

Torq N' Seal®

Mechanical Tube Plugs



Tube & Pipe Cleaners ◦ Tube Testers ◦ Tube Plugs ◦ Tube Removal ◦ Tube Installation



Operating and Maintenance Instructions

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INTRODUCTION

Thank you for purchasing this Elliott product. More than 100 years of experience have been employed in the design and manufacture of this plug, representing the highest standard of quality, value and durability. Elliott tools have proven themselves in thousands of hours of trouble-free field operation.

If this is your first Elliott purchase, welcome to our company; our products are our ambassadors. If this is a repeat purchase, you can rest assured that the same value you have received in the past will continue with all of your purchases, now and in the future.

Torq N' Seal® Mechanical Tube Plugs have been designed for high pressure applications, such as feedwater heaters and other high pressure heat exchangers.

If you have any questions regarding this product, manual or operating instructions, please call Elliott at +1 800 332 0447 toll free (USA only) or +1 937 253 6133, or fax us at +1 937 253 9189 for immediate service.

SAFETY GUIDELINES

Read and save all instructions. Before use, be sure everyone using this product reads and understands this manual, as well as any labels packaged with or attached to the product.

- Know Your Elliott Tool. Read this manual carefully to learn your tool's application and limitations as well as the potential hazards specific to this tool.
- Avoid Dangerous Environments. Do not use power tools in damp or wet locations
- Keep Work Area Clean and Well Lit. Cluttered, dark work areas invite accidents.
- Dress Properly. Do not wear loose clothing or jewelry. Wear a protective hair covering to contain long hair. It is recommended that the operator wear safety glasses with side shields or a full face shield eye protection. Gloves and water repellant, nonskid footwear are also recommended. Keep hands and gloves away from moving parts.
- Use Safety Equipment. Everyone in the work area should wear safety goggles or glasses with side shields complying with current safety standards. Wear hearing protection during extended use, respirator for a confined space and a dust mask for dusty operations. Hard hats, face shields, safety shoes, respirators, etc. should be used when specified or necessary. Keep a fire extinguisher nearby.
- Keep Bystanders Away. Bystanders should be kept at a safe distance from the work area to avoid distracting the operator.
- Use The Right Tools. Do not force a tool or attachment to do a job or operate at a speed it was not designed for.
- Use Proper Accessories. Use Elliott accessories only. Be sure accessories are properly installed and maintained.
- Check for Damaged Parts. Inspect parts before use. Check for misalignment, binding of moving parts, improper mounting, broken parts or any other conditions that may affect operation. A damaged part should be properly repaired or replaced by an Elliott service facility. For all repairs, insist on only identical replacement parts.
- Stay Alert. Watch what you are doing, and use common sense. DO NOT use a tool when you are tired, distracted or under the influence of drugs, alcohol or any medication causing decreased control.
- Maintain Tool Carefully. Keep tools clean for best and safest performance. Have damaged parts repaired or replaced by an Elliott service facility.
- Store Idle Tools. When not in use, store your tool in a dry, heated, secured place
- Maintain Labels and Nameplates. These carry important information and will assist you in ordering spare and replacement parts. If unreadable or missing, contact an Elliott service facility for a replacement.

PLUG INSTALLATION

When needing to use and install mechanical tube plugs, having the correct tools for the job can make it easier and quicker to get the job done. Below are step by step instructions to help overcome this challenge.

Clean & Prep

Prior to any work being done it is important to brush the tube using Elliott's MPB brush sized properly for the tube ID. The MPB brush is a rigid steel wire brush that is designed to remove material from the tube to create a prime surface that the plug can seal against. The brush can be driven by a standard handheld drill. If the MPB brushes does not create a prime surface, an adjustable reamer can be used.



Mechanical Plug Prep Brush

Please note the size and use caution to not over adjust the reamer and remove too much tube wall during this process. Elliott suggests that the adjustable reamer be driven by hand power only to avoid damage and control the reaming.



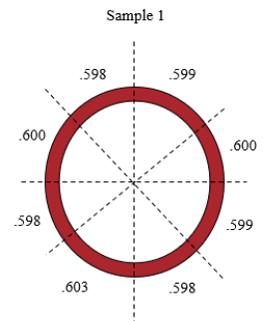
Adjustable Reamer

Measuring

Elliott's Tube Hole Gauge can be ordered for a wide range of sizes and reaches to overcome any reach constraints. When using this tool, it is important to measure in the area that you plan to install the tube plug and ensure that after each measurement, rotate the gauge 5-10° to further check the tube for any tenting or irregular shapes. Be sure to log this information so that it can be tracked for quality assurance.



Tube Hole Gauge



Tube ID Irregularities

PLUG INSTALLATION

Venting

One of the most overlooked best practices for plugging a tube is to vent the tube beforehand. Tube venting is a process by which a small puncture is made inside of the tube, releasing any pressure or chemicals that may be trapped inside. Venting is highly recommended for oil refineries, petrochemical, chemical and other processes that utilize heat exchangers and feed water heaters. Certain chiller applications may specify otherwise, so it's best to check with your manufacturer.

To do this, we recommend using Elliott's One-Rev tube cutter. The vent should be beyond the tube sheet to ensure the tube does not build up pressure and create risk for plug dislodging, fire, or explosion. Venting can be done on both ends of the tube, as well as, on the top and bottom of the tube. This ensures that pressure cannot build-up later on due to corrosion or process fluids.



One-Rev Tube Cutter

1. Determine how far down the tube you wish to make the cut and lock the collar in place.
2. Insert the cutter into the tube and start rotating the cutter clockwise.
3. When you begin to feel some resistance, rotate the tool a quarter turn more to pierce the tube.
4. Turn the cutter counter-clockwise to reset the cutter bit. Once the bit is retracted, the cutter can be removed.

Tube Plugging

Once the above has been completed, the operator can now choose the correct plug for the tube and application. Remember it's important to match like materials and to select the appropriately sized plug for the tube ID being plugged.

During installation you may find that you need accessories to reach through channels for water boxes. This will be dependent on the vessel and space constraints. Things to keep in mind:

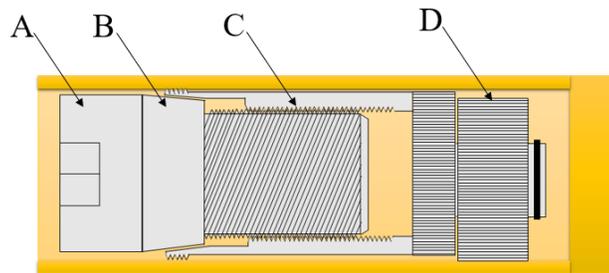
- If using socket extensions, be aware that extreme reaches could result in slight loss in torque. Double check the torque value on a test stand to anticipate and account for any loses.
- Brush extension kits are available from Elliott to ensure you can reach through headers, water boxes, and channels to clean the tube end.



PLUG INSTALLATION

- Air coolers pose a unique challenge as a 12' reach expander could be needed to expand the tube past the tube sheet so that the eccentric cam has room to lock into place during installation.

To install the plug, select the correct size and place the plug on the end of the provided hex key until you hear a slight 'snap'. This indicates that the plug is secure. When positioning the plug, be sure that the serrated portion of the plug lands within the tube sheet area. This will ensure that the plug seals against the tube and tube sheet to allow for optimal performance. If the serrated area lands outside of the tube sheet area, the plug and torque wrench could reach torque but during testing and operation, the plug could come loose and leaks would be present.



- A : socket head cap screw
- B: Ferrule
 - Small but important detail to remember when removing the plug
- C: Plug Body
- D: Eccentric cam – locking cam

Once the plug is placed in the appropriate spot, take your torque wrench and start turning until torque increases. Elliott recommends the use of a digital torque wrench that features color, audio, and vibration alerts when you meet your desired torque. Once you reach the desired torque, stop applying force and remove the hex key from the plug and repeat this process for the next tube.

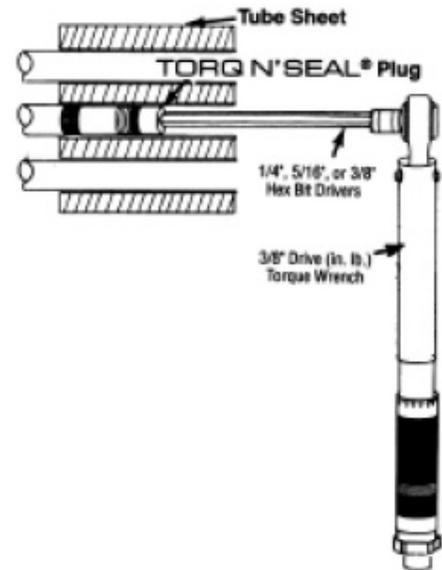


Torque Wrench

PLUG INSTALLATION

Be Careful To Avoid The Following:

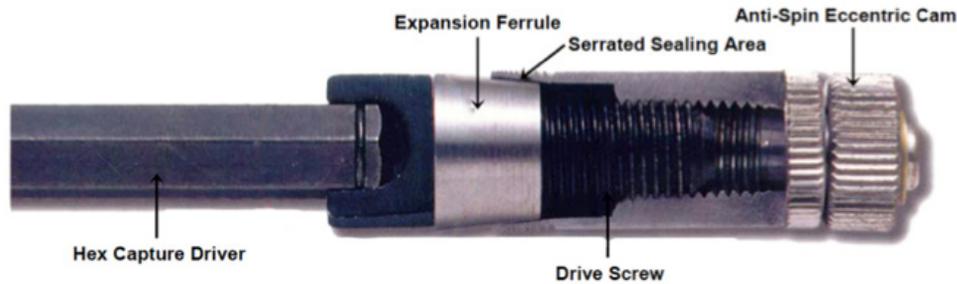
1. Do not measure tube at roll joint seal weld (not true tube ID)
2. Do not use in a tube sheet that is more than 0.020" larger in diameter than the plug.
3. Do not push the drive adapter against the tube sheet face. The expanding screw threads into the plug body and may slip off the drive prior to sealing.
4. Do not place plug in an internal tube area near a step roll transition or a tube with severe pitting, corrosion or crack.



| Required Torque To Set Tube Plug | | | | | | | |
|----------------------------------|------------------|------|--------------|------|---------------------------------------|------|-----------------------|
| Plug OD (Inches) | Brass & Cu-Ni | | Carbon Steel | | Stainless Steel, Titanium, & Monel | | Hex Drive (Inches) |
| | in lbs. | Nm | in lbs. | Nm | in lbs. | Nm | |
| 0.410-0.550 | 200 | 22.5 | 250 | 28.2 | 300 | 33.9 | 1/4 |
| 0.570-0.710 | 250 | 28.2 | 350 | 39.5 | 500 | 56.5 | 5/16 |
| 0.730-0.980 | 350 | 39.5 | 450 | 50.8 | 600 | 67.8 | 3/8 |

The range on the torque wrench is 120 – 960 in. lbs.

PLUG REMOVAL



1. Remove the drive screw.

Determine the hex size of the drive screw in order to choose the correct hex driver (1/4", 5/16", 3/8"). Insert the drive into the end of the plug and begin rotating the drive to unthread and remove the drive screw.



2. Remove the expansion ferrule.

Once the drive screw is removed, the expansion ferrule can be removed. This is the section of the plug that expands inside the tube during installation. In order to remove it correctly, first select an easy out tool sized to the expansion ferrule ID. Then, insert the easy out tool into the plug and remove by turning and pulling the tool.



3. Remove the plug body.

There are a few different methods that may be used to remove the remaining plug body. The first of which is with a slide hammer. A slide hammer uses a short piece of tube over a threaded rod (see table below for sizing). Begin by threading the rod into the plug with the piece of tube already over top. Then thread a washer and nut on the end of the rod. Once the washer and nut are in place, take the piece of tube and slide it towards the end of the rod, so that it strikes the washer. This action will work to knock out the plug body.

Another way to remove the plug body is to loosen it with a washer and a nut. Begin by inserting a threaded rod into the plug. Next, place a washer and nut on the end of the threaded rod and tighten them until the plug is removed.

Lastly, a hydraulic cylinder may be used to remove the plug body. Similar to a slide hammer, the hydraulic cylinder exerts a greater pulling force in order to remove the plug. Begin by inserting a threaded rod into the plug. Next, place a hollow hydraulic cylinder over the rod with a washer and nut on the end. Then, energize the cylinder so that it pulls out the plug body.



| Thread | Plug Size |
|----------|-----------------|
| 5/16"-24 | 0.460" - 0.550" |
| 3/8"-24 | 0.560" - 0.690" |
| 1/2"-20 | 0.700" - 1.125" |

WARRANTY

Should any part, of Seller's own manufacture, prove to have been defective in material or workmanship when shipped (as determined by Seller), Seller warrants that it will, at its sole option, repair or replace said part f.o.b., point of manufacture, provided that Buyer notifies, in writing, of such defect within twelve (12) months from date of shipment from the manufacturing plant.

On request of Seller, the part claimed to be defective will be returned, transportation, insurance, taxes and duties prepaid, to the factory where made, for inspection. Any item, which has been purchased by Seller, is warranted only to the extent of the original manufacturer's warranty to Seller. Seller shall not be liable for any damages or delays caused by defective material or workmanship.

No allowance will be made for repairs or alterations made by others without Seller's written consent or approval. If repairs or alterations are attempted without Seller's consent, Seller's warranty is void.

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Seller's total liability is limited to the lower of the cost of repair or replacement.



Contact Us

Elliott Tool offers a complete line of precision tube tools to meet your needs. Contact us or your local support.

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Printed in the USA
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TM-12
PL-32

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