IN-LINE FIGURE 700 QUICK OPENING CLOSURE INSTALLATION, OPERATIONS AND MAINTENANCE MANUAL

SECTION ONE: SAFETY INFORMATION

SECTION TWO: INSTALLATION INSTRUCTIONS

SECTION THREE: OPERATION INSTRUCTIONS

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IMPORTANT

THIS DOCUMENT HAS BEEN MADE AVAILABLE TO PROVIDE ADDITIONAL INFORMATION FOR ANY IN-HOUSE TRAINING PROGRAM ON THE INSTALLATION, OPERATION AND MAINTENANCE OF THE IN-LINE QUICK OPENING CLOSURE AND IS NOT INTENDED TO SUPERSEDE THE SAFETY POLICIES OR PROCEDURES OF THE END-USER.

ALL SUPERVISORS, OPERATORS, WELDERS AND OTHER FIELD PERSONNEL THAT ARE DIRECTLY INVOLVED IN THE INSTALLATION, OPERATION AND MAINTENANCE OF THE IN-LINE QUICK OPENING CLOSURE SHOULD RECEIVE AND REVIEW THIS INFORMATION AS PART OF ANY TRAINING PRIOR TO THE INSTALLATION AND OPERATION OF THESE DEVICES.

FAILURE TO FOLLOW SAFETY GUIDELINES OR PROCEDURES MAY RESULT IN SEVERE INJURY OR DEATH.

ADDITIONAL COPIES OF THIS MANUAL MAY BE OBTAINED AT NO CHARGE BY CONTACTING:

IN-LINE FLOW PRODUCTS LIMITED

TEL: (780) 490-5337
FAX: (780) 490-5314

SECTION ONE
SAFETY INFORMATION

GENERAL

Operation of any access device is one of the most dangerous procedures faced by plant personnel and it is very important to be aware of the potential for serious injury or death that may result from unsafe practices or unseen hazards.

INTERNAL PRESSURE

Prior to operating any Closure, be certain that all internal system pressure has been fully equalized with the external pressure in a safe, controlled manner.

- Any residual internal pressure can cause severe injury or death if the Closure is operated in this state. Beware of the dangers of lower pressures as they can be equally as fatal as higher pressures, for example an NPS8 Closure with just 10 psig residual internal pressure may suddenly expend a force of 500 lbs. to free the Closure Cap.
- The Pressure Alert Fitting is designed to warn the Operator of residual internal pressure and is not intended to be used as a system bleed. If pressure is released through the Fitting as it is opened, DO NOT OPERATE THE CLOSURE. Close the Fitting and completely bleed the system pressure in a safe manner.
- The Pressure Alert Fitting is standard on all sizes NPS6 and larger. The Fitting is optional on smaller sizes.
- Since Closures are generally used in clean-out and otherwise dirty applications, pressure gages and warning devices may become plugged-off or fouled and provide false pressure situation. Even if these devices indicate a safe state continue to use extreme caution when operating the Closure.

OPERATOR POSITION

Prior to operating any Closure, be certain the Operator is situated in a safe position.

- As a rule-of-thumb, the Operator should stand on the side of the Closure opposite the hinge. If in the event residual pressure or a projectile are present, the Cap will swing away from the Operator.
- Whether the Closure Cap is in the opened or closed position, avoid looking directly into or standing in front of the opened bore or unopened Cap. Trapped objects, such as pigs or ice dams, may be suddenly released and be violently expelled out of the bore or against an unopened Cap, damaging it or forcing it clear given sufficient force and may result in severe injury or death.
- Avoid installing the Closure where the bore is directed towards buildings and equipment or where personnel or the public have access.

OPERATION

The In-Line Closure must be operated in a manner to limited physical damage to the unit and maintain its integrity.

- When opening or closing the Closure, DO NOT strike the Closure Cap with any hard-faced tools. This will severely damage the Cap by deforming the lugs and possibly crack or create a system of micro-fractures within the microstructure of the Cap material that may result in catastrophic failure.
- The In-Line Closure seals by means of a pressure energized O-Ring that is compressed only until metal-to-metal contact is achieved between the Cap and Weld Hub. Tightening beyond this point will not create a better seal and may damage the Closure. **DO NOT OVERTIGHTEN**.
- Spanner wrenches for all Closures are available and are extremely effective for safely obtaining a tight seal.

SECTION TWO
INSTALLATION

IMPORTANT

OPERATING ISSUES HAVE OCCURRED WHEN CLOSURES ARE ATTACHED PRIOR TO THE INSTALLATION OF WELDED ATTACHMENTS OR BOLT-ON EQUIPMENT IN CLOSE PROXIMITY TO THE CLOSURE. THE EXTERNAL FORCES AND DISTORSION CREATED BY THESE ITEMS HAVE BEEN SHOWN TO TRANSLATE TO THE CLOSURE HUB RESULTING IN AN OUT-OF-ROUND CONDITION, CREATING SEALING AND CLOSURE MAKE-UP PROBLEMS. FOR BEST PERFORMANCE, ALL WELDED ATTACHMENTS AND BOLT-ON EQUIPMENT WITHIN TEN (10) PIPE DIAMETERS OF THE CLOSURE SHOULD BE FULLY INSTALLED PRIOR TO INSTALLATION OF THE CLOSURE WELD HUB.

Preliminary

1. All welding procedures, welding operations and welder performance qualifications should be controlled to ensure compliance with the Construction Code and the Regulatory Authority in the Jurisdiction of installation. All welding must be performed in accordance with these procedures by welders qualified with those procedures.

2. The material specification and grade are permanently marked on all Weld Hubs. Check all markings to ensure proper material is as ordered and welding protocols are followed.

3. Do not drop the Closure and especially avoid impact on the Cap Pin. The Cap Pin runs concentric with the Closure Threads and any bending of the Cap Pin may result in the Closure being inoperable or may damage the Closure threads during make-up. If bending occurs, do not operate the Closure any further and return the Closure to the factory for adjustment.

4. When multiple installations are occurring simultaneously, place a unique mark on each Cap and Weld Hub prior to disassembly to prevent mixing of assemblies.

5. Where required, use lifting equipment of sufficient size and stability when performing installation and ensure operation by trained personnel.

Disassembly

Horizontal and Vertical Hinge Closures (NPS2 to NPS14)

1. With the Closure placed on the ground on the Weld Hub, remove the stem from the Pressure Alert Fitting and completely unscrew the Cap. Carefully swing the Cap off of the Hub and slide the Hinge Arm out of the Hinge. Store the Cap/Hinge assembly in a clean location or cover to minimize contamination.

2. Carefully remove the O-ring seal from the Weld Hub. If the seal is damaged, replacement seals can be obtained from In-Line or from any local O-ring supplier. The O-ring number is stamped directly on the Closure Weld Hub.

3. Remove the Pressure Alert Fitting from the Weld Hub and store with the Cap/Hinge assembly.

Horizontal Hinge Closures (NPS16 and Larger)

1. With the Closure placed on the ground on the Weld Hub, remove the stem from the Pressure Alert Fitting.

2. On the Trolley Bolt, place a mark with a paint maker on the Bolt and Nut below the Suspension Arm to ensure the Cap remains at the factory set height after assembly.

3. Remove the Lock Collar from the Cap Pin and slide the Suspension Arm off of the Cap Pin. Lift the Suspension Arm and Trolley off of the Davit Arm. CAUTION: Have another worker support the Davit Arm while removing the Suspension Arm /Trolley to prevent the Davit Arm from swinging and causing injury.

4. Remove the Davit Arm from the Hinge. Remove all bearings (NPS26 and larger).

5. Insert an Eyebolt in the Cap Pin and use a lift to support the weight of the Closure – DO NOT lift completely off the ground. Only use a Lifting Hook with a swivel so the Eyebolt does not unscrew from the Cap Pin while the Cap is rotated. Alternatively, use a set of hooks through the three Lugs attached to the Closure Cap to support the weight during removal.

6. Using the Ratchet Tool, loosen the Cap approximately 1/8 turn until the Cap can rotate by hand.

7. While carefully countering the weight of the Cap with the lift, unscrew the Cap from the Weld Hub. Store the Cap in a clean location or cover to minimize contamination.

8. Carefully remove the O-ring seal from the Weld Hub. If the seal is damaged, replacement seals can be obtained from In-Line or from any local O-ring supplier. The O-ring number is stamped directly on the Closure Weld Hub.

9. Remove the Pressure Alert Fitting from the Weld Hub and store with the Cap/Hinge assembly.

Vertical Hinge Closures (NPS16 and Larger)

1. With the Closure placed on the ground on the Weld Hub, remove the stem from the Pressure Alert Fitting.

2. Insert an Eyebolt in the Cap Pin and use a lift to support the weight of the Closure – DO NOT lift completely off the ground. Only use a Lifting Hook with a swivel so the Eyebolt does not unscrew from the Cap Pin while the Cap is rotated. Alternatively, use a set of hooks through the three Lugs attached to the Closure Cap to support the weight during removal.

3. Using the Ratchet Tool, loosen the Cap approximately 1/8 turn until the Cap can rotate by hand.

4. While carefully countering the weight of the Cap with the lift, unscrew the Cap from the Weld Hub until the Davit Arm bottoms on the Cap Pin. Lift the Cap and attached Davit Arm and store the Cap in a clean location or cover to minimize contamination. Remove all bearings (NPS26 and larger).

5. Carefully remove the O-ring seal from the Weld Hub. If the seal is damaged, replacement seals can be obtained from In-Line or from any local O-ring supplier. The O-ring number is stamped directly on the Closure Weld Hub.

6. Remove the Pressure Alert Fitting from the Weld Hub and store with the Cap/Hinge assembly.

Attachment of the Weld Hub

1. Remove all paint and residue from the weld area.

2. Position the Weld Hub to the pipe/vessel as below and tack weld:

    a) For Horizontal Hinged Closures NPS2 to NPS14, the Hinge shall be leveled vertical on the Left side of the Weld Hub while facing the seal groove. The Pressure Alert Fitting opening shall be in the 12 o'clock position (note – for specially ordered right-hand hinged Closures, the Hinge will be located on the opposite (right side) of the Weld Hub);

    b) For Vertical Hinged Closures NPS2 and larger and Horizontal Hinged Closures NPS16 and larger, the Hinge shall be leveled vertical.

3. Heat input during welding must be controlled to avoid distortion. It is recommended that sufficient pre-heat and the following pass sequence be used to minimize stress gradients caused by welding:

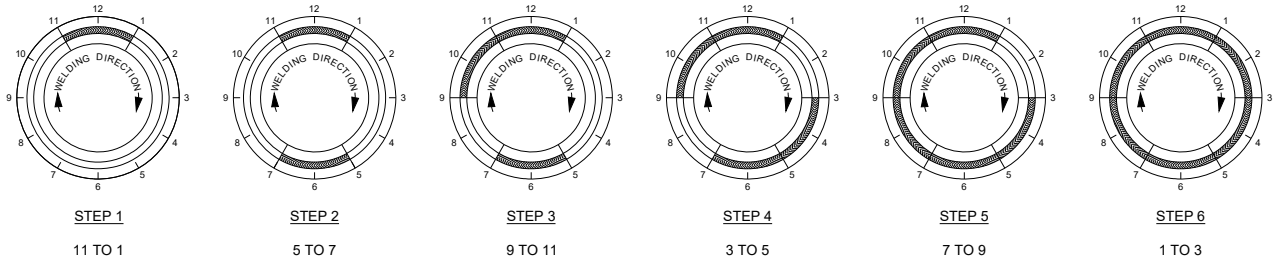

Figure 1. Recommended Welding Pass Sequence

4. If post-weld heat treatment is required, remove all grease from the threads and sealing surfaces and coat these exposed with an anti-oxidation compound to prevent scaling. Do not heat treat the Cap, Hinge Assembly or Pressure Alert Fitting.

Assembly

Horizontal and Vertical Hinge Closures (NPS2 to NPS14)

1. Prior to assembly, be certain horizontal hinge Closures are orientated horizontally and vertical hinge Closures are orientated vertical. The Davit assembly is only designed to support the weight of the Cap in its designed orientation. Failure to do so may result in injury or damage to the Closure threads.

2. Clean all grease, scale, dirt and other residue from the Weld Hub, Cap and Hinge Assembly, especially from the threads and sealing surfaces. Liberally coat the Weld Hub and Cap threads with molybdenum disulfide grease (preferably) or other anti-seize lubricant. **Do not assemble or operate with the threads dry.** Grease Hinge components and assemble Hinge Arm/Cap Assembly into the Weld Hub Hinge. **Do not replace the Seal at this point**.

3. Carefully insert the Hinge Arm into the Hinge and gently lower the Cap/Hinge assembly until it contacts the adjustable Lock Collar.

4. Attempt to screw the Cap on to the Weld Hub. If smooth operation is not evident, finely adjust the position of the Lock Collar until the best movement is obtained.

5. With the seal removed, tighten the Cap until metal-to-metal contact is achieved with the Weld Hub. Permanently stamp two alignment marks on the Cap and Weld Hub.

6. Unscrew the Cap. Clean and apply a very thin film of grease into the O-ring groove and replace the Seal. Do not pack the O-ring groove with grease.

7. Screw the Cap on to the Weld Hub and tighten until alignment of the marks made in Step 7 is made. Do not tighten past these marks.

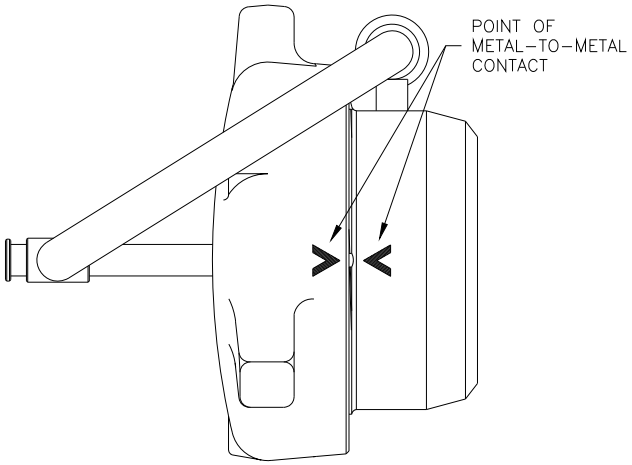

Figure 2 Alignment Marks

Horizontal Hinge Closures (NPS16 and Larger)

1. Prior to assembly, be certain the Closure is orientated horizontally. The Davit assembly is only designed to support the weight of the Cap in the horizontal orientation. Failure to do so may result in injury or damage to the Closure threads.

2. Clean all grease, scale, dirt and other residue from the Weld Hub, Cap, especially from the threads and sealing surfaces. Liberally coat the Weld Hub and Cap threads with molybdenum disulfide grease (preferably) or other anti-seize lubricant. **Do not assemble or operate with the threads dry. Do not replace the Seal at this time**.

3. Clean and grease the Davit Arm and bearings (NPS26 and larger) and insert into the Hinge.

4. Grease the Cap Pin and slide the Suspension Arm/Trolley over the Pin. Replace the Lock Collar and tighten.

5. Carefully lift the Cap/Suspension Arm/Trolley assembly and slide the Trolley on to the Davit Arm.

6. Without the Seal in place, attempt to screw the Cap on to the Hub by hand. If smooth operation is not evident, finely adjust the Nut holding the Suspension Arm upwards or downwards until the best possible movement is obtained.

7. Rotate the Cap slowly until metal-to-metal contact is achieved with the Weld Hub. The Ratchet Tool is not necessary to achieve this point, but maybe helpful to ensure contact is made and the Cap is centered. Do not overtighten. Permanently stamp two alignment marks on the Cap and Weld Hub.

8. Unscrew the Cap. Clean and apply a very thin film of grease into the O-ring groove and replace the Seal. Do not pack the O-ring groove with grease.

9. Screw the Cap on to the Weld Hub and tighten until alignment of the marks made in Step 7 is made. Do not tighten past these marks.

Vertical Hinge Closures (NPS16 and Larger)

1. Prior to assembly, be certain the Closure is orientated vertically. The Davit assembly is only designed to support the weight of the Cap in the vertical orientation. Failure to do so may result in injury or damage to the Closure threads.

2. Clean all grease, scale, dirt and other residue from the Weld Hub, Cap, especially from the threads and sealing surfaces. Liberally coat the Weld Hub and Cap threads with molybdenum disulfide grease (preferably) or other anti-seize lubricant. **Do not assemble or operate with the threads dry.** Do not replace the Seal at this time.

3. Clean and grease the Davit Arm and bearings (NPS26 and larger). Make certain the Davit Arm is spun down and solidly contacts the bottom of the Cap Pin. Insert into the Hinge.

4. Attempt to screw the Cap on to the Weld Hub. If smooth operation is not evident, finely adjust the position of the Lock Collar until the best movement is obtained.

5. With the seal removed, tighten the Cap until metal-to-metal contact is achieved with the Weld Hub. Permanently stamp two alignment marks on the Cap and Weld Hub.

6. Unscrew the Cap. Clean and apply a very thin film of grease into the O-ring groove and replace the Seal. Do not pack the O-ring groove with grease.

7. Screw the Cap on to the Weld Hub and tighten until alignment of the marks made in Step 7 is made. Do not tighten past these marks.

SECTION THREE
OPERATION INSTRUCTIONS

IMPORTANT: PRIOR TO OPERATING THE IN-LINE CLOSURE, BE CERTAIN ALL PRESSURE HAS BEEN RELIEVED. FAILURE TO PROPERLY RELIEVE PRESSURE, REGARDLESS OF ITS MAGNITUDE, MAY RESULT IN SEVERE INJURY OR DEATH. PLEASE FOLLOW ALL IN-HOUSE SAFETY PROCEDURES AND THESE INSTRUCTIONS THROUGHLY AND USE EXTREME CAUTION WHEN OPERATING THESE DEVICES.

OPENING PROCEDURE (Review Section One – Safety Information prior to operation)

1. **Completely relieve all system pressure.**

2. Open the Pressure Alert Fitting (if equipped) completely to verify pressure has been relieved. The Pressure Alert Fitting is not intended to relieve system pressure, only to warn the Operator of residual system pressure. It is standard on sizes 6” and above and available as a recommended option on smaller sizes.

3. If the Pressure Alert Fitting indicates system pressure remains, **DO NOT OPERATE THE CLOSURE**. Close the Fitting and repeat Steps 1 and 2 until the all pressure is relieved.

4. Loosen the Cap approximately one-half turn and stop. It is recommended that a spanner wrench (or ratchet for sizes 16 and above), available as an option, be used to loosen the Cap. The use of hard-faced tools and/or impact is not recommended, will void the warranty and may damage the Closure where catastrophic failure may result.

5. At this point the Seal between the Cap and Weld Hub is broken and any remaining pressure should vent through the Pressure Relief Slots in the Weld Hub threads. If pressure vents through the Slots, do not open the Closure further. Close the Cap and properly relieve remaining residual pressure. The Slots only serves as an alert feature in conjunction with the Pressure Alert Fitting and is not intended to relieve system pressure.

6. Once it is verified all pressure is relieved and with the Operator standing on the side opposite the Hinge, continue to rotate the Cap until it is removed from the Weld Hub. Swing the Cap completely out from the front of the Weld Hub to gain access to the system.

7. During the opening operation and after the Closure is opened, avoid standing or placing any part of the body directly in front of the Closure opening. Trapped or stuck objects within the system may result in projectiles if they suddenly break loose and are ejected through the Closure.

CLOSING PROCEDURE

1. Prior to closing the Closure, perform the maintenance operation as outlined in **Section Four – Maintenance Instructions.**

2. Position the Cap to the Weld Hub and adjust until the threads engage. Rotate the Cap until Seal contact is made.

3. Continue to rotate the Cap until metal-to-metal contact is achieved as indicated by the markings on the Cap and Weld Hub as described in Section Two Part 9. **DO NOT OVER TIGHTEN THE CAP PAST THIS POINT.**

4. As stated in the Opening operation, the used of hard-faced tools and/or impact for loosen and tightening the Cap is not recommended, will void the warranty and may damage the Closure where catastrophic failure may result. Spanner wrenches are highly recommended.

5. If the Closure is equipped with a Pressure Alert Fitting, replace the stem and hand-tighten. If necessary, gently snug the stem closed with a wrench. **DO NOT OVERTIGHTEN THE STEM AS THIS MAY DAMAGE THE PRESSURE ALERT FITTING.** If over tightening occurs, the Pressure Alert Fitting may require replacement.

6. Pressurize the system and check for leakage. If leakage occurs, perform the maintenance operation as outlined in **Section Four – Maintenance Instructions.**

SECTION FOUR
MAINTANENCE INSTRUCTIONS

IMPORTANT: REGULAR MAINTANENCE OF THE IN-LINE CLOSURE IS NECESSARY TO ENSURE INTEGRITY OF SAFETY FEATURES AND TROUBLE-FREE OPERATION. FAILURE TO PERFORM REGULAR MAINTANENCE MAY RESULT IN UNSAFE OPERATION CAUSING SEVERE INJURY OR DEATH.

1. Regular maintenance should be performed each time the Closure is operated. Contact the factory, if required, if the Closure or any part(s) exhibit damage or wear to the extent replacement is warranted.

2. **Be certain all system pressure is relieved prior to performing maintenance procedures.**

3. Inspect all welds and pressure–containing parts for defects such as cracks. Repair or replace as required.

4. Inspect the threads on both the Cap and Weld Hub for signs of wear or galling. It is vitally important the threads are clean and well lubricated. **Do not operate with the threads dry.**

5. Inspect the Seal and replace if damaged. In-Line Closures use standard HSN O-Rings available locally and worldwide. The O-Ring number is stamped on Weld Hub for convenience and easy identification. The Operator may use any elastomer suitable for the service.

6. If system fluids, sand and other residue contaminate the threads or Seal, remove the Seal and thoroughly clean the threads, thread slots and Seal Groove. Lightly lubricate the Seal Groove with a thin film of all-purpose grease and insert the Seal (replace if required). Liberally lubricate the Cap and Weld Hub threads with an anti-seize compound, preferably one containing molybdenum disulfide.

7. Lubricate all sliding Hinge components and grease fittings.

8. If Hinge adjustments are required, with the Closure closed halfway, loosen the Hinge Stop and lift the Hinge Arm and Cap simultaneously and re-tighten. Cycle the Closure and continue to adjust until smooth operation is achieved.

SECTION FIVE
STORAGE INSTRUCTIONS

1. Closures and Closure components shall remain on/in the original pallet/crate until installation with shrink-wrapping fully intact. Damaged shrink-wrapping shall be repaired or replaced as required to maintain protection.

2. Closures shall be stored in a clean, dry area away from traffic areas to avoid physical damage and contamination from dirt, spray, etc.

3. Prior to installation, the Closures shall be warmed to ambient temperatures above freezing to facilitate easier disassembly. Disassembled components shall be stored in a clean/dry environment and inspected for cleanliness after removal from storage up to installation/assembly.

4. It is important that the Closure threads remain clean and protected with clean grease during storage, disassembly, installation and assembly. Dirt, weld slag, etc. will damage threads if entrained within the grease during Head removal or make-up.

TERMS AND CONDITIONS

1. In-Line Flow Products Ltd. (“In-Line”) warrants its products against defects in material and workmanship for a period of one calendar year after date of shipment when the products are properly installed, operated and maintained within the limits for which they were designed, manufactured and in accordance with In-Line’s written instructions. No warranty applies after this period. By entering into a transaction with In-Line, the Buyer or Owner accepts to be bound by the terms and conditions contained herein.

2. This warranty does not suggest nor imply suitability for any particular application, nor expected life span of the product regardless if the purpose or use has been disclosed to In-Line through specifications, drawings or otherwise. Selection of materials of construction, including seals and gaskets, product configuration and rating is the sole responsibility of the product Buyer or Owner.

3. It is expressly understood that any technical information, recommendations or advice furnished by In-Line with respect to the materials, design, installation, use of products, engineering, and other matters are given without charge or consideration. Although they are believed to be accurate, based on In-Line’s knowledge and experience, In-Line assumes no obligation or liability for the information, suggestions or advice given, including errors or omissions, or results obtained in their use or application and all such communications being given and accepted at the Buyer’s or Owner’s risk. Furnished technical information, recommendations or advice does not establish any warranty, express or implied.

4. This warranty shall not cover, and In-Line shall not be responsible for, costs incurred with respect to the removal of defective products or the installation of replacement products, including, but not limited to, labor, freight, production and profit losses as well as any proximate, incidental, consequential or other damages, injuries or losses arising out of any breach of this warranty. All obligations and liabilities are limited to the cost of repair, up to the acquisition cost of the product, at In-Line’s option. In-Line shall have the right to inspect any product returned to it or for which a claim is being made under this warranty.

5. Product orders accepted by In-Line cannot be changed or canceled unless agreed in advance by In-Line with full reimbursement of costs incurred to date. This shall include changes or cancellation of products ordered to special Owner specifications, non-standard or special construction or for quantities that exceed normal production runs or inventory levels.

6. All products sales are made EXW In-Line manufacturing facility. Title to any product shall pass to the Buyer or Owner only after In-Line has received full payment.

7. No product may be returned and credited without prior written approval from In-Line. Products returned for credit shall be received in the same condition as originally shipped. Restocking, reconditioning expenses and freight charges shall be deducted from the credit as required. Product ordered to special Owner specifications, non-standard or special construction or for quantities that exceed normal production runs or inventory levels are not subject to return and no credit shall be issued.

8. This warranty does not extend to any product which has been altered from its manufactured condition, such as, but not limited to, intentional or unauthorized modification, accident, corrosion, misuse, vandalism, use of third-party parts and workmanship, failure to provide necessary and reasonable maintenance, damage due to improper storage, handling, installation or operation, use beyond rated capacity, normal wear or any other cause not the fault of In-Line.

9. Operation by way of impact (hammering, etc.) constitutes misuse and immediately voids the product warranty. The determination of fitness for service after impact operation, or after any other physical damage is incurred after receiving the product or while in service, is that of the product Owner. If it is determined that the product is no longer fit for service and the Owner elects to replace the product, the product, in its entirety, shall be replaced at the Owner's expense. In-Line will not supply individual components to replace those damaged as described herein.

10. In-Line drawings and technical data, whether hardcopy or electronic, furnished to the Buyer or Owner are the exclusive property of In-Line. Possession of In-Line drawings and technical data does not convey any rights to the Buyer or Owner, including but not limited to reproduction or disclosure to third parties by any means without written permission of In-Line, and shall be returned to In-Line immediately upon request.

11. In-Line reserves the right, without prior notice, to change, alter or discontinue design and construction of any product and has no obligation or liability to extend such changes, alterations or discontinuance to products previously or subsequently sold.

12. This is the sole and exclusive warranty given by In-Line with respect to the products offered and is in lieu of and excludes all other warranties, express or implied.

For further assistance or additional copies of this document, please contact:

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