



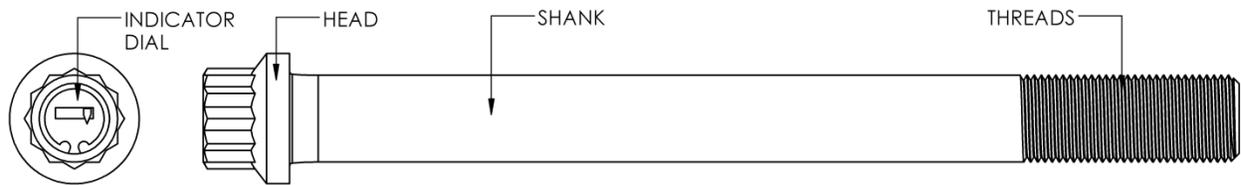
Maxbolt™ Installation

MSI Technical Bulletin 032
Subject: Maxbolt™ Installation

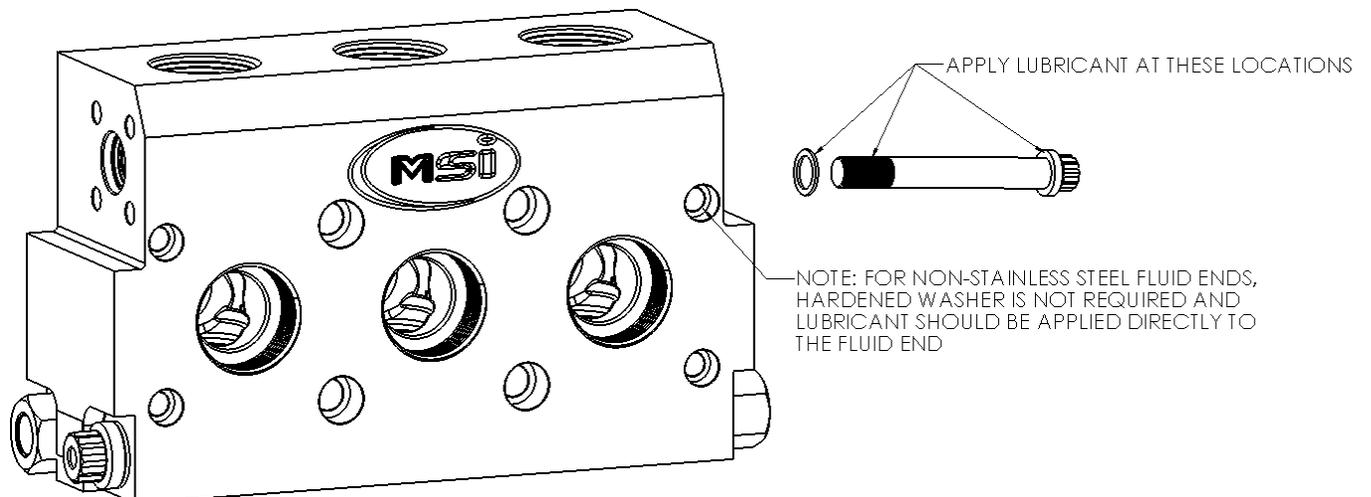
The purpose of this technical bulletin is to provide instructions that will ensure all Maxbolts™ on MSI well service pumps are installed in the same way. The following instructions apply to the fluid end mounting bolts on all fluid ends as well as the large tension bolts found on Xtreme service fluid ends.

When tightening bolts, the goal is to apply a specific level of clamping force. The most common method of controlling the applied clamping load is to tighten bolts to a specified torque. The problem with this method is that for a given torque the clamping force is highly variable depending on the lubricant used, the number of tightening cycles, and the behavior of the material at the interface. For this reason, MSI uses load indicating Maxbolts™ that provide a visual indication of the applied clamping force accurate to within +/-6%.

Prior to installing a Maxbolt™, carefully examine the shank and threads for corrosion, dings or burrs, and make sure the indicator dial reads '0'. If any damage is present, or the indicator does not read '0', do not use the Maxbolt™.



When installing Maxbolts™ on MSI well service equipment, first apply a Dow Corning Molykote® G-n metal assembly paste to the locations indicated in the diagram below.



Assembly paste must be applied at least to the threads of the Maxbolt™ and nut, underside of Maxbolt™ head, and face contacted by the Maxbolt™ head.

NOTE: If the fluid end is stainless steel a hardened washer must be installed between the Maxbolt™ and the fluid end. Lubrication shall not be applied to the fluid end; it shall only be applied to the bottom of the bolt head and the side of the washer which contacts the bolt head.

Next, tighten the bolt until the load indicator on the bolt head reads 90-95%. During the service life of the equipment, observe the load indicator to make sure the bolt tension remains in the 90-95% range. If the Maxbolt™ is tightened until the dial reads '100' it must be completely loosened and inspected to ensure that the dial reads '0'. If the dial returns to zero, re-assemble the parts. If the dial does not return to '0', replace the Maxbolt™.

NOTE: Do not use an impact tool to tighten the Maxbolt™.

MSI recommends that all Maxbolts™ used for mounting fluid ends be replaced when the accompanying fluid end is replaced.

See manufacturer's recommendations for Maxbolt™ inspection in Appendix A.

You may contact an MSI representative at sales@diwmsi.com or engineering@diwmsi.com if you have any further questions or concerns.

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Appendix A

A message from our bolt manufacturer:

This instruction applies to Maxbolt™ load indicating bolts and studs which have previously been in service, and the user has determined to re-issue for service. Prior to re-use of any Maxbolt™ product, the following pre-installation checks shall be completed:

(FASTENERS REMOVED FROM SERVICE - MANUFACTURER DOES NOT RECOMMEND RE-USE, END USER MUST INSPECT AND DETERMINE SERVICEABILITY)

- 1) Measure basic thread parameters to verify that fastener has not been permanently deformed during past use.
 - a. Measure thread major diameter (at 3 points) along thread length for conformance to ASME B1.1 thread specification limits.
 - b. Measure thread pitch and calculate "TPI" (at 3 points) along thread length for conformance to ASME B1.1 thread specification limits.
 - c. Perform a visual inspection of the entire fastener for visual defects (eg. corrosion, pitting or physical damage).
- 2) Perform a Liquid Dye Penetrant(LPI) test to inspect for surface discontinuities. Special focus shall be placed on inspecting under-head fillet radii, and along the threaded length including the thread transition area.
- 3) Inspect Maxbolt™ indicator for proper function.
 - a. Upon removal, or prior to re-installation visually inspect the Maxbolt™ dial for evidence of physical damage, and with no load applied to the fastener the dial shall read 0% load (to within +/- 3%).
 - b. If it ever appears during assembly that the indicator is not responding to increased tightening, suspend the assembly process and remove all loads from the fastener in question. Check ZERO and re-inspect fastener as outlined above. If the fastener does not respond on the MaxBolt Gauge to loading at the recommend Minimum torque range – discard the fastener.

If any fastener has reached its service life, these outlined inspection processes will not detect bolts which are ready to fail. Please ask your OEM about the expected service life of your specific parts.