PART NUMBERS (Including, but not inclusive)

EV1XAETM-AAVB
EV1ETM-AAVB
EV1XAETM-AAFS
EV1ETM-AAFS

Table of Contents:

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. Use only genuine Betts replacement parts. Substitute parts will void all warranties and could impair the proper function making this equipment unsafe.

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

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

1.5 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.

1.6 Safety alert symbols are used to alert operator to potential personal injury hazards. These symbols are per ANSI Z535.5 and are listed below. Operator 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.

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

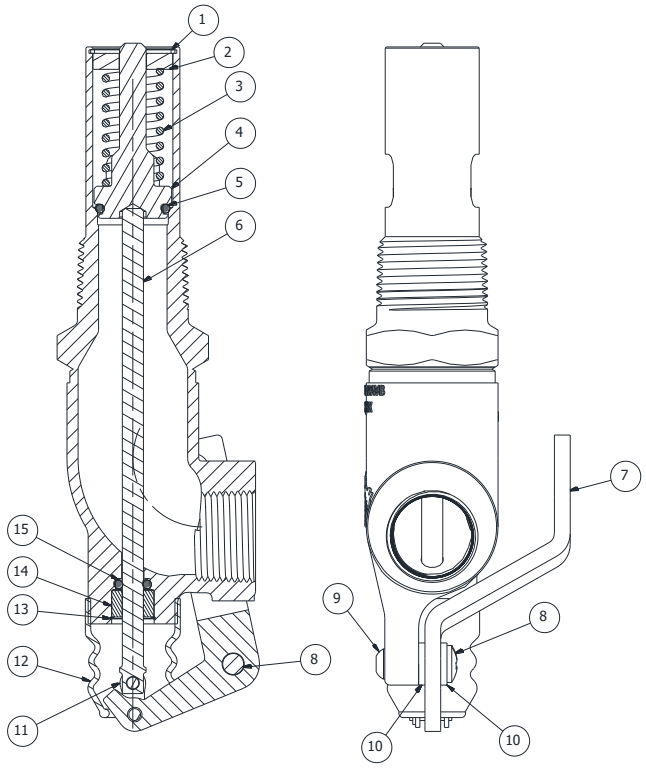
1.7 Product Warranty shall be void if equipment is subject to misapplication, misuse, neglect, alteration, or damage.

1.8 Specific design details described in this document are for reference only and are subject to change without notice. See Betts Industries, Inc. web page for the most recent revision to this document. www.bettsind.com

1.9 ⚠ **WARNING:** This product can expose you to chemicals including Chromium (hexavalent compounds), 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

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

2.0 Parts List



No.	Description	Req.	Material	Part No.
1	Retaining Ring	1	Stainless Steel	9Q9720
2	Spring Retainer	1	Aluminum	76165AL
3	Spring	1	Stainless Steel	76166SS
4	O-ring Holder Stem	1	Anodized Aluminum	76164AL
5a	O-Ring Main Seal	1	FKM-B	75096VB
5b			Fluorosilicone	75096FS
6	Push Stem	1	Stainless Steel	76163SS
7	Lever	1	Stainless Steel	29375SL
8	Binding Barrel	1	Stainless Steel	9Q9722
9	10-24 – 3/8 Button Cap Screw	1	Stainless Steel	9Q9721
10	Nylon Washer	2	Nylon	9Q9712
11	Roller Chain Connecting Link	1	Steel	9Z9734
12	Boot	1	EPDM	75933EP
13	Retaining Ring	1	Stainless Steel	9Q4999
14	Bushing	1	Oil Embed Bronze	76167BR
15a	O-Ring Push Stem	1	FKM-B	19505VB
15b			Fluorosilicone	19505FS

Rebuild Kit P/N **EV76247VB** – includes items 5,10,12,14,15

WARNING: Use only genuine Betts Industries Inc. replacement parts. Use of substitute parts can impair the proper functioning of the Water Drain Valve.

3.0 Description and Intended Use

The Betts 1" Water Drain Valve meets HM183 requirements for an internal self-closing stop valve and is ideal for use as a water drain/sampling valve. The valve is manually operated with use of a pull cable and offers a 1" NPT male threaded inlet and ¾" NPT female threaded outlet. Optional features include a conversion to pneumatic actuation or a 1" NPT female outlet.

The shear section is located above both the pull lever and push stem connection point which helps to provide a cleaner separation in the event of an under-carriage impact. The valve meets the shear section requirements of 49CFR §178.345-8 and is tested per TTMA RP84.

The valve body and O-ring holder stem are constructed of lightweight anodized aluminum to maximize durability and corrosion resistance. The valve push stem is 316 stainless steel and is supported by an oil impregnated bushing with FKM-B (Viton® B) standard seals for compatibility with a wide range of products and temperatures. The simplistic design allows for easy tear-down and maintenance.

Valve MAWP: 25 psi [1.7bar]
Minimum Bursting Pressure: 100 psi [6.9bar]

Valve Temperature Range: –45°F to +380°F [-43°C to +193°C]
FKM-B (Viton® B) - Seals
Weight: .82 lbs [.38kg]

* *Dimension will vary dependent on thread engagement.*

4.0 Installation

4.1 Prior to installation, it is recommended to verify proper function of the water drain valve. Refer to 5.0 for detailed instructions.

4.2 Apply PTFE tape or thread sealant to the male threads of the water drain valve. Ensure that the sealant is compatible with the product being hauled or stored.

4.3 Thread the valve into the 1" NPT fitting or sump.

4.3.1 The flow rates of the valve will vary depending on the type of fitting used. The major diameter of the valve is 1.20" in diameter. Any full or half coupling used must have an inside diameter of a minimum of 1.25". It is not recommended to use a full coupling as the flow path of fluid through the valve windows will be drastically restricted.

4.4 Use an adjustable wrench or 1-5/8" wrench on the valve hex to fully tighten the valve to the sump or fitting. Overtightening the valve can cause damage to the threads.

4.4.1 Check the threaded mounting joint for leakage. Additional tightening or additional PTFE tape or thread sealant may be required to ensure a leak tight joint.

4.5 Apply PTFE tape or thread sealant to the male fitting/connection that will install to the female outlet threads of the water drain valve. Ensure that the sealant is compatible with the product being hauled or stored.

4.6 Use a wrench and fully tighten the outlet piping to the valve

4.6.1 Overtightening the fitting/piping can cause damage to the threads.

4.6.2 Additional tightening or additional PTFE tape or thread sealant may be required to ensure a leak tight joint.

4.7 Ensure outlet piping is supported to reduce the transmission of vibration or load which may damage the valve.

4.8 Use the lever mounting 7/16" hole to attach cable.

4.8.1 It is important to review the cable system to ensure the valve spring force is sufficient to close the valve and retract the cable. Reduce cable friction by minimizing bends and long runs.

4.8.2 Use of a wire thimble will help prevent the cable from being damaged during actuation

4.8.3 A fusible link is available as an **option** if additional thermal protection is desired. The fusible element melts at not more than 250°F and uses a nonslip adjustable cable attachment. The Fusible Link part number is **76173SLZC**.

5.0 Inspection and Testing

5.1 Bench Test:

- Use Betts Part number: **76248SLBN** Inlet Test Fixture 1-11.5NPS
- Use Betts Part number: **76249SSBN** Outlet Test Fixture ¾-14NPS
- Use Betts Part number: **76250SSBN** Outlet Test Fixture 1-11.5NPS

5.1.2 Use silicone grease to lubricate the O-ring in the test fixture

5.1.3 Thread the fixture all the way down onto the valve

5.1.4 Attach a regulated air supply to the test fixture and set at the desired test pressure (valve MAWP is 25 psi).

5.1.5 Dunk the valve into a water tank and check for bubbles propagating from the outlet of the valve indicating a leak of the main seal.

- If the valve leaks, disassemble the test fixture and check the valve O-ring and valve seat for any debris, dirt or scratches. Repair the valve and retest.
- If leaks are propagating from the threads of the valve, inspect and clean/change the O-ring seal (-217) in the fixture.

5.1.6 Thread the plug fixture with gasket into the outlet of the valve body sealing on the face of the valve. Ensure that the face of the valve body is free of any dirt debris or scratches.

5.1.7 With the regulated air supply still attached, dunk the valve into the water tank and open the valve. Check for bubbles propagating from either the valve body or the push stem seal.

- If the push stem leaks, repair the valve and retest.

5.2 **Inspection and testing on the cargo tank:** Ensure the tank does not contain pressure or product.

⚠ WARNING		**Pressure Hazard** – Cargo tank or piping may contain residual pressure and failure to safely relieve could result in sudden loss of pressure causing death or serious injury.
⚠ 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.

5.2.1 Once the valve has been mounted, pressure can be applied to the tank. The MAWP of the valve is 25 psi [1.7bar]

- Inspect the valve for leaks and repair if necessary.

6.0 Disassembly and Rebuild Instructions

6.1 Always wear protective gear appropriate to the product being transported. Examples may include gloves, safety goggles, face shields, protective suits and respirators. It is the responsibility of the operator to know the product being hauled and the gear required.

6.2 Ensure the tank does not contain pressure or product.

⚠ WARNING		**Pressure Hazard** – Cargo tank or piping may contain residual pressure and failure to safely relieve could result in sudden loss of pressure causing death or serious injury.
⚠ 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.
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6.3 Remove the cable attachment to the valve lever.

6.4 Unthread the outlet piping or fittings from the valve.

6.5 Unthread the valve from the sump or fitting.

6.6 Using a 1/8" hex key (Allen) wrench, insert into the button cap screw **(9)**. While holding the 1/8" hex key (Allen) wrench, unscrew the binding barrel **(8)** with a Phillips head screwdriver

6.7 Remove the binding barrel **(8)**, the cap screw **(9)** and the two nylon washers **(10).** Inspect parts for damage and replace if necessary.

6.8 Pull out the Push Stem **(6),** Lever **(7),** and Roller Chain Connecting Link **(11).** Inspect parts for damage.

6.8.1 Make sure Push Stem **(6)** is smooth with no scratches in the area of the push stem that rides past the push stem O-ring. If the push stem needs replaced remove the Roller Chain Connecting Link **(11)**

- Use a flat head screwdriver to help remove the side plate of the roller chain connecting link. Be careful not to deform the side plate. If the side plate is deformed during removal, replace.

6.8.2 Replace the Lever **(7)** if necessary.

6.9 Using a small flat head screwdriver, remove the Retaining Ring **(13)** by inserting into the grooved portion of the retaining ring and prying up as you "walk" the screwdriver around the Retaining Ring **(13)**

6.10 Pull out the Bushing **(14)**. An O-ring pick can be used to assist removal of the Bushing **(14)** if it is stuck. Replace with a new Bushing **(14)**.

6.11 Using an O-ring pick remove the O-ring Push Stem **(15).** Use care to not scratch the O-ring groove in the valve body. Inspect the O-ring groove for debris or scratches, and replace the O-ring. Use a silicone grease or product compatible lubricant to reinstall the seal.

6.12 Using retaining ring pliers remove the Retaining Ring **(1)**, Spring Retainer **(2)**, Spring **(3)**, O-ring Holder Stem **(4)**, and O-ring Main Seal **(5)**.

6.12.1 Inspect the O-ring Holder Stem **(4)** for wear or scratches and replace if necessary.

6.12.2 Inspect the Spring Retainer **(2)** for wear or scratches and replace if necessary.

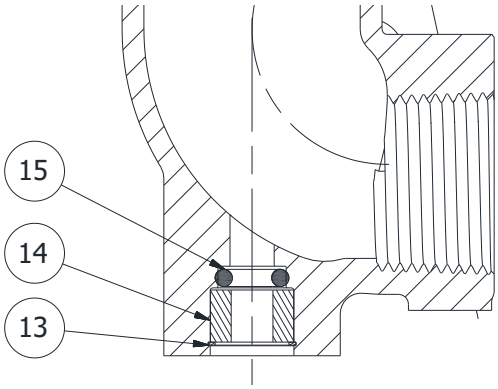
6.12.3 Using an O-ring pick remove the O-Ring Main Seal **(5)** and replace. Use a silicone grease or product compatible lubricant to reinstall the seal.

6.13 Remove the EPDM Boot **(12)** by pulling off the valve and inspect for damage or degradation and replace if necessary.

6.14 Fully inspect the valve body. Check all sealing points, thread damage, or corrosion and replace if necessary.

6.15 **Rebuilding:** With the valve body, install the O-ring Push Stem **(15)**, ensuring that the O-ring, the Bushing **(14)**, and the Retaining Ring **(13)**.

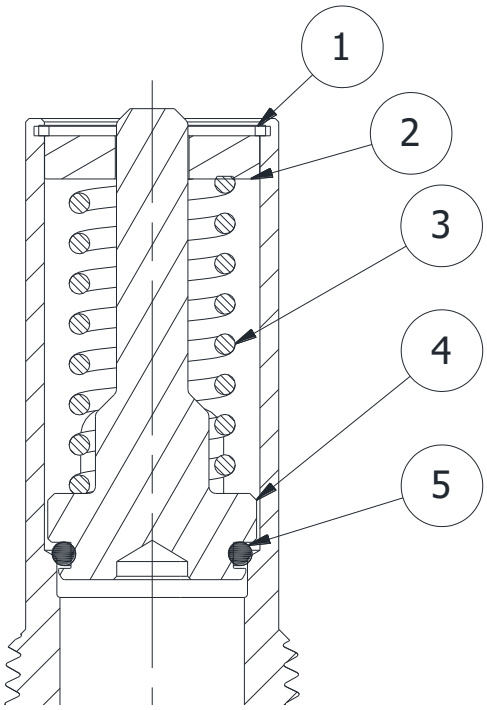
- Use a silicone grease or product compatible lubricant to reinstall the seal.
- Ensure the O-ring is seated in the smaller counterbore.
- Ensure that the Retaining Ring **(13)** snaps into the groove. Start with one end into the groove and "walk" around with your fingers.



6.16 Install the O-ring Holder Main Seal **(5)** into the O-ring Holder Stem **(4)**. Use a silicone grease or product compatible lubricant to reinstall the seal.

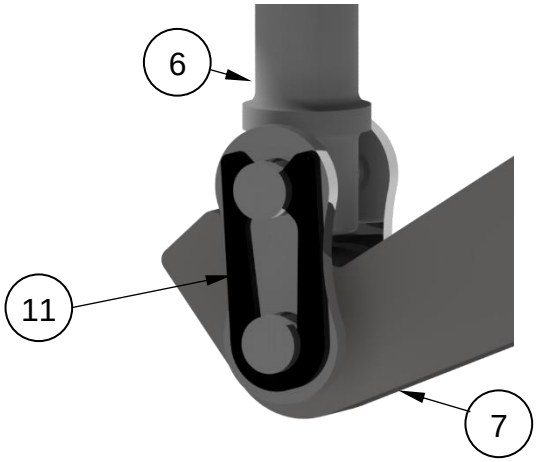
6.17 Install the O-ring Holder Stem **(4)**, Spring **(3)**, Spring Retainer **(2),** and the Retaining Ring **(1)**.

- Set the parts in order into the valve body. With the Retaining ring **(1)** on top insert the retaining ring pliers into the Retaining Ring **(1)**. While compressing the Retaining Ring **(1)** push down until the spring compresses enough to expose the retaining ring groove. Release the retaining ring pliers until the retaining ring compresses or snaps into the groove. Ensure that the retaining ring **(1)** is completely seated into the retaining ring groove.



6.18 Install the Lever **(7)** and Push Stem **(6)** utilizing the Roller Chain Connecting Link **(11)**

- The Side plate of the Roller Chain Connecting plate can be removed with a flat head screwdriver and needle nose pliers.
- Use the flat head screwdriver push the side plate back. Ensure that the side plate isn't damaged when removed.



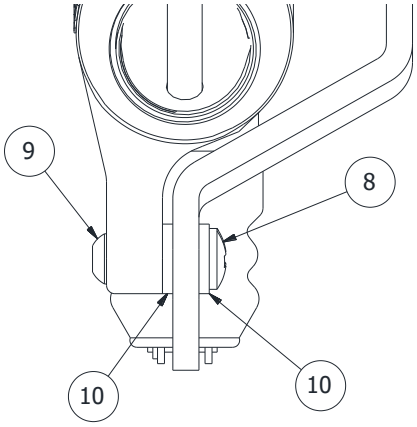
6.19 Install the Boot **(12)** onto the valve.

- To aid assembly, turn the top portion of the boot inside out and push completely onto the valve body boss. Once installed roll top portion of boot into place.

6.20 Slide the Push Stem **(6)** and Lever **(7)** into the valve.

- Ensure that the Push Stem **(6)** does not damage the Push Stem O-ring **(15)** by wiggling the push stem slightly during insertion.

6.21 With the Push Stem **(6)** and Lever **(7)** in place, install the Nylon Washers **(10)** on both sides of the Lever **(7)** with the Binding Barrel **(8)**



6.22 Apply removable thread lock on the Button Cap Screw **(9)**.

6.23 Screw the Button Cap Screw into the Binding Barrel **(8)** using a Phillips head screwdriver and a 1/8" hex key (Allen) wrench in the Binding Barrel. Tighten down until the is minimal slop between the Nylon Washers **(10)** and the Lever **(7)**. Overtightening will cause too much friction and the valve will not operate properly. Manually actuate the valve to ensure the spring closes the valve.

7.0 Trouble Shooting Guide

Problem	Potential Cause	Potential Solution
Product is leaking out of the inlet threads of the valve	Insufficient use of a thread sealant or tape	Use additional thread sealant or tape
	Under tightened valve	Use a 1-5/8 wrench and tighten the valve up to the sump or fitting
	Damaged threads	Replace valve body or sump / fitting
Product is leaking past the Main O-ring Seal **(5)**	The Main O-ring Seal **(5)** is incompatible with product	Investigate chemical compatibility and resolve
	The Main O-ring Seal **(5)** is worn or damaged	Replace the Main O-ring Seal **(5)**
	The O-ring Holder Stem **(4)** O-ring groove is damaged	Replace the O-ring Holder Stem **(4)**
	The Valve Body O-ring seat is damaged	Replace the Valve Body
	Dirt or debris is between the Main O-ring seal and the Valve body or O-ring Holder Stem	Remove dirt and debris from the seat areas
	The Spring Retainer **(2)** ID is worn or damaged	Replace the Spring Retainer **(2)**
Product is leaking past the Push Stem O-ring **(15)**	The Push Stem O-ring Seal **(15)** is incompatible with product	Investigate chemical compatibility and resolve
	The Push Stem O-ring Seal **(15)** is worn or damaged	Replace the Push Stem O-ring **(15)**
	The Push Stem **(6)** is damaged	Replace the Push Stem **(6)**
	Dirt or debris is between the Push Stem O-ring seal **(15)** and the Valve body or Push Stem **(6)**	Remove dirt and debris from the seat areas
	The Bushing **(14)** is worn	Replace the Bushing **(14)**
Product is leaking out of the outlet threads	Insufficient use of a thread sealant or tape	Use additional thread sealant or tape
	Under tightened Piping/fitting	Use wrench and tighten the piping/ fitting up to the valve
	Damaged threads	Replace valve body or pipe/fitting
Valve won't actuate	Over tightened Binding Barrel **(8)** and Button Cap Screw **(9)**	Loosen the Button Cap screw **(9)** from the Binding Barrel **(8)**
	Check cable connection	Adjust cable connection to the valve and or cable run
Valve won't return closed	Cable is bound or too much cable friction	Minimize cable runs
	Retaining Ring **(1)** was improperly installed and has come out of the groove	Replace Retaining ring **(1)**
	Spring **(3)** broke	Replace Spring **(3)**
	Overtightened biding barrel	Loosen the binding barrel so there is minimal friction between the Washer10
	Spring Retainer **(2)** has bound the Main O-ring Holder **(4)**	Replace the Spring Retainer **(2)** or Main O-ring Holder **(4)**