

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, as set 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. MAUSER is prepared to provide this training in addition to supplying closing instructions. It has been the practice of MAUSER to send closing instructions attached to the shipping documents with each shipment of drums. This document provides specific information on closing MAUSER packagings.

These closing instructions must be given to the individuals responsible for closing the packagings prior to shipment. Many companies use electronic copies as site specific work instructions and/or use laminated hard copies posted at the fill lines for reference by the fill line operators. 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 shipment so that it is capable of meeting the performance standards indicated by the UN marking on the side or top of the packaging.

MAUSER recommends that only parts that have been tested and certified by MAUSER be used to close the packagings for shipment. Any UN marking is voided if parts or components other than those as sold with the original packaging design are used. Each closure is supplied with the proper gasket in accordance with the UN design type tests for the packaging supplied. In the case of removable head drums the lids, gaskets and locking rings are supplied as tested.

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. 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 identical to those in the design qualification.

CLOSING PROCEDURES FOR PLUGS AND CAPS:

1. 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.
2. 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. Adjustable wrenches available at hardware stores, auto parts stores, and through equipment catalog suppliers and drum parts suppliers.

PLASTIC NON-REMOVABLE HEAD DRUMS

All non-removable head, UN 1H1, 1H1W Plastic Drums, 49 CFR § 178.509(a)(1), 15 gallon to 65 gallon nominal capacity supplied with plug or screw cap closures with gaskets must be **closed for shipment using only the closures and gaskets supplied and specified in the design qualification test** for the drum as indicated below:

	Part Size / Part Number (Plug number with gasket)¹	Torque
A	2-inch buttress: L10 EPDM; L10B Buna; L10VT FPM¹	20-25 ft.-lbs.
B	2-inch NPS: L16 EPDM¹; L16B Buna; L16VT FPM; L16RVCLG	20-25 ft.-lbs.
C	2-inch buttress: L10V Vented EPDM; L10V-B Buna; L10V-VT FPM	20-25 ft.-lbs.
D	2-inch NPS: L16 Vented EPDM; L16V Buna; L16VT FPM	20-25 ft.-lbs.
E	2-inch NPS: L16R with L12 EPDM	20-25 ft.-lbs.
F	2-inch ACT¹ buttress: SA10B with A72	30-40 ft.-lbs.
G	3/4-inch NPS: C34 or C39 (S) AD with C31 EPDM; C31 Silicone	6-9 ft.-lbs.
H	2-inch: L10RHD with L11FHD; L16RHD; Polyolefin and Santoprene® gaskets	25-30 ft.-lbs.
I	Metric: 70x6 BCS LR10W w/LR11EPDM; 70x6 BCS LR10W w/LR11VT FPM gaskets	35-40 ft.-lbs.
J	Metric: 56x4 BCS LR17 with LR12 EPDM	20-25 ft.-lbs.
K	Polycon® II² : 2-inch NPS L16-6RK/EPDM	37-42 ft.-lbs.
L	Polycon® II : 3/4-inch NPD C34-6RK/EPDM	8-10 ft.-lbs.

¹ ACT drums may also be supplied with the standard NPS and buttress fittings noted above and should be closed to those torque values
² Polycon II may also be supplied with the standard NPS fittings noted above and should be closed with those torque values

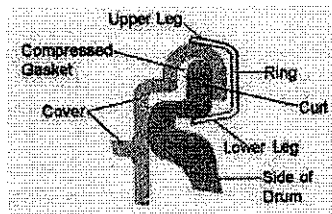
PLASTIC REMOVABLE HEAD DRUMS

	Part Size / Part Number (Plug number with gasket)	Plug Torque
A	Vanguard and Vanguard HLR lid with 2 inch NPS plug	15-20 ft.-lbs.
B	Vanguard and Vanguard HLR lid with ¾ inch NPS plug	6-9 ft.-lbs.

1. All removable head, UN 1H2, Plastic Drums, 49 CFR § 178.509(a)(2), of nominal capacity 15 to 60 U.S. gallons supplied with plastic lids, gaskets and associated clamp bands, or locking rings, or bolt rings, must be **closed for shipment using only the components supplied and specified** in the design qualification tests according to the following installation instructions:

- Place drum lid with gasket and selected clamp band as supplied on the top opening of the drum body.
- Firmly place lid onto top opening by applying downward pressure to lid above drum sidewall.
- While pressing down on lid, engage locking mechanism of clamp band to secure the lid in place. Make sure the locking mechanism is completely latched. Insert locking tab into slots in lever lock handle.

Lever Lock Side View

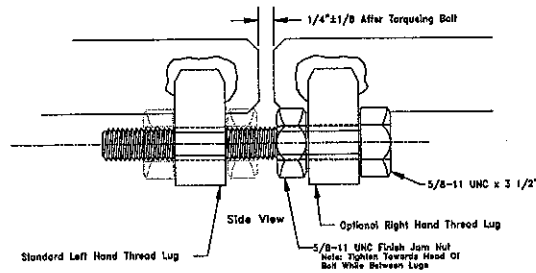


2. Please note that the Vanguard 57 gallon HLR drum carries a liquid rating Y1.2/100 with a bolt ring or lever lock closure. This is valid when the lid is factory installed with a lid press. This drum should be filled through the 2-inch opening in the lid and bungs closed as in the steps listed above. If the lid is removed the liquid rating is no longer valid unless a new lid is installed with a lid press and a MAUSER bolt ring or lever lock is used for closure.

3. The MAUSER removable head plastic drum may be provided with a bolt ring closing device. This bolt ring is closed as follows:

- Place lid with gasket in place, as supplied, on the curl at the top of the drum body.
- Place bolt ring around the drum head and curl.
- Using a head compressor, apply force to the top of the drum head assembly to compress head gasket.
- Drive bolt into ring until the ends of the bolt ring are at a 3/8-inch or less ring gap.
- If a head compressor is not available, start bolt into threaded eye, alternating tapping of ring with a mallet and drive bolt with a wrench, until bolt ring ends meet the above requirements.
- When ring has been tightened as required, the jam nut, if supplied, must be tightened against the left threaded eye.
- In the case of the Vanguard V57 HLR drum supplied with a bolt ring for liquid service, the bolt may have no jam nut but may use a shoulder type bolt. Follow the previous steps to tighten the bolt until the shoulder meets the threaded eye.

Bolt Ring Closure



CAP SEALS AND TAMPER EVIDENT DEVICES

Many fillers order their drums with closures “factory torqued” or with cap seals and tamper evident device factory installed. Keep in mind that the filler is responsible to close the packaging prior to shipment and having a closure inaccessible may be viewed by regulators as a failure to properly close the packaging. It has been demonstrated repeatedly that plastic plugs can relax their torque thus “factory torqued” plugs may not stay that way and should be verified.

Further cap seals are just that-seals. If a vented closure is required of a lading a cap seal can seal off the vented plug allowing for potentially dangerous pressure build up in the drum. Vented or less occlusive plug caps are available and should be used with vented plugs.

DIP TUBES AND EXTRACTION VALVE ASSEMBLIES

As more users strive to keep their purchased product clean as possible and address employee safety, drums can be outfitted at MAUSER with extraction valves and dip tubes. These systems reduce the potential for human contact and many are totally closed, keeping dust and dirt out of the product. For self installation these are suggested torques as they represent the values used for factory installed units. Manufacturers’ specific recommendations should always be consulted—these are only a guide.

Part Size / Part Number (Plug number with gasket)	Plug Torque
A Micro Matic EPV (plastic w/FKM or EPDM gaskets)	20-25 ft.-lbs.
B Micro Matic RSV (stainless steel w/FKM, EPDM, or PE gaskets)	20-25 ft.-lbs.
C Colder Products Drum Quick Pro buttress and NPS (FKM, Buna, EPDM, PE or silicone rubber gaskets)	20-25 ft-lbs
D Entegris QCII Shipping Cap	5 ft-lbs
E Entegris QCII Drum Insert	20 ft-lbs
F Entegris QCIII	20 ft-lbs
G Taylor Cain DV-155	5 ft-lbs
H Taylor Cain A-PIC-36	36 ft-lbs

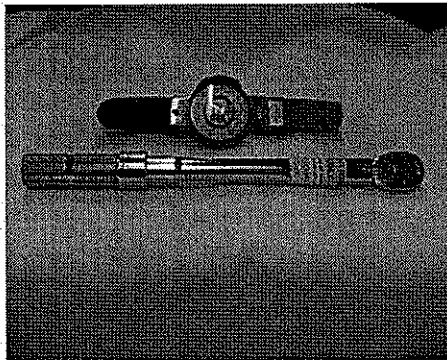
COMPOSITE DRUMS

All non-removable head, UN 6HA1, Composite drums, 49 CFR § 178.522(a)(1), 55 gallon nominal capacity supplied with plug or screw cap closures with gaskets must be **closed for shipment using only the closures and gaskets supplied and specified** in the design qualification test for the drum as indicated below:

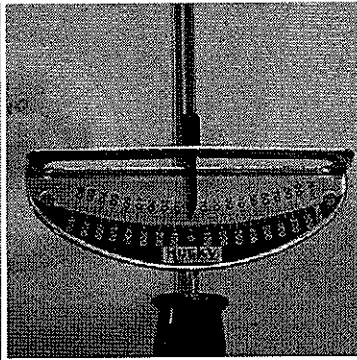
	Part Size / Part Number (Plug number with gasket)	Torque
A	HDPE Liner 6HA1/X1.8/350 and X1.8/300: 2 inch double buttress L10 with L11 EPDM	29-32 ft-lbs
B	HDPE Liner 6HA1/Y1.8/100: 2-inch double buttress: L10-xx with L11 EPDM	20-25 ft.-lbs.
C	Liner 5510 :2-inch double buttress: L10-HD with L11F-HD Polyolefin gasket	25-30 ft.-lbs.
D	Nylon/Polypropylene 2 inch with EPDM Gasket	12-15 ft-lbs.
E	HDPE Liner 6HA1 with 56x4 mm PP metric plugs with BUNA Gaskets	18-22 ft-lbs

TORQUE WRENCHES

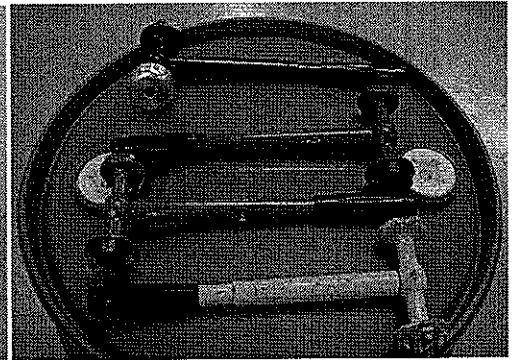
The following are photographs of various torque wrenches MAUSER has found suitable to apply the required closing torque. These are typical units and other brands of adjustable wrenched are acceptable. These should be regularly calibrated.



Dial Indicating and Adjustable Torque Wrench



Husky Brand Indicating Wrench



Rieke Brand Preset Wrenches

ⁱ Note: MAUSER uses various buttress and NPS plugs under the generic part numbers L10 and L16 respectively. They are supplied with the drum with gasket-installed ready for final closing for shipment. The plug and gasket are specific to the drum as tested. The closures must be properly installed and tightened to the torque shown or specified on the particular closing instructions for the drum supplied. Closures must be tightened to recommended torque using pre-set or variable-range machinist torque wrenches calibrated to the indicated value. Variable range machinist torque wrenches are available and most auto parts stores, catalog stores like Grainger and Mc Master Carr, Sears, Home Depot, Lowes, on-line drum parts suppliers, and many others.

ⁱⁱ **MAUSER L-ring drums marked UN 1H1/Y1.9/150** must have a torque applied of 25-27 ft-lbs (34-37 N-m)**