



CLOSING INSTRUCTIONS – STEEL DRUMS (UN 1A1, UN 1A2)

Industrial Container Services DBA Mauser Packaging Solutions (MPS) provides these instructions to the filler of UN certified steel drums. This document applies to drums produced at the following manufacturing locations:

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|--|--|
| M4067 – 6191 Jones Avenue, Zellwood, FL 32798 | M4762 – 3201 S Millard Avenue, Chicago, IL 60623 |
| M4358 – 1385 Blatt Boulevard, Gahanna, OH 43230 | M4884 – 1402 Clinton Drive, Bldgs 1-4, Galena Park, TX 77547 |
| M4379 – 2810 W Trade Street, Charlotte, NC 28201 | M4954 – 2006 Thornhill Road, Auburndale, FL 33823 |
| M4433 – 4336 Hansen Avenue SW, Grand Rapids, MI 48548 | M5152 – 990 Spiral Boulevard, Hastings, MN 55033 |
| M4470 – 7152 First Avenue South, Seattle, WA 98108 | M5620 – 640 Baseline Road, Brighton, CO 80601 |
| M4472 – 1051 Union Street, Montebello, CA 90640 | M5660 – 455 George Washington Highway, Smithfield, RI 02917 |
| M4483 – 749 Galleria Boulevard, Roseville, CA 95678 | M6201 – 320 Walker Drive, Springville, AL 35146 |
| M4655 – 405 Industry Road, Bldgs 1-4, Louisville, KY 40208 | M6638 – 2443A N Expressway, Griffin, GA 30223 |

United States Department of Transportation regulations state that packaging manufacturers are required to notify each person to whom the packaging is transferred of all requirements not met at the time of transfer. This requirement is given in Title 49, Code of Federal Regulations (49 CFR), Part 178 Specifications for Packagings, § 178.2 (c). In addition, this Paragraph requires the closing information to be provided to any person to whom this package is transferred who may need to close the packaging prior to re-shipment. Furthermore, it is the shipper's responsibility as set forth in §173.22(a)(4) to ensure that these closing instructions are carried out as described. In order to ensure the instructions are followed in a manner to result in safe transport of hazardous materials the shipper is obligated, asset forth in § 172.704(a)(4), namely - function specific training - to train his/her employees in the correct way to close the packaging for shipment. In order to fulfill this obligation, the shipper often turns to the packaging manufacturer for this training since the manufacturer has designed, produced, and tested the packaging to meet UN performance standards. MPS is prepared to provide this training in addition to supplying closing instructions. It has been the practice of MPS to send closing instructions attached with the shipping documents with each shipment of drums. This document provides specific information on closing MPS packaging.

These closing instructions must be given to the individuals responsible for closing the packagings prior to shipment. A hard copy (printed) must be maintained by the filler or offeror for shipment.

The following tables and text give examples of the parts and closing torque required to prepare the drum for shipmentso that it is capable of meeting the performance standards indicated by the UN marking on the side or top of the packaging. **MPS recommends that only parts that have been tested and certified by MPS be used to close the packagings for shipment.** In the case of removable head drums the lids, gaskets and locking rings are supplied as tested. Any modification of the drum components that changes the design of the drum from the design that was tested by or on behalf of MPS, or any deviation from the above, voids said certification.

PRIOR TO CLOSING:

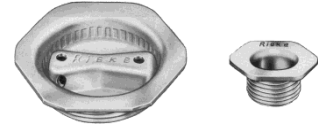
Inspect each closure to ensure that the closure has the proper gasket and that both closure and gasket are in good condition. Open head cover gasket performance can be affected by time (age), temperature, exposure to chemicals and ozone. Inspect the sealing surface for damage and make sure the threads and sealing surfaces are dry. Replace any defective gaskets, plugs or lids with new, defect free parts as sold with the original packaging.

CLOSING PROCEDURES FOR PLUGS AND CAPS:

The plug or cap is inserted into the appropriate opening and screwed down hand tight until the gasket is in contact with the sealing surface. A torque wrench capable of applying the proper torque to the fitting as specified by the closing instructions following is then used to tighten the plug or cap until it reaches the pre-set torque as indicated by a release or click. These wrenches should be calibrated at least annually.

All non-removable head, UN 1A1, Steel Drums, 49 CFR § 178.504(a)(1), and removable head, UN 1A2, Steel Drums, 49 CFR § 178.504(a)(2), that are supplied with plugs and gaskets must be **closed for shipment using only the plugs and gaskets supplied and specified** in the design qualification test for the drum, as indicated below:

HEXAGONAL HEAD PLUGS TORQUE
(RIEKE VISE GRIP & VICE GRIP II STYLE)



| Closing Torques in ft.-lbs. (by Type) | | Gasket Type | 3/4" Plug Torque | 1 1/2" Plug Torque | 2" Plug Torque |
|---------------------------------------|---|--------------|------------------|--------------------|----------------|
| Rieke ¹ : | VISE-GRIP II Plug - Plastic Flange | Polyethylene | 8-10 ft.-lbs. | ---- | 18-22 ft.-lbs. |
| | | Rubber | 8-10 ft.-lbs. | ---- | 18-22 ft.-lbs. |
| | VISE-GRIP II Plug - Steel Flange | Polyethylene | 8-10 ft.-lbs. | ---- | 18-22 ft.-lbs. |
| | | Rubber | 8-10 ft.-lbs. | ---- | 18-22 ft.-lbs. |
| | VISE-GRIP II Plug with built-in gasket - Plastic Flange | ---- | 8-10 ft.-lbs. | ---- | 18-22 ft.-lbs. |
| | VISE-GRIP II Plug with built-in gasket - Steel Flange | ---- | 8-10 ft.-lbs. | ---- | 18-22 ft.-lbs. |
| | Steel Plug - Steel Flange | Polyethylene | 8-10 ft.-lbs. | ---- | 18-22 ft.-lbs. |
| | | Teflon | 18-22 ft.-lbs. | 36-44 ft.-lbs. | 36-44 ft.-lbs. |
| | | Rubber | 14-17 ft.-lbs. | 27-33 ft.-lbs. | 27-33 ft.-lbs. |

ROUND HEAD PLUGS TORQUE
TS Type (Tite Seal, Tri-Sure®, or Tite Grip)



| Closing Torques in ft.-lbs. (by Type) | | Gasket Type | 3/4" Plug Torque | 1 1/2" Plug Torque | 2" Plug Torque |
|---------------------------------------|-----------------------------------|----------------|------------------|--------------------|----------------|
| TS Type ² : | Polypropylene and Nylon Plugs | Polyethylene | 8-12 ft.-lbs. | ---- | 11-20 ft.-lbs. |
| | | Rubber | 8-12 ft.-lbs. | ---- | 18-25 ft.-lbs. |
| | Polyethylene Plugs | Rubber | 8-12 ft.-lbs. | ---- | 18-25 ft.-lbs. |
| | Self-Gasketing, Polyethylene Plug | ---- | 5 ft.-lbs. | ---- | 12 ft.-lbs. |
| | Steel Plugs | Polyethylene | 8-15 ft.-lbs. | ---- | 15-25 ft.-lbs. |
| | | Teflon | 8-15 ft.-lbs. | ---- | 15-25 ft.-lbs. |
| | | Rubber | 8-15 ft.-lbs. | ---- | 15-25 ft.-lbs. |
| | Zinc Die-Cast Plugs | Polyethylene | 8-15 ft.-lbs. | ---- | 15-25 ft.-lbs. |
| | | Teflon | 8-15 ft.-lbs. | ---- | 15-25 ft.-lbs. |
| | | Rubber | 8-15 ft.-lbs. | ---- | 15-25 ft.-lbs. |
| Leak Lock Plugs | All | 18-22 ft.-lbs. | ---- | 23-27 ft.-lbs. | |

STEEL REMOVABLE HEAD DRUMS³

If a head compressor is not available, start bolt into lug, alternating tapping of ring with a mallet and drive bolt with a wrench until bolt ring ends meet the below requirements:

CLOSING RINGS BOLT LOCKING RINGS (Including Overlapping Style Ring)

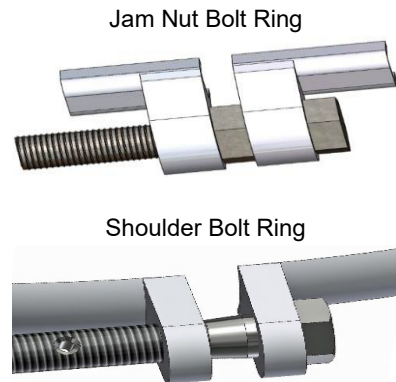
1. Snap the closing ring over the cover and curl area of the drum, making sure that it is seated over the entire perimeter. For drums with 12-gauge forged lug rings, use of a mechanical head-compressing device is required to assure proper gasket compression. Ring's bolts should be tightened while the cover/gasket is being compressed. Drums assembled without using a mechanical head compressing device may not perform to the certified level.

2. While a head compressing device is preferred for all rings, for rings 12-gauge or lighter, it is acceptable to tighten the ring's bolt while simultaneously tapping the outside of the closing ring around the entire perimeter, with a non-sparking mallet. In order to compress the gasket uniformly. If a head-compressing device is used, make sure that the cover is centered on the drum curl. Check to see that the cover and the drum curl are pinched together and within the recess of the ring.
3. Torque the bolt and nut until the gap between the closing ring ends is $\frac{1}{4}$ " gap $\pm \frac{1}{8}$ " but with no bending of the lugs. For drums with poly liner "bags", the gap should be $\frac{1}{2}$ " or less while ensuring that the liner is seated uniformly over the curl of the drum and protruding out from under the cover. Generally, the closing ring ends must not touch when the ring's bolt has been fully torqued (see paragraph "b" below).

a. **On rings supplied with a jam nut between the lugs**, tighten the nut securely against the unthreaded lug. The closing ring ends should not touch when the ring's bolt has been fully torqued.

b. **On rings supplied with a shoulder bolt, there should be no jam nut.** It is important that jam nuts not be used with rings for which they are not supplied. Thread the bolt into the ring nut and tighten until the threaded portion is through the lug. The smooth unthreaded portion will not engage the threads and tightening stops at the prescribed gap.

c. **Rings supplied without a jam nut or a shoulder bolt, may look very similar to those supplied with a jam nut or shoulder bolt, however these are not interchangeable.** See the Solid Seal closing instructions for specifics on Solid Seal Rings.



4. **Ring gap is critical.** If it cannot be obtained, utilize the following torques:

| Manufacturing plant | Drum/Ring Configuration | Application torque |
|---|--|--------------------------|
| All plants | 55-gallon, 5/16" and 3/8" bolts | not less than 15 ft-lbs. |
| All plants | 55-gallon 12 ga Forged Lug ring w/ 5/8" bolt | 65-75 ft-lbs. |
| Manufacturing location identification is marked in inkjet on drum. | | |
| Zellwood (M4067), Gahanna (M4358), Charlotte/Trade Street (M4379), Grand Rapids (M4433), Seattle (M4470), Montebello (M4472), Roseville (M4483), Louisville (M4655), Chicago Millard (M4762), Galena Park (M4884), Lakeland (M4954), Hastings (M5152), Brighton (M5620), Smithfield (M5660), Springville (M6201), Griffin (M6638) | | |

CLOSING INSTRUCTIONS FOR 1A2 FULL OPEN HEAD DRUMS WITH SOLID SEAL™ BOLT RING CLOSURE – TYPE II (TYPE II HAS A 5/8" BOLT WITH A NYLON LOCKING PATCH, WHICH ELIMINATES THE NEED FOR A RETAINING NUT OR JAM NUT)

1. Snap the closing ring over the cover and curl area of the drum, making sure that it is seated over the entire perimeter. Check to see that the cover and drum curl are fully contained and centered within the recess of the ring.
2. The bolts for this application have a nylon-locking patch on the threads. Insert the 5/8" diameter nylon patched bolt through the unthreaded ring lug and tighten the bolt while compressing the gasket with a mechanical head press or while tapping the outside of the closing ring around the entire perimeter with a non-sparking mallet.

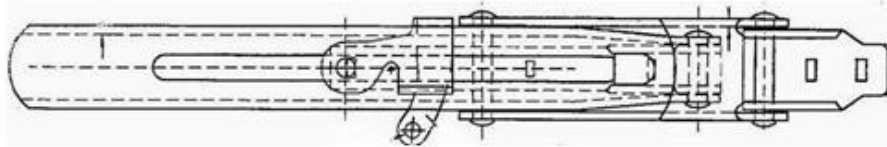


- a. The bolt should be tightened until the two lugs meet and touch each other with no gap. A torque of at least 30 ft-lb should be applied. If a mechanical head compressor is not used, the torque required to bring the lugs together with no gap may be higher.
- b. When the ring and bolt are assembled and tightened correctly the two lugs should meet and touch each other with no gap, regardless of the torque required. If the lugs do not meet, go back to step 1 and repeat steps 1 through 3.
- c. For drums with poly liner bags, the gap should be 3/8" or less while ensuring that the liner is seated uniformly over the curl of the drum and protruding out from under the cover.

Note: Per IFI STD 124, a nylon patch bolt may be reused (re-torqued) a maximum of five times, after which it should be replaced.

LEVER RINGS

1. Snap the closing ring over the cover and curl area of the drum, making sure that it is seated over the entire perimeter. In order to compress the gasket uniformly, tap around the entire perimeter of the ring. For some ring/gasket combinations, a mechanical head compressing device may be necessary to accomplish this while closing the lever assembly handle.
2. For side lever locking rings, the ring latch must be snapped securely in place. For top lever locking rings, the top lever must be fully locked in place under the securing bar.
3. Sealing the eyelets of lever rings is necessary not only for evidence tampering, but for the integrity of the closure.



CAUTION

Per 49 CFR 172.22, it is the responsibility of the person offering a hazardous material for shipment to assure that the containers selected are appropriate to the product being shipped, and that the containers are properly assembled, as per the above closing Instructions. The correct installation and torquing of all closures, rings, plugs, etc. should be verified by the shipper prior to releasing a package for transportation.

Additionally, it is the responsibility of the Shipper to determine the suitability of any MPS packaging for transportation of hazardous materials by Air. For shipments by Air, the shipper must refer to all applicable provisions (including the Hazardous Materials Table and 172.321) in 49 CFR and take into account the characteristics of the material being shipped and the performance capabilities of the container sold to you.

¹ ISO 15750-3 Circular Serrated Closure Type B. ANSI MH2-2018 § 3.1.4

² ISO 15750-3 Octagonal & Hexagonal Closures Type A. ANSI MH2-2018 § 3.1.4

³ ANSI MH2-2018 § 3.2 and 3.2.4

Revision History:

| Version | Description | Prepared By | Effective Date |
|----------------|--|---------------------|-----------------------|
| 00 | <ul style="list-style-type: none"> • Origination | A. Fischbach | 03/23/22 |
| 01 | <ul style="list-style-type: none"> • Consolidated “Steel Non-Removable Head Drums” under “Closing Procedures for Plugs and Caps” and included “removable head, UN 1A2, Steel Drums, 49 CFR § 178.504(a)(2)” • Added reference to Leak Lock plugs in TS Plug table • Editorial and formatting changes | A. Fischbach | 01/19/23 |
| 02 | <ul style="list-style-type: none"> • Added image for shoulder bolt rings • Added Solid Seal ring closing instructions and image • Added torque specifications for 1-12” (agitator) Rieke plugs • Added Tite Grip as plug supplier • Updated Hastings M number and address • Editorial and formatting changes | A. Fischbach | 05/03/23 |