

THE PIPELINER



OPERATIONS AND MAINTENANCE MANUAL





DANGER - IMPORTANT WARNINGS

The Industrial Radiography Supplies and Services Inc. (IRSS) PipeLiner System must be operated only by trained and qualified radiographers who have read and understood this Operations Manual and the 880 Series Source Projector Operating and Maintenance Manual, or by trained assistants working under their direct supervision.

WARNING

The use of radiographic exposure devices by unqualified personnel or when safety procedures are not fully met, could result in life threatening dangers.

Gamma radiography systems emit high levels of penetrating ionizing radiation during use and present a significant health risk to operators and the public including injury, sickness and/or death if appropriate safety and operational procedures are not employed.

Unshielded sources or source assemblies must never come in contact with any body parts under any circumstances.

Since gamma radiation is undetectable by the human senses, strict operating and emergency procedures must be followed. The proper use of PPE must be employed at all times during radiographic operations including calibrated survey meters, direct reading dosimeters, direct alarming dosimeters and the wearing of personal dosimeters.

During use of this radiography system, never assume the position of the radiation source. Always conduct a thorough confirmatory survey using a calibrated survey meter to verify the location of the radiation source. Be reminded that a multitude of overexposure incidents which include injuries are directly attributed to a failure of the operator to perform or supervise an adequate confirmatory survey.

It is very important and required by regulation to prevent access by unauthorized persons to radiography equipment and to the area where radiography is performed.

Take advantage of the three basic radiation protection methods to minimize radiation exposure.

TIME

Spend less time near a source of radiation

DISTANCE

Increase your distance in a direction away from a radiation source

SHEILDING

Use effective shielding between you and the source of radiation

DO NOT

Perform any unauthorized modifications to the radiography exposure device or the components of this system

DO

Perform daily safety inspections of the radiography system for defects, wear and tear, replacing components as required. Inspections will be carried out or supervised only by trained and qualified radiographers.



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TECHNICAL SPECIFICATIONS THE 880 SERIES PROJECTOR PIPELINER ACCESSORY

GENERAL DESCRIPTION

(The following are not intended as assembly instructions. For assembly instructions please refer to the work instructions sent with the conversion kit)

The PipeLiner is a rugged, easy to use attachment for the Sentinel™ 880 series of gamma ray radiography projectors to improve utilization and reduce dose rates to operators when performing pipeline radiography, while still maintaining the option of conventional set ups. The addition of the PipeLiner accessory essentially converts the 880 series of projectors into a dual purpose exposure device.

The PipeLiner accessory consists of four main components; the jacket, collimating guide tube, pipe shoe and clamp assembly

PIPELINER JACKET

The PipeLiner jacket is made of polyurethane for strength, durability and weight reduction. The jacket is similar to the stock 880 jacket in design and serves the same functions with a few exceptions. Wheels have been added to the jacket for easy transportation from weld to weld along pipelines. Accommodations have been made for the attachment of the “pipe shoe” and “clamp assembly” to the front of the jacket.

A significant change, mounts the projector 180° or upside down in contrast to its current or original jacket orientation. This new position gives a better angle to the control assembly for added durability and the collimating guide tube for ease of operation.

The PipeLiner jacket is attached to the 880 device with six stainless steel screws.

PIPELINER COLLIMATING GUIDE TUBE

The collimating guide tube is made of tungsten and stainless steel producing a unique design that maintains continuous shielding of the source while it is being projected to the beam port. The bayonet fitting is made of stainless steel and is attached to the collimating guide tube with two stainless steel screws.

The beam port of the guide tube has been carefully designed to minimize the size of exclusion areas, virtually eliminate flash dose, while maintaining proper beam orientation. When used with standard 35' (10.5m) or 50' (15m) controls, a significant reduction in operator dose rate can be achieved.

The collimating guide tube fits securely inside the “Pipe Shoe” when in use.

PIPE SHOE

The pipe shoe is made from similar polyurethane as the jacket and is designed to orientate the device on the pipe for double wall exposures. It consists of a molded bottom for positioning the exposure device along the center line of the pipe. This portion also includes the focal opening, a transverse groove that is used to align the beam port of the collimating guide tube into the position that best suits the intended geometry of the radiograph.

The top section of the shoe consists of a raised area and a large indent. The raised portion will not allow the shoe to be closed unless the 880 outlet port cover is either fully closed or in the fully open position with the collimating guide tube attached. The indented area accommodates the collimating guide tube when the shoe is attached to the jacket.

The jacket accommodates the pipe shoe at the front by hinging it to the bottom portion of the jacket using two 2 3/4” x 2” socket head shoulder bolts. This hinging action is important as it allows the PipeLiner to be quickly prepared for the use of conventional guide tubes. The connection of the pipe shoe is completed by fastening the top portion of the jacket through the handle with the 3/8” x 12” socket head bolt.

CLAMP ASSEMBLY

The clamp assembly consists of three main sections, the swing arm plate including swing arm, and the hook plate that includes strapping, quick release latch and cam buckles and the hook side plate. For pipe diameters up to 8” the swing arm and swing arm side plate are attached to the right side of the pipe shoe and the hook side plate is attached to the left side using four 3/4” x 2” socket head shoulder bolts with the two rear bolts also acting to hinge the pipe shoe to the PipeLiner Jacket. For pipe diameters over 8” (20cm) the swing arm side plate and hook plate can be reversed and this may provide improved access to the swing arm handle for easier clamping.

An important safety feature has been built into the clamp assembly that will not allow the hook plate to be removed from the hook plate pin without depressing the cam buckles, releasing the strapping. This feature will not allow the PipeLiner to prematurely disengage from the pipe and fall to the ground. If the swing arm has not been engaged and the PipeLiner is accidentally allowed to fall uncontrolled it will only swing to the bottom of the pipe where it will hang until it is righted or removed.



APPLICATION

The PipeLiner Accessory has been designed for the industrial applications of gamma radiography of pipeline butt welds using double wall contact and single wall viewing technique.

By hinging open or removing the pipe shoe standard guide tubes can be attached to the 880 projector and conventional radiography performed. (*SEE 880 OPERATION AND MAINTENANCE MANUAL for conventional operation procedures.*)

880 PROJECTOR

The PipeLiner is designed specifically for the 880 series of projectors. It is necessary that the operator has been trained and qualified in the operations of the 880 projector. Only those individuals who have received a certificate of competence for the maintenance of 880 devices should perform the jacket replacement. See your nearest Sentinel service center.

SOURCE ASSEMBLIES

The PipeLiner accommodates .250" diameter source capsules using TCI 5222 Teleflex cable style source assemblies only.

The following source assemblies meet the above requirements:

ISOTOPE	ASSEMBLY MODEL NO.	GAMMA ENERGY RANGE	HALF LIFE	APPROXIMATE STEEL WORK- ING THICK- NESSES
Selenium 75	A424-25W	66-612 keV	120 days	3-29mm
Iridium 192	A424-9	206-612 keV	74 days	12-63mm
Cobalt 60	A424-19	1.17-1.33 MeV	5.27 years	50-150mm
Ytterbium 169	98810	8-308 keV	32 days	2-20mm
Cesium 137	A424-30	663 keV	30 years	12-63mm

Activities

Authorized isotope activities are dependant on the 880 model, user license, and regulatory restrictions.

OPERATING DISTANCE/POSITION

All standard lengths of control assemblies can be used with the PipeLiner accessory.

The shielding characteristics of the collimating guide tube, all distances being equal, are such that the operator is favored standing directly behind the projector. Directly forward of the projector offers the least protection while the sides, as you proceed from front to back, will continue to produce a reduction in dose rate until directly behind the projector.



ACCESSORY SPECIFICATIONS

Manufacturer

Industrial Radiography Supplies and Services Inc.
 14705 116 Ave
 Edmonton, Alberta
 Canada T5M 3E8
 1 (780) 452-4761
 1 (780) 453-5239
 sales@irss.ca
 www.irss.ca

ACCESSORY FOR:

880 MODEL	ASSEMBLED WEIGHT	LENGTH	WIDTH	HEIGHT
DELTA	65LBS (29.5Kg)	15" (38cm)	7.5" (19cm)	10" (25.5cm)
SIGMA	65LBS (29.5Kg)	15" (38cm)	7.5" (19cm)	10" (25.5cm)
ELITE	55LBS (25Kg)	15" (38cm)	7.5" (19cm)	10" (25.5cm)
OMEGA	46LBS (21Kg)	15" (38cm)	7.5" (19cm)	10" (25.5cm)

MATERIALS

Polyurethane, Aluminum and Stainless Steel

INSPECTION REQUIRMENTS

Daily pre-operational inspection for obvious damage to the system

MAINTENANCE REQUIRMENTS

Clean and dry after use as needed

OPERATING TEMPERATURE RANGE

-40°C to 149°C

NOTICE

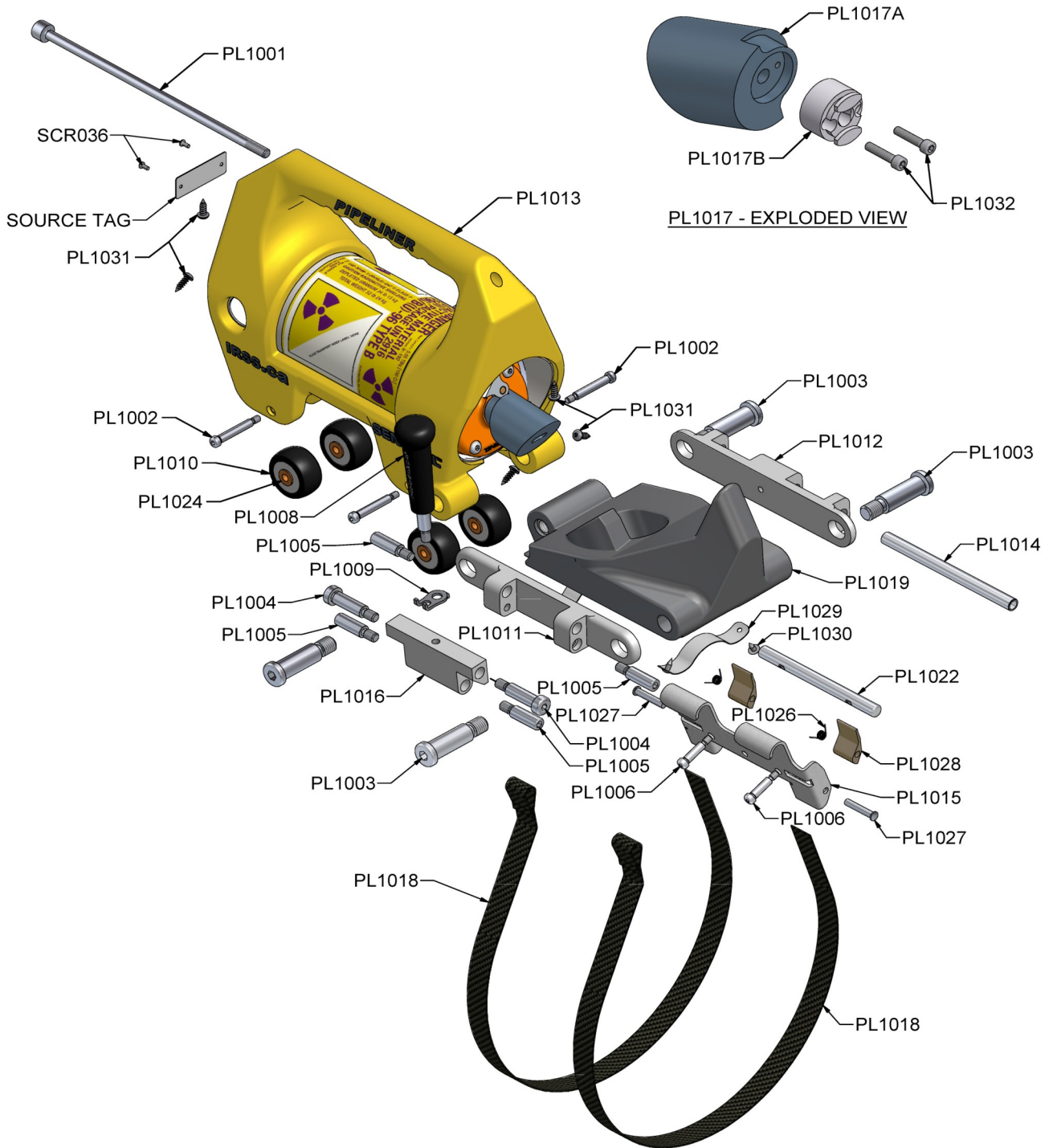
***The 880 PipeLiner accessory jacket has been registered as part of the Type B(U) shipping container for QSA Global Inc. source assemblies and thus can remain on the projector during shipment. However all other parts of the PipeLiner accessory must be removed in their entirety before transport.**

The purpose of this manual is to provide information which will assist qualified radiographers in using the PipeLiner accessory with the 880 series of projectors. The user must be thoroughly familiar with the 880 instruction manual and this instruction manual before attempting operation and use of this equipment.

Prior to use of PipeLiner Jacket in conjunction with the 880 projector as a shipping container a registered user certificate specifying the combination must be obtained from the CNSC (Canada only).

It is the responsibility of the user of this equipment to comply with local, national and international regulatory, licensing and transport rules and regulations as they apply in their respective countries.

PARTS DIAGRAM



PARTS LIST



PART NUMBER	QTY	DESCRIPTION
PL1001	1	3/8" x 12" PIPE SHOE BOLT
PL1002	4	5/16" x 1 3/4" WHEEL AXLE BOLT
PL1003	4	3/4" x 2" PIPE SHOE BOLT
PL1004	2	3/8" x 3/4" SWING ARM STRAP BOLT
PL1005	2	1/2" X 1 1/4" SWING ARM HINGE BOLT AND STRAP GUIDE
PL1006	2	1/2" X 1 1/4" HOOK PLATE RELEASE BOLT
PL1007	1	SWING ARM HANDLE BOLT
PL1008	1	SWING ARM HANDLE
PL1009	1	BUNGEE CATCH
PL1010	4	WHEEL
PL1011	1	SWING ARM SIDE PLATE
PL1012	1	HOOK SIDE PLATE
PL1013	1	PIPELINER JACKET
PL1014	1	HOOK PLATE PIN
PL1015	1	HOOK PLATE
PL1016	1	SWING ARM
PL1017	1	COLLIMATING GUIDE TUBE COMPLETE
PL1017A	1	COLLIMATOR WITHOUT BAYONNET FITTING
PL1017B	1	GUIDE TUBE BAYONNET FITTING
PL1018	2	STRAPS
PL1019	1	PIPE SHOE
PL1022	1	HOOK PLATE RELEASE BAR
PL1024	4	WHEEL HUB BUSHING
PL1026	2	CAM BUCKLE SPRING

WARRANTY AND LIMITATION OF LIABILITY

Industrial Radiography Supplies and Services Inc. (IRSS, herein referred to as the manufacturer) warrants its product which it manufactures and sells to be free from defects in material and workmanship for a period of one year from the date of shipment. This warranty shall not apply to any products or parts which have been subjected to misuse, improper installation, repair, alteration, neglect, accident, abnormal conditions of operation, or use in any manner contrary to instruction or intended application.

The manufacturer's liability under such warranty shall be limited to replacing or repairing at its option, any parts found to be defective in such respects, which are returned to the manufacturer, transportation prepaid; or at its option, to returning the purchase price thereof.

The warranty on other manufacturer's components shall be that of the original manufacturer whose warranty shall be binding.

In no event shall the manufacturer be liable for any incidental or consequential damages whether or not such damages are alleged to have resulted from the use of such product in accordance with instructions given by or referred to by the manufacturer.

IRSS assumes no liability or responsibility for the usage of any radioactive material or device generating penetrating radiation used in connection with this product.

All other warranties, except those warranties expressly stated herein, including without limitation warranties of, merchantability and implied warranties of fitness, are expressly excluded.

The warranty on this accessory is specifically limited to its use with the Sentinel 880 series of gamma ray projectors and sealed source assemblies as described on page 4 of this manual.

IRSS shall not be liable for any errors or omissions contained herein and the provision by IRSS of the information set out in this manual does not in itself constitute acceptance of any liability on the part of IRSS.

OPERATING INSTRUCTIONS

***NOTE

This manual assumes that the reader has a thorough understanding of the operation and maintenance of the Sentinel™ 880 projector. Only personnel trained and qualified in the operation and maintenance of 880 projectors should attempt to use the PipeLiner accessory and only personnel with formal maintenance training should attempt to install an 880 projector into the PipeLiner Jacket.

880 PROJECTOR CONVERSION

Only specially trained personnel should attempt this procedure.

SEE SENTINEL™ 880 SERIES SOURCE PROJECTOR OPERATING AND MAINTENANCE MANUAL OR YOUR LOCAL DISTRIBUTOR

***NOTE: 880 Projectors to be converted for use with the PipeLiner Accessory must have been retrofitted by a trained technician before conversion can be performed. See your Sentinel™ dealer for information on the necessary retrofits needed for your specific 880 projector.**

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PIPELINER ASSEMBLY

Tools Required

3/8" T Handle Allen Key (Supplied)

Parts Required

Retrofitted and Converted 880 Projector
 Pipe Shoe
 Swing Arm Plate with Swing Arm
 Hook Side Plate
 Tungsten Collimating Guide Tube
 Hook Plate
 Polyurethane Straps
 4 - 3/4" x 2" Socket Head Cap Bolts
 1 - 3/8"x 12" Socket Head Cap Bolt

Pipe Shoe Attachment

Place the Pipe Shoe foot side down, hinge barrel in front of the projector with the 880 projector on it's wheels. Approaching from the right side, plunger lock opening to your left, slide the pipe shoe back toward the projector inserting the pipe shoe hinge barrel between the PipeLiner jacket hinge barrels.

Align the swing arm side plate bolt hole, swing arm handle pointing up, with the jacket hinge bolt hole and insert the 3/4" x 2" socket head cap bolt and tighten loosely. Align the swing arm side plate bolt hole with the bolt hole in the front of the pipe shoe and insert a 3/4" x 2" socket head cap bolt through the hole and hand tighten using the T handle Allen key wrench.

Approaching the projector from the opposite side attach the hook side plate in the same manner as the swing arm side plate using the two remaining 3/4" x 2" socket head cap bolts. With the front bolts securely fastened the rear bolts can now be securely hand tightened using the T handle Allen key wrench. The pipe shoe is now effectively hinged to the PipeLiner jacket.

For pipe diameters over 8" (20cm) the swing arm side plate and hook plate can be reversed and this may provide improved access to the swing arm handle for easier clamping.

Attaching The Collimating Guide Tube

The swivel bayonet connector used with conventional guide tubes is not used with the PipeLiner accessory. Connect the collimating guide tube in the same manner you would a conventional guide tube remembering that the 880 projector is now upside down or 180° to its original position. (See step 2 "Connecting the Source guide tube(s) pg.2.3", in the Sentinel™ 880 Series Source Projector Operating and Maintenance Manual)

Once the collimating guide tube is attached and the outlet port cover fully rotated clockwise until it stops, the pipe shoe can be lifted up, closing it over the collimating guide tube sealing from view the front of the 880 device. The 3/8" x 12" socket head cap bolt is then inserted through the carrying handle of the jacket and tightened securely using the 3/8" T handle Allen key wrench.

Attaching The Clamping Plate (See Figure A, B, C,)

Select a strap length that best suits the diameter of pipe being radiographed. The proper length should leave a minimum of 6" of strapping material or tag end, projecting out of the cam buckles.

Placing the hook plate, hook side down and thread about 8" to 12" of the urethane strapping, unlooped end under the cam buckle. Reversing the direction, thread the strapping back and through the cam buckle jaw. Perform the same steps for the other cam buckle. The straps are now secured to the hook plate.

There are four horizontal posts attached to the swing arm side plate assembly. Two fixed "fulcrum" on the swing arm side plate called the swing arm strap guides and two swing arm strap bolts, that pivot as part of the swing arm. Attach the looped end of the strapping to the swing arm strap bolts by sliding the loops over the ends. The strapping should now be positioned between the swing arm side plate and the swing arm strap guide. The hook plate should be positioned so that the hook points away from you and the straps should not be twisted or crossed but remain flat and parallel.

This completes the assembly of the Sentinel™ 880 PipeLiner accessory.

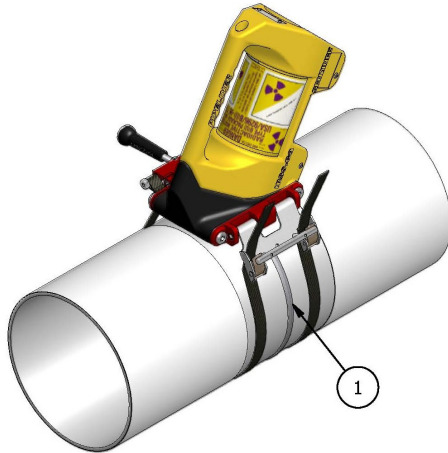


Disassembly

If the operator wishes to use conventional guide tubes only the 3/8" x 12" socket head cap bolt needs to be removed to allow the pipe shoe to hinge open. Enough space is provided to attach conventional guide tubes. If the operator wishes to remove the pipe shoe entirely, in addition to the 3/8" x 12" socket head cap bolt, the two 3/4" x 2" hinge bolts are all that need to be removed. This procedure will leave the swing arm assembly and hook side plates attached to the pipe shoe for quick reattachment later.

NOTE

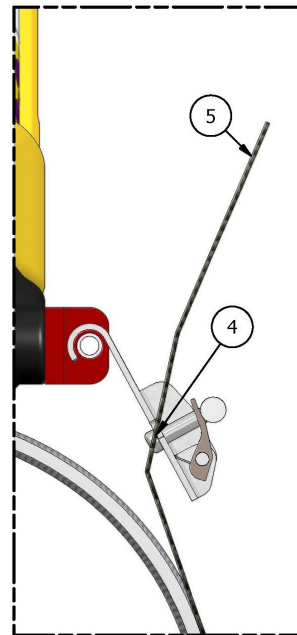
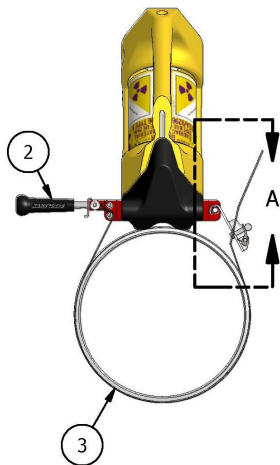
The 880 series of projectors may not be approved for transport of sealed sources while the pipe shoe remains attached to the Jacket. Please refer to your local regulations for transportation requirements.



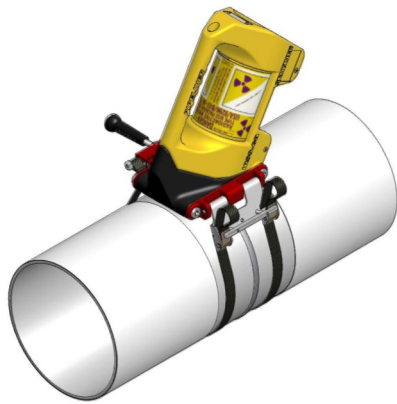
INSTALLATION NOTES:

1. LOCATE ON WELD JOINT TO EXAMINE.
2. ENSURE CLAMP HANDLE IS DISENGAGED.
3. WRAP STRAP AROUND PIPE.
4. FEED END OF STRAP THROUGH SLOTS FROM UNDERSIDE OF PL1015.
5. PULL STRAP TAUNT.

CONTINUED ON SHEET 2..



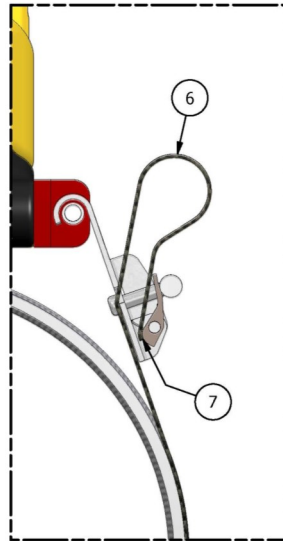
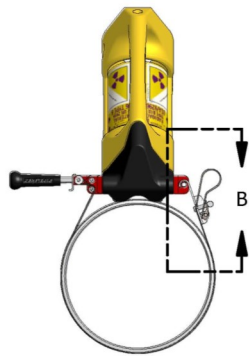
DETAIL A



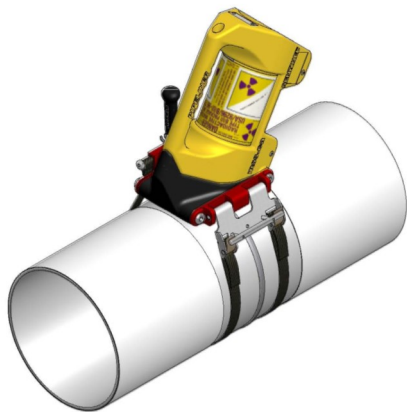
INSTALLATION NOTES CONT'D:

- 6. LOOP END OF STRAP BACK TOWARDS PL1015.
- 7. FEED END OF STRAP BETWEEN PL1015 AND SPRING LATCH.

CONTINUED ON SHEET 3..

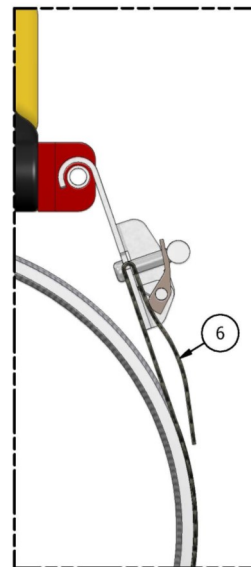
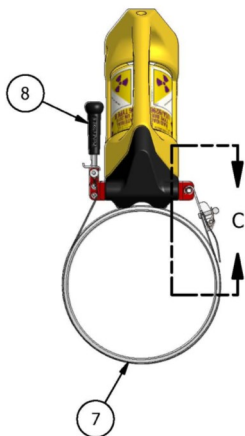


DETAIL B



INSTALLATION NOTES CONT'D:

- 6. PULL STRAP TAUNT.
- 7. MAKE SURE NO SLACK EXIST BETWEEN STRAP AND PIPE. REPEAT STEPS IF NECESSARY.
- 8. ENGAGE HANDLE UPRIGHT TO CLAMP UNIT TO PIPE.



DETAIL C



OPERATION

Set up

Place the PipeLiner accessory, wheels on the pipeline and pipe shoe forward and roll it to within a few inches of the weld to be radiographed. Number belts or other identification markers can be attached to the pipe adjacent to the weld at this time. The projector is then tilted forward off its wheels so that it is resting on the feet of the pipe shoe. The feet of the pipe shoe are designed to accommodate piping as small as 2.5" OD and will automatically align the beam port along the center line of the pipe.

To position the focal opening, simply line up the swing arm handle directly over the weld. This position will position the source slightly to the rear of the weld center line and can be adjusted by moving the entire device forward or backward, depending on the intentions of the resultant radiograph.

Working from the right side of the PipeLiner and slightly forward with the swing arm handle in the "open" or down position, keep one hand on the PipeLiner and either reach over or under the pipeline, grasp the hook plate then hooking it onto the hook plate pin.

While still holding the device in place with one hand, grasp the tag ends of the straps with your free hand and pull in a downward direction until the straps are tight. If the straps have been tightened properly it should be impossible to remove the hook plate from the hook pin without loosening the straps. In some cases, and especially with small diameter pipe, 3" and under, it is useful to give the straps one or two quick tugs to ensure the straps are sufficiently tight. Now lift the swing arm handle to lock the device securely to the pipe. It should now require a force much greater than the weight of the device to move the projector around the radius of the pipe. The larger the diameter of the pipe the greater the force required to move it, or the less tension required to hold the device in place.

The remote control assembly can now be connected to the projector and the exposure performed. (See Sentinel™ 880 Series Source Projector Operating and Maintenance Manual Step 3 pg.2.5).

360° Rotation Around the Pipe

In order to position the PipeLiner to produce radiographs of the entire weld, it needs to be rotated into various positions around the circumference of the pipe. To accomplish this, first grasp the PipeLiner near the plunger lock opening with your left hand, curling your fingers over and around the end of the jacket. Next grasp the swing arm handle and lower it slightly to release just enough tension so that the projector can be pushed or pulled and rotated into the position required. The swing arm handle can, in this fashion, be used as a break providing the operator a high degree of control. Once you have attained the desired position, the swing arm handle is lifted locking the projector into position. This maneuver requires very little effort and can be accomplished with considerable accuracy with only a little practice.

Positioning of Film or Flexible Imaging Plates

Provisions for the attachment of bungee cord or similar material to the hook plate and a catch to fasten the bungee cord, has been added to the swing arm handle so that film cassettes or imaging plates can be held firmly in place. This task will be easily performed if the operator is positioned slightly in front of the device.

Moving to the Next Welded Joint

Once the required number of radiographs have been produced and it is time to move to the next welded joint, the PipeLiner is rotated back to the upright position on top of the pipe. If the remote control assembly is wound around the pipe it should be unwound at this time and the pistol grip hung over the pipe close to and in front of the PipeLiner.

With your left hand holding firmly onto the PipeLiner, remove the hook plate from the hook pin by depressing the quick release mechanism with the palm of your right hand and lifting with your fingers in unison. Allow the hook plate to fall under the pipe. Tilt the PipeLiner back onto its wheels. Retrieve number belts and/or other identification markers and again with your right hand, reach under the pipe and retrieve the clamping plate. Position the clamping plate comfortably in your left hand while still maintaining a grip on the PipeLiner handle. This may seem awkward at first but becomes quite routine very quickly.

Pick up the pistol grip with your right hand and begin rolling the PipeLiner along the pipe to the next welded joint. The set up procedure is now repeated for the next radiograph.

INSPECTION AND MAINTENANCE



NOTE

Maintenance instructions in this manual for the PipeLiner accessory apply only to the parts listed in this manual. For maintenance instruction for the 880 projector, remote control assemblies or other Sentinel™ products not listed herein please refer to the Sentinel™ 880 Series Source Projector Operation and Maintenance Manual or the original products Operations Manual.

Daily Inspection of the Radiography System

A daily inspection of the gamma radiography system for obvious defects is essential.

The daily inspection ensures that the equipment is in a safe and proper operating condition.

It is important that all trained supervisors perform or supervise this inspection prior to the first radiographic exposure of the shift regardless of any previous inspections that may have been performed that day. As an example, damage to a component of the system may occur during transport of the equipment to the job site. If damaged equipment were used without detection, the result may be the inability to retract the source assembly into the exposure device and secure it.

The result of a daily inspection should be recorded and include the date, name of the inspector and what specific equipment was inspected. If any defective or damaged components are discovered during daily inspection, the component must be removed from service and identified with a status indicator (tag, label, tape) to prevent inadvertent use by other radiography personnel. Defective or damaged components must be repaired or replaced before reuse in radiography operations. The main components of the radiography system consisting of the radiographic exposure device, remote controls and source guide tubes must be inspected in addition to accessories such as lab stands, collimators, jigs, j-tubes, and pipe clamping apparatus.

Radiographers must take a proactive role in preventing incidents, by performing or directly supervising a simple but thorough daily inspection of the radiography system. The implications that affect safety and the importance of the daily inspection must be emphasized and understood by the entire radiography staff.

Daily Inspection of the PipeLiner Accessory

1. Before starting any inspection, survey the surface of the exposure device to ensure that the radiation level is less than 2mSv/hr (200mR/hr). This survey provides a function test of the survey instrument, that it is responding to radiation, in addition to providing the radiographer with a reference measurement that can be compared to confirmatory surveys after terminating each radiographic exposure.

2. Inspect the labels on the exposure device to ensure they are legible and securely attached. The warning label containing the trefoil should be legible from a distance of 1 meter (approximately 3 feet). Inspect the legibility and attachment of the source identification tag that describes the radioactive source contained within the exposure device.

3. Check the PipeLiner jacket for cracks and gouges that could pinch or cut hands and fingers or wear damage that could affect the safe operation of the exposure device. Replace or repair as necessary.

It is common for the polyurethane material of the jacket to darken in color over time especially if the jacket is in direct sunlight for long periods. This is natural and will not affect the function of the jacket or the device. Inspect the wheels for smooth rotation, and the tires for wear, gouges or chunks missing. Replace as needed.

4. Inspect the collimating guide tube for obvious damage. Ensure the guide tube is free of dirt or debris. Check the bayonet fitting for burrs, cracks or dents. If damaged is found to the bayonet fitting it should be replaced. Ensure the bayonet fitting engages and rotates smoothly into place in the outlet port by installing and removing it. A crunchy or gritty feeling indicates that dirt and/or sand has entered the outlet port mechanism and it must be serviced before use.

5. Inspect the pipe shoe for rough or sharp edges, these should be filed smooth to prevent injury. Inspect the feet for excessive wear. The feet of the pipe shoe receive the most wear from contact with the pipe and will eventually wear to a point that the shoe will need to be replaced. Check the apex of the focal opening and of the concave between the feet for cracks. Ensure the indent that houses the collimating guide tube is free of dirt or debris and is sound with no wear through areas, allowing dirt into the collimating guide tube.

6. Inspect the entire swing arm assembly, swing arm and hook side plates, for obvious damage or wear and nicks or sharp edges that could cause injury. These can be filed smooth. The swing arm should operate smoothly, the fulcrum and swing arm posts should be free of bends or burrs.

Check the straps for wear, cuts or abrasions. Check the loops, paying special attention to the inside of the loop where it rubs against the posts. If the straps show obvious fatigue or wear they need to be replaced. Inspect the operation of the cam buckles, they should open and close smoothly, firmly grasping the straps. Check the hook plate and hook plate pin for damage and deformities.

7. During the initial set up of the days work and with the PipeLiner on the pipeline, the following exercise needs to be performed to ensure all components of the PipeLiner accessory are functioning together as intended.

Engage the hook plate onto the hook plate pin, tighten the straps and check to ensure the hook plate cannot be removed from the hook plate pin without releasing the quick release cam buckles first.

Next rotate the entire device 120° away from you and engage the swing arm. Put slight hand pressure on the PipeLiner with the intent of trying to force it further towards the bottom of the pipe. Now rotate the device from the top of the pipeline 120° in a direction towards you and engage the swing arm. Again put slight hand pressure on the PipeLiner with the intent of trying to force it further towards the bottom of the pipe. Return the device to the top of the pipeline. If the device failed to hold sufficiently at any time, inspect the device for anomalies, repair or replace components as required, retighten the straps and repeat the above tests until the projector holds securely.



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MAINTENANCE

Daily (routine) and annual (complete) maintenance requirements

Radiographic exposure devices and associated equipment must be maintained regularly by trained and qualified personnel to ensure consistent and safe operation of the radiographic system. The routine inspection and maintenance also ensures the integrity of transport packages are maintained in compliance with the package certifications.

Manufacturers base the recommended inspection and maintenance requirements on the system's design, application, materials, anticipated work cycles, environmental factors of use under the normal and abnormal conditions of industrial radiography and while in the transport system. A program of systematic maintenance will prolong the working life of the radiographic exposure device and associated equipment in addition to ensuring safety during use. By most national regulations, routine maintenance of the systems is required at intervals not to exceed 3 months in addition to the radiographer's daily inspections for obvious defects. The complete annual servicing ensures the integrity of the system.

Maintenance program administrators must recognize the need for maintenance intervals that are less than the required 3 month intervals especially in cases where the systems are used in severe environmental conditions. Maintenance program administrators must ensure the systems are completely serviced immediately after certain jobs in severe conditions. Extreme or severe conditions may include, but are not limited to:

- Conditions where the equipment was immersed in water or mud.
- Subjected to high-concentrations of particulate such as fly ash or sand.
- Subjected to hot radiography conditions.
- Subjected to salt-water conditions, caustic or acidic materials.
- Subjected to accidental drops or falling objects.
- Whenever subjected to extreme environmental conditions.

The routine maintenance of the PipeLiner accessory performed daily requires cleaning, inspection and operational checks of the system. The complete maintenance (performed once a year) involves a complete disassembly, cleaning, inspection and operational tests of the entire system.

Equipment maintenance can be performed by trained and qualified individuals within the licensee's organization. QSA Global service technicians are available to provide maintenance on the systems at the licensee's premises or at certified service centers.

Routine Daily Maintenance Requirements

At the end of each days use the PipeLiner accessory needs to be cleaned of any obvious debris, mud, dirt, or other foreign material. Use a soft wire brush or a stiff bristle brush to remove dried mud and to reach tight spaces. Mild detergent and water can be used to remove dirt and grime with a damp rag. Spilled chemicals or other chemical compounds should be removed immediately using proper methods approved for the chemical involved.

NOTE: **Safety glasses** should be worn when using brushes to remove dirt and mud.

Yearly Maintenance Requirements

Once a year the entire system should be dismantled and thoroughly cleaned and inspected. (see inspection portion of this manual)

The PipeLiner uses no lubricants nor does it require regular replacement of parts. Simple cleaning and a thorough inspection of all parts including bolts is all that is necessary.

Records

The results of the inspections, repairs and maintenance should be recorded and retained. Reports should contain the name of the person (s) involved, dates, location and should identify the specific equipment that was serviced.

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