

MAINTENANCE PROCEDURES FOR GRIPTIGHT®, GRIPTIGHTMAX®, AND GRIPTIGHT ELBOW HIGH PRESSURE TEST PLUGS

- Curtiss-Wright Proprietary

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WARNING! FOR PROPER OPERATION, GRIPTIGHT (GT), GRIPTIGHTMAX (GTMAX), AND GRIPTIGHT ELBOW (GTLBO) PLUGS MUST BE ASSEMBLED AS SHOWN.

- ◆ **PRESSURE TESTING IS INHERENTLY DANGEROUS. STRICT ADHERENCE TO THESE OPERATION INSTRUCTIONS AND INDUSTRY SAFETY PRACTICES COULD PREVENT INJURY TO PERSONNEL**
- ◆ **ALL PERSONNEL MUST BE CLEAR OF TEST PLUG WHEN PRESSURE TESTING**
- ◆ **FOR SAFETY, AN INCOMPRESSIBLE LIQUID SUCH AS WATER SHOULD BE USED AS THE TEST MEDIUM. RESIDUAL AIR OR GAS SHOULD BE DISPLACED FROM THE PIPE PRIOR TO TESTING. IN NON-VERTICAL APPLICATIONS AN OPTIONAL VENT, WHERE APPLICABLE, WILL ALLOW FOR VENTING MOST AIR OR GAS. IF NOT INTEGRATED INTO THE FAR SUPPORT, VENTS ARE AVAILABLE FOR MOST GT, GTMAX, AND GTLBO PLUGS.**
- ◆ **GT, GTMAX, AND GTLBO TEST PLUGS ARE DESIGNED TO WITHSTAND PRESSURE IN THE DIRECTION SHOWN IN THE ABOVE DRAWINGS. DO NOT USE THESE PLUGS FOR REVERSE PRESSURE APPLICATIONS. FOR REVERSE PRESSURE APPLICATIONS, GTRP TEST PLUGS ARE TO BE USED.**
- ◆ **PLUG SIZES AND OPERATING PRESSURES DO NOT APPLY TO COATED PIPE. CONTACT EST PRIOR TO USE OF TEST PLUGS ON ANY TYPE OF COATED PIPE / TUBE.**

Questions? Contact EST Group Customer Service at any of the following locations.

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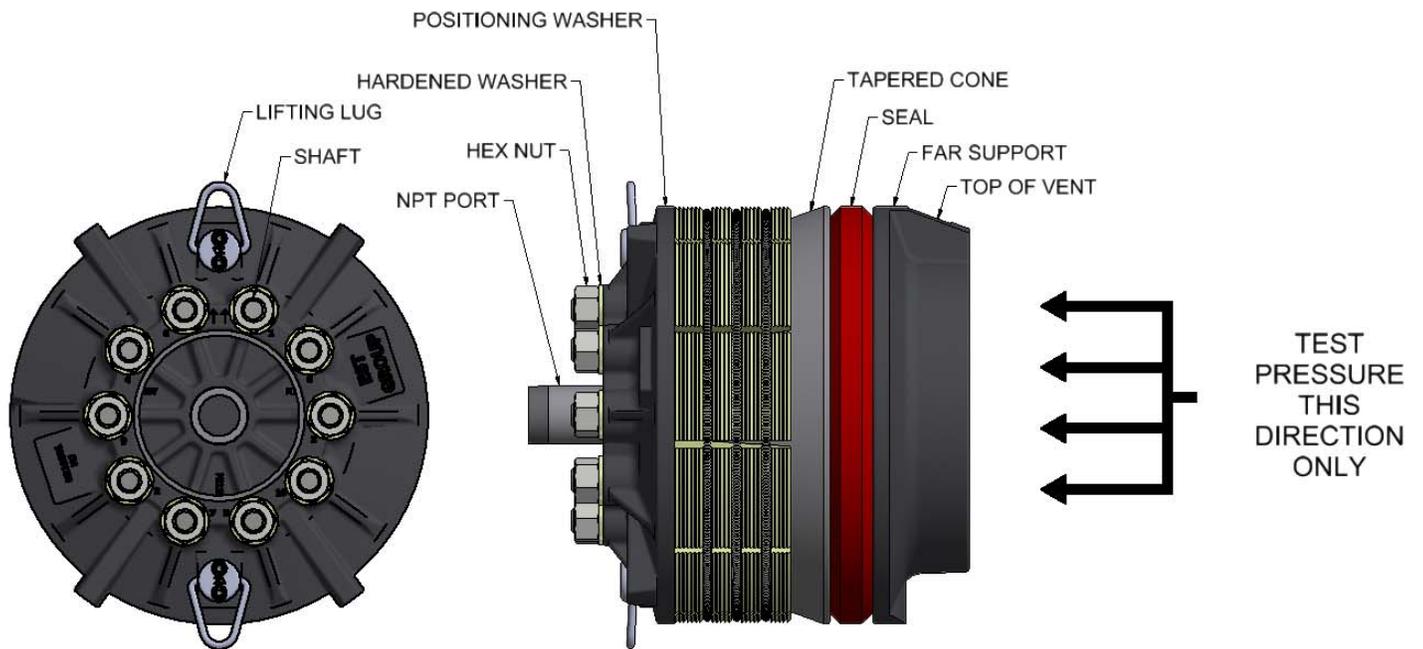
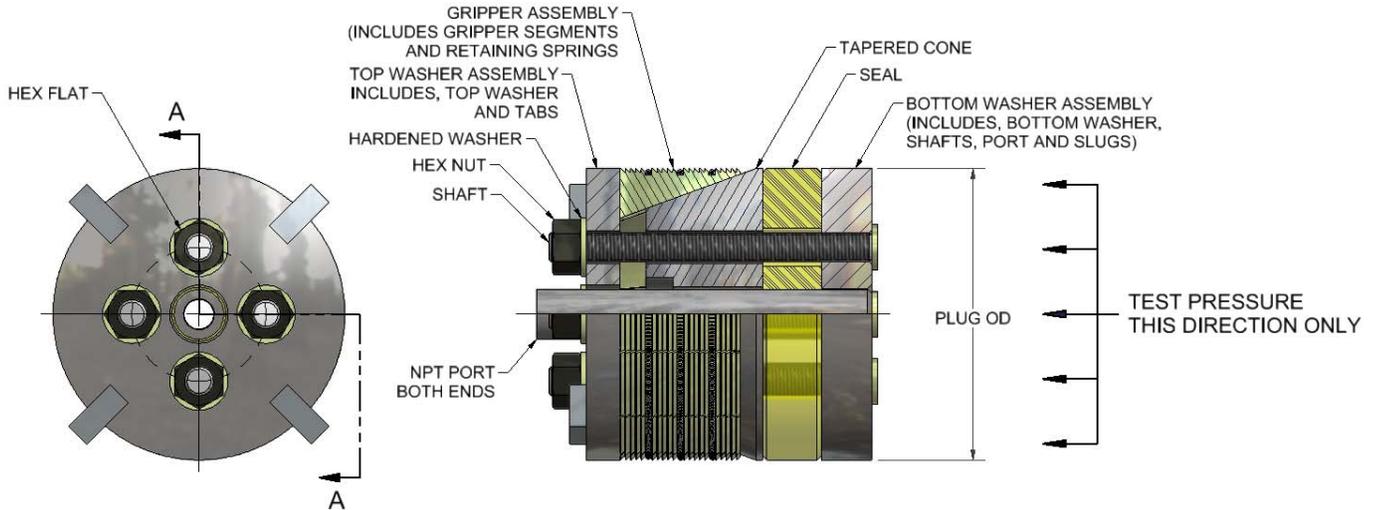
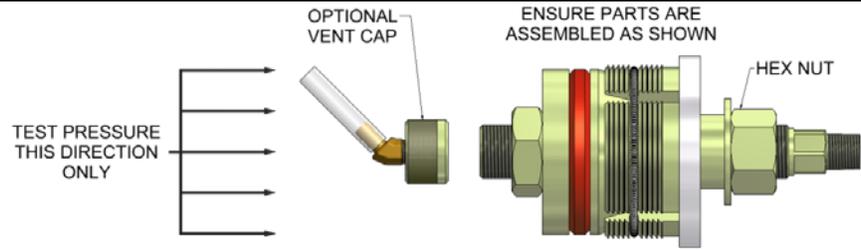
North, Central & South America
EST Group Corporate Office
2701 Township Line Road
Hatfield, PA 19440-1770 USA
P: +1.215.721.1100
+1.800.355.7044
F: +1.215.721.1101
est-info@curtisswright.com

Europe / Middle East / Africa
EST Group B.V.
Hoom 312a
2404 HL Alphen aan den Rijn
The Netherlands
P: +31.172.418841
F: +31.172.418849
est-emea@curtisswright.com

China
P +86.400.636.5077
est-china@curtisswright.cn

Singapore
P +65.3158.5052
est-asia@curtisswright.com

GRIPTIGHT TEST PLUGS



GRIPTIGHTMAX TEST PLUGS

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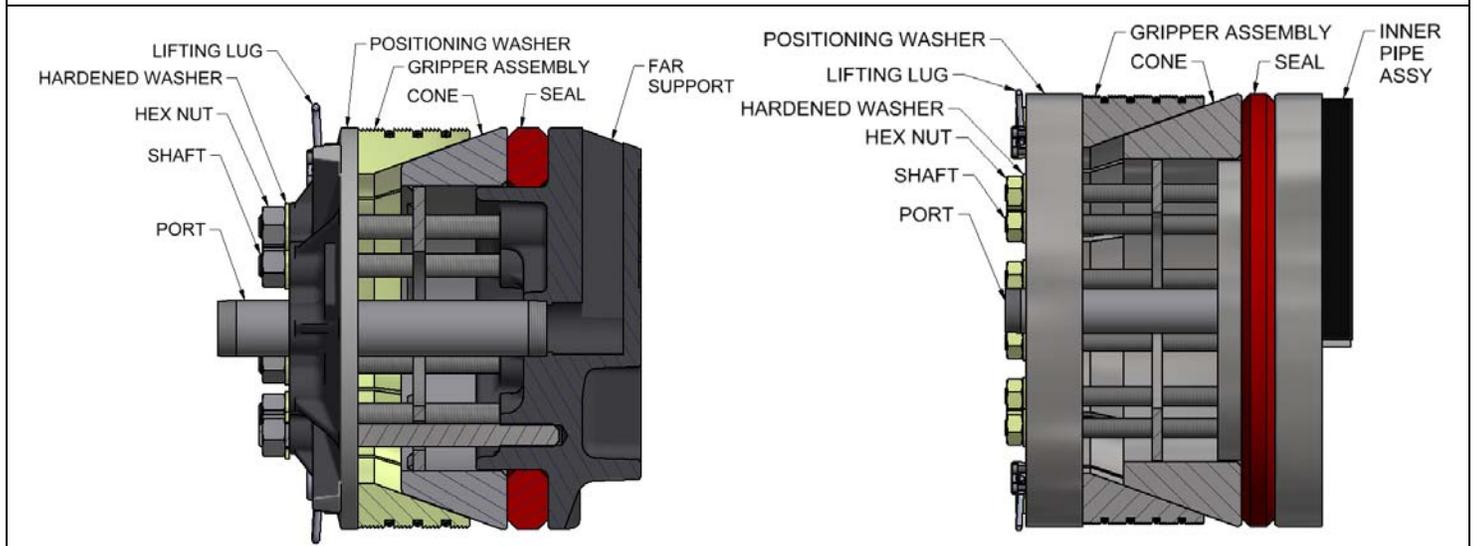
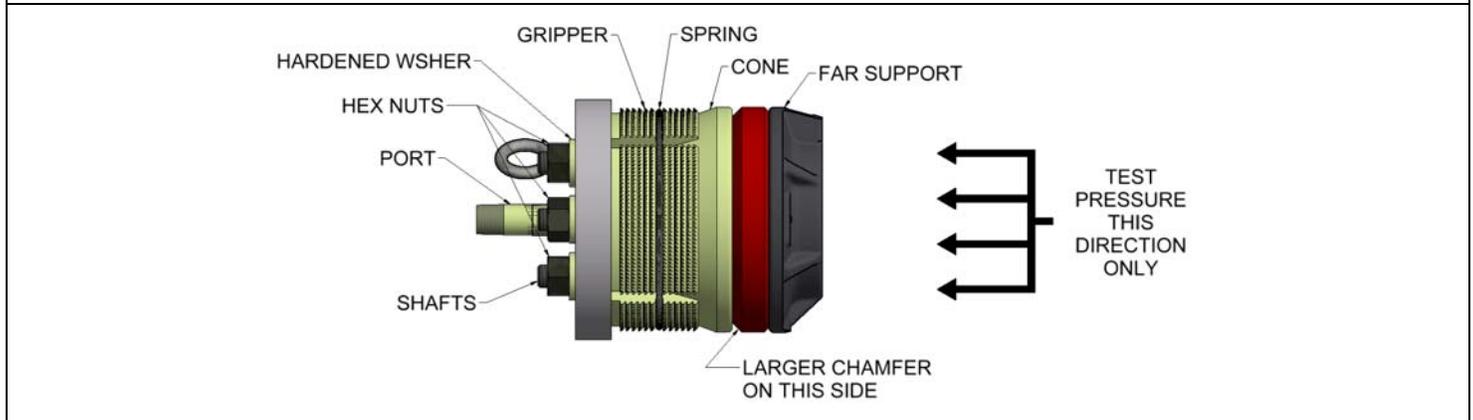
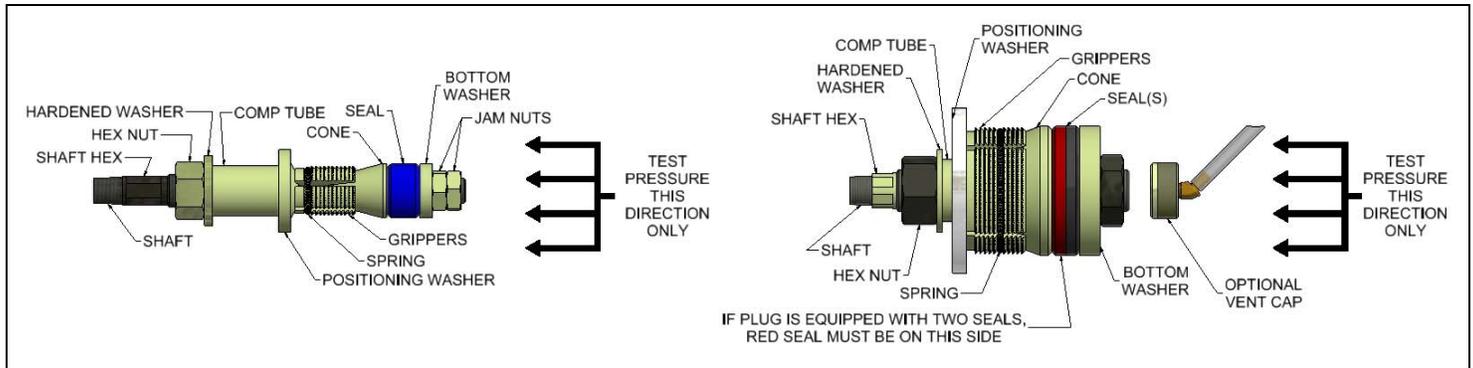
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www.cw-estgroup.com

North, Central & South America
EST Group Corporate Office
 2701 Township Line Road
 Hatfield, PA 19440-1770 USA
 P: +1.215.721.1100
 +1.800.355.7044
 F: +1.215.721.1101
est-info@curtisswright.com

Europe / Middle East / Africa
EST Group B.V.
 Hoorn 312a
 2404 HL Alphen aan den Rijn
 The Netherlands
 P: +31.172.418841
 F: +31.172.418849
est-emea@curtisswright.com

China
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Singapore
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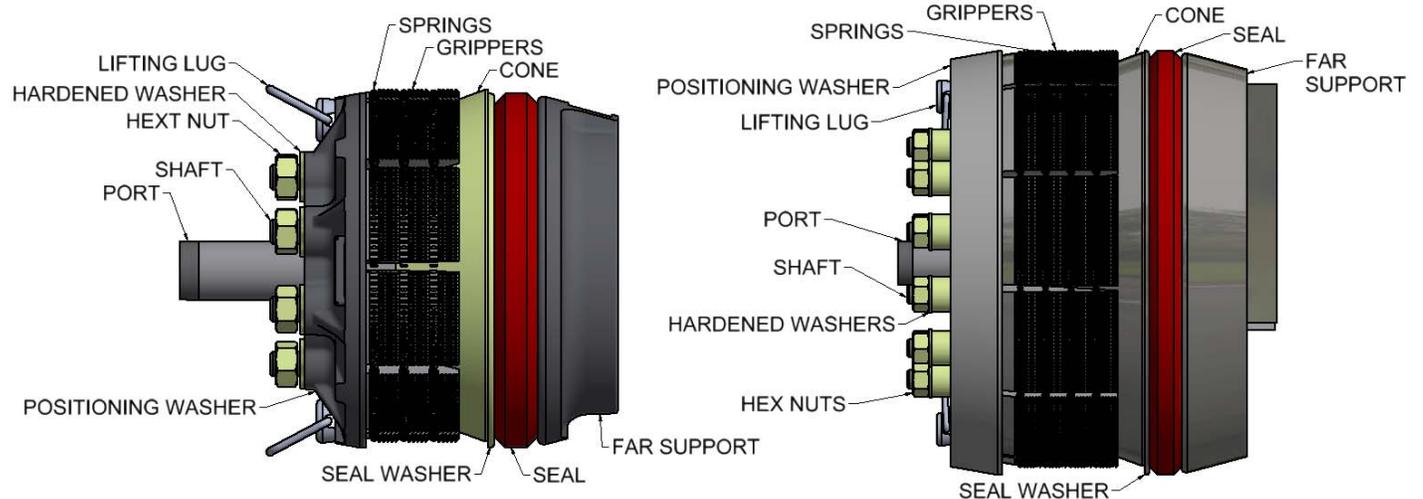
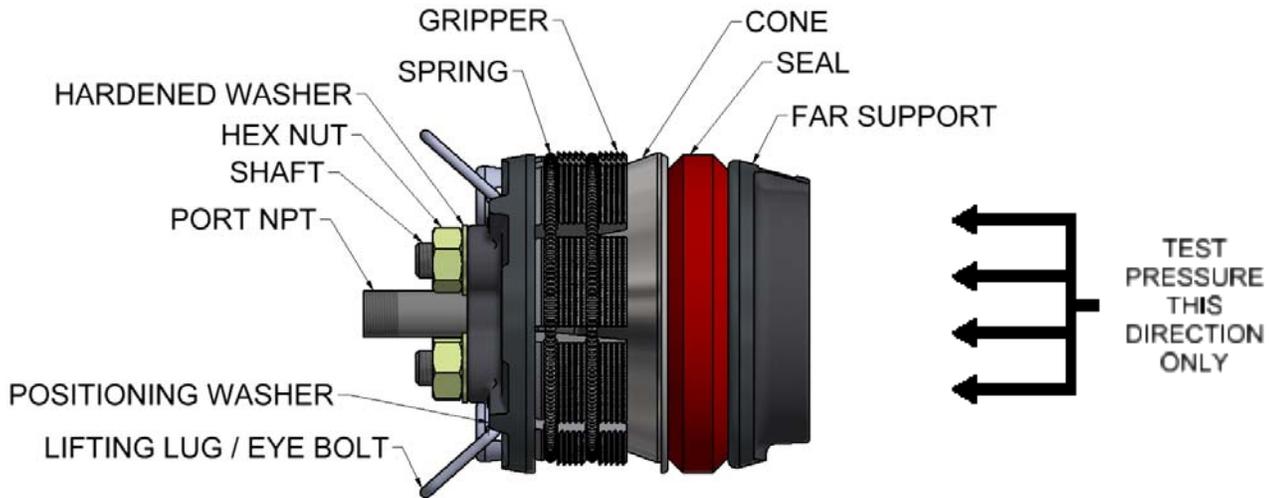
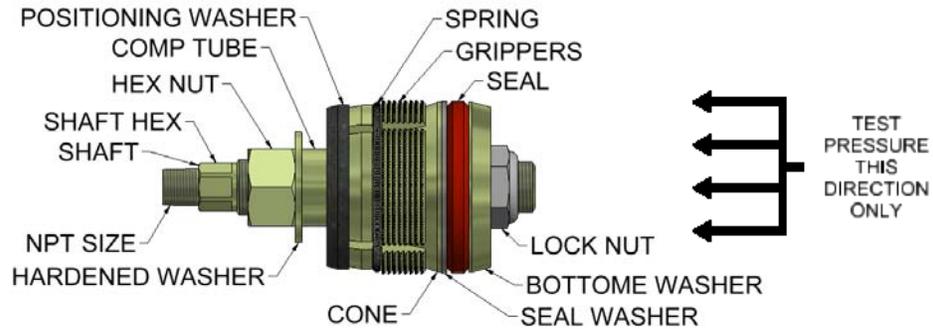
North, Central & South America
EST Group Corporate Office
 2701 Township Line Road
 Hatfield, PA 19440-1770 USA
 P: +1.215.721.1100
 +1.800.355.7044
 F: +1.215.721.1101
est-info@curtisswright.com

Europe / Middle East / Africa
EST Group B.V.
 Hoorn 312a
 2404 HL Alphen aan den Rijn
 The Netherlands
 P: +31.172.418841
 F: +31.172.418849
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China
 P +86.400.636.5077
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Singapore
 P +65.3158.5052
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GRIP TIGHT ELBOW PLUGS



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North, Central & South America
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 2701 Township Line Road
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 +1.800.355.7044
 F: +1.215.721.1101
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Europe / Middle East / Africa
EST Group B.V.
 Hoorn 312a
 2404 HL Alphen aan den Rijn
 The Netherlands
 P: +31.172.418841
 F: +31.172.418849
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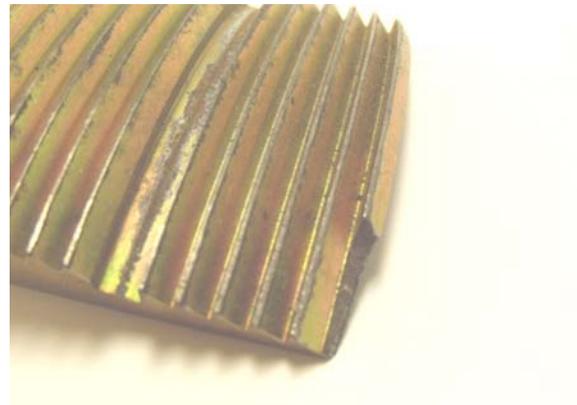
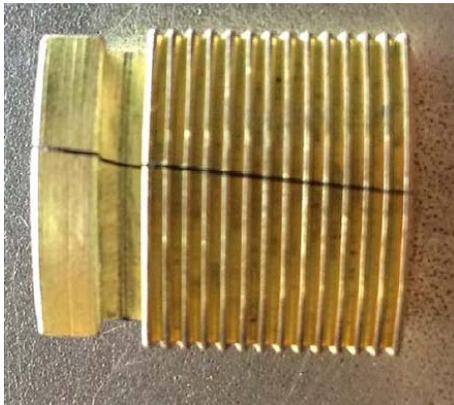
China
 P +86.400.636.5077
est-china@curtisswright.cn

Singapore
 P +65.3158.5052
est-asia@curtisswright.com

INSPECTION OF GRIPTIGHT TEST PLUGS

1. Prior to ANY pressure testing, each GT, GTMAX, GTLBO Test Plug **MUST** be inspected for proper operation.
2. When inspecting grippers, carefully examine each segment, as well as, the individual serrations located on the outside of each segment.
3. The following, although not limited to, are examples of gripper segments that need to be taken out of service and replaced:
 - 3.1. Worn or flattened serrations
 - 3.2. Chipped serrations
 - 3.3. Sheared off or missing serrations
 - 3.4. Deformed or cracked segments or segments

SEE PICTURES BELOW OF GRIPPER DAMAGE



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North, Central & South America
EST Group Corporate Office
2701 Township Line Road
Hatfield, PA 19440-1770 USA
P: +1.215.721.1100
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Europe / Middle East / Africa
EST Group B.V.
Hoom 312a
2404 HL Alphen aan den Rijn
The Netherlands
P: +31.172.418841
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China
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4. If there is any doubt in the integrity of any gripper segment, remove it from service and replace. Contact EST Group Customer Service for assistance in replacement or evaluation.
5. The cone's taper needs to be free to slide on the gripper segments' mating taper for proper operation. Therefore the taper surfaces of the cone and gripper segments must also be inspected prior to each pressure test.
6. The following, although not limited to, are examples of cone deformation that will impede the proper operation of the GripTight Test Plug:
 - 6.1. Pitting due to corrosive medium
 - 6.2. Gouging on the taper
 - 6.3. Indentations
7. If any of these conditions are apparent, the cone needs to be removed from service and repaired or replaced. Contact EST Customer Service for assistance in replacement or evaluation.
8. After the cone has been evaluated and has been deemed ready for service, apply a lubricant, such as Molykote® DX paste, to the tapered surface of the cone and wipe away any excess.
9. Pay careful attention to ensure no lubricant is on the surface of the seal as this can cause a leak-path or premature seal wear.
10. The seal(s) will also need to be examined prior to any pressure test, as this is the primary apparatus for leak-tight testing.
11. The following, although not limited to, are examples of seal deformation that may create a leak-path or a situation that may result in difficulty removing the Test Plug after pressure testing:
 - 11.1. Large rips or tears of the seal
 - 11.2. Large pieces missing from the outside diameter of the seal
 - 11.3. Significant cuts of the outside diameter of the seal
 - 11.4. Excessive extrusion of the seal so that the seal material has rolled over the adjacent cone outside diameter
 - 11.5. Dried out or crumbling seal material

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Europe / Middle East / Africa
EST Group B.V.
Hoorn 312a
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The Netherlands
P: +31.172.418841
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China
P +86.400.636.5077
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Singapore
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SEE PICTURE BELOW OF SEAL DAMAGE



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12. If any of these conditions are present, the seal needs to be removed from service and replaced. Contact EST Customer Service for assistance in replacement or evaluation.
 13. The shaft(s) should be free from debris and the hex nuts should spin freely on the shaft(s) threads.
 14. The following, although not limited to, are examples of shaft and nut issues that, if present, will be detrimental to the proper operation of the GripTight Test Plug:
 - 14.1. No antiseize for lubrication
 - 14.2. Minor diameter of the shaft threads are filled with debris
 - 14.3. I.e. rust, dirt, metal chips, etc.
 - 14.4. No hardened washer present
 - 14.5. Hex nut installed upside down so the load bearing surface is facing up rather than towards the hardened washer
 - 14.6. Hex nut has been cross-threaded onto the shaft
 - 14.7. Shaft threads have been rounded over due to galling
 15. If the threads have been damaged due to galling, lack of lubrication, or rust, in some cases, they may be repaired by running a die of current thread pitch down the affected shaft(s). There are a limited number of times the shafts can be repaired using this technique.
 16. However, if after using the die the hex nut does not freely spin on the shaft(s) threads, do NOT use this plug. It needs to be removed from service and replaced. Contact EST Customer Service for assistance in replacement or evaluation.
 17. After the shaft(s) has been evaluated and has been deemed ready for service, apply antiseize the shaft(s) threads over the full area where the hex nut will travel.
 18. All load bearing surfaces need to also be lubricated with antiseize.
 19. The load bearing surfaces that need to be lubricated with antiseize are as follows:
 - 19.1. In between the hardened washers and the top washer
 - 19.2. In between the hardened washers and the hex nuts
- NOTE:** The nut must be installed so the load bearing surface, denoted by the smooth side vs. the side with identification markings, is down towards the hardened washer.
20. Check the Positioning Washer of the plug for deflection. This is an indication of over-torquing the plug from a previous pressure test.
 21. If the Positioning Washer is bowed or shows signs of galling on the surface adjacent to the grippers, it needs to be removed from service and replaced. Contact EST Customer Service for assistance in replacement or evaluation.
 22. All welds on multi-shaft Test Plugs need to be checked prior to pressure testing. Multi Shaft Test Plugs made with Casting Far Supports do not have welds.
 23. If a weld is broken or cracked, it can result in unsafe operation or the creation of a leak-path. It needs to be removed from service and replaced. Contact EST Customer Service for assistance in replacement or evaluation.
 24. Check all springs used to hold the gripper assembly together.
 25. If there are any missing springs, kinks or points that look to be overly stretched within the spring, they need to be removed from service and/or replaced. Contact EST Customer Service for assistance in replacement or evaluation.

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Hoom 312a
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The Netherlands
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China
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IMPORTANCE OF MAINTENANCE FOR GRIPTIGHT TEST PLUGS

1. If there is any damage to the grippers, they may not effectively grip or “bite” into the pipe/vessel wall. The gripper serrations see, in some cases, a tremendous amount of force while under rated pressure. If there is material missing or deformed, the load may be distributed unevenly and could result in improper operation, failure or ejection.
2. The cone taper and mating gripper taper work in concert with each other. While the plug is being pressurized, the bottom washer, and in turn, the cone are attempting to move out of the pipe/vessel. Since the grippers are already locked into the place relative to the inside of the pipe/vessel, the cone will slide inside the gripper taper. The more pressure is exerted on the plug, the more outward force is applied from the cone into the grippers. It is this action that allows the GripTight Test Plugs to operate as designed. Failure to properly lubricate the cone taper, and keep it free from deformation, may result in improper operation, failure or ejection.
3. Deformation such as tears or missing pieces to the seal will result in the creation of a leak-path. Also, seal extrusion, while it may not create a leak-path, can cause the plug to be very difficult to remove once the pressure test has concluded. The seal will squeeze around the cone outside diameter and into the adjacent gripper gaps created due to installation. When the pressure has been released and the hex nuts have been loosened, the seal will not retract and will remain caught with the gripper assy. Most often, the plug needs to be dis-assembled from the top down to remove it from the pipe/vessel.
4. Lubrication on the shafts and load bearing surfaces is just as vital to the operation as the lubrication between the cone grippers. If there is not adequate lubrication on the shaft, this will result in improper installation; even when using a torque wrench. Since the torque values, provided in the operating procedures, have been established through extensive testing, the full amount needs to be applied to the seal to make the plug leak-tight. Failure to properly lubricate the shafts may result in some of the torque load galling and deforming the shafts instead of squeezing the seal within the pipe/vessel.
5. Deflected or damaged top washers may bow enough to make contact with the shaft threads. This can cause galling and lack of the installation torque being applied to the seal.
6. Any broken or cracked welds may allow the shafts to dislodge from the bottom washer assembly. It could also lead to a leak-path while under pressure test.
7. The function of the springs is to retract the gripper assembly at the conclusion of the pressure test. Missing or damaged springs could result in the gripper assembly not properly retracting up the cone taper and remaining lodged within the pipe/vessel.

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