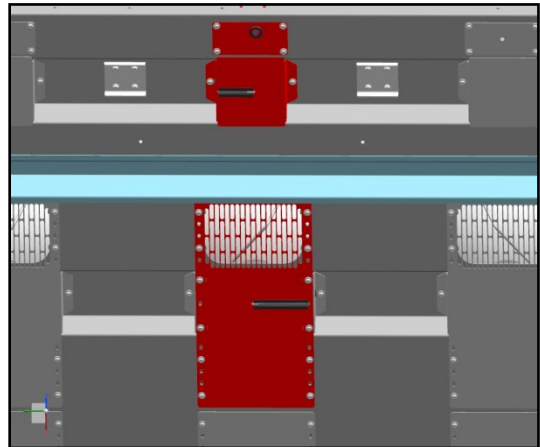


3. Attempt to move the cylinder assembly and check for movement between the flex plate and the flex plate nut and sleeve. Any visible movement indicates wear is present and the assembly should be serviced.

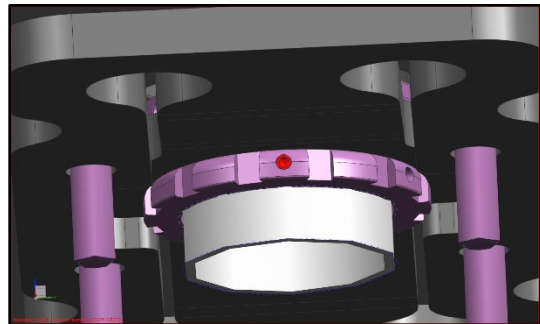
TECHNICAL SERVICE BULLETIN**Flex Plate Sleeve Replacement**

IMPORTANT: If the flex plate sleeve, lock nuts or hardware is damaged where the adjustments cannot be measured prior to disassembly, the cylinder pressure **MUST** be under 500 psi (3447 kPa) before beginning this procedure.

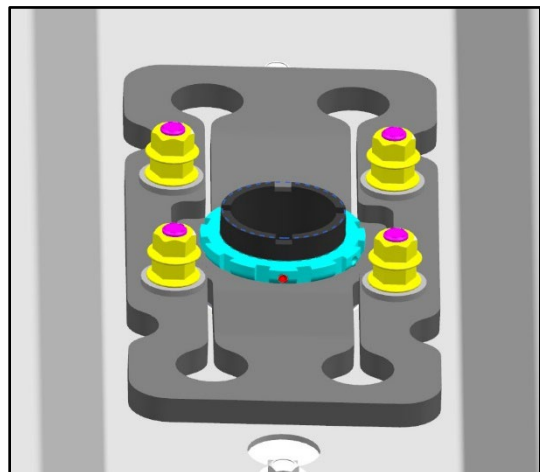
1. Remove and retain the lower cover assembly and hardware.



2. Loosen the set screw locking the flex plate spanner nut in position, then remove the flex plate spanner nut.



3. Remove and retain the eight (8) flex plate retaining nuts, remove and retain the flex plate.



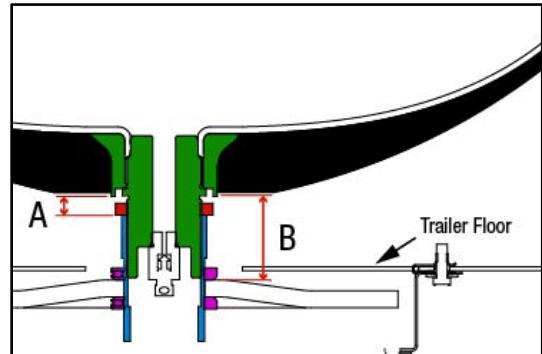
TECHNICAL SERVICE BULLETIN

IMPORTANT: On some cylinders the sleeve jam nut may not be present, and the sleeve is tightened against the cylinder boss, or the jam nut and sleeve are tightened up to the cylinder boss. If no sleeve jam nut exists, or jam nut and sleeve are against the boss, install the new sleeve or sleeve and jam nut in the same manner and torque the new sleeve against the cylinder boss.

This measurement will be necessary for proper reassembly.

4. Measure and document the distance from the cylinder boss to the bottom edge of the sleeve jam nut, reference A in the illustration.

IMPORTANT: If this sleeve replacement procedure must be completed on a cylinder with more than 500 psi (3447 kPa), measure and document the position of the top flex plate jam nut from the bottom of the cylinder dome. This measurement will be necessary for proper reassembly.



5. Measure and document the distance from the cylinder boss to the bottom edge of the upper flex plate spanner nut, reference B in the illustration.


DANGER

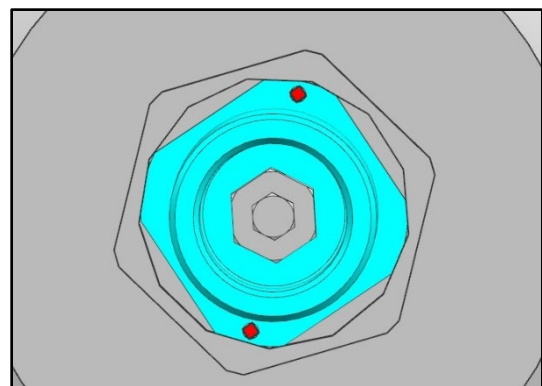
Care must be taken to not disturb or turn the cylinder adapter in the cylinder boss during cylinder sleeve removal. This may result in cylinder damage or an irreparable leak. Make sure to inspect for the presence of both adapter pins prior to removal of the cylinder sleeve.

Failure to follow these instructions will result in death or serious injury.

6. Before removing the cylinder sleeve a cylinder adapter pin inspection MUST be completed. Use the following steps:

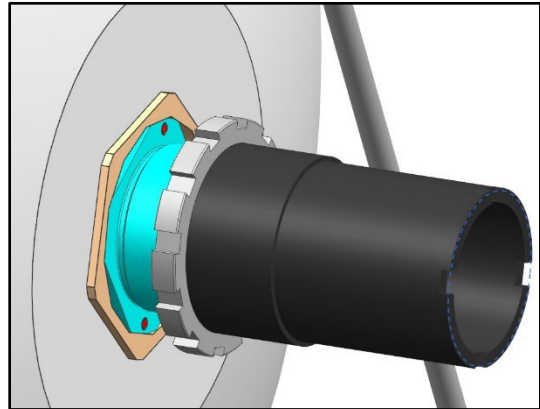
NOTE: If the sleeve jam nut or the cylinder sleeve is tightened all the way against the cylinder boss, the cylinder adapter pins may not be visible and are assumed to be in place.

If the cylinder pins are visible use the following steps:



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- Looking at the bottom of the cylinder, verify the locating pins in cylinder adapter are present. Use of an inspection mirror may be required.
 - If both pins are not present, install a pin using a 3/16" diameter, 3/4" long pin in place of missing pin. A 3/4" long pin will protrude slightly even if fully seated,
 - If required, the cylinder sleeve jam nut (if present) may be threaded up to secure the pin in place.
 - Failure to ensure the cylinder adapter is properly secured could result in loosening of cylinder adapter. This will result in an irreparable leak past the seals in the cylinder adapter.
7. Loosen the sleeve jam nut securing the cylinder sleeve by turning clockwise.
 8. Remove the cylinder sleeve from the cylinder adapter by turning counterclockwise.



If the cylinder sleeve does not spin off by hand, a pipe wrench of up to 18" may be used to help aid removal. Do NOT use any wrench over 18".


 DANGER

Do NOT apply a turning force of more than 295 ft lbs. (400Nm) to the cylinder sleeve or the cylinder may be damaged resulting in severe personal injury or an irreparable leak. Failure to follow these instructions will result in death or serious injury.

If the sleeve does not spin off easily or has been damaged, STOP! Refer to Damaged Sleeve Removal procedures or contact Quantum for guidance.

9. Install the new cylinder sleeve and adjust until it is in the same position as the original sleeve measured in step 4.
10. While holding the cylinder sleeve in position, tighten the sleeve jam nut. It is also acceptable to hold the jam nut and using tool 702603 or equivalent tighten the sleeve.



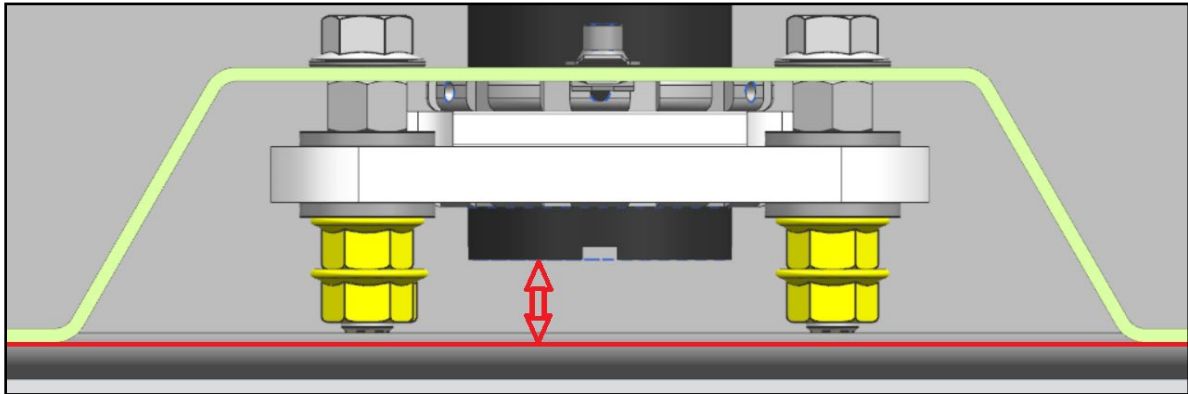
Tighten to 148 lb ft (200 N.m.)

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IMPORTANT: If this sleeve replacement procedure is being completed on a cylinder with more than 500 psi (3447 kPa), install the sleeve to the previously measured position and skip this step.

11. Place a straight edge across the bottom of the container floor and measure the distance from the bottom of the container floor and the bottom edge of the sleeve.

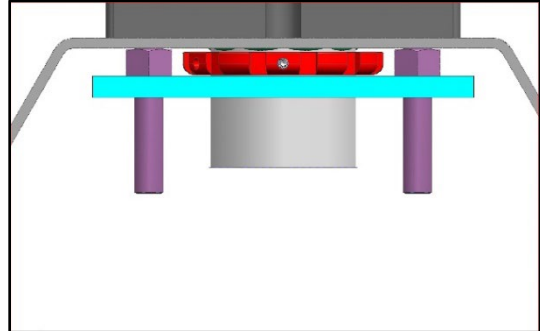
If the distance is less than 0.394" (10mm) adjust the sleeve installed height.



12. Thread the upper flex plate spanner nut up the sleeve until it is approximately flush with the weld nuts.

Note: The stainless steel flex plate nuts are radiused on both sides.

IMPORTANT: If cylinder pressure is more than 500 psi (3447 kPa), adjust the top flex plate spanner nut to the position measured during disassembly and proceed to the next step. Otherwise proceed with this step.

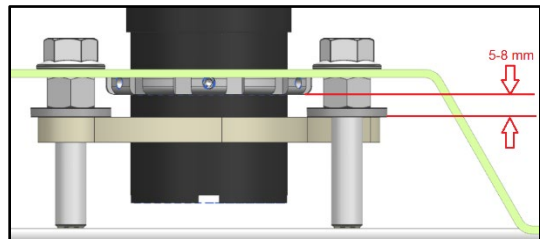


13. Holding the sleeve support tool 702210 in place tightly against the weld nuts, adjust the upper flex plate spanner nut until it touches the tool.

If support tool 702210 is not available, fit the flex plate with the proper mounting hardware into position. Tighten the mounting hardware so the flex plate is held firmly in position.

Adjust the upper flex plate spanner nut until it is 0.197" – 0.315" (5mm – 8mm) from touching the top of the flex plate.

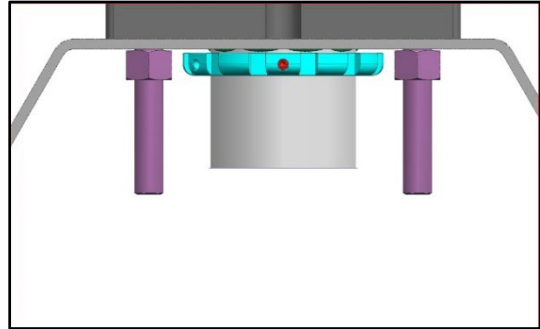
Remove the flex plate and hardware.



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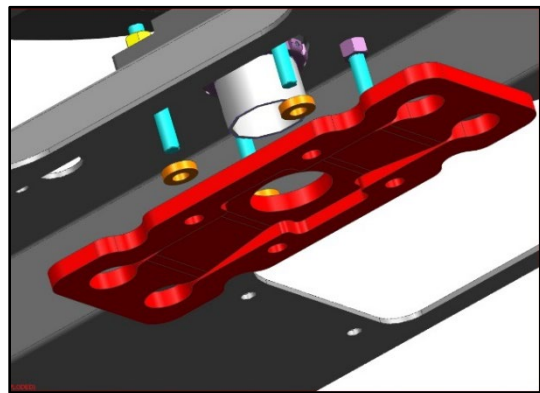
14. Install a set screw in the upper flex plate spanner nut to secure the flex plate nut in position.

Tighten set screw to 14 lb.in. (16 dN.m.)

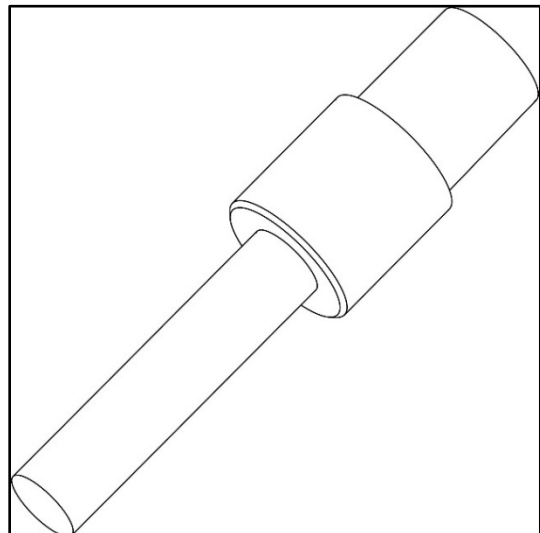


IMPORTANT: Depending on the vintage of the trailer being serviced, the upper support hardware may be spacers or nuts and washers. Ensure any supporting hardware is in place for this step.

15. Place a spacer over each stud and then place the flex plate over the studs; move the cylinder as necessary to align the cylinder sleeve to the center of the flex plate.



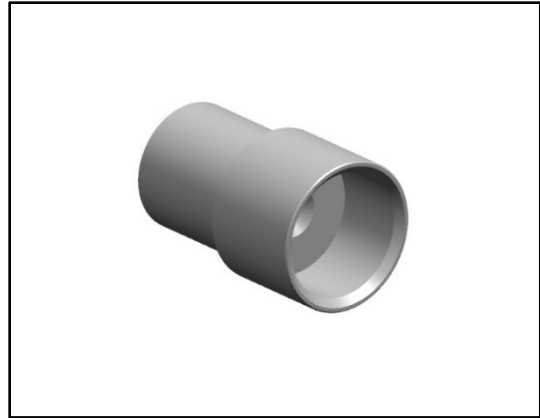
16. Use the 702208 alignment tool or equivalent as needed to move the cylinder to align with the hole in the flex plate.



TECHNICAL SERVICE BULLETIN

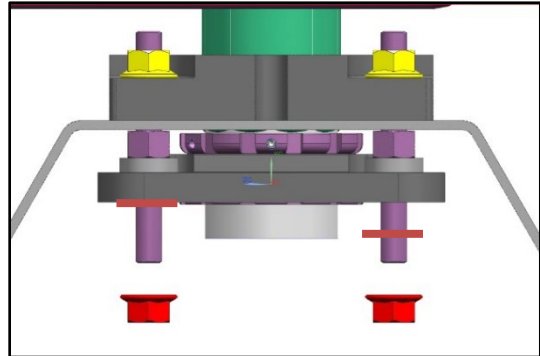
17. Even when aligned, it may be difficult to install the flex plate over the cylinder sleeve due to minor alignment issues.

Use the 702209 installation tool or equivalent and a small dead blow hammer to fully seat the flex plate over the cylinder sleeve.



18. Install washers and four (4) flex plate retaining nuts over the studs and tighten the flex plate retaining nuts.

Tighten to 59 lb ft. (80 N.m.)

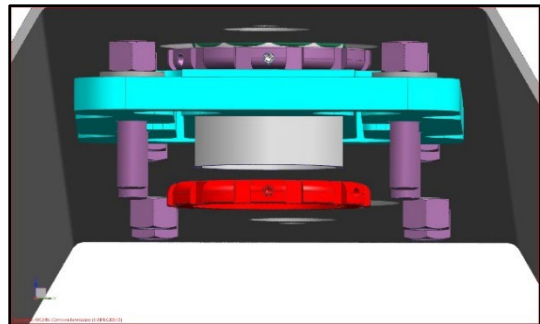


19. Install the lower flex plate spanner nut, verify the side of the nut with the radius is facing the flex plate.

Note: The stainless steel flex plate nuts are radiused on both sides.

IMPORTANT: Note that the flex plate spanner nut torque specification is higher than the torque specification for flex plates without inserts.

Tighten to 85 lb ft. (115 N.m.)

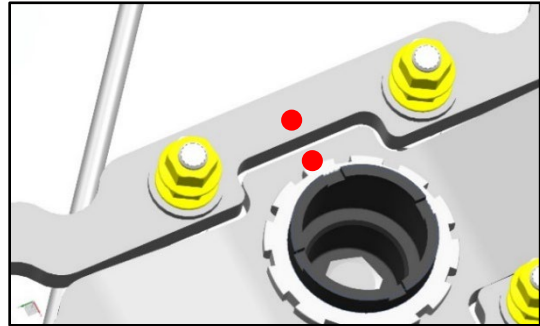


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IMPORTANT: If cylinder pressure is more than 500 psi (3447 kPa), the offset specification noted in this step is not applicable. Proceed to the next step.

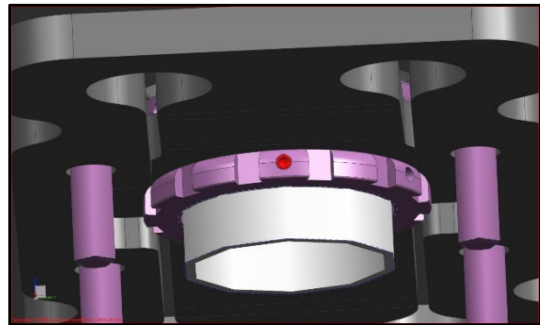
20. Measure the offset between the two surfaces of the flex plate in the location shown, the offset must be between 5mm – 8mm.

If the flex plate offset is not within this specification, adjust the upper flex plate spanner nut as needed.



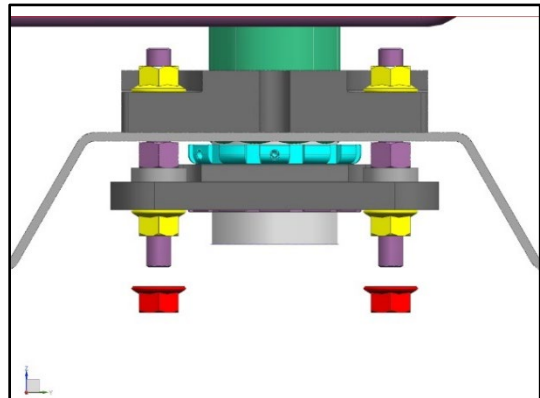
21. Install a set screw in the lower flex plate spanner nut and secure the nut in place.

Tighten to 14 lb.in. (16 dN.m.)



22. Install the remaining four flex plate retaining nuts over the studs and tighten.

Tighten to 59 lb ft. (80 N.m.)



23. Install any removed lower covers:

Tighten to 22 lb ft. (30 N.m.)

