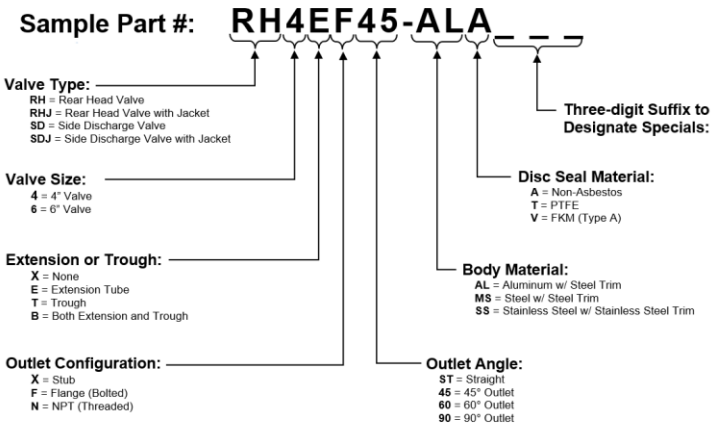
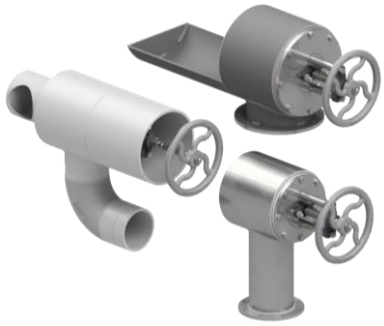
PART NUMBERS (Including, but not inclusive)

Rear Head Valve and Side Discharge Part Numbering Code:



Rear Head Valve and Side Discharge Part Numbering Code



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1. General
2. Parts List
3. Description and Intended Use
4. Installation
5. Inspection and Testing
6. Operation
7. Disassembly and Rebuild Instructions
8. Trouble Shooting Guide

1.0 General Maintenance Manual Guidelines

1.1. It is strongly recommended that this entire manual be read prior to any operation, disassembly, or assembly of this equipment.

1.2. Betts Industries, Inc. provides this manual as a guideline for reference only and assumes no responsibility for personal injury or property damage that may occur in conjunction with this manual. Betts Industries, Inc. cannot be held responsible for incorrect installation, operation or maintenance of this equipment.

1.3. Use only genuine Betts replacement parts. Substitute parts will void all warranties and could impair the proper function making this equipment unsafe. Product warranty shall be void if equipment is subject to misapplication, misuse, neglect, alteration, or damage.

1.4. Betts Industries, Inc. recommends all equipment be placed on a regular maintenance schedule that includes the routine replacement of seals and visual inspection for leaks and corrosion. The end user must make their own determination and set their own schedule based upon specific use and severity of the application and environment. At a minimum, yearly preventive maintenance including replacement of wear items and seals is recommended. In some cases, regulations may dictate the minimum testing frequency of items. Make sure operators are aware of all applicable codes.

1.5. Only trained and qualified personnel should perform maintenance on this equipment.

1.6. As with any maintenance work, proper safety gear must be utilized and approved procedures must be followed at all times. Examples of safety gear may include but are not limited to gloves, safety goggles, face shields, protective suits and respirators. It is the responsibility of the person/company working on this equipment to identify the hazardous products that the equipment has been exposed to and designate specific and appropriate protective gear and safety procedures.

1.7. Safety alert symbols are used to alert operators to potential personal injury hazards. These symbols are per ANSI Z535.5 and are listed below. Operators MUST obey all instructions that follow a safety symbol. Alerts will be used to indicate known safety concerns.

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, **will result** in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, **could result** in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, **may result** in minor or moderate injury. It may also be used to alert against unsafe practices.

1.8. A list of hazards may include but are not limited to fall hazards, pressure hazards, loaded springs, corrosive material, flammable product and pinch points. Additional concerns are possible and should be identified and avoided by the operator.

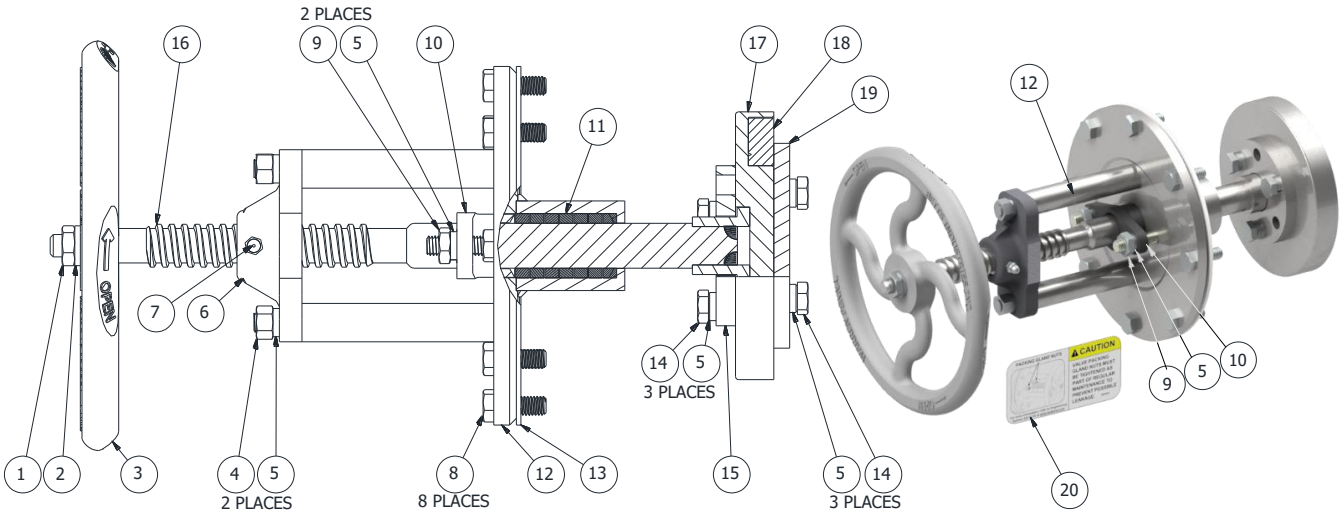
1.9. Specific details described in this document are for reference only and are subject to change without notice. See Betts webpage for the most recent revision to this document. www.bettsind.com

1.10. ⚠ **WARNING:** This product can expose you to chemicals including Chromium (hexavalent compounds) for stainless steel valves or Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov

1.11. For additional questions or more detailed technical assistance, contact Betts, Customer Service, Sales or Engineering Department at (814) 723-1250.

2.0 Parts List

4" Rear Head



Install Caution Label close to valve in a conspicuous area of tank.

Sub Assembly	Description
RH17962MSA	Steel w/ Non-Asbestos Disc

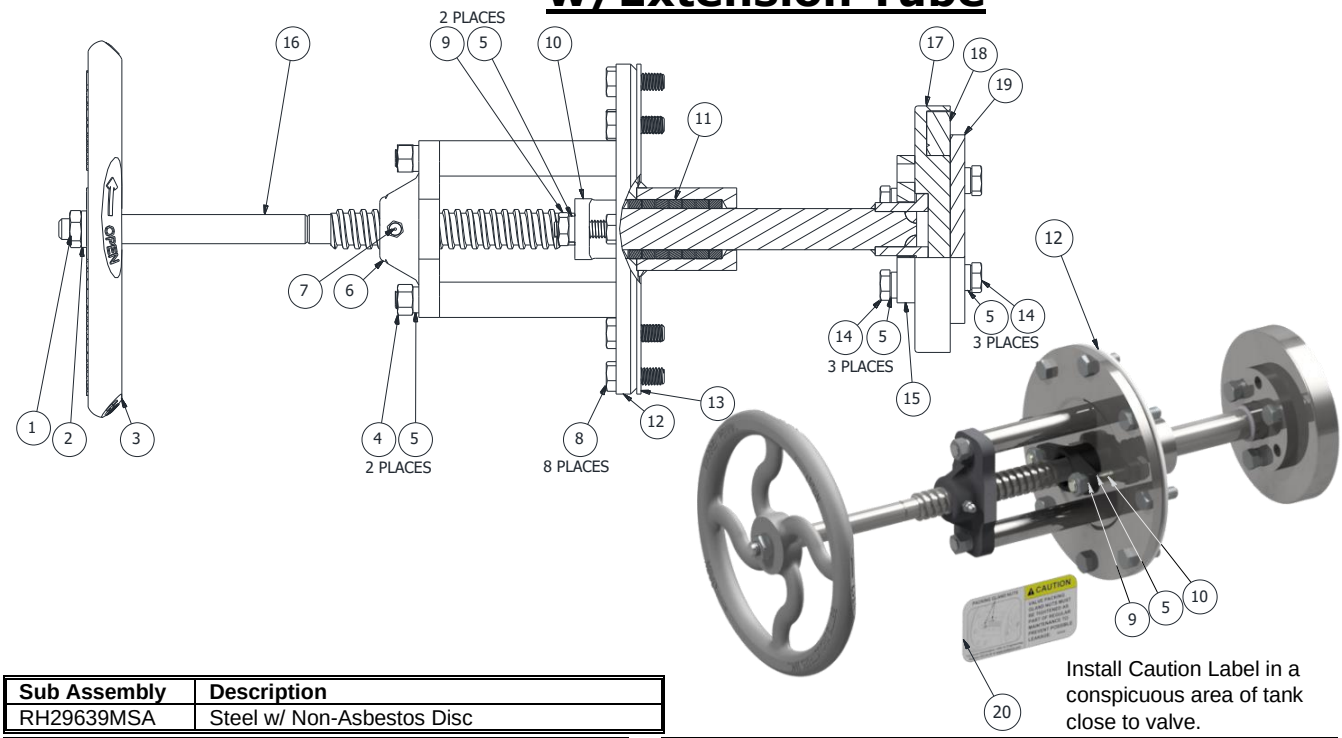
No.	Description	Req.	Material	Part No.
1	Jam Nut 7/16-14	1	Steel (Zinc Plt.)	9Q5811
			Stainless Steel	9Q8026
2	Lock Washer 7/16"	1	Steel (Zinc Plt.)	9Q8617
			Stainless Steel	9Q8616
3	Handwheel	1	Aluminum	26604AL
4	Jam Nut 3/8-24	2	Steel (Zinc Plt.)	9Q5905
			Stainless Steel	9Q5874
5	Lock Washer 3/8"	10	Steel (Zinc Plt.)	9Q5907
		18	Stainless Steel	9Q5906
6	Stem Nut	1	Malleable Iron	26576MA
7	Grease Fitting	1	Steel (Zinc Plt.)	9Z3058
8	Cap Screw 3/8-16 X 1	8	Steel (Zinc Plt.)	9Q5833A
	Cap Screw 3/8-16 X 3/4	8	Stainless Steel	9Q5994
9	Nut 3/8-16	2	Steel (Zinc Plt.)	9Q5890
			Stainless Steel	9Q5809
10	Packing Gland	1	Stainless Steel	15503SL
11	Packing (Standard)	1	Non-Asbestos w/ Graphite	15655NA
	Packing (SS valves)	1	Non-Asbestos w/ PTFE	15655NT

No.	Description	Req.	Material	Part No.
12	4" Tophead & Bonnet	1	Steel	27865MS
			Stainless Steel	27865SL
13	4" Tophead Gasket	1	Non-Asbestos	17493NA
14	Cap Screw 3/8-24 X 3/4	6	Steel (Zinc Plt.)	9Q5832
			Stainless Steel	9Q5831
15	Stem Retainer	1	Steel	17489MS
			Stainless Steel	17489LC
16	Stem	1	Steel	26574MS
17	4" Disc Holder	1	Steel	17488MS
			Stainless Steel	17488SL
18	4" Disc	1	Non-Asbestos	15024NA
			FKM (Type A)	15024VT
			PTFE	15024TF
19	4" Disc Retainer	1	Steel	17490MS
20	Caution Label	1	Vinyl	9Z4040

WARNING: Use only genuine Betts replacement parts. Use of substitute parts can impair the proper function and safety of this product and void all warranties.

2.0 Parts List

4" Rear Head & Side Discharge w/Extension Tube



Install Caution Label in a conspicuous area of tank close to valve.

Sub Assembly	Description
RH29639MSA	Steel w/ Non-Asbestos Disc

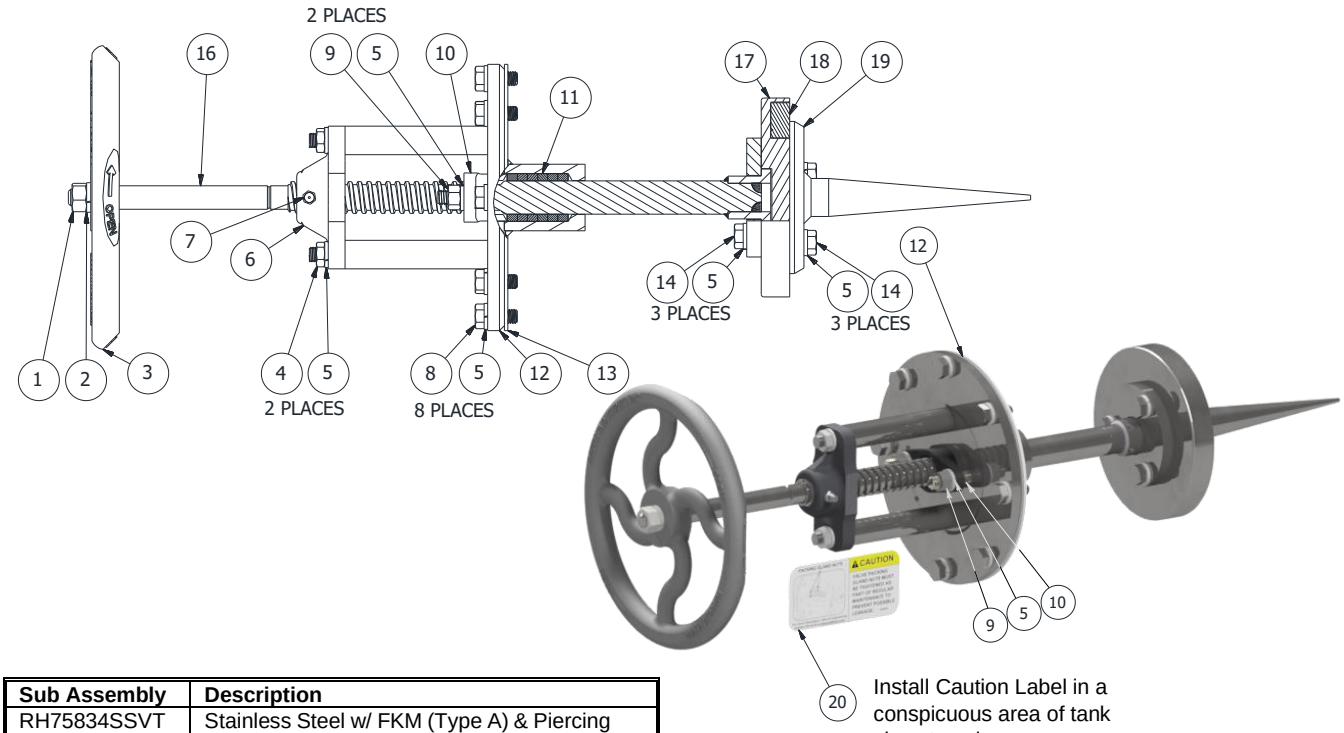
No.	Description	Req.	Material	Part No.
1	Jam Nut 7/16-14	1	Steel (Zinc Plt.)	9Q5811
			Stainless Steel	9Q8026
2	Lock Washer 7/16"	1	Steel (Zinc Plt.)	9Q8617
			Stainless Steel	9Q8616
3	Handwheel	1	Aluminum	26604AL
4	Jam Nut 3/8-24	2	Steel (Zinc Plt.)	9Q5905
			Stainless Steel	9Q5874
5	Lock Washer 3/8"	10	Steel (Zinc Plt.)	9Q5907
		18	Stainless Steel	9Q5906
6	Stem Nut	1	Malleable Iron	26576MA
7	Grease Fitting	1	Steel (Zinc Plt.)	9Z3058
8	Cap Screw 3/8-16 X 1	8	Steel (Zinc Plt.)	9Q5833A
	Cap Screw 3/8-16 X 3/4	8	Stainless Steel	9Q5994
9	Nut 3/8-16	2	Steel (Zinc Plt.)	9Q5890
			Stainless Steel	9Q5809
10	Packing Gland	1	Stainless Steel	15503SL
11	Packing (Standard)	1	Non-Asbestos w/ Graphite	15655NA
	Packing (SS valves)	1	Non-Asbestos w/ PTFE	15655NT

No.	Description	Req.	Material	Part No.
12	4" Tophead & Bonnet	1	Steel	27865MS
			Stainless Steel	27865SL
13	4" Tophead Gasket	1	Non-Asbestos	17493NA
14	Cap Screw 3/8-24 X 3/4	6	Steel (Zinc Plt.)	9Q5832
			Stainless Steel	9Q5831
15	Stem Retainer	1	Steel	17489MS
			Stainless Steel	17489LC
16	Stem (Extended)	1	Steel	27808MS
17	4" Disc Holder	1	Steel	17488MS
			Stainless Steel	17488SL
18	4" Disc	1	Non-Asbestos	15024NA
			FKM (Type A)	15024VT
			PTFE	15024TF
19	4" Disc Retainer	1	Steel	17490MS
20	Caution Label	1	Vinyl	9Z4040

WARNING: Use only genuine Betts replacement parts. Use of substitute parts can impair the proper function and safety of this product and void all warranties.

2.0 Parts List

4" Rear Head Stainless Steel w/ Steam Jacket



Install Caution Label in a conspicuous area of tank close to valve.

Sub Assembly	Description
RH75834SSVT	Stainless Steel w/ FKM (Type A) & Piercing Lance

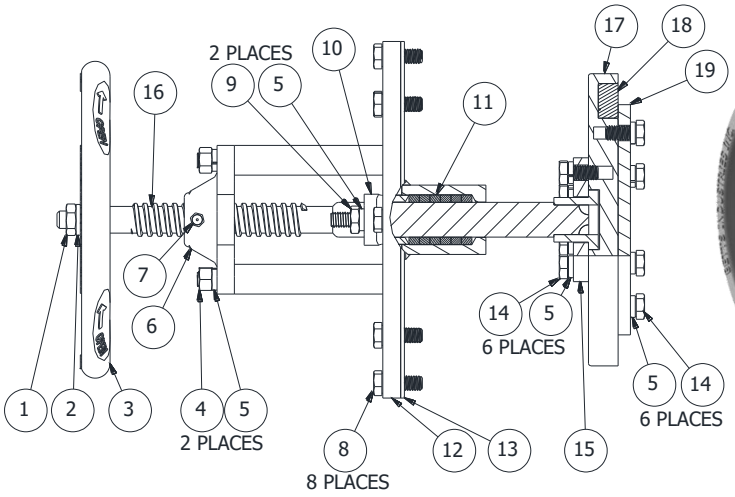
No.	Description	Req.	Material	Part No.
1	Jam Nut 7/16-14	1	Stainless Steel	9Q8026
2	Lock Washer 7/16"	1	Stainless Steel	9Q8616
3	Handwheel	1	Aluminum	26604AL
4	Jam Nut 3/8-24	2	Stainless Steel	9Q5874
5	Lock Washer 3/8"	18	Stainless Steel	9Q5906
6	Stem Nut	1	Malleable Iron	26576MA
7	Grease Fitting	1	Steel (Zinc Plt.)	9Z3058
8	Cap Screw 3/8-16 X 3/4	8	Stainless Steel	9Q5994
9	Nut 3/8-16	2	Stainless Steel	9Q5809
10	Packing Gland	1	Stainless Steel	15503SL
11	Packing (Optional)	1	Non-Asbestos w/ Graphite	15655NA
	Packing (Standard)		Non-Asbestos w/ PTFE	15655NT

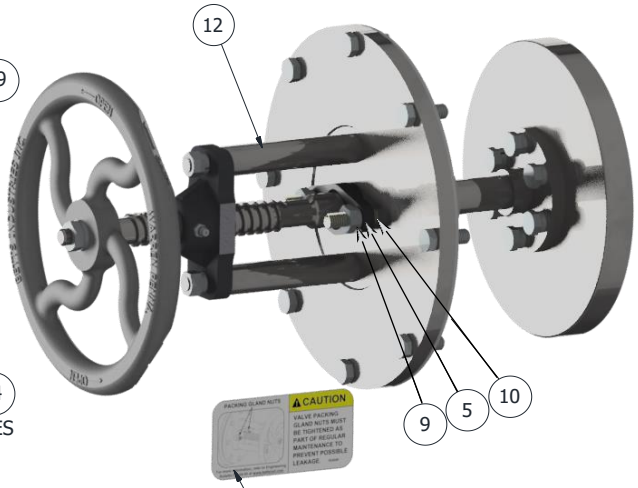
No.	Description	Req.	Material	Part No.
12	4" Tophead & Bonnet	1	Stainless Steel	27865SL
13	4" Tophead Gasket	1	Non-Asbestos	17493NA
14	Cap Screw 3/8-24 X 3/4	6	Stainless Steel	9Q5831
15	Stem Retainer	1	Stainless Steel	17489LC
16	Stem (Extended)	1	Stainless Steel	27808SL
17	4" Disc Holder	1	Stainless Steel	17488SL
18	4" Disc	1	Non-Asbestos	15024NA
			FKM (Type A)	15024VT
			PTFE	15024TF
19	4" Disc Retainer w/ Piercing Lance	1	Stainless Steel	19909LC
20	Caution Label	1	Vinyl	9Z4040

WARNING: Use only genuine Betts replacement parts. Use of substitute parts can impair the proper function and safety of this product and void all warranties.

2.0 Parts List

6" Rear Head





Install Caution Label in a conspicuous area of tank close to valve.

Sub Assembly	Description
RH75851MSA	6" Steel w/ Non-Asbestos Disc

No.	Description	Req.	Material	Part No.
1	Jam Nut 7/16-14	1	Steel (Zinc Plt.)	9Q5811
			Stainless Steel	9Q8026
2	Lock Washer 7/16"	1	Steel (Zinc Plt.)	9Q8617
			Stainless Steel	9Q8616
3	Handwheel	1	Aluminum	26604AL
4	Jam Nut 3/8-24	2	Steel (Zinc Plt.)	9Q5905
			Stainless Steel	9Q5874
5	Lock Washer 3/8"	16	Steel (Zinc Plt.)	9Q5907
			Stainless Steel	9Q5906
6	Stem Nut	1	Malleable Iron	26576MA
7	Grease Fitting	1	Steel (Zinc Plt.)	9Z3058
8	Cap Screw 3/8-16 X 1	8	Steel (Zinc Plt.)	9Q5833A
	Cap Screw 3/8-16 X 3/4	8	Stainless Steel	9Q5994
9	Nut 3/8-16	2	Steel (Zinc Plt.)	9Q5890
			Stainless Steel	9Q5809
10	Packing Gland	1	Stainless Steel	15503SL
11	Packing (Standard)	1	Non-Asbestos w/ Graphite	15655NA
	Packing (SS valves)	1	Non-Asbestos w/ PTFE	15655NT

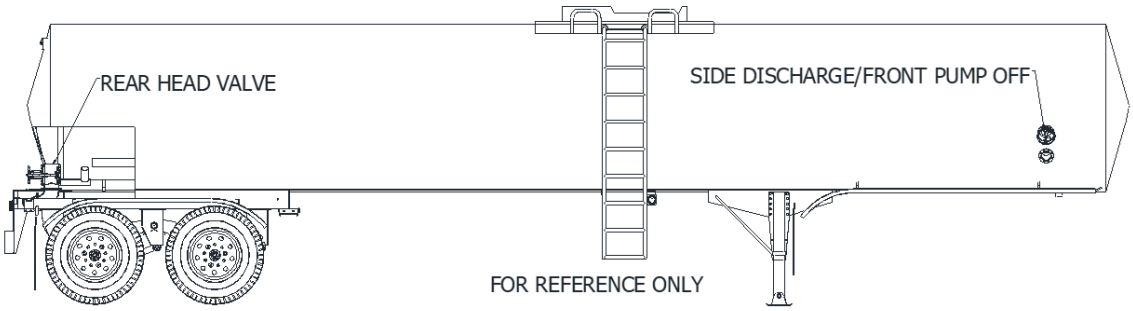
No.	Description	Req.	Material	Part No.
12	6" Tophead & Bonnet	1	Steel	35758MS
13	6" Tophead Gasket	1	Non-Asbestos	18637NA
14	Cap Screw 3/8-24 X 3/4	12	Steel (Zinc Plt.)	9Q5832
			Stainless Steel	9Q5831
15	Stem Retainer	1	Steel	17489MS
			Stainless Steel	17489LC
16	Stem	1	Steel	26574MS
17	6" Disc Holder	1	Steel	18926MS
18	6" Disc	1	Non-Asbestos	18639NA
			PTFE	18639TF
19	6" Disc Retainer	1	Steel	18636MS
20	Caution Label	1	Vinyl	9Z4040

WARNING: Use only genuine Betts replacement parts. Use of substitute parts can impair the proper function and safety of this product and void all warranties.

3.0 Description and Intended Use

3.1 The Betts' Rear Head Valve is a manual external stop valve designed to handle the challenges of hot product transportation. The valve body is constructed of steel, aluminum, or stainless steel and is welded directly into the bottom of the tank at the rear head which allows the seat and surrounding area to be fully heated by the elevated temperature of the product. The valve is available with an optional trough which provides a drainage pocket in the tank to locate the internal piping inlet for the side discharge/front pump-off valve. A steam jacket option facilitates heating the valve to reduce build-up of solidified product and the optional piercing lance aids flow by breaking away semi-solidified product heels.

The Rear Head Valve's outward opening disc and unobstructed flow path is ideal for heavy, viscous, temperature-sensitive commodities. The stem and stem nut utilize ACME threads and a grease fitting for exceptional service life. The external packing gland allows for easy adjustment of the packing to ensure proper sealing. A caution label explaining the packing gland adjustment is included with the valve and should be located close to the valve in a conspicuous area of the tank. Please note: a shear section is not standard on Rear Head Valves. If a shear section is desired, use the Betts' website (www.bettsind.com) to confirm if a specific model contains a shear section.



3.2 The Betts' Side Discharge Valve is a manual external stop valve designed to facilitate front pump-off applications for hot product tanks. The valve body is welded directly into the side shell of the tank which allows the seat and surrounding area to be fully heated by the elevated temperature of the product. Internal pump-off piping is welded to the rear inlet port of the valve. The front extension tube is provided to accommodate tank insulation yet keeps the top-head and bonnet area open for inspection and maintenance. The Side Discharge Valve's outward opening disc and unobstructed flow path is ideal for heavy, viscous, temperature-sensitive commodities. The stem and stem nut utilize ACME threads and a grease fitting for exceptional service life. The external packing gland allows for easy adjustment of the packing to ensure proper sealing. A caution label explaining the packing gland adjustment is included with the valve and should be located close to the valve in a conspicuous area of the tank. An optional piercing lance can be specified to aid flow by breaking away semi-solidified product heels. Please note: a shear section is standard on Side Discharge Valves.

3.3 Details:

Valve MAWP: 10 psig [.69 bar]
Minimum bursting pressure: 100 psig [6.9 bar]
Max. Temp. of Aluminum Valve: +400°F [204°C]
Max. Temp. of Steel Valve: +500°F [260°C]
Max. Temp. of Stainless Steel Valve: +500°F [260°C]
Max. Steam Jacket Pressure: 150 psig [10.3 bar]

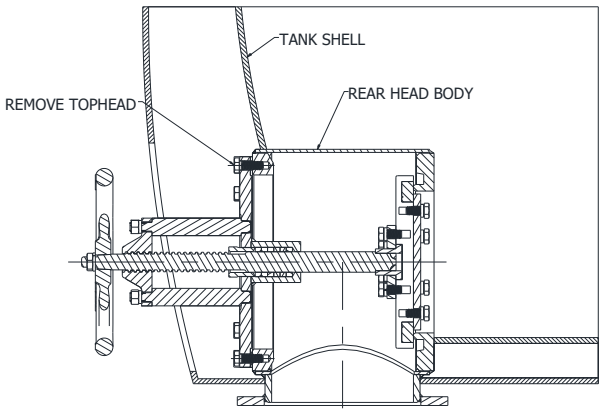
* Disc Seal Material	Temperature Rating **
A = Non- Asbestos	-20°F to +500°F [-29°C to 260°C]
T = PTFE	-20°F to +500°F [-29°C to 260°C]
V = FKM (Type A)	0°F to +400°F [-18°C to 204°C]

Note: ** Values shown are test values and actual results may vary due to service conditions.

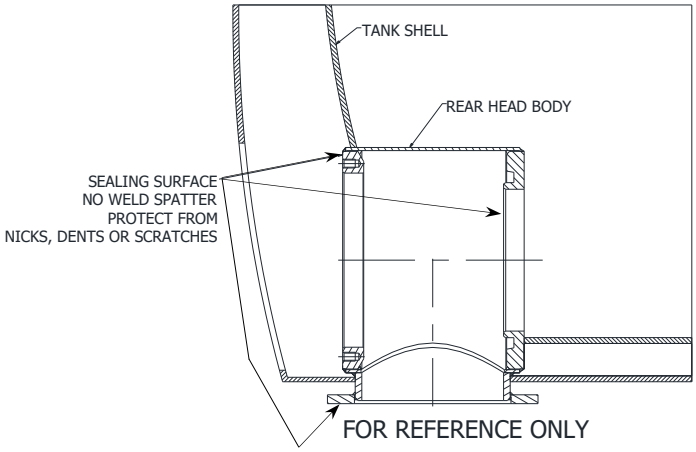
4.0 Installation

4.1 Installation method and location of the rear head valve or side discharge valve is determined by the tank manufacturer in accordance with any applicable design and construction requirements of the cargo tank. The rear head valve is intended to be welded directly to the cargo tank shell. Please note that not all rear head and side discharge valves come standard with an integrated shear section, and if required may need to be protected per US DOT 49CFR §178.345-8 for accidental damage protection. Use the Betts' website (www.bettsind.com) to confirm if a specific model contains a shear section.

4.2 Prior to welding the rear head or side discharge valves to the tank, the tophead should be removed. Refer to 7.3 for specific instructions.



FOR REFERENCE ONLY



FOR REFERENCE ONLY

4.2.1 Use care to not damage the valve body sealing surfaces. Protect from weld spatter, nicks, dents, or scratches.

4.3 If the valve is replacing an existing rear head or side discharge valve on a specification cargo tank and continued qualification is desired, per US DOT 49CFR §180.403 the cargo would be considered repaired and would be subject to US DOT 49CFR §180.413

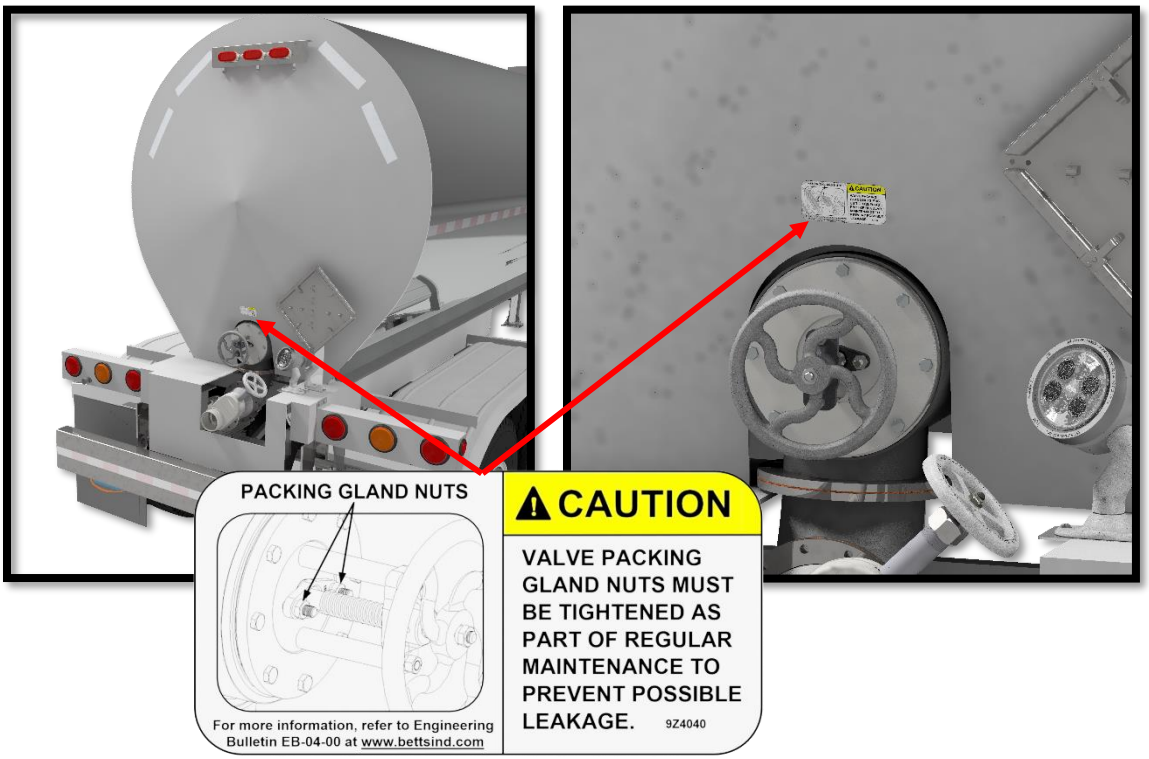
4.4 Use proper personal protection equipment and care when welding to the cargo tank.

⚠ WARNING		**Flammable Product** – Cargo tank or piping may contain product that could present risk of fire, explosion, asphyxiation or other hazards resulting in death or serious injury.
⚠ WARNING		**Corrosive Material** – Cargo tank or piping may contain corrosive material. Protective clothing including gloves and face shield shall be worn.

4.5 Affix the supplied Packing Gland Caution Label in a conspicuous area of tank close to valve. See the example shown on the following page.

4.5.1 Ensure the area is clean and free from any dirt or debris prior to placing label.

4.6 Please Note: Additional caution and warning labels must be supplied and affixed by the tank manufacturer to warn of other potential hazards that are involved with the transportation, loading and unloading of elevated temperature (hot) products.



5.0 Inspection and Testing

5.1 **Preload Inspection**: It is important to visually inspect the rear head or side discharge valves, piping, flange joints and installation areas for any potential problems before each load. Recognizing and addressing issues before there is a problem will help to reduce the probability of a costly accident. The following steps assume the tank, piping and valve are free of all product.

5.1.1 Inspect the tophead for any missing tophead bolts. Replace any missing tophead bolts.

5.1.2 Inspect the valve, piping, flange joints, and installation areas for any product leakage or corrosion. This may be an indicator of a more serious issue and the valve may need to be repaired or replaced.

5.1.3 Verify that the packing gland is properly tightened. If the packing gland is loose, tighten the two packing gland nuts on both sides of the packing gland evenly. Ensure that the packing gland is parallel with the tophead surface and that it is not bottomed out to the tophead. Overtightening the packing gland will cause the valve to be difficult or impossible to open. The packing gland must be tightened as part of regular maintenance of the valve. Please see Engineering Bulletin EB-04-00 for additional information.

5.1.4 Verify the tank and piping are empty. Slowly open the valve and inspect for smooth operation. If movement of the tophead is detected, tighten the tophead bolts. A grease fitting is available in the stem nut to apply multipurpose grease to the threads of the stem and stem nut.

5.1.5 Close the valve completely and ensure there is no movement of the tophead. The closing force will vary per valve and be dependent upon the tightness of the packing gland. Ensure that the valve fully closes and apply enough torque to create a seal between the valve seat and valve disc.

5.2 **Bench/Empty Tank Inspection**: With the tank, valve and piping completely empty, remove the tophead assembly. Refer to the disassembly instructions 7.3

5.2.1 **Tophead Gasket Inspection:** The tophead gasket is crucial to ensure the proper sealing of the Rear Head or Side Discharge Valves. Inspect the gasket for any nicks, wear, or cracks. A damaged or worn gasket must be replaced. Use only genuine Betts Industries replacement gaskets to ensure proper sealing. Select the proper tophead gasket material to ensure compatibility with the product carried and any temperature requirements.

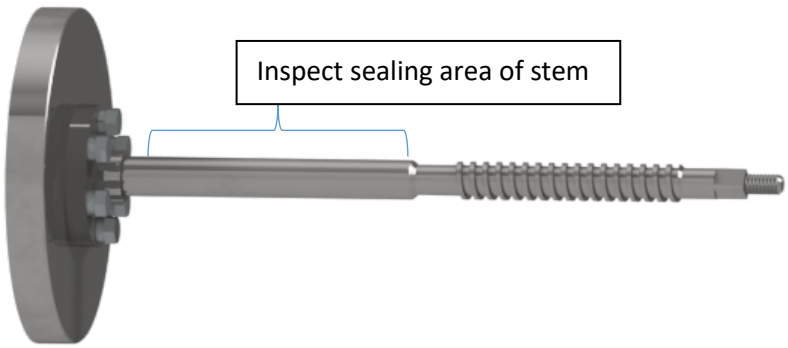
5.2.2 **Tophead Gasket Sealing Surface Inspection:** The tophead gasket seals against the tophead and the body of the rear head/side discharge valve. A smooth finish on both components is required for the gasket to seal. Any nicks, dents, or scratches may cause the tophead to leak product.

5.2.3 **Disc Inspection:** The disc is crucial to ensuring the proper sealing of the Rear Head or Side Discharge Valves. A damaged or worn disc must be replaced. Use only genuine Betts Industries replacement discs to ensure proper sealing. Select the proper disc material to ensure compatibility with the product carried and any temperature requirements.

5.2.4 **Disc Sealing Surface Inspection:** The disc seals against the disc retainer and body seat. A smooth finish on both components is required for the disc to seal. Any nicks, dents, scratches may cause the valve to leak product.

5.2.5 **Packing and Packing Gland Inspection:** The Packing seals against the valve stem by compressive forces from the packing gland and nut. Ensure that the packing gland is not bottomed out on the tophead. Inspect for any product leakage around the packing gland that would indicate a leak from the packing/stem seal. Adjust or replace packing as needed. Please see section 7.4 and Engineering Bulletin EB-04-00 for additional information.

5.2.6 **Stem Inspection:** Inspect the stem in the sealing area for any nicks, dents, scratches, or residual product and replace if necessary. Inspect threads for damage or corrosion. The stem threads must be clean. A multipurpose grease can be used on the threads to resist galling.



5.2.7 **Reinstall Tophead Assembly:** Follow details explained in section 7.4 to reinstall tophead assembly.

5.2.8 **Leak Test Valve:** Prior to putting the valve back into service, pressure test the valve and packing to the rated test pressure of the tank but do not exceed 15 psig (1 bar).

6.0 Operation

6.1 **Personal Protective Equipment:** The valve is designed to handle the challenges of hot product transportation. It is imperative that during operation the proper personal protective equipment (PPE) be worn at all times when operating the rear head valves.

⚠ WARNING		**Temperature Hazard** – Cargo tank may contain hot products. Protective clothing including gloves and face shield shall be worn. Hot product leak or equipment could cause death severe burns, injury, or death.
⚠ WARNING		**Pressure Hazard** – Cargo tank may contain residual pressure. Failure to safely relieve could result in sudden loss of pressure causing death or serious injury. Position body away from the front of the valve when operating.
⚠ WARNING		**Flammable Product** – Cargo tank or piping may contain product that could present risk of fire, explosion, asphyxiation or other hazards resulting in death or serious injury.
⚠ WARNING		**Corrosive Material** – Cargo tank or piping may contain corrosive material. Protective clothing including gloves and face shield shall be worn.

6.2 **Opening the Valve**: Always position body away from the front of the valve when operating. To open the valve, turn the handwheel counterclockwise slowly. Check for leaks while opening the valve. If any leaks are detected, slowly close the valve. Remove yourself to a safe location if a hazardous or dangerous situation presents itself. **Never try to maintenance the valve with product in the tank.**

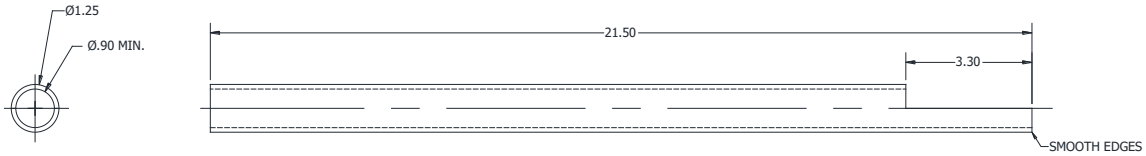
6.3 **Closing the Valve**: Always position body away from the front of the valve when operating. To close the valve, turn the handwheel clockwise until closed. The closing force will vary per valve and be dependent upon the tightness of the packing gland. Ensure that the valve fully closes, and apply enough torque to create a seal between the valve seat and valve disc.

7.0 Disassembly and Rebuild Instructions

7.1 Tools Needed

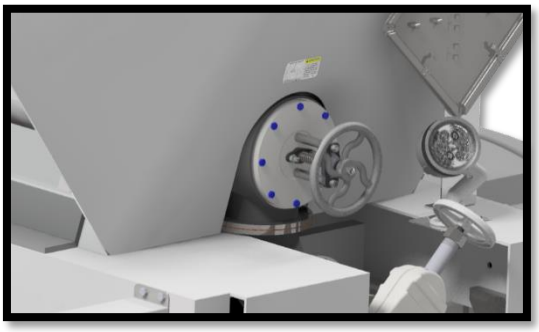
Tools	
9/16" wrench or socket & wrench	Personal Protective Equipment
11/16" wrench or socket & wrench	Multipurpose grease
Pick	Grease Gun
Needle nose pliers	Never Seize for Stainless Steel Valves
Packing tool – see 7.1.1	Silicone Lubricant for Stainless Steel Valves
Rubber Mallet	

7.1.1 A special packing tool, or similar, is recommended to properly compress the packing when rebuilding the valve. The cut-out allows for the packing to be wound and tamped into place. The Betts' part number for this tool is 29663SL.

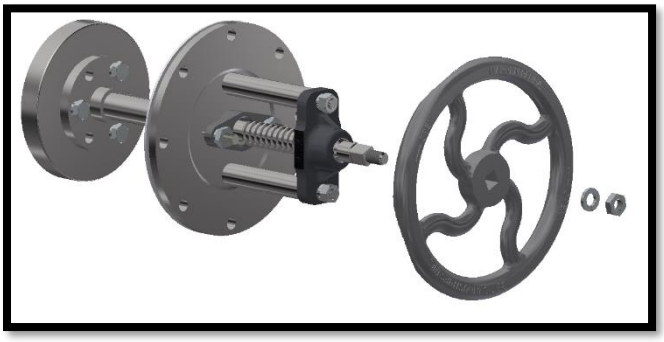


7.2 **Disassembly-** Never try to maintenance the valve with product in the tank.

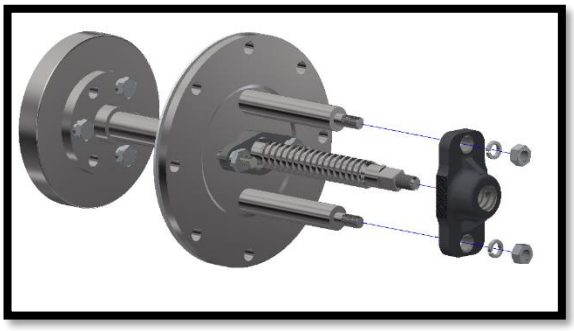
7.2.1 Using a 9/16" wrench, remove tophead bolts and pull out the tophead assembly.



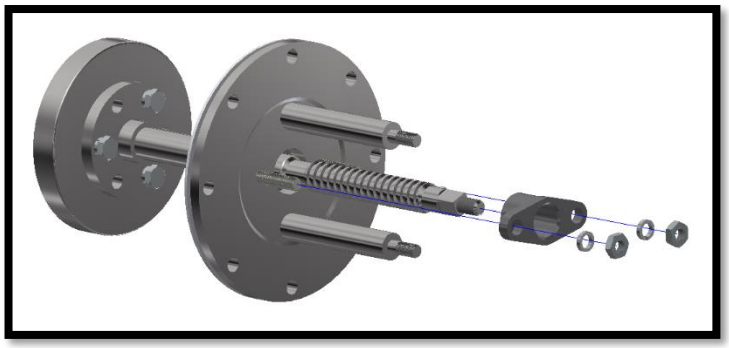
7.2.2 Using a 11/16" wrench, remove the hand wheel, nut, and lockwasher.



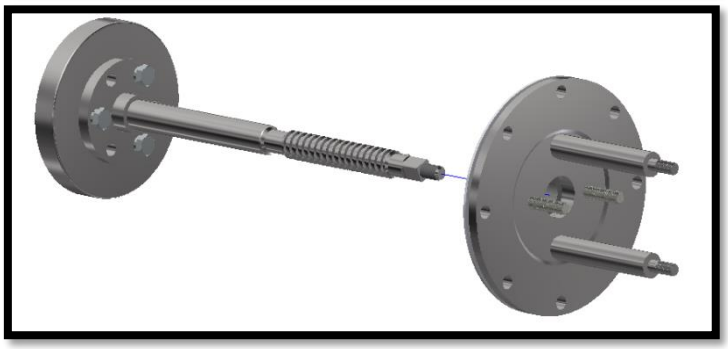
7.2.3 Using a 9/16" wrench, remove the stem nut, nuts and lockwashers.



7.2.4 Using a 9/16" wrench, remove the packing gland, nuts and lockwashers.

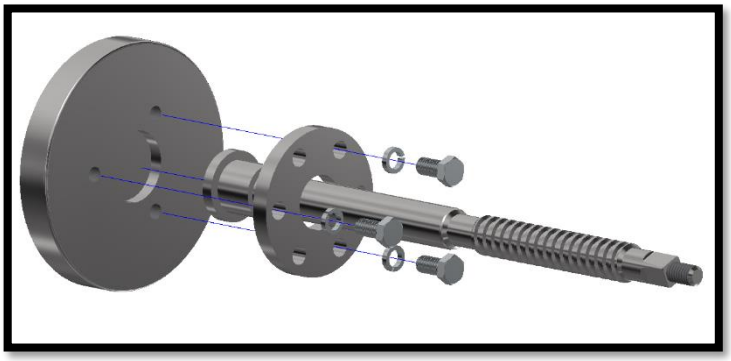


7.2.5 Slide tophead and bonnet assembly off the stem.

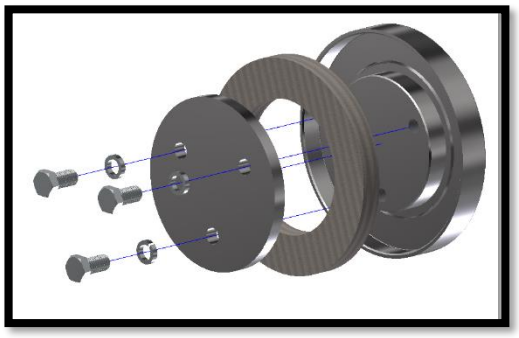


7.2.6 Using a pick and pliers, remove the packing from the stuffing box. Use care not to scratch the interior bore of the tophead stuffing box.

7.2.7 Using a 9/16" wrench, remove the stem retainer, bolts, lockwashers, and stem.



7.2.8 Flip the disc holder over and use a 9/16" wrench to remove the disc retainer, disc, bolts, and lockwashers.



7.3 Rebuild

7.3.1 Apply thread lubricant that is compatible to the product being hauled to all threaded fasteners and threaded components. Thread lubricant is especially important on stainless components.

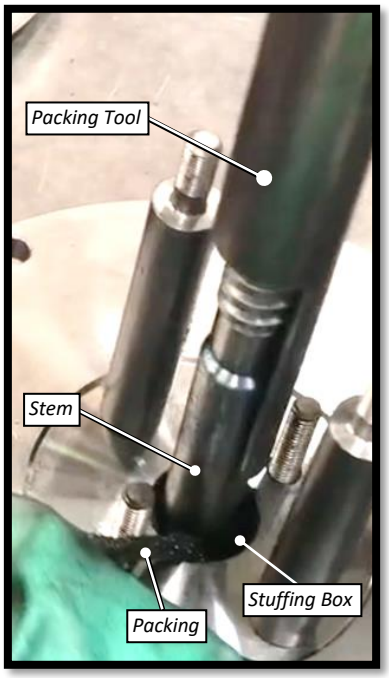
7.3.2 Insert the disc into the disc holder. Using a 9/16" wrench, bolt the disc retainer to the disc holder to pre-compress the disc. Remove the bolts and add the lockwashers to the bolt. Torque down until tight (approximately 10-15 ft-lbs).

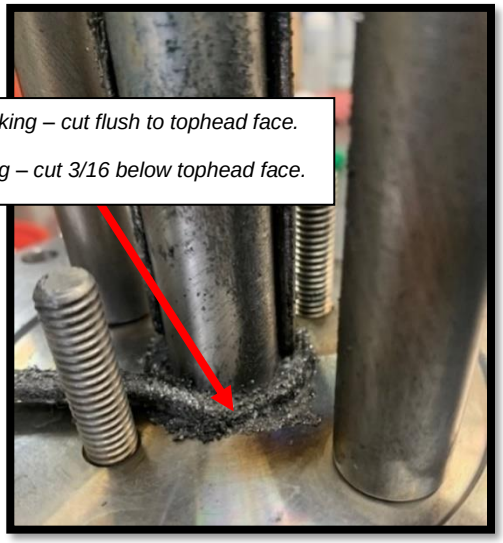
7.3.3 Insert the stem retainer over the stem. Using a 9/16" wrench, bolt the stem retainer to the disc holder. Torque down until tight (approximately 10-15 ft-lbs).

7.3.4 Coat the stem and ACME threads with a liberal amount of grease that is compatible with the product being hauled.

Image of a properly greased stem and ACME threads.

7.3.5 Insert the tophead over the stem. Insert the end of packing into the stuffing box and begin to wind the packing around the stem. Use the Packing tool, 29663SL (see section 7.2) to compress/tamp the packing as it is being wound. At the halfway point of the packing being wound, use a rubber mallet and hit the end of the packing tool to further compress the packing. For the Non-Asbestos w/ Graphite packing continue winding until flush with the tophead. For the Non-Asbestos w/ PTFE packing continue winding until the packing is about 3/16" short of the tophead. Cut and remove remaining packing.





Non-Asbestos w/ Graphite packing – cut flush to tophead face.

Non-Asbestos w/ PTFE packing – cut 3/16 below tophead face.

7.3.6 Insert the packing gland down over the stem. Thread on the nuts finger tight to hold the packing in place yet still let the tophead slide freely on the stem.

7.3.7 Lubricate the stem threads using multipurpose grease.

7.3.8 Thread the Stem nut by hand ¼ way down the stem and pull the tophead up until the tophead posts are through the stem nut.

7.3.9 Using a 9/16" wrench, tighten the stem nut down onto the posts of the tophead with the lock washers and nuts. Torque down until tight (approximately 10-15 ft-lbs).

7.3.10 Remove the packing gland nuts that were installed finger tight from step 7.4.5. Add lock washers and use a 9/16" wrench to tighten the nuts down evenly so that the top of the packing gland is parallel with the tophead. Since there are many factors that contribute to the packing functionality, there is not a specific torque value for the packing gland nuts. Tighten enough to seal the stem but not too tight to make it difficult to turn the handwheel. The packing will "relax" and the packing gland will require additional adjustment after the break-in period. Please see section 7.4 and Engineering Bulletin EB-04-00 for additional information.

7.3.11 Assemble the Handwheel over the stem and, using a 11/16" wrench, tighten the lockwasher and nut.

7.3.12 Install the tophead gasket over the tophead holes in the body and insert the tophead head assembly into the valve. Make sure the tophead is slightly opened by turning handwheel counter-clockwise 2-3 times. This is important because the disc must not be touching the valve seat when the tophead bolts are tightened down.

7.3.13 Align the holes of the body, gasket and tophead. Using a 9/16" wrench tighten down the tophead into the body using the tophead bolts and lockwashers if applicable. Torque the bolts in a star pattern. Torque down until tight (approximately 10-15 ft-lbs). Thread lubricant is especially important on stainless valves.

7.3.14 Fully open the valve by turning the handwheel counter-clockwise. Ensure smooth operation. Close the valve fully by turning the handwheel clockwise until closed. The closing force will vary per valve and be dependent upon the tightness of the packing gland. Ensure that the valve fully closes, and apply enough torque to create a seal between the valve seat and valve disc.

7.3.15 Prior to putting the valve back into service, pressure test the valve and packing to the rated test pressure of the tank but do not exceed 15 psig (1 bar).

8.0 **Trouble Shooting Guide** - Prior to proceeding, read entire manual and follow all safety guidelines. The following steps assume the tank is unloaded and the valve and all piping is free of all product.

Use to help diagnose potential issues that could be encountered. The list is not inclusive and other solutions might be needed.

Problem	Potential Cause	Potential Solution
Valve leaks out of the tophead and gasket area	Tophead gasket is worn or damaged	Replace the tophead gasket
	Tophead sealing surface is damaged	Use scotch brite or similar method to remove any nicks, dents, or residual product. The sealing surface must be flat and smooth. Replace if necessary.
	Body sealing surface is damaged	Use scotch brite or similar method to remove any nicks, dents, or residual product. The sealing surface must be flat. Replace if necessary.
Valve leaks out of the packing/ packing gland area	Packing gland is loose	Tighten the packing gland. Inspection of the packing gland should be part of a tank carrier's regular valve maintenance.
	Packing is worn or damage	Replace the packing
	Stem is damage or residual product is stuck to the stem	Use scotch brite or similar method to remove any nicks, dents, or residual product. The shaft must be smooth, straight, and round. Replace if necessary.
Valve leaks out of the main disc seal.	The valve is not closing completely	Inspect threads and ensure no product solidification.
	The valve disc is worn or damaged	Replace the valve disc
	The body seat is damaged or residual product is stuck to the valve seat	Use scotch brite or similar method to remove any nicks, dents, or residual product on the valve seat. Replace the valve body if necessary.
	The disc holder is damaged or residual product is stuck to the disc holder	Use scotch brite or similar method to remove any nicks, dents, or residual product on the valve seat. Replace the disc holder if necessary.