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SPM[®] PRODUCT SAFETY GUIDE

WARNING: IMPORTANT SAFETY INFORMATION ENCLOSED. READ THIS OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL BEFORE OPERATING PRODUCT.

WARNING: THIS INFORMATION MUST BE AVAILABLE TO ALL PERSONNEL THAT WILL OPERATE AND MAINTAIN EQUIPMENT. FAILURE TO READ, UNDERSTAND AND FOLLOW THE OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL COULD RESULT IN **SERIOUS BODILY INJURY, DEATH, OR PROPERTY DAMAGE.**

Most SPM[®] products generate, control or direct pressurized fluids; therefore, it is critical that those who work with these products be thoroughly trained in their proper application and safe handling. It is also critical that these products be used and maintained properly!!

SPM[®] flow control products contain elastomeric seals and are not intended to provide proper functionality when exposed to fire.

WARNING: MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS BODILY INJURY, DEATH, OR PROPERTY DAMAGE.

The following information is given in good faith and should aid in the safe use of your SPM[®] products. This information is not meant to replace existing Company's safety policies or practices.

Personal Responsibilities:

1. When working on SPM[®] flow control products, safety glasses, approved safety shoes and hard hat must be worn.
2. Personnel should never hammer on any component when pressure is present. Hammering on any part or component may also cause foreign material or steel slugs to become airborne.
3. It is a personal responsibility to use the proper tools when servicing the valve. It is a personal responsibility to be knowledgeable and trained in the use and handling of tools for all maintenance of the valve.
4. Hot surface may be present; it is a person's own responsibility to protect against burn injury.

On Location:

Each valve is clearly marked with a maximum pressure rating. This pressure must not be exceeded or **SERIOUS BODILY INJURY, DEATH, OR PROPERTY DAMAGE may occur.**

1. The valve discharge connections should be properly cleaned and lightly oiled before the downstream piping is attached. Any worn, damaged or missing seals should be replaced.
2. Welding, brazing or heating any part of the product is prohibited. If accessories must be attached, consult Weir Oil & Gas factory prior to installation.
3. A complete visual inspection of the product must be made prior to each use. Any leaking seals, broken bolts, leaking hoses or improperly tightened parts must be remedied prior to using.
4. Any repairs or service (even routine maintenance) performed on the product must be performed by a trained service technician who is qualified to work on high pressure flow control products. All such service and repairs must be supervised by qualified management personnel or returned to Weir Oil & Gas for service. **Only SPM® replacement parts should be utilized.** Failure to do so may result in loss of warranty as well as **SERIOUS BODILY INJURY, DEATH, OR PROPERTY DAMAGE.**

Special Precautions:

1. Modifications to or unauthorized repair of any part of a SPM® product, or use of components not qualified by Weir Oil & Gas, can lead to damage or failure resulting in **SERIOUS INJURY OR DEATH!**
2. All SPM® threaded components are right hand threaded unless specifically designated otherwise. Any turning counterclockwise will unscrew the assembly. Make sure all threaded components are assembled to the correct torque value.
3. All products should be properly cleaned, greased or oiled after each use and inspected prior to each use.
4. Each union connection is clearly marked with a pressure code (i.e. "1502", 15,000 psi). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All union connections used must match (according to size, pressure rating, etc.). These connections must also match the service of the designated string they are installed in.

WARNING: OBSERVE ALL INSTRUCTIONS, CAUTIONS AND WARNINGS AS NOTED IN THIS MANUAL. FAILURE TO DO SO CAN LEAD TO EQUIPMENT DAMAGE AND SERIOUS BODILY INJURY, DEATH, OR PROPERTY DAMAGE.



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SECTION I: General Information

This service manual covers:

Parts List			Item				
Size (in)	Pressure (PSI)	Assembly PN	Bolt	Bolt Retainer	Clamp (Plain)	Soft/Hard Seal	Clamp (Threaded)
			1	2	3	4&5	6
2"	15,000	2A25919	2P25242	2P25243	2P25918	2A39288	2P25916
3"	15,000	2A25917	2P25247	2P25248	2P25904	2A39290	2P25910
4"	10,000	2A25927	2P25247	2P25248	2P25921	2A39294	2P25922
4"	15,000	2A25402	2P25233	2P25234	2P24728	2A39298	2P25232

Reference Exploded View of Assembly on Page 7

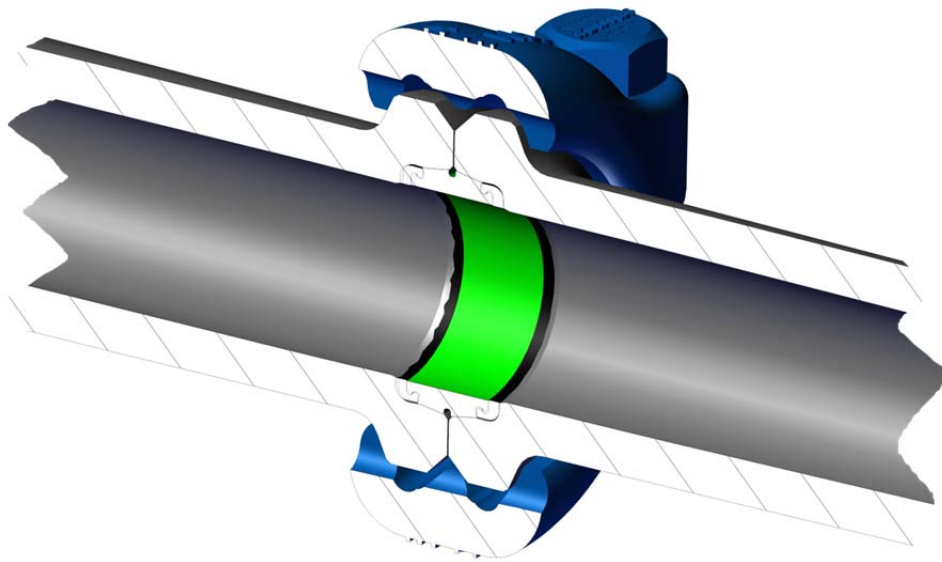
Seal Ring Kits:

Seal Ring Kits					
Size (in)	Pressure (PSI)	Kit Part Number	Type of Seal	Hard Seal	Soft Seal
2"	15,000	2A39288	Buna	2P38948	2P28294
		2A39289	Viton	2P38948	2P25702
3"	15,000	2A39290	Buna	2P38949	2P28292
		2A39291	Viton	2P38949	2P25704
4"	10,000	2A39294	Buna	2P38947	2P27767
		2A39295	Viton	2P38947	2P28020
4"	15,000	2A39293	Buna	2P38949	2P28292
		2A39296	Viton	2P38950	2P25377

Overview:

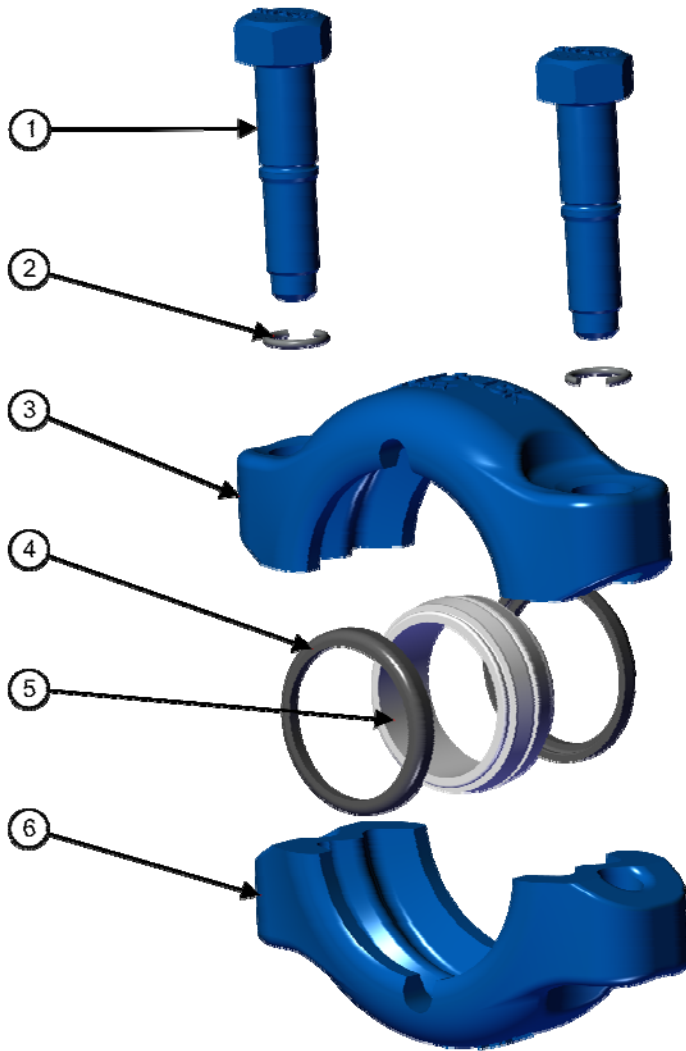
SPM[®] Safety Iron[®] products are designed as an alternative to the traditional hammer union products used within the oil and gas industry. Safety Iron[®] products eliminate the safety hazard of swinging a hammer to make up and break down a connection while providing stronger, more durable connections that are less fatiguing for the user.

Available in a broad range of configurations for use in high-pressure applications, these products are built to exact specifications and meet the most rigorous quality standards from third parties such as DNV. SPM[®] Safety Iron[®] products are available in 2", 3", and 4" sizes with pressure ratings up to 15,000 PSI.



Cross Section View – SPM[®] Safety Iron[®] Assembly

SPM[®] Safety Iron[®] – Exploded View



Parts List	
ID	Description
1	Bolt
2	Bolt Retainer
3	Clamp (Plain)
4	Soft Seal
5	Hard Seal
6	Clamp (Threaded)

Maintenance:

SPM[®] Safety Iron[®] products generally are not maintenance intensive. Care must be taken so that the threads on bolts and clamps and all mating surfaces are lubricated, free of burrs, dents, gouges and dirt. Otherwise, products should be maintained as directed. Typical maintenance would include properly cleaning, greasing, or oiling the product after each use.

Identification:

SPM[®] Safety Iron[®] products are permanently identified on each individual component. All metal components have full material traceability and are identified by their VENDOR ID (SPM), PART NUMBER, SIZE, PRESSURE RATING, HEAT CODE.



Top View – Non Threaded Safety Iron[®] Half (Showing identification markings)

Inspection:

SPM[®] Safety Iron[®] components are generally more robust than their hammer union counterparts. Since no parts are being forced or struck on a regular basis, the parts do not wear very quickly. However, certain features should be inspected prior to use. Qualified personnel should review the overall installation before every use.

- a) Flange faces should be free of significant burrs, gouges, dents, dirt, and cracks. The outer surfaces are precision machined to fit against the clamp inner faces and are an integral part of maintaining a proper seal.
- b) Flange inner sealing surfaces should be clean and free of dirt or debris. Failure to clean these surfaces could cause the connection to leak.
- c) Bolt threads should be clean and free of burrs, gouges, and cracks. Bolts with damaged threads should be replaced immediately.
- d) Clamp threads should be clean and free of burrs, gouges, and cracks. Clamps with damaged threads should be replaced immediately.
- e) Clamp inner mating surfaces should be free of burrs, gouges, dents, dirt, and cracks. Clamps with damaged inner mating surfaces should be replaced immediately.

Inspection Continued

- f) Soft seals should be inspected for tears or cracks. Seals showing significant wear or damage of any sort should be immediately replaced.
- g) Any part with excessive rust or corrosion that prevents proper assembly or sealing should be immediately replaced.
- h) Parts showing signs of internal washing, corrosion, acid pitting, or rust should be replaced.
- i) SPM[®] recommends magnetic particle inspection on SPM[®] Safety Iron[®] clamps during the periodic re-inspection for all applications involving strong vibrations.
- j) Strings, treating lines, and equipment are recommended to be inspected every six months. SPM[®] also recommends routine hydrostatic tests on all SPM[®] Safety Iron[®] connections and equipment
- k) Weld repair is prohibited for SPM[®] Safety Iron[®] products.

Engineering Reference Documents

The following list of SPM[®] Engineering documents serves as guidelines when working with Safety Iron[®] products. It is important that all are adhered to and are completed by a qualified technician.

ENG-051	SPM [®] Safety Iron [®] Clamp Assembly & Union Inspection
ENG-052	SPM [®] Safety Iron [®] Seal Polishing Requirement
2P38163	Inspection and Maintenance
2P36604	Manifold Trailer Operations Guide
BLLT1668	S.I. installed on mobile fixed applications
BLLT1224	S.I. Torque Values
ENG-086	10 Station Manifold Trailer Assembly procedure

Temperature Rating

All Safety Iron[®] products are rated as low-temperature product. Accordingly, they are certified for the below temperature range:

Temperature Ratings		
Seal Type	Minimum	Maximum
Buna	-30C (-22F)	100 C (230 F)
Viton	-30C (-22F)	160 C (350 F)

For other temperature applications, please contact Engineering.

SECTION II: Installation and Operation

Installation Equipment, Accessories & Specifications

Installation of individual Safety Iron[®] components and systems should be done by persons qualified by Weir to do so. WEIR recommends training for all personal involved with installation and assembly of SPM[®] Safety Iron[®].

Prior to installation, all SPM[®] Safety Iron[®] components should be inspected for improper or excessive wear, insufficient lubrication, and general damage. Any damaged part should be immediately withdrawn from use.

In general, Weir suggests that customers adhere to the following principles:

- a) Provided bolts should be clean and lubricated with an approved grease or lubricant. Stripped or worn bolts should be immediately replaced with other SPM[®]-manufactured Safety Iron[®] bolts. These bolts are specifically engineered for this application and are not to be replaced with unapproved bolts. Replacement bolts must also have a SPM[®]-manufactured retainer ring installed (once bolt is inserted into a clamp) prior to use in the field. Failure to install the retainer ring or replacing it (or the bolt) with non- SPM[®] parts can lead to serious injury or death.
- b) Provided clamps should be kept clean and lubricated on contact surfaces with an approved grease or lubricant. Bent or worn clamps should be immediately replaced.
- c) All bolted SPM[®] Safety Iron[®] connections should be initially made up with an approved power wrench.
- d) All SPM[®] Safety Iron[®] connections except 4"15K should be torqued using a SPM[®] Torque Regulating Bar. 4"15K Safety Iron[®] does not require regulating bar for assembly. This device should be verified by an approved calibrated, manual torque wrench once during each job. This manual torque wrench should be periodically calibrated to verify accuracy in the field.

Failure to follow Weir Oil & Gas suggestions for equipment, methodology, and verification may result in improper installation of SPM[®] Safety Iron[®] components, possibly resulting in injury and even death.

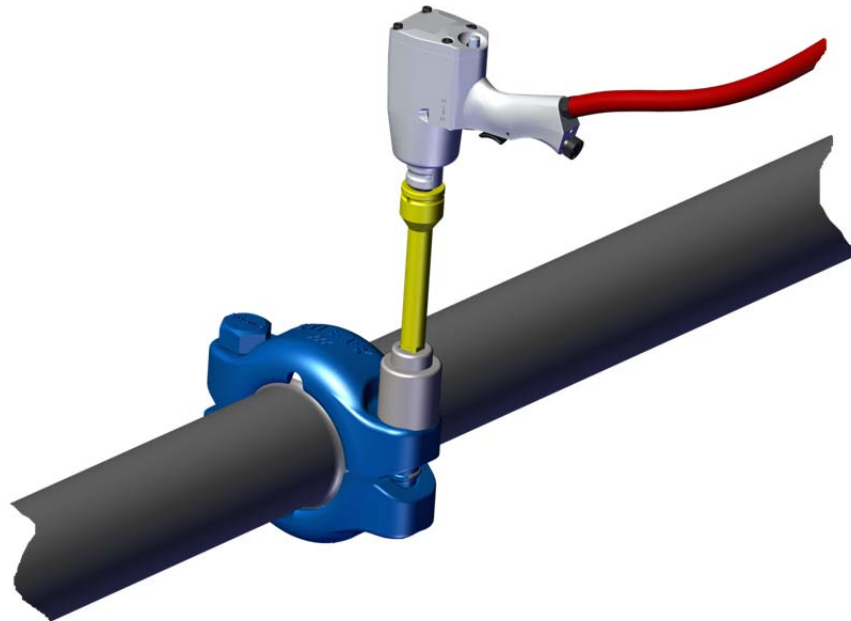
Through product research and testing, Weir Oil & Gas has developed recommendations for the equipment and products that should be used in the assembly and maintenance of SPM[®] Safety Iron[®].

- A) Bolt lubricant - To extend service life and ease of installation, SPM[®] recommends that all bolts be properly lubricated. Using a general purpose anti-seize such as Loctite[®] C5-A is recommended.
- B) Impact wrench – SPM[®] recommends the use of a pneumatic impact wrench for primary assembly of all Safety Iron[®] connections. This wrench must be chosen to suit the torque requirements listed below and should have a minimum drive of 1/2". However, a 3/4" drive impact wrench is recommended for larger sizes. If required, an adaptor can be incorporated to allow the use of larger size impact sockets.
- C) Seal pocket lubricant - SPM[®] recommends the use of Super Lube[®] 41050 Synthetic Grease or approved equivalent on all seals and Safety Iron[®] pockets.

Installation Equipment, Accessories & Specifications continued

Impact Wrench Specifications			
Safety Iron® Size	Pressure Rating (PSI)	Drive Size (in)	Torque Capacity (ft-lbs)
2"	15K	1/2	50 to 400
3"	15K	3/4	300 to 1000
4"	10K	3/4	300 to 1000
4"	15K	3/4	300 to 1000

Impact Wrench Specifications



C) Torque Regulating Bar (TRB) - Safety Iron® bolts must be properly tightened during assembly to preserve the pressure and structural integrity of the joint. SPM® requires that all bolts be torqued such that they fall within 50 ft-lbs of the listed torque for each size of Safety Iron®. This is best achieved by employing the SPM® "Torque Regulating Bar". (4" 15K does not require TRB)



Torque Regulating Bar (TRB)			
SIZE (IN)	PRESSURE (PSI)	TORQUE (FT/LBS)	PART NUMBER
2"	15K	130-230	P26641
3"	15K	300-400	P40935
4"	10K	300-400	P40935
4"	15K	-	CONTACT ENGINEERING

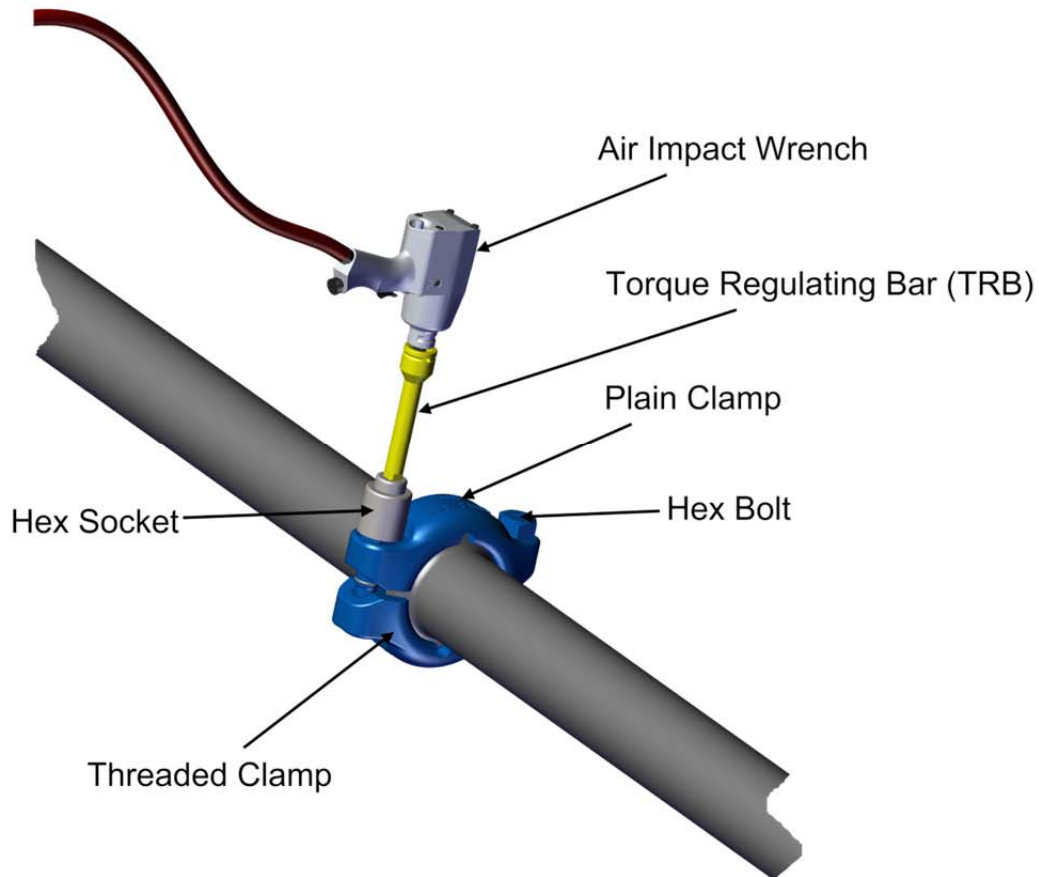
Installation Equipment, Accessories & Specifications continued

This device appears like a simple hex drive extension but is actually an engineered product that limits the torque that an impact wrench can impart to a bolt. This functionality is achieved by a specific combination of physical geometry and material properties of the steel. When the torque applied to the bolt reaches the rated value of the extension, the shaft will flex. Before the next impulse from the impact gun can be applied, the shaft will "spring" back. Any further attempts to tighten the bolt will only result in the shaft flexing in sync with the blows from the impact wrench.

The extension is easily attached to the impact wrench using a 3/4" square male/female drive with a socket retainer. The additional reach offered by the extension also helps to reduce worker fatigue.

The Torque Regulator Bar is capable of limiting torque to within +/- 25 psi of the rated value and is a function of available air pressure. Due to this, SPM[®] requires that the extension be verified and calibrated before each job (see Calibration Procedure).

TORQUE REGULATING BAR FOR ASSEMBLY ONLY. DO NOT USE FOR DIS-ASSEMBLY



Installation Equipment, Accessories & Specifications continued

Please note that over- or under-torquing the bolts outside of the indicated range is detrimental to the performance and safety of the assembly and may lead to leakage or even failure.

DO NOT USE TRB TO REMOVE BOLTS - FAILURE MAY OCCUR.

Safety Iron [®] Bolt Torque		
Safety Iron [®] Size	Pressure Rating (PSI)	Torque Capacity (ft-lbs)
2"	15K	180 +/- 50
3"	15K	350 +/- 50
4"	10K	350 +/- 50
4"	15K	700 +/- 50

Safety Iron[®] Bolt Torque values

D) Minimum Air Requirements - In order for the impact wrenches and the TRB to function as intended, minimum air requirements must be met. SPM[®] recommends 45 SCFM per impact wrench, with an air pressure (measured at the impact wrench) of 90 psi. Failure to supply these minimum requirements will not allow the wrench to achieve the rated bolt torque, and will increase assembly time do to starvation. In order to minimize pressure drop from the compressor, it is recommended that the minimum hose size be observed.

Minimum Air Requirements				
Safety Iron [®] Size	Pressure Rating (PSI)	Air Supply (SCFM)	Air Pressure (PSI)	Minimum Hose Size
2"	15K	45	90	1/2"
3"	15K			1/2"
4"	10K			1/2"
4"	15K			3/4"

Minimum Air Requirements

Installation Equipment, Accessories & Specifications continued

E) Manual Torque Wrench – SPM[®] recommends the use of a manual adjustable torque wrench to verify the calibration of the Torque Regulating Bar. If this extension is not available, the manual torque wrench must be used on each assembled Safety Iron[®] connection in order to verify the proper torque.



Each manual torque wrench has a 1/2" drive (or larger) in order to more easily match sockets used for the impact wrench. The following pneumatic torque wrenches are recommended by SPM[®] for use in the assembly of Safety Iron[®]:

Manual Torque Wrench Specifications			
Safety Iron [®] Size	Pressure Rating (PSI)	Socket Size (in)	Torque Capacity (ft-lbs)
2"	15K	1/2"	50 to 250
3"	15K	1/2" or 3/4"	50 to 400 +
4"	10K	1/2" or 3/4"	50 to 400 +
4"	15K	1"	100 to 700

Manual Torque Wrench Specifications

F) Torque Regulating Bar Calibration Procedure - Due to variations in the operating characteristics of impact wrenches, the torque level achieved by the torque stick should be verified before each job. It is important that a regulator be installed on the compressor to allow for adjustments necessary to complete the calibration procedure.

- Adjust the air pressure delivered to the impact wrench so that the tool is operating at 90 - 100 psi at the tool when the trigger is pulled. Note: the regulator may require a higher setting to maintain this pressure.
- Using the Torque Regulating Bar on the impact wrench, tighten a clamp bolt until the bar stops turning.
- Set a calibrated torque wrench to the maximum bolt torque allowed per the manual.
- Check the clamp bolt with the hand torque wrench. The wrench should rotate before clicking is heard. If clicking occurs without rotation, the torque is excessive and the system air pressure must be reduced.
- Set a calibrated torque wrench to the minimum bolt torque allowed per the manual.
- Check the clamp bolt with the hand torque wrench. The wrench should not rotate before clicking is heard. If rotation occurs before the clicking, the torque is insufficient and the system air pressure must be increased.

Installation Equipment, Accessories & Specifications continued

G) Socket Size – SPM[®] Safety Iron[®] comes with specified bolt-hex head sizes. Sockets to tighten these bolts are required to match perfectly. The following sockets should come (at a minimum) with a 1/2" drive:

Bolt Hex Head Sizes		
Safety Iron[®] Size	Pressure Rating (PSI)	Socket Size (in)
2"	15K	1 - 1/2"
3"	15K	1 - 1/16"
4"	10K	1 - 11/16"
4"	15K	2 - 1/16"

Bolt Hex Head Sizes

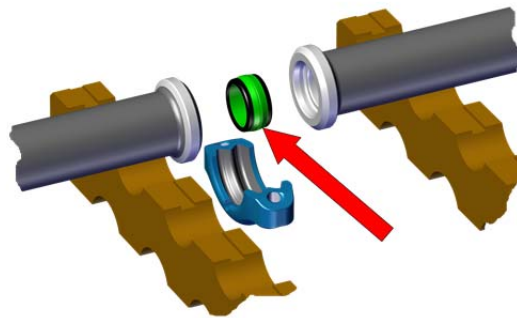
SECTION III: Assembly Of Components

Repeated assembly testing has given Weir Oil & Gas the opportunity to determine the safest, fastest, easiest, and most repeatable way to (dis)assemble SPM[®] Safety Iron[®]. The below instructions detail the suggested steps in properly and successfully making up and breaking down SPM[®] Safety Iron[®].

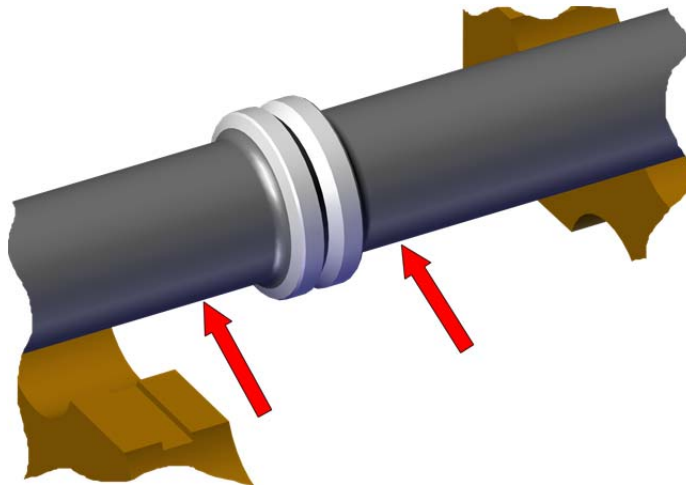
1. Verify the internal and external surfaces of the SPM[®] Safety Iron[®] flanges are clean and lubricated with multi-purpose grease or heavy oil.



2. Verify that the seal ring outside surfaces are clean and lubricated with multipurpose grease. This will ease removal at the time of dis-assembly. Insert the seal ring assembly into the bore of one of the SPM[®] Safety Iron[®] flanges.

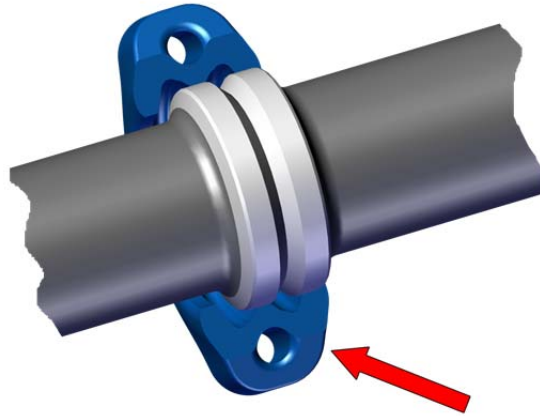


3. Pull the two SPM[®] Safety Iron[®] flange faces together until they are touching each other (or as close as possible).

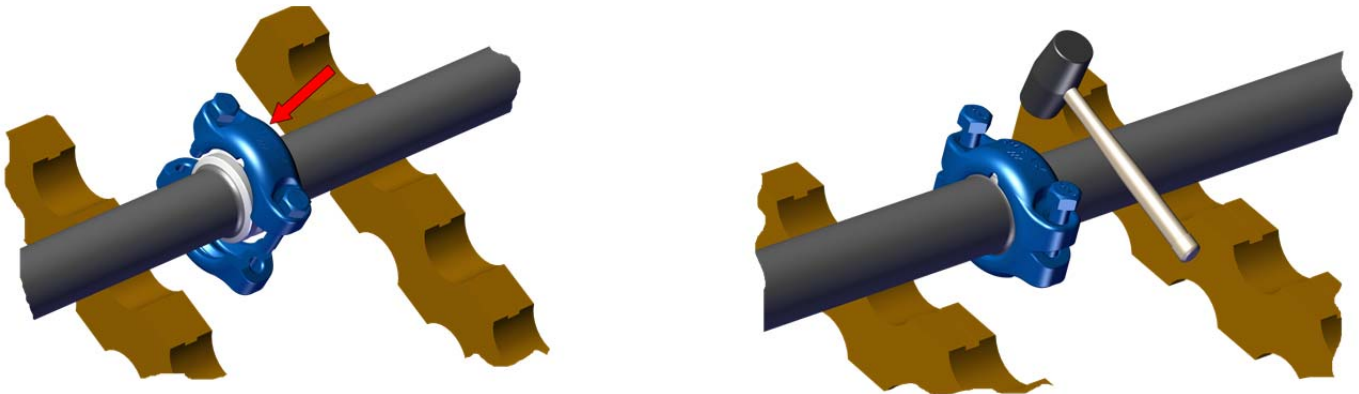


Assembly of Components continued

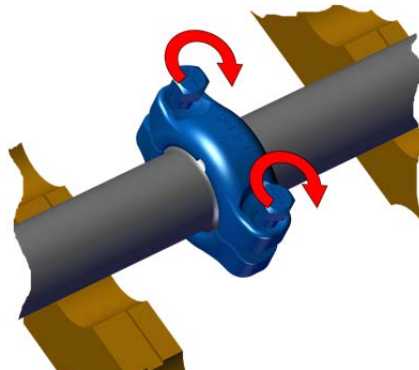
- Slide the threaded clamp half underneath the SPM® Safety Iron® flanges, pulling it snugly against the flange outer faces. In the interest of eliminating a pinch point, it is best if the clamps are oriented at a 45 degree angle (see bottom right photo). This configuration reduces the chance of a hand getting trapped beneath a clamp or the piping assembly should it be dropped.



- Set the plain clamp (with captive bolts) on top of the SPM® Safety Iron® flanges, orienting it so that the bolts easily seat against the threaded holes in the threaded clamp. All fixed manifold applications will require striking the top of the upper clamp with a dead blow hammer prior to tightening the bolts. This action will ensure the clamp is fully seated and will reduce the "settling" of the clamp that may occur during initial transportation of the manifold

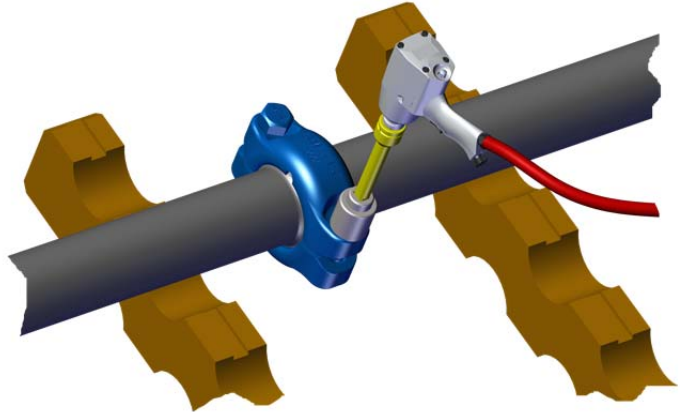


- Adjust the clamps as needed to get both bolts to engage easily. Rotate the bolts (by hand) roughly two full turns to guarantee good thread engagement.

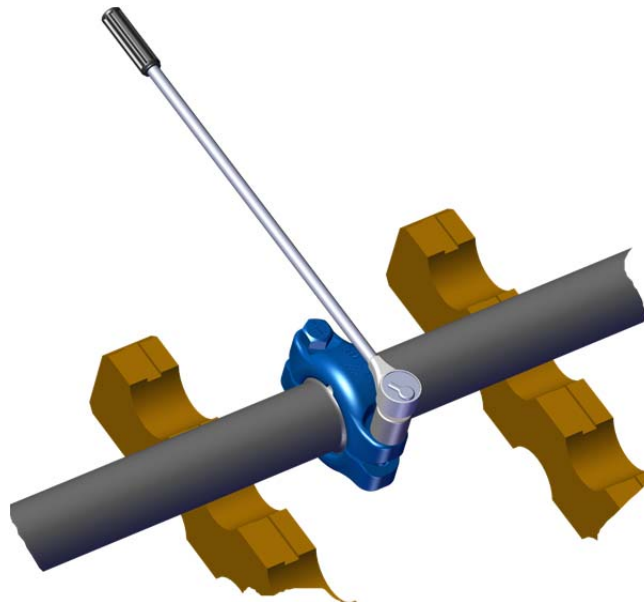


Assembly of Components continued

7. Attach the Torque Regulating Bar to an approved power wrench. Care must be taken that bar has the appropriate rating for the intended application. This is clearly indicated on the large end of the extension.



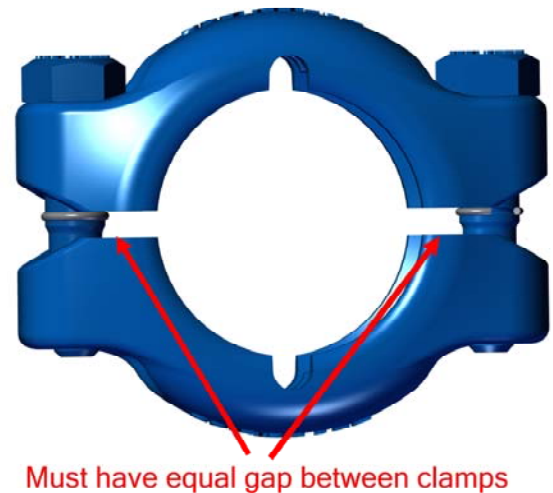
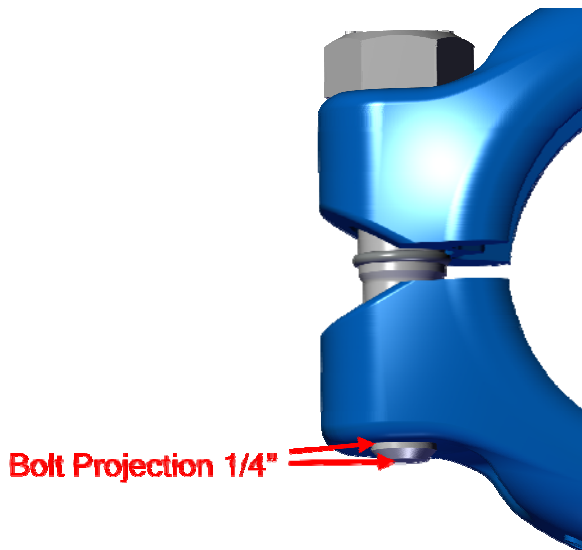
8. Tighten the bolts using an alternating pattern in which the bolts are incrementally rotated to ensure each thread engagement length is similar. Continue this until the bolts no longer rotate.



9. Verify that the torque applied to the bolts is within the allowable range for each size. This is to be accomplished by testing the first connection (see Calibration Procedure) using a standard torque wrench. If the Torque Regulating Bar is not available, all connections must have the torque verified.

Flow Line Inspection

Weir Oil & Gas strongly recommends performing a flow line inspection to verify that each clamp has been assembled prior to pressurizing the line. This will require physically inspecting the underside of each clamp to verify that bolt is within approximately 1/4" of the opening in the bottom threaded clamp. This action will provide additional verification that any clamps that may have been loosened to allow for adjustment during the installation process were properly re-tightened.



One way to ensure that an equal amount of torque is being applied to the assembly, the gap between the clamp halves must be approximately the same on both sides as shown below. This is only to be used as a sanity check after torquing the assembly. If there is a significant difference in the gap between each side, the assembly must be corrected per the discussed assembly steps covered in this manual. There is no gauge for this operation, so it is vital that an experienced technician adhere to this manual and apply the correct assembly procedure.

SECTION III: Disassembly

Disassembly of components is roughly the reverse of the assembly. Do not use Torque Regulating Bar to remove bolts - failure can occur. Care should be taken to loosen the bolts in a gradual manner.

The "two step" method of loosening the bolts is recommended.

1. Loosen one bolt to about its halfway point, then loosen the other the same amount
2. Loosen the first bolt all the way, followed by the other bolt.

Completely disassemble the connection and store the components as desired. It is recommended that clamp halves be bolted together for storage to keep bolt threads from being damaged as shown below.



Care should also be taken to minimize damage to the metal seal rings by storing them such that they do not come into regular contact (vibration) with other metal surfaces.



Troubleshooting Guide

SYMPTOM	PROBLEM	SOLUTION
Metal Seal Ring Stuck in bore	Insufficient lubrication in seal area	Insert a screwdriver into the small circumferential groove on the outside diameter of the seal ring. Lever the seal ring out of the bore. Inspect seal ring and seal area for damage or debris. Replace seal ring if damaged. Lubricate seal area prior to reinserting a seal ring.
	Damage to seal ring	
	Improperly cleaned seal area	
Unable to fully tighten Safety Iron® clamps	Insufficient torque on bolts	Use a calibrated hand torque wrench to verify or adjust torque on the bolts as specified in this manual.
	Improperly aligned clamps	Verify that clamps are properly seated and aligned on the flange faces. Correct if necessary.
	Damaged inner face on clamps	Remove clamps and check inner faces that contact flange. Ensure that no large burrs, gouges, or protrusions are visible. Replace damaged clamp.
	Damaged flange face	Check the flange faces (inner and outer) to ensure that no obvious burrs or protrusions exist. If flange face is damaged, replace part as required.
	Damaged threads on bolts or threaded clamp	Improper tightening of a bolt into a threaded clamp may ruin the thread on the bolt and/or the clamp. Cross threaded bolts and clamps will have to be replaced. Threads with minor damage can be repaired with a tap and die.
	Insufficient lubrication on bolts	Loosen bolts, then lubricate with approved lubricant.
Standard impact socket does not fit on Safety Iron® bolt hex head	Improper clamp alignment	If the clamps are not roughly parallel to each other, the bolt head will be cocked, which may cause the impact socket to interfere with the surface of the clamp. Make sure clamps are aligned properly. All clamps have proper clearances to allow standard impact sockets to fit.
	Damaged hex head	Due to rough treatment, the heads on older bolts may become worn or deformed. Check the hex head on the bolt to ensure that it is clear of obvious protrusions. Replace bolt as needed.
	Incorrect impact socket size	Ensure that you are using the proper impact socket size for the particular size of Safety Iron.
Warped Safety Iron® clamps	Excessive overpressure	Excessive overpressure may warp Safety Iron® clamps. Replace clamps, bolts, seal ring, and seals immediately.
	Repeated misalignment	Continued tightening of misaligned Safety Iron® clamps may warp them. Replace clamps and bolts immediately.
Warped Safety Iron® bolts	Excessive overpressure	Excessive overpressure may warp Safety Iron® bolts. Replace bolts (and all other parts) immediately.
	Excessive over tightening	Excessive torque on Safety Iron® bolts may warp them. Replace bolts and clamps immediately.
Warped Seal Ring	Excessive overpressure	Excessive overpressure may warp a metal seal ring. Replace seal ring (and all other parts) immediately.
	Heavily impacted by large object	Dropping heavy piping or flow iron on these seal rings may damage a metal seal ring. Replace immediately.
Safety Iron® bolts not captive in clamp	Retainer ring has been removed	Install new retainer ring on bolt.
Safety Iron® connection leaking	Improperly torqued bolts	Use a calibrated hand torque wrench to verify or adjust torque on the bolts as specified in this manual.
	Clamp misalignment	Verify that clamps are properly seated and aligned on the flange faces. Correct if necessary.
	Damaged soft seal	Inspect soft seals to verify that they are free from cuts, extrusions, or any other damage. Replace as needed.
	Damaged metal seal ring	Inspect metal seal ring to verify that there are no obvious protrusions or burrs. Ensure all exterior surfaces are free of heavy debris.
	Improper lubrication	Inspect bolts and seal area to ensure that they are properly lubricated. Lubricate if needed.
	Debris in seal area	Inspect seal area to ensure that it is free from heavy residue or debris. Clean as needed.

SECTION IV: Service and Support

Service Center Order Information:

Weir Oil and Gas stocks a large inventory of genuine original equipment replacement parts. In order to expedite a parts order and avoid any delays, please provide the following information with your order:

- The part number and description (refer to drawings and parts lists in this section) of each item ordered.
- The quantity of each part, kit, or assembly ordered.
- The model number and serial number.
- Your purchase order number.
- Specify method of shipment, complete shipping address, complete billing address and telephone number at the destination of the shipment.

Please refer to our web site for global locations:

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