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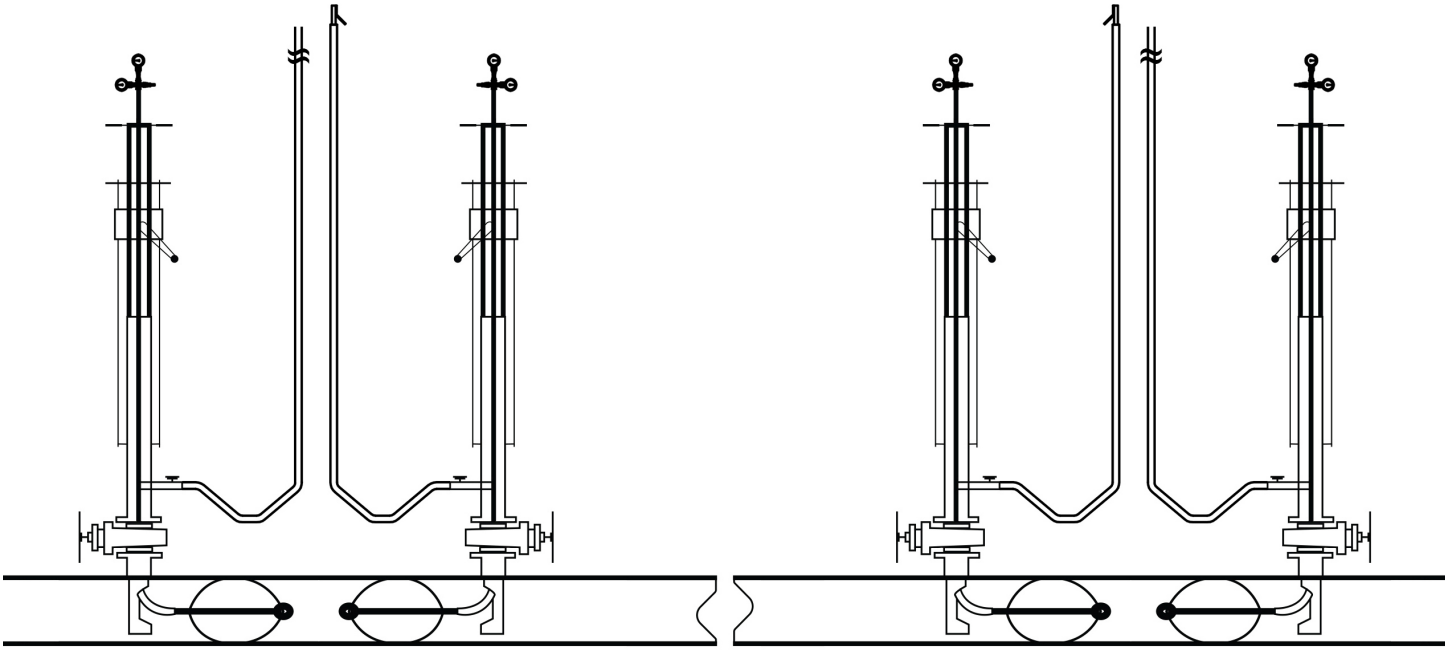
Mainline Control Systems

Kleiss MCS15-1824 System Manual

Flow Stopping System / 18" - 24" up to 15 psi



Kleiss MCS15-1824 System Overview

The Kleiss inflatable stopping systems meet the needs of the North American Natural Gas LDCs by providing a flow control system that is easy to use and effective at stopping off flow in various pipe materials and a wide range of pipe diameters.

The Kleiss MCS15-1824 System consists of four major components:
1) fitting to access the pipe, 2) tapping / completion tool, 3) inflatable stopper, and 4) stopping tool.

The Kleiss MCS15-1824 System (all tools) has a maximum operating pressure of 15 psi. The inflatable stoppers have a design safety factor of 3. The balance of the tools have a design safety factor of 2.

The Kleiss MCS15-1824 System is designed to handle flow control on pipe sizes 18" to 24" on pipe material – cast iron and steel. To accommodate the various pipe materials and sizes the tapping tool and stopping tool are outfitted with the appropriate fitting, cutter, chute, and stopper.

The basic operation of the equipment is the same for all pipe materials. When working on non-metallic pipe materials, make sure the equipment is grounded per your company operating practices.

(Kleiss & Co., who developed the system, has reviewed and approved this manual.)

Table of Contents:

1.0 General Safety Information:

NOTE: Before using the Kleiss MCS15-1824 System make certain you read the instruction manual completely and are comfortable and familiar with the operation of the tools. If you have any questions, concerns or feel there is conflicting information, please contact Mainline Control Systems (MCS) before proceeding at 844-FLO-STOP.

NOTE: The purpose of the Kleiss MCS15-1824 System is to tap and stop flow in natural gas lines sizes 18" through 24" operating at a maximum of 15 psi. Review and follow your company safety procedures for operations involving tapping and stopping live natural gas lines.

NOTE: When operating the Kleiss MCS15-1824 System on non-metallic pipe materials, please follow company procedures for grounding equipment for discharge of any static electricity.

2.0 System Specifications:

2.1 General

A) Pipe diameter between 18" and 24"
B) Pipe material of cast iron and steel
C) Maximum operating pressure of 15 psi
NOTE: Tools are designed and built with a safety factor to allow +10% (1.5 psi) for operation on 15 psi MAOP systems or in abnormal operating conditions.
D) Tool to fitting connection of 6" ANSI 150 flange

2.2 Tapping Tool and Completion Tool Kit Specifications

A) Maximum operating pressure of 15 psi (see NOTE in 2.1C)
B) Cutters available
    a) 5.51" (140 mm) cast iron and steel [Part #13200760]
C) Pilot drills available
    a) Cast iron and steel [Part #14300025]
D) Air motor & compressor requirements
    a) Connection to the air motor ~ 3/4" NPT
    b) 90 psi measured at the inlet of the air motor during operation
    c) Air volume through the motor should operate the air motor at 20 RPM's load speed (cut) & 40 RPM's free speed (non-cut)
    d) Refer to manufacturer air motor specifications guide
E) Oiler / separator required to be used to extend the life of the air motor
    a) Use standard pneumatic oil in tool
F) Weights
    a) Tapping tool with cutter, stabilizing bridge, and bridge stands = 110 lbs.
    b) Completion tool without plug attached = 64 lbs.
    c) Air motor = 31 lbs.
    d) Shipping weight in case = 258 lbs.
G) Dimensions
    a) Tapping tool height with cutter, stabilizing bridge, and bridge stands = 39-1/2"
    b) Completion tool height = 36-1/2"
    c) Storage case = 67" length x 17-1/2" width x 17-1/2" height

2.3 Stopping Tool Kit Specifications

A) Maximum operating pressure of 15 psi (see NOTE in 2.1C)
B) Stopping Case Weights
    a) Stopping tool = 124 lbs.
    b) Stopping case shipping weight = 251 lbs.
C) Stopping Case Dimensions
    a) Stopping tool height with stopper rod completely extended and gear box cranked to highest position = 11’ 11”
    b) Stopping tool height with stopper set = 5’ 2-1/2”
    c) Storage case = 98” length x 21” width x 20” height
D) Valve Case Weights
    a) Valve = 91 lbs.
    b) Valve case shipping weight = 140 lbs.
E) Valve Case Dimensions
    a) Valve height = 8”
    b) Storage case = 29” length x 15” width x 18-1/2” height
F) By-pass / vent port
    a) 3/4” tap size 1” camlock connection

2.4 MDS Inflatable Stopper Specifications

A) Sizes
    a) 17.72” – 23.62” (450 mm – 600 mm) Pipe ID, 15 psi [Part #23100140]
B) Inflation pressure of 30 psi or 2x system pressure if unable to achieve 30 psi by compressor or nitrogen
C) Design burst pressure of 90 psi
D) Operating temperature range of 5° F (- 15° C) to 140° F (60° C)
E) Maximum temperature range of 158° F (70° C) for up to 30 minutes

2.5 Vent Stack Specifications

A) Height assembled = 112”
B) 1” camlock male coupling
C) Air hose to venturi connection
D) Hose (standard) of 10 m, 1” camlock connection F x F
E) Ground rod included
F) Weight (less hose) = 27 lbs.
G) Air supply and flow capacity rates =

Air Supply		**Flow Capacity**
Working Pressure (PSI)	Air Consumption (ft^3/min)	Blow Out Volume (ft^3/hr)
80	13	24300
120	13	21200

2.6 Hand Pump (Pressure and Vacuum Pump)

A) 1 positive pressure connection
B) 1 negative pressure (vacuum) connection
C) 10 foot air hose with quick disconnects included
D) Weight = 12 lbs.

2.7 Maximum Flow Rates

A) Maximum design flow rate = 30 ft/sec (9.144 m/sec)
B) For reducing speed, use by-pass / vent port
NOTE: The system is designed to be used in controlled stop off applications, and is not intended to be used to stop flows in severely ruptured pipes. Flow should be reduced before attempting stop off.

3.0 Typical Site Set Up and Sequence:

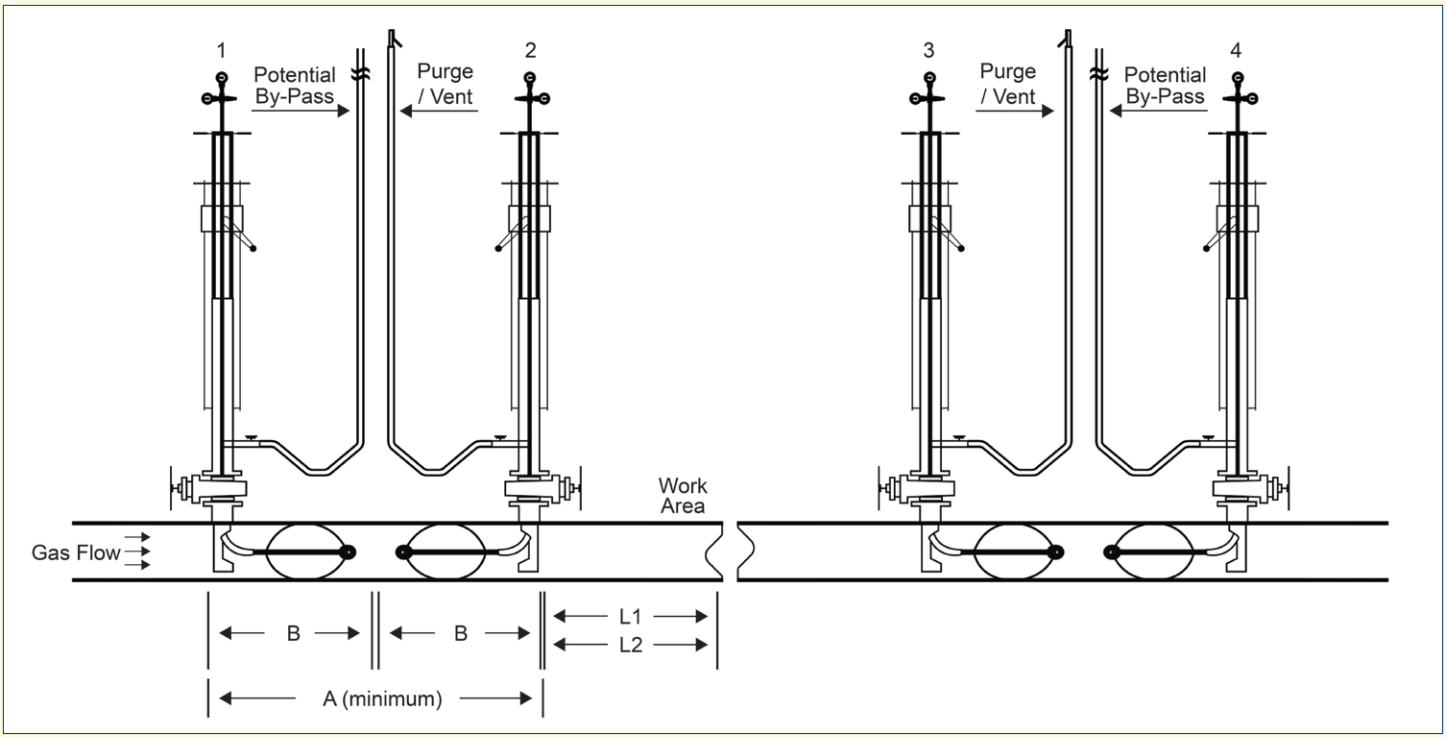
It is important to understand the MCS stopping tools and their operation completely. It is also important to understand the complete job and sequence of steps to perform a safe stop. Safety of the operators on the job site is the most important factor so pre-plan the whole job including the stopping and retrieval sequences.

The following examples are typical installations. Example I (yellow background) illustrates stoppers positioned towards each other. Example II (blue background) illustrates stoppers positioned away from the work area. Both configurations work equally well. For additional set up illustrations, see Appendix B or contact your distributor / MCS representative.

Remember to consider the ancillary steps like purging / venting the area to be worked on and back pressuring stoppers for removal. The features of the MCS15-1824 offer options to make these processes efficient.

Plan accordingly to avoid launching or inflating stoppers under existing fittings, joints, or other obstructions.

Example I – Stopping Sequence: Stoppers Positioned Towards Each Other (Most Flexible)



STOPPING TOWER DISTANCES

Nominal Pipe Size	A (minimum)	B	L1* = Steel Welding	L2** = PE, CI, and Mechanical
20”	120”	60”	40”	48”
24”	120”	60”	40”	48”

A = minimum distance between towers

B = stopper length

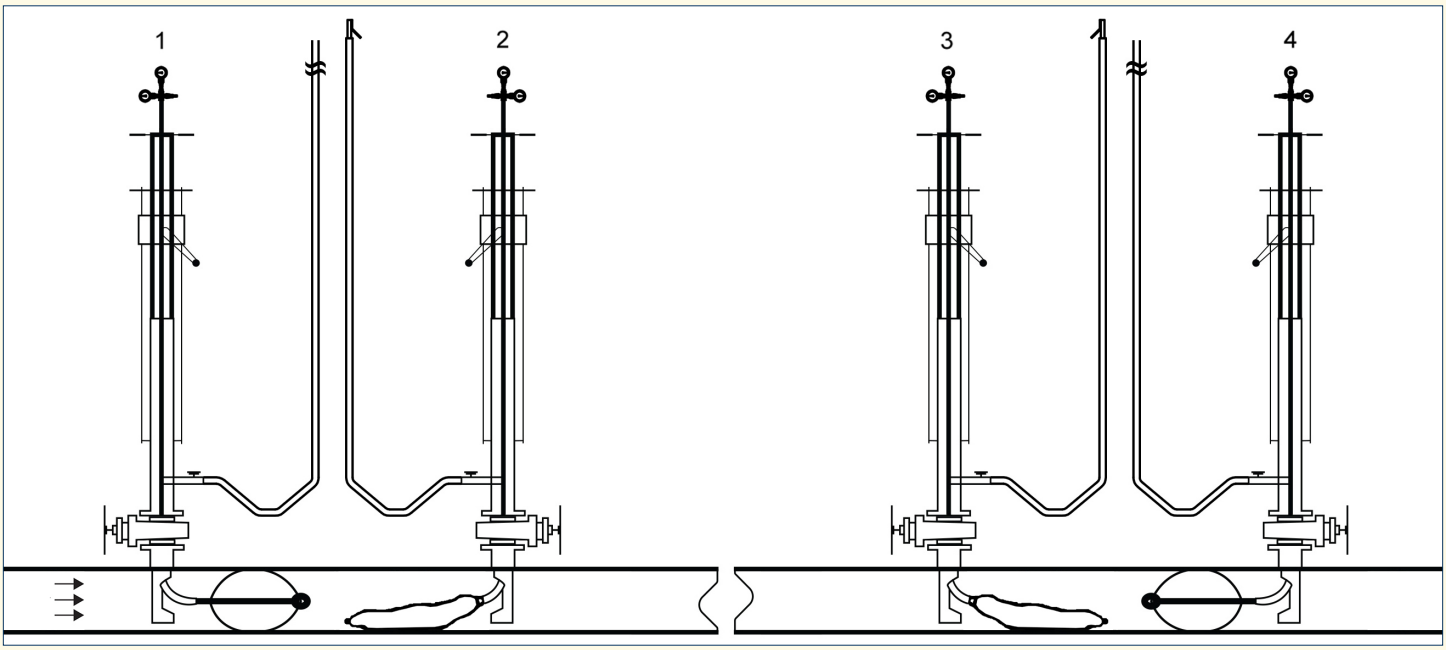
L1 = distance from stopper/tower to work area - use standard industry & company practices to minimize heat transfer & sparks reaching the inflatable stopper*

*L2** = distance from stopper/tower to work area - measurement is a guide only, follow manufacturer’s fitting recommendations*

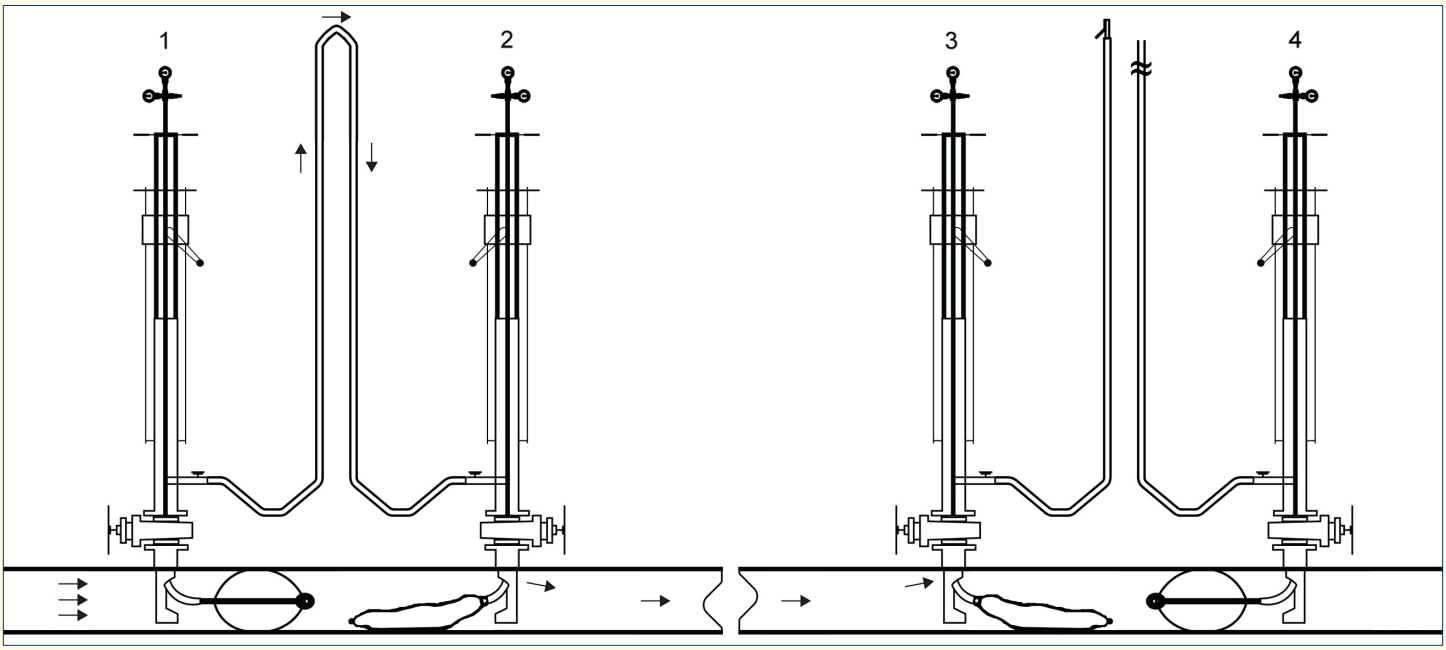
1) If a by-pass in the work area is being used (through our MCS tool or another), initiate the by-pass flow first.
2) Always insert first inflatable stopper WITH the flow of gas.
3) Always inflate the stopper as quickly as practical.
4) Suggested stopper setting sequence is tower #1, #2, #3, #4. Set all 4 stoppers.
5) First inflated stopper is now in a no flow condition. Reset stopper for best possible seal (deflate, reposition stopper rod, inflate).
6) Always allow stoppers to settle for 10 minutes prior to beginning pipeline work. This allows the stopper to acclimate to internal pipe conditions. Verify system pressures, inflation pressures, and any bleed-by before starting pipeline work. Adjust as necessary.
7) Use the by-pass / vent port on tower #2 or #3 to purge the work area. Utilize the MCS vent stack to assist in evacuating the work area. This connection can also be used to inject nitrogen into the work zone.
8) Keep by-pass / vent ports on towers #2 and #3 open to atmosphere during work to keep gas away from the work area. Follow company procedures for venting and purging gas.
9) This set up can easily be used on both single feed and dual feed systems.

Example I – Stopper Retraction Sequence: Stoppers Positioned Towards Each Other

NOTE: Always equalize pressure on both sides of the stopper before deflation or removal.

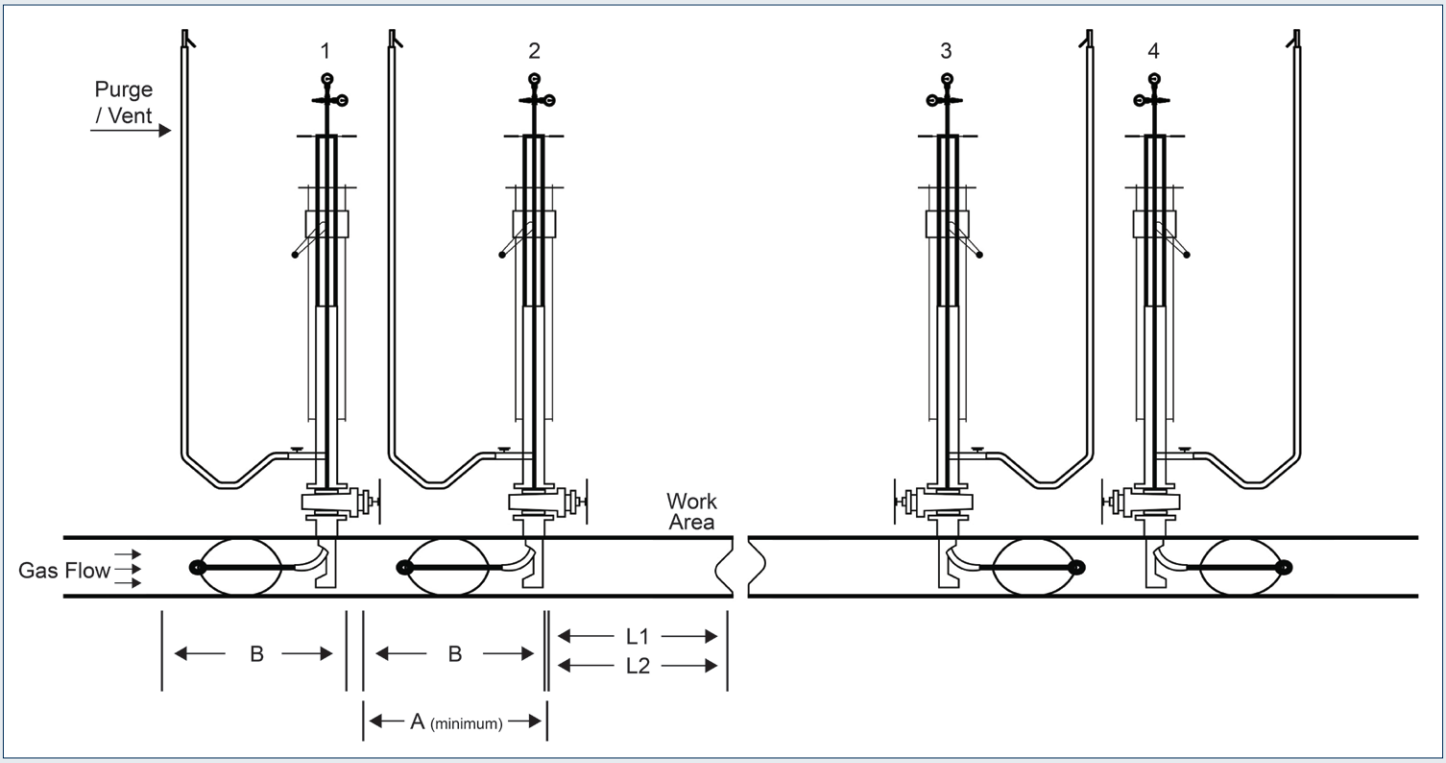


1) Deflate stoppers #2 and #3.



2) Use by-pass / vent ports on tower #1 and #2 to equalize pressures on stoppers #1 and #4. Equalize slowly.
3) Use by-pass / vent port on tower #3 to purge air from the repaired area.
4) Use system pressure gauge on tower #1, #2, #3, or #4 to determine if stoppers are equalized.
5) When pressure is equalized, deflate stoppers #1 and #4. Retract all stoppers.
6) Remove tools and install completion plugs.

Example II – Stopping Sequence: Stoppers Positioned Away From Work Area



STOPPING TOWER DISTANCES

Nominal Pipe Size	A (minimum)	B	L1* = Steel Welding	L2** = PE, CI, and Mechanical
20”	60”	60”	40”	48”
24”	60”	60”	40”	48”

A = minimum distance between towers

B = stopper length

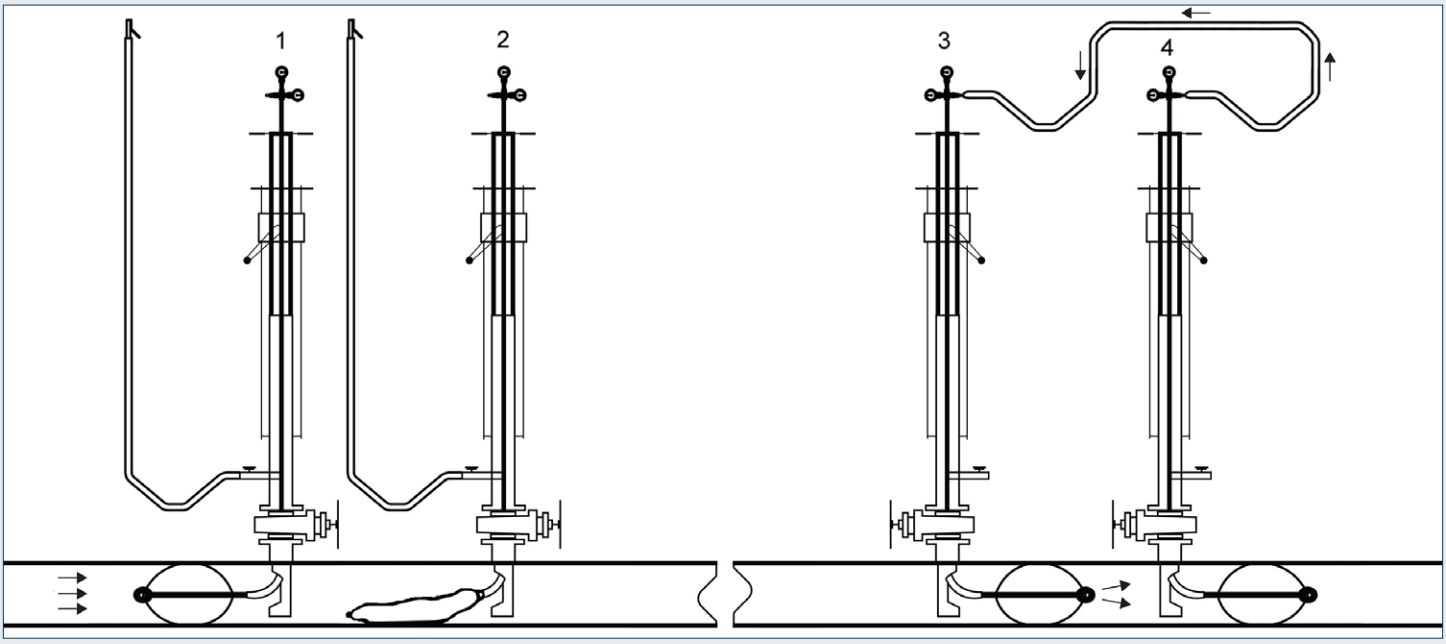
L1 = distance from stopper/tower to work area - use standard industry & company practices to minimize heat transfer & sparks reaching the inflatable stopper*

*L2** = distance from stopper/tower to work area - measurement is a guide only, follow manufacturer’s fitting recommendations*

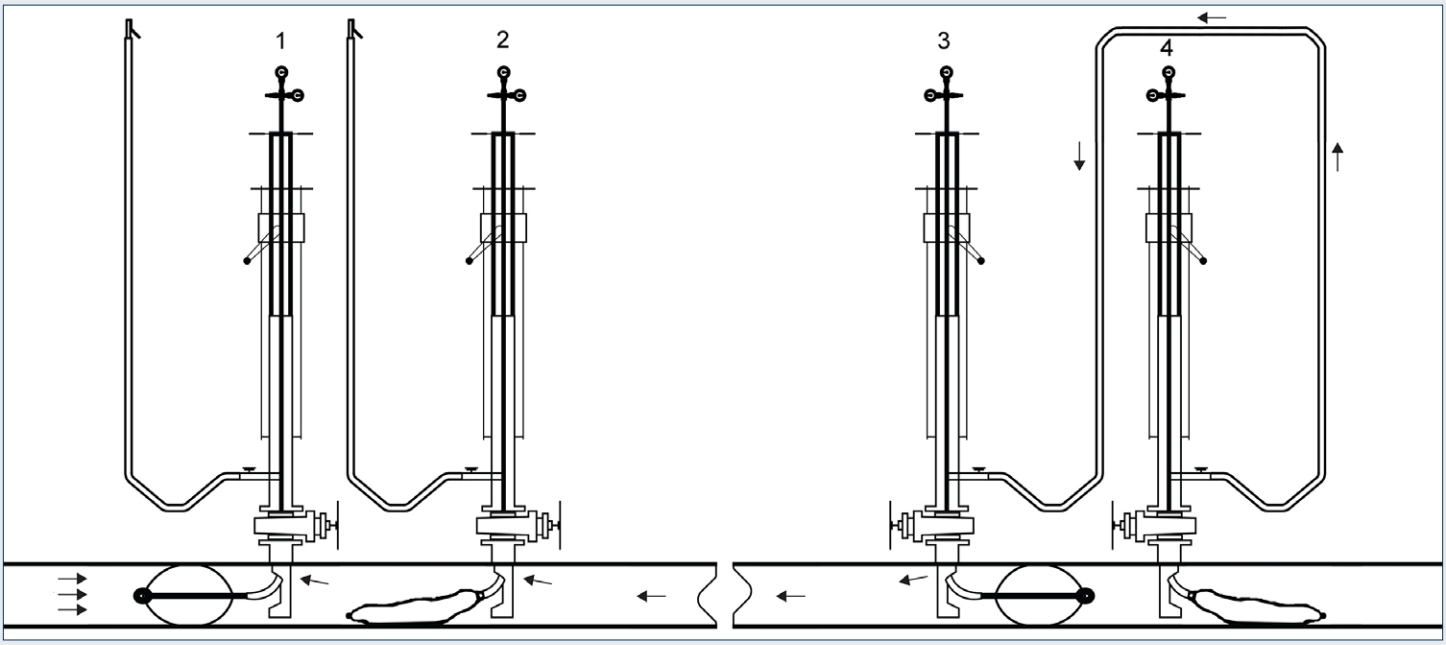
1) If a by-pass in the work area is being used (through our MCS tool or another), initiate the by-pass flow first.
2) Always insert first inflatable stopper WITH the flow of gas.
3) Always inflate the stopper as quickly as practical.
4) Suggested stopper setting sequence is tower #3, #4, #2, #1. Set all 4 stoppers.
5) First inflated stopper is now in a no flow condition. Reset stopper for best possible seal (deflate, reposition stopper rod, inflate).
6) Always allow stoppers to settle for 10 minutes prior to beginning pipeline work. This allows the stopper to acclimate to internal pipe conditions. Verify system pressures, inflation pressures, and any bleed-by before starting pipeline work. Adjust as necessary.
7) Use the by-pass / vent port on tower #2 or #3 to purge the work area. Utilize the MCS vent stack to assist in evacuating the work area. These connections can also be used to inject nitrogen into the work zone.
8) Keep all by-pass / vent ports on towers open to atmosphere during work to keep gas away from the work area. Follow company procedures for venting and purging gas.

Example II – Stopper Retraction Sequence: Stoppers Positioned Away From Work Area

NOTE: Always equalize pressure on both sides of the stopper before deflation or removal.



1) Deflate stopper #2.
2) Back pressure stopper #4 through the system pressure ports in towers #3 and #4.

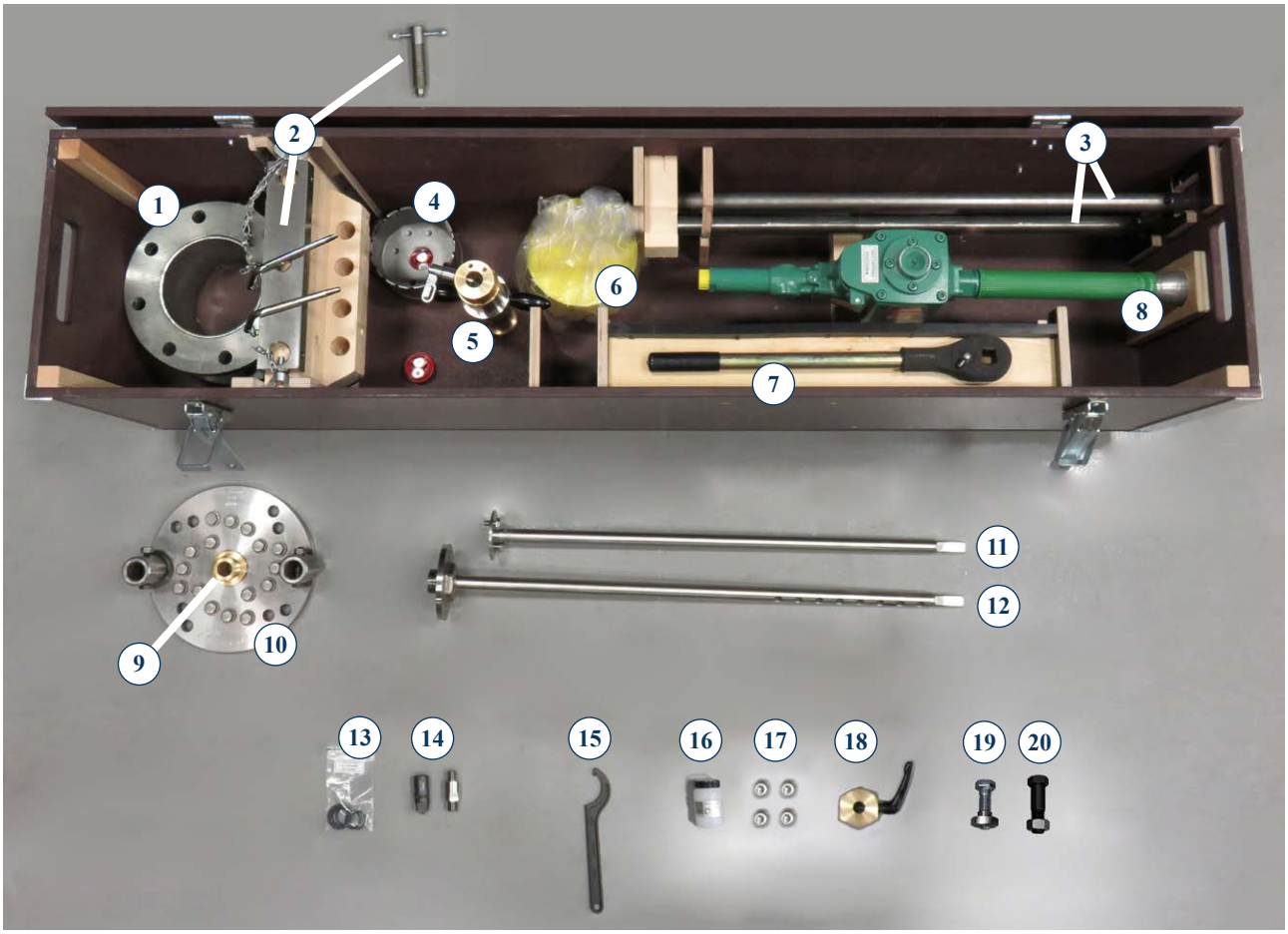


3) Deflate stopper #4.
4) Equalize pressure on stoppers #1 and #3 through the by-pass / vent port between towers #3 and #4.
5) Use the by-pass / vent port in tower #1 or #2 to purge air from repaired area.
6) Use system pressure gauge on tower #1 or #2 to determine stoppers are equalized.
7) Deflate and remove stoppers.
8) Remove tools and install completion plugs.

NOTE: For additional set up illustrations, see Appendix B.

4.0 Equipment:

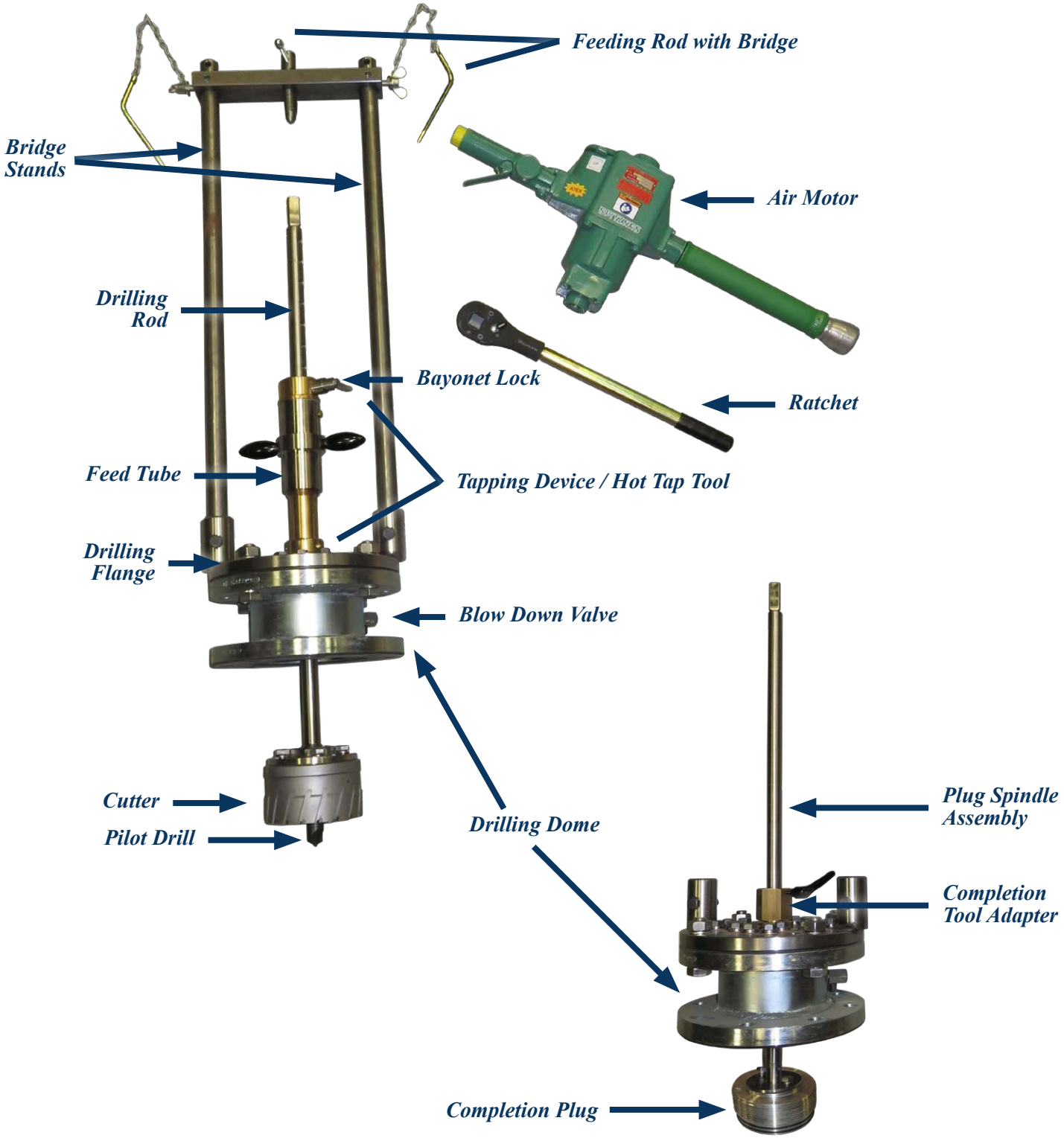
Tapping Case [Part # MCSTK015-1824-001]:



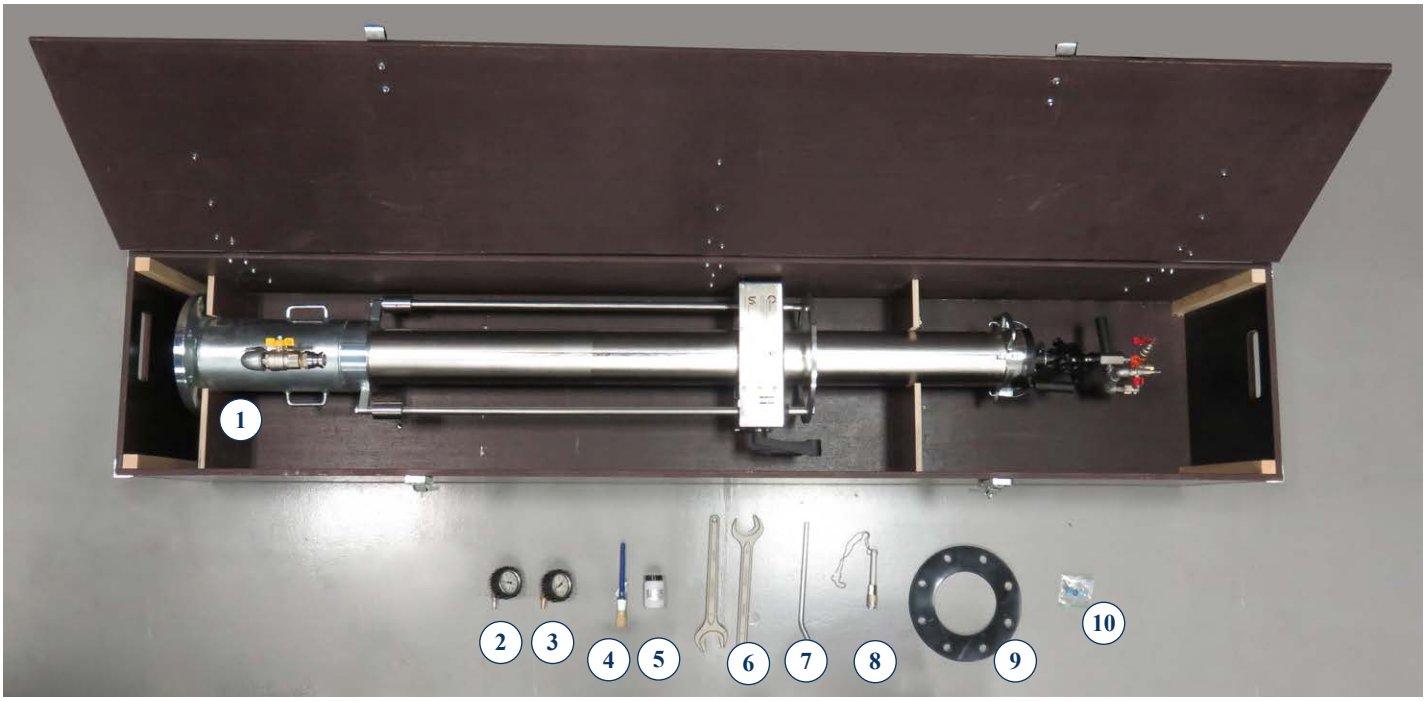
	PART #	DESCRIPTION
1)	96003190	Drilling Dome (2” female x 6” flange 150#)
2)	10800216	Feeding Rod with Bridge
3)	90004080	Bridge Stands (2 rods)
4)	13200760	Steel and Cast Iron Cutter (1004HM 140 mm x 1-1/4”)
5)	10310800	Tapping Device / Hot Tap Tool (LB-493HD)
6)	14700013	Cutter Grease (1/2 kg)
7)	11000120	Ratchet (square, 20 mm)
8)	10800250	Air Motor (larget type, square, 20 mm)
9)	11000032	Dome Adapter (G 1-1/4” x G 1-1/2” 267 050)
10)	10800215	Drilling Flange

	PART #	DESCRIPTION
11)	99012001	Service Rod Assembly for Plugging
12)	10310917	Drilling Rod (830 mm 25 mm x 1-1/4”, square, 20 mm)
13)	10310830	Spare Seal Set
14)	14300025	Steel and Cast Iron Pilot Drill (with retainer spring 328.111)
15)	11005310	Hook Assembly Wrench (58-62)
16)	94200020	Silicon Grease Canister
17)	10310925	Cutter Assembly Bolts [set of 4]
18)	10310918	Completion Tool Adapter (1-1/4” x 25 mm)
19)	96003196	#1 Bolts [set of 8 with nuts]
20)	96003195	#2 Bolts [set of 8 with nuts]
	10321055	Case with Interior

Tapping Tool and Completion Tool Components:

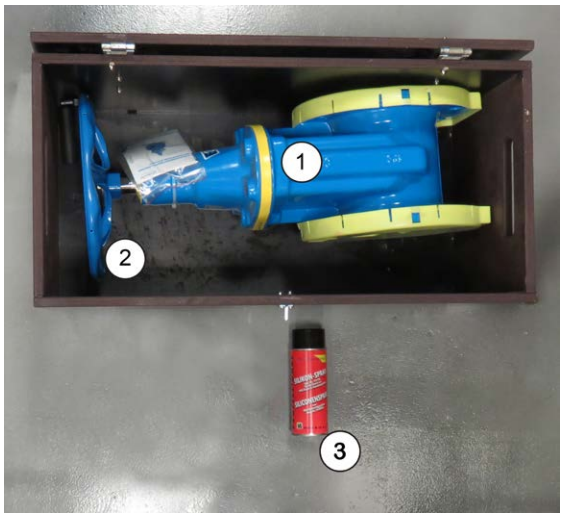


Stopping Case [Part # MCS015-1824-001]:



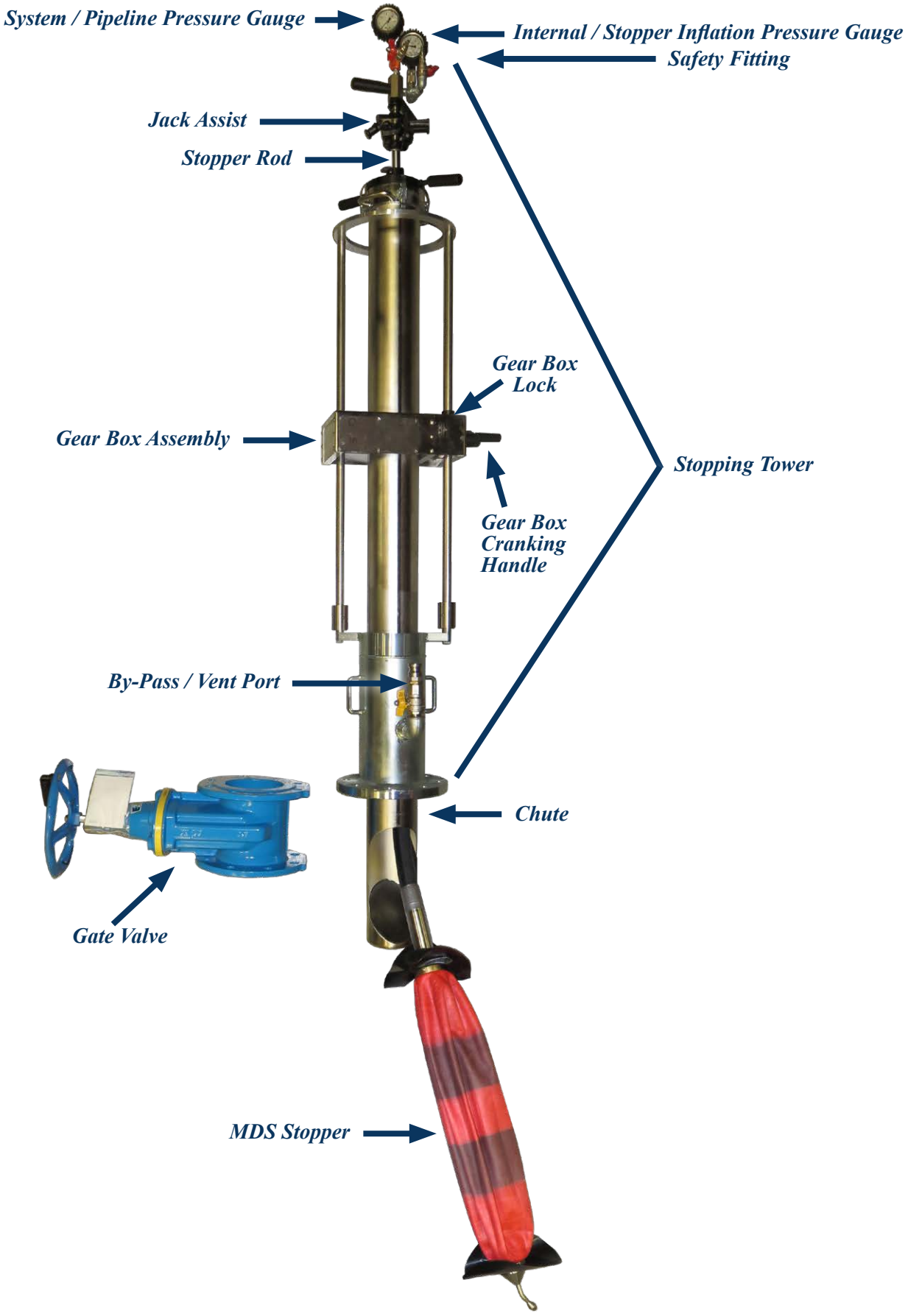
	PART #	DESCRIPTION
1)	12100010	Flow Stopping Tower MCS15-1824
2)	12100022	Inflation Pressure Gauge (-15 to 160 psi)
3)	12053001	Pipeline Pressure Gauge (0 to 30 psi)
4)	99600450	Brush

	PART #	DESCRIPTION
5)	94200020	Silicone Grease
6)	11000201	Wrench (41 mm) [set of 2]
7)	10200190	Jacking Handle
8)	12100740	Safety Fitting (silver)
9)	12110076	Gasket (6” ANSI) [set of 3]
10)	12110077	Gasket Set (MCS15-1824)
	12200030	Case with Interior



	PART #	DESCRIPTION
1)	12100140	Gate Valve
2)	12100141	Gate Valve Wheel
3)	94200010	Silicone Grease Aerosol
	99100629	Gate Valve Case

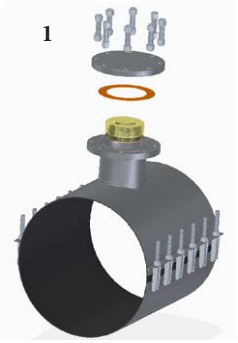
Stopping Tool Components:

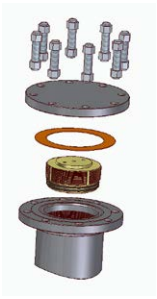


MDS Stopper:

	PART #	DESCRIPTION
1)	23100140	MDS Stopper size 17.72” – 23.62”, 15 psi (450 mm – 600 mm)

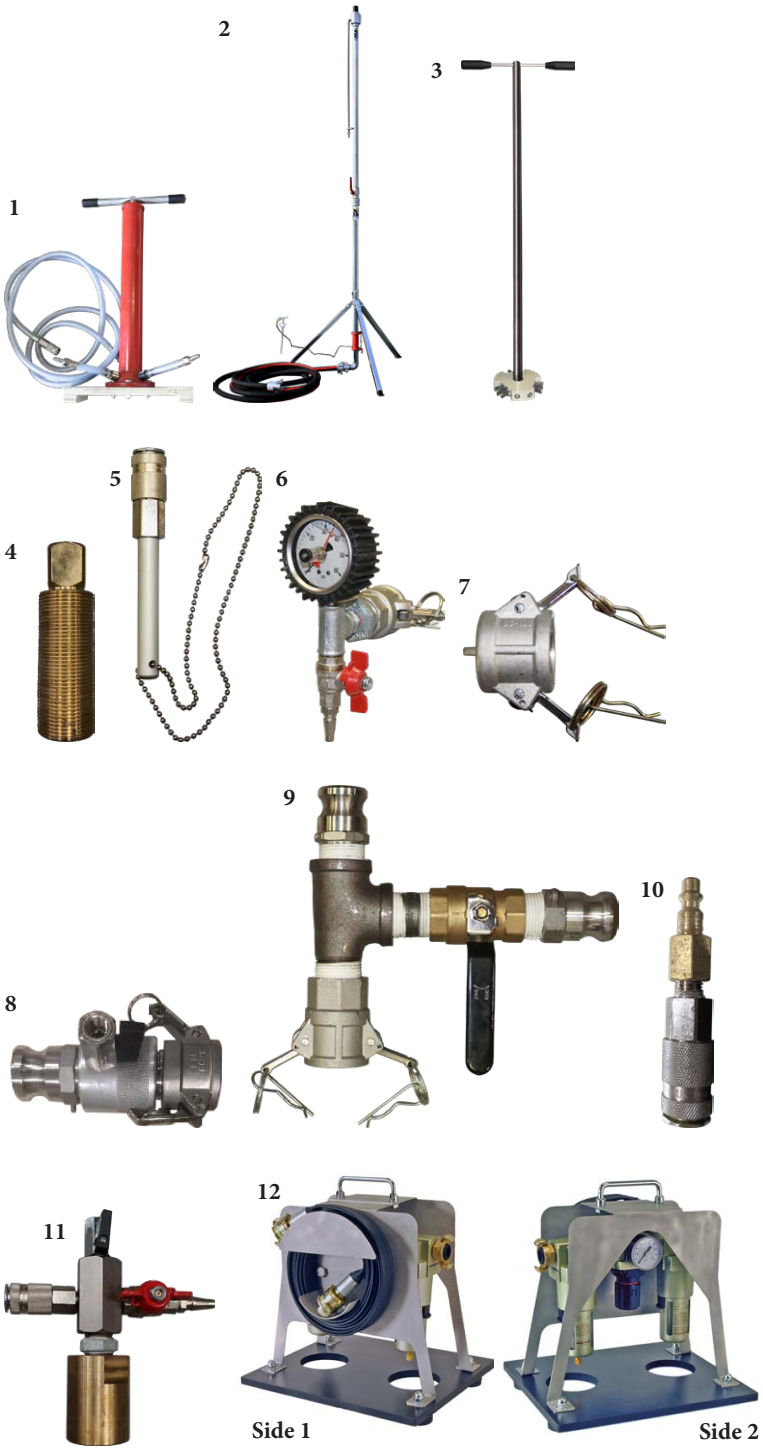
Fitting / Completion Plug / Blind Flange / Stud Bolts:





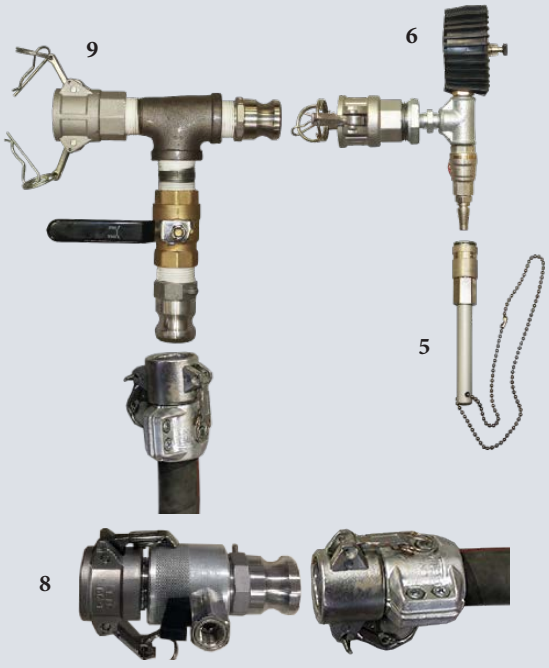
	PART #	DESCRIPTION
1)	90001031 to 90001039	Stainless Steel Saddle Fitting (size specific)
2)	12110050	Steel Fitting (18” to 24”)

Accessories:



	PART #	DESCRIPTION
1)	22500011	Hand Pump with Hose
2)	59003176	1” Vent Stack with Hose
3)	10801853	Magnetic Spindle with Handle
4)	13200097	Coupon Remover (1-1/4” connection)
5)	12100740	Safety Fitting (silver)
6)	BPGT-1	By-Pass Gauge Tree
7)	BPC-1	By-Pass Cap
8)	BPVA-1	By-Pass Vent Adapter
9)	BPT-1	By-Pass Tee Assembly
10)	AHA-1	Air Hose Adapter
11)	12242200	MDS Stopper Test Adapter
12)	49101380	Air Motor Oiler / Water Separator Unit (complete)

ACCESSORY COMBINATIONS:



Sizing Table [Equipment Part #'s]:

CAST IRON PIPE					
Pipe OD Range	**19.48" - 20.28"**	**21.65" - 22.44"**	**25.99" - 26.77"**	**21.26" - 22.04"**	**25.393" - 25.984"**
Fitting	90001031	90001032	90001033	90001034	90001039
Cutter	13200760	13200760	13200760	13200760	13200760
Pilot Drill	14300025	14300025	14300025	14300025	14300025
MDS Stopper *(Pipe ID Range)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*

NOTE: Verify actual pipe OD and wall thickness to make certain fitting and stopper dimensions will work.

STEEL PIPE				
Nominal Pipe Size	**18"**	**20"**	**22"**	**24"**
Fitting	12110050	12110050	12110050	12110050
Cutter	13200760	13200760	13200760	13200760
Pilot Drill	14300025	14300025	14300025	14300025
MDS Stopper *(Pipe ID Range)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*	23100140 *(17.72" - 23.62" / 450 mm – 600 mm)*

5.0 Preparatory Steps:

☐	Measure accordingly to avoid launching or inflating stopper under existing fittings, joints, or other obstructions.
☐	Select proper MDS Stopper.
☐	Select proper fitting.
☐	Attach selected fitting, based on pipe material, per company standards and specifications.
	☐ Before welding steel fitting on main, remove the blind flange, gasket, and plug from fitting.
☐	Pressure test attached fitting per company standards and specifications.

5.1 Alignment Operation:

☐	Attach gate valve, with gasket in place, to fitting outlet using #2 shoulder bolts, but do not tighten. Check gasket.	
☐	Use wheel to check if gate valve opens and closes. (31 turns for full open / 31 turns for full close)	 #2 bolt
☐	Attach drilling flange to drilling dome using #1 bolt and nut combination (see picture on page 10).	 #1 bolt
☐	Attach completion plug to plug spindle assembly so plug hangs on spindle.	
☐	Pull plug up to drilling dome.	
☐	Attach drilling dome, with gasket in place, to slide gate valve using #1 shoulder bolts, but do not tighten. Check gasket.	
☐	Open gate valve.	
☐	Push down plug spindle assembly until it reaches top of fitting.	
☐	Turn plug spindle assembly clockwise. (Approximately 5 revolutions. Do not engage o-ring.)	

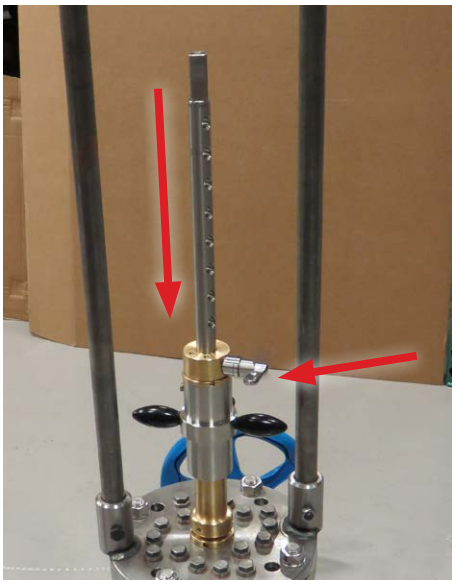
☐	Extract and insert completion plug multiple times to make sure the valve and drilling dome are aligned properly with no interference.	
☐	With completion plug in, tighten the fitting and valve #2 bolts using a star pattern.	
☐	Check multiple times that the plug moves smoothly in and out of the fitting, gate valve, and drilling dome.	
☐	Mark the alignment of the drilling dome to the valve with a sharpie to note the current orientation when assembled.	
☐	When completed, remove the completion tool and plug by unbolting the drilling dome from the valve.	

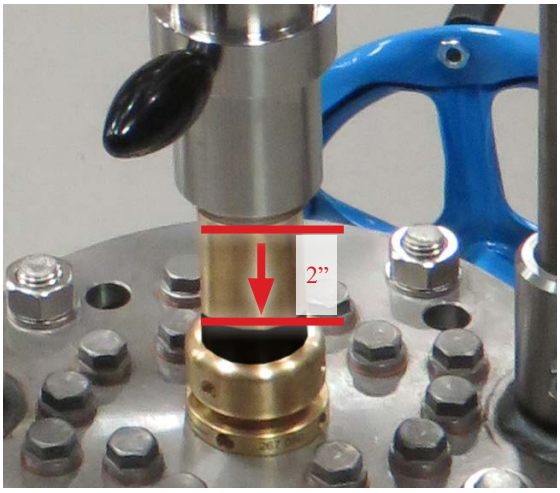
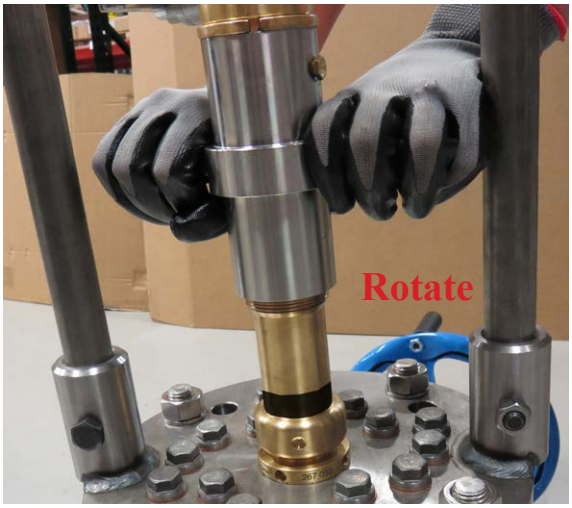
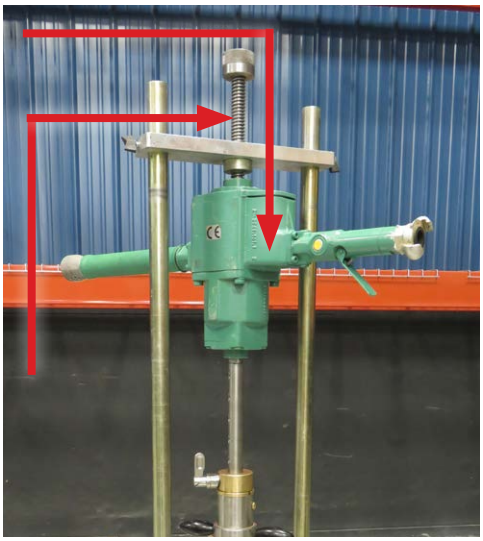
6.0 Tapping Operation:

☐	Take the tapping device out of the case and inspect the device visually for irregularities. Make sure the threads are clean and the device operates freely.	
☐	Begin to assemble the tapping tool, with gasket in place, by attaching the dome adapter to the drilling flange. If not done already attach drilling flange to drilling dome using #1 bolts. Check gasket.	
☐	Thread the tapping device on to the dome adapter by means of the hook assembly wrench.	

☐	Install the drilling rod through the middle of the tapping device and drilling dome.	
☐	Attach pilot drill to drilling rod then attach proper cutter by means of the cutter assembly bolts. Figure A: Steel and cast iron cutter [13200760] and pilot drill [14300025]. Thread the two pilot drill pieces together and then thread that piece into the drilling rod.	  A: 
☐	If cutting through steel or cast iron, grease the cutter and pilot drill with the cutting grease for better drilling results.	

☐	Retract the cutter completely into the drilling dome. No part of the cutter should be visible. When retracting into the drilling dome, the cutter should be in the position as shown in the picture.	
☐	Attach complete tapping tool, with gasket in place, to top of gate valve using #1 shoulder bolts. Check gasket.	
☐	Position feed tube so it is flush with the bottom thread.	

☐	Attach bridge stands (both rods) to top of drilling dome using bolts.	
☐	Make sure the gate valve is open.	
☐	Pull out the bayonet lock on tapping device and lower drilling rod until pilot drill touches the surface of the pipeline to be tapped. When doing this, make sure the bayonet lock is in a free position and does not lock into the drilling rod.	
☐	After the pilot drill is in contact with the pipeline, lock the feed tube to the drilling rod at the closest hole on the drilling rod using the bayonet lock. Do this by either rotating the feed tube until it locks in place or pulling up on drilling rod.	

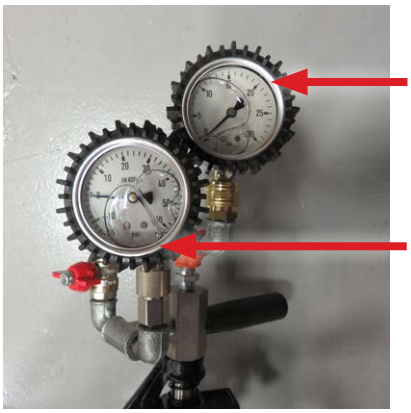
☐	Locate the maximum drilling depth by measuring 2” down from the bottom of the feed tube. Place a mark on the brass tapping tube. (In picture, 1/2” black electrical tape was used.)	
☐	Rotate the feed tube counterclockwise until 3 additional threads are exposed. (This ensures the pilot drill is not on the pipe and is in the proper position to start drilling.)	
☐	Place air motor on drilling rod square. Operator should ensure the air compressor is working properly at 90 psi measured at the inlet of the air motor. Air volume through the motor should operate the air motor at 20 RPM’s load speed (cut) & 40 RPM’s free speed (non-cut). Make certain the oiler / separator is in place. NOTE: If issues with air motor occur, tapping can be completed by hand using the ratchet.	
☐	Attach feeding rod with bridge to bridge stands. Lower feeding rod with bridge down to air motor.	

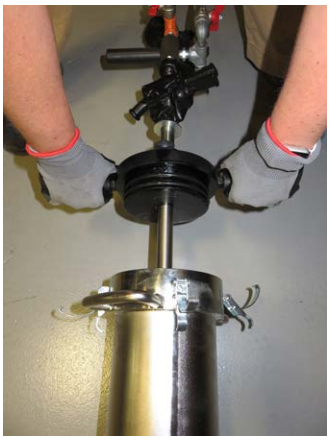
☐	Use the air motor to turn the drilling rod clockwise. While the drilling rod is rotating clockwise slowly hand feed the cutter downward by turning the feed tube handles clockwise to cut the pipe. (Do not feed the cutter too quickly and cause a bind and potential cutter breakage. Especially on steel and cast iron.) Continue to lower the feeding rod from above with bridge as the air motor lowers to keep the air motor centered and stable.	
☐	The tapping procedure is finished when the drilling rod can rotate without any resistance. NOTE: You will feel less resistance twice - once in the beginning when the pilot drill has perforated the pipe wall and secondly when the cutter is completely through.	
☐	To retract cutter and coupon, continue spinning the drilling rod clockwise while rotating the feed tube counterclockwise until you have reached the starting position with 3 threads exposed. ***(NEVER turn the drilling rod counterclockwise. This can damage the cutter.)***	

☐	Detach feeding rod with bridge, bridge stands, and air motor or hand ratchet.	
☐	**WARNING: Always control the drilling rod.** Free the drilling rod by unlocking the bayonet lock on the tapping device. Then pull the drilling rod completely upwards above the gate valve. ***(If assistance to get the cutter out is needed, turn the drilling rod clockwise.)*** ***(NEVER turn the drilling rod counterclockwise. This can damage the cutter.)*** ***(Be aware of the fact that the pressure inside the pipeline may automatically move the rod upwards. Avoid being above the rod with your hands or face.)*** **WARNING: Always control the drilling rod.**	
☐	Close gate valve.	
☐	Release pressure from the dome by opening blow down valve.	
☐	Unbolt the drilling dome from the gate valve.	
☐	Disassemble the tapping tool. Use the hook wrench to remove tapping device from drilling dome. Remove cutter and pilot drill from drilling rod. The cutter should contain the drilling coupon. Use the necessary tools [Coupon Remover] to remove the coupon from the cutter.	 

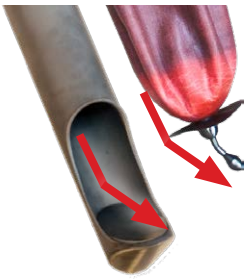
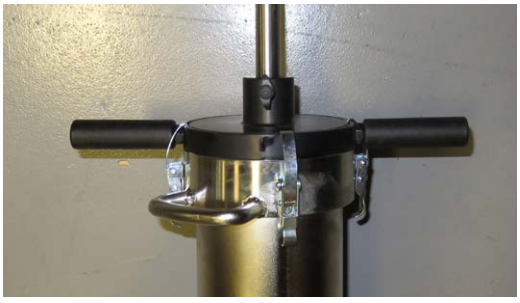
☐	After tapping steel pipe, to remove steel shavings from interior of pipe, use the magnetic spindle in combination with the completion tool adapter and drilling dome to clean the interior of the pipe. To remove the majority of the shavings, it may take multiple insertions. Once the shavings are out, go in one more time and sweep the internal threads of the fitting. The brushes on the magnetic spindle will assist in this.	 
☐	Clean and store tapping tool in its case.	

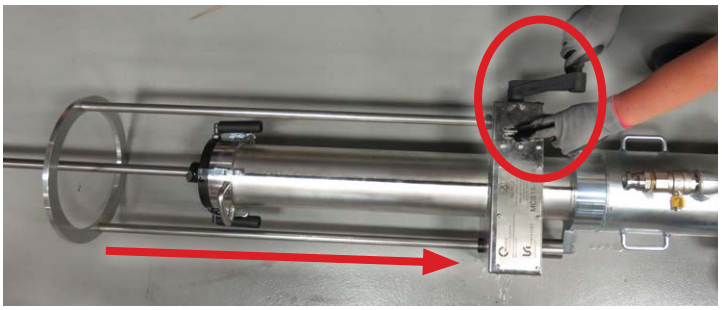
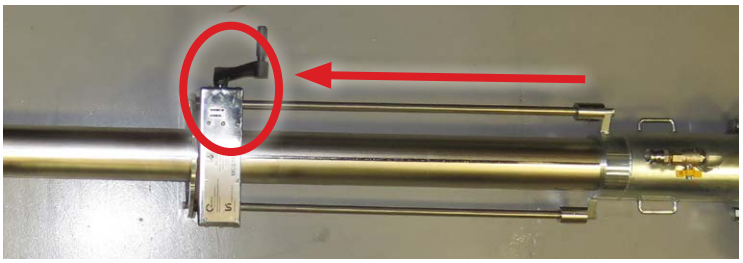
7.0 Stopping Operation:

☐	Attach the appropriate gauges on the appropriate couplings at the top of the stopper rod. Each gauge has a specific function. The gold connection gauge will indicate the pressure inside the pipeline in front of the MDS Stopper. The silver connection gauge indicates the inflation pressure of the inflatable stopper.	
☐	Verify that the coupling on the bottom of the stopper rod contains a gasket. The gasket should be in good visual condition. The condition of the gasket can be verified when conducting the vacuum test on the stopper prior to inserting the stopper into the gas system. NOTE: Extra stopper rod gaskets should always be available. Never use the stopping tool if the gasket is not inside the coupling.	
☐	Take the stopper you selected from the chart in Section 4.0 and visually inspect that the stopper is in good condition without weak spots or concern for integrity. (If the condition of the stopper is uncertain, refer to Appendix A for additional stopper testing and verification.) Pre-bend the hose of the MDS Stopper as this will facilitate the positioning of the stopper into the pipeline through the chute. NEVER pre-bend the MDS Stopper on the frame!!! This can damage the frame and it will not help as the internal frame is rigid.	 

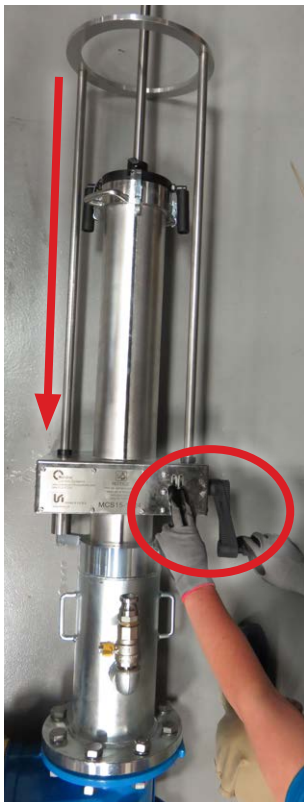
☐	Begin taking the stopper rod out of the tower by unlocking the cap locks on the stopping tower as pictured.	
☐	Extend black handles on cap and with some force, pull cap off from tower until stopper rod is completely exposed. Verify jack assist is in highest most position.	 
☐	Attach the proper size of MDS Stopper onto the stopper rod. Tighten the connection by means of a pair of wrenches. Always use two wrenches to ensure tight connection and seal.	

☐ Connect hand pump to the stopper inflation connection on the top end of the stopper rod. (This is the offset connection.)	
☐ With the valve open, pull a vacuum of -15 psi on the stopper to make it as compact as possible.	
☐ Close the valve after evacuation.	
☐ Verify negative pressure is maintained for 5 minutes to ensure seal and integrity of MDS Stopper and complete stopper rod. This is what a well evacuated MDS Stopper looks like!	
☐ **ADDITIONAL STOPPER TESTING BY INFLATION:** If additional stopper testing is desired, insert the stopper into a piece of pipe within the stopper's pipe ID range. (Make certain the test set up is in a safe place where the open end of the test pipe is pointed away from people.) Inflate the stopper to the maximum allowable pressure either by using the stopper rod or a MDS Stopper Test Adapter [12242200]. After the stopper stabilizes, wait 10 minutes to make certain the same pressure is maintained within the MDS Stopper. **NOTE: Do not inflate the stopper outside of a pipe as it can damage the stopper.**	*Using rod:*  *Using MDS Stopper Test Adapter:* 

☐	For proper MDS Stopper insertion into the pipeline, use Kleiss silicone spray to lubricate the stopper.	
☐	Spray the back of the stopper at the conical connection.	 
☐	Spray the front of the stopper around the nose.	
☐	Next, push the stopper into the tower until plate on stopper rod is just inside tower allowing cap to attach.	
☐	Make sure stopper is orientated in the correct position. Same direction as arrow on tower.	
☐	Lower stopper rod and lock cap to stopping tower as pictured.	

☐	Lock the stopper rod by tightening the black thumb screws onto the rod.	
☐	Fold in black handles on cap.	
☐	Grease stopper rod with silicone grease.	
☐	While holding the release buttons on the gear box, crank the gear box to the lowest position allowing the chute to be visible at the bottom of the flow stopping tower.	
☐	Using the same Kleiss silicone spray you used on the stopper, lightly spray the open end of the chute.	
☐	While holding the release buttons on the gear box, crank the gear box to the highest position to completely retract the chute into the tower.	

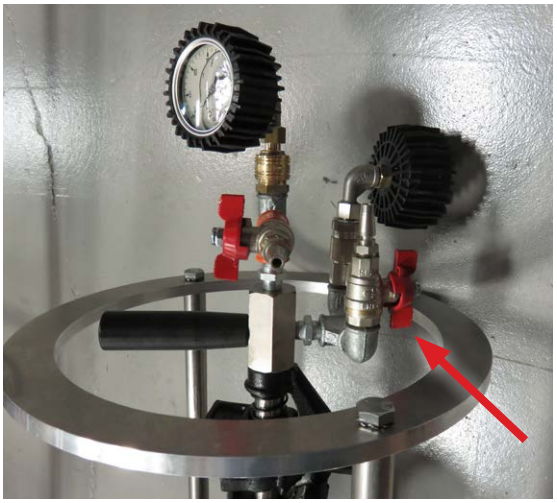
☐	With gasket in place, set complete flow stopping tool on top of gate valve positioning stopper rod in correct orientation to deploy stopper. (Use the arrow indicators on tool to verify direction of stopper insertion.)	 
☐	Attach flow stopping tool to top of gate valve using #1 stud bolts. Check gasket.	
☐	Make certain by-pass port is closed before opening gate valve.	
☐	Open gate valve and check for any leaks in the stopping tower. Use leak soap if necessary. Correct any blow-by or leaks before continuing stopping operation.	

☐	While holding the release buttons on the gear box, crank the gear box to the lowest position to position the chute into the main.	
☐	Unlock the stopper rod by loosening the black thumb screws.	
☐	Push the stopper rod downwards until the bottom of the jack reaches the top of the tower. You may need to use a little force to do so. **Try NOT to rotate the stopper rod when inserting.**	

☐	Lock the stopper rod by tightening the black thumb screws.	
☐	*Recommended:* If needed or applicable, attach By-Pass Gauge Tree [BPGT-1] as pictured. NOTE: Additional options are available in the 4.0 Accessories section.	
☐	Prior to stopper inflation, verify system / pipeline pressure is displaying on proper gauge (not more than 15 psi). The MDS Stopper inflation pressure gauge will be indicating a negative pressure.	
☐	Inflate the stopper to 30 psi via compressor or nitrogen source. Inflate stopper as rapidly as possible to ensure the best seal on pipeline wall. NOTE: If 30 psi is not obtainable, then inflate to a minimum of 2 times system pressure to achieve stop off.	

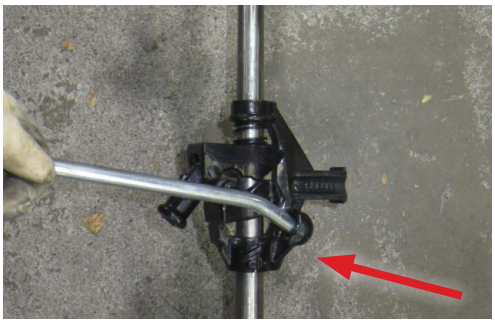
☐	Install safety fitting on inflation pressure port.	
☐	Allow the stopper to stabilize inside the pipeline for at least 10 minutes.	
☐	Evacuate or purge pipeline work area. Use the by-pass / vent port on tower and vent stack, if desired. (Do this in accordance with your gas company procedures.)	
☐	Verify inflation pressure and system pressure remains stable.	
☐	You may now start your work on the pipeline. NOTE: Continue to monitor gauges on stopping towers.	

8.0 Retrieving MDS Stopper:

☐	**NOTE: Always equalize pressure on both sides of the stopper before deflation or removal.** After the work on the pipeline is complete, equalize the pressure behind the MDS Stopper and in front of the MDS Stopper. This can be done in a variety of ways. Refer to examples in Section 3.0 of this manual and your gas company procedures.	*** ALWAYS EQUALIZE PRESSURE ***
☐	Once pressure is equalized, open the inflation valve of the MDS Stopper to deflate the stopper. Pressure inside the pipeline will assist with the evacuation.	
☐	Connect the hand pump to the stopper inflation connection and pull a vacuum on the stopper to make it as compact as possible.	

☐	Unlock the stopper rod by loosening the black thumb screws.	
	Lift the stopper rod up until initial resistance is met. This is when the hose connection to the stopper meets the opening of the chute. Lock the stopper rod again by using the black thumb screws.	
	With firm control of the black handle, release the gear box locking mechanism and complete (3) clockwise turns of the black handle. This will raise the chute for the beginning of the stopper entry into the chute allowing for easier extraction. Lock the gear box into the raised position.	

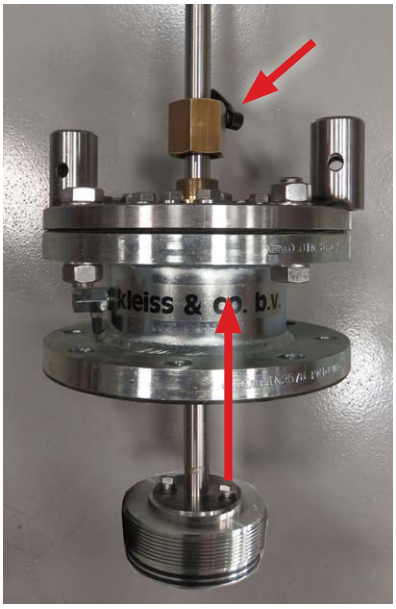
☐	Unlock the stopper rod and pull the stopper rod completely upwards. You may need to use some force to do this. Hint: If you feel some resistance, twist the stopper rod in a clockwise direction and/or use the jack assist until the rod is in the complete upwards position.	

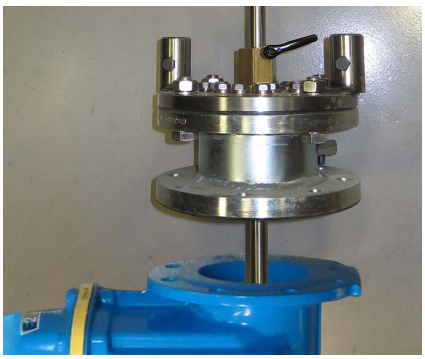
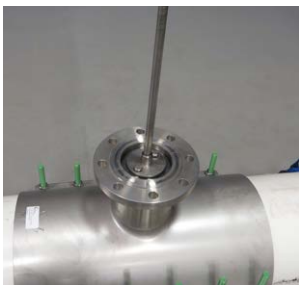
☐	JACK ASSIST INSTRUCTIONS: Slide the jack assist down the stopper rod to the top of the tower. Do this by placing the jacking handle in the retraction divot (as shown) and lifting up to compress the spring. Then push the jack assist to slide it along the stopper rod. Once on top of the tower, insert the jacking handle as shown and begin jacking until the pressure has lessened, then continue to pull up by hand.	 
☐	Once the stopper rod us pulled all the way up, the stopper is retracted into the tower, lock the stopper rod by tightening the black thumb screws.	
☐	While holding the release buttons on the gear box, crank the gear box to the highest position to completely retract the chute into the tower.	

☐	Close gate valve.	
☐	Open the by-pass / vent port in order to evacuate the stopping tool.	
☐	Disconnect flow stopping tool from the gate valve.	
☐	Slide the jack assist to the highest most position on the stopper rod.	
☐	Unlatch the stopper rod from the top of the tower and pull the stopper rod and stopper out.	

☐	Disconnect the MDS Stopper from the stopping tool.	
☐	Clean and store MDS Stopper in transportation case. Do not leave it on the ground. Inspect the stopper for damages. Clean the stopper with a cloth. Place a protection cap over the thread.	 
☐	Remove gauges.	
☐	Clean and store stopping tool in its cases.	

9.0 Plugging Operation:

☐	Bolt completion plug to plug spindle rod.	
☐	Then insert plug spindle rod through drilling dome, and attach completion tool adapter to top of dome.	
☐	Pull plug up in to drilling dome.	
☐	With gasket in place, attach drilling dome using #1 shoulder bolts (use a minimum of 4 bolts). Check gasket.	
☐	Open gate valve.	

☐	Attach ratchet. Push down plug spindle assembly through valve and onto fitting. Turn clockwise to thread plug onto fitting. Continue until it bottoms out.	
☐	Test to make sure there is seal by opening the blow down valve on the dome and relieving the pressure in the dome.	
☐	After the plug seal has been verified, remove rachet and unbolt the drilling dome and remove the dome up and over the completion tool.	
☐	Unbolt the gate valve and remove the valve up and over the completion tool.	
☐	Remove plugging assembly by unbolting the assembly from the plug.	
☐	Prior to bolting on the blind flange, inspect the plug again for any leaks.	

☐	Attach the blind flange, with gasket in place, to fitting using stud bolts. Check gasket.	
☐	Disassemble the plugging tool.	
☐	Clean and store the completion tool and valve in their respective cases.	

10.0 General Maintenance:

All equipment should be cleaned and inspected for wear after each job to prolong the life of the equipment and ensure the safety of the operators.	
☐	Inventory all system components (refer to Section 4.0 Equipment)
☐	Visually inspect the cutters and pilot drills
	☐ Steel and cast iron cutter - looks to be in good condition (13200760)
	☐ Steel and cast iron pilot drill - looks to be in good condition (14300025)
	☐ NOTE: The best indication of the condition of the cutter and pilot drill is the coupon removed from the pipe. Smooth cuts indicate good condition and jagged / rough cuts indicate wear of the cutter and pilot drill.
☐	Grease the tapping device, if needed (10310800)
☐	Inspect gauges for any damage and ensure they are reading zero and function properly
☐	Inspect stopper rod for bends and/or damage
☐	Check to make sure the gear box is operating freely with no binding or grinding
☐	Clean ALL threads and quick connections
☐	Inspect and clean all chutes (quantity 1)
☐	Inspect to make sure gate valve is opening and closing smoothly and functioning properly
☐	Inspect all bolts, screws, and joints
☐	Inspect MDS Stoppers for any excessive wear and replace if necessary (refer to Appendix A)
	☐ Make sure protective cap is on the stopper to protect the threads
☐	Thoroughly clean off any dirt, debris, and grease on all tools and stoppers with a lint free cloth and water (well-maintained equipment extends the life)

NOTE: MCS recommends that the complete set of tools be inspected, serviced, and tested by an authorized MCS service center on a two year rotation or sooner.

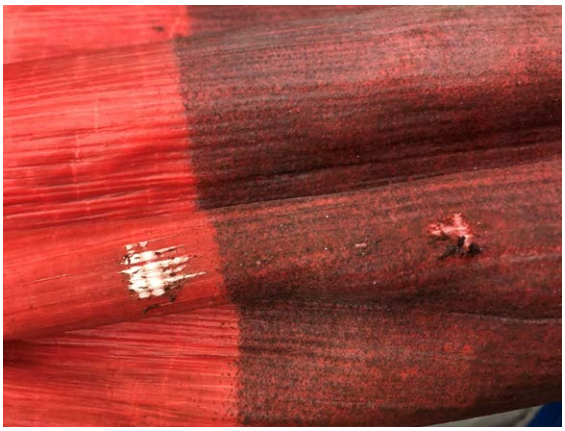
APPENDIX A: Stopper Testing and Verification

☐ Visually inspect the stopper for weak spots and integrity.

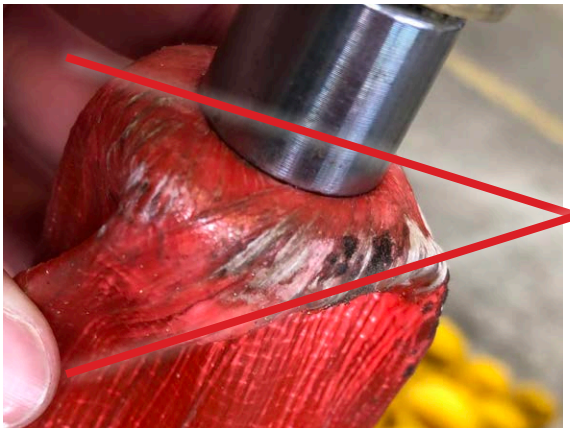
Discard stopper if weak spots are found.

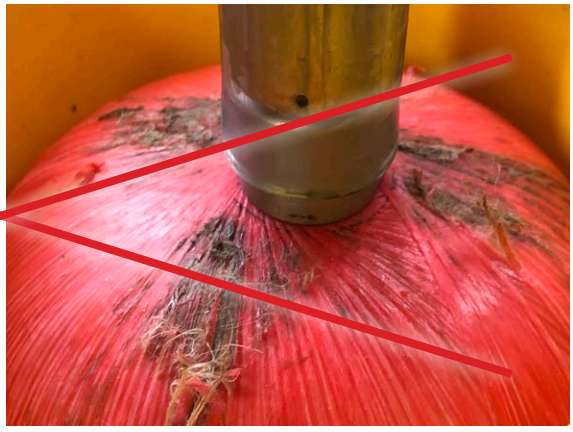
Continue with inspection if everything looks OK.

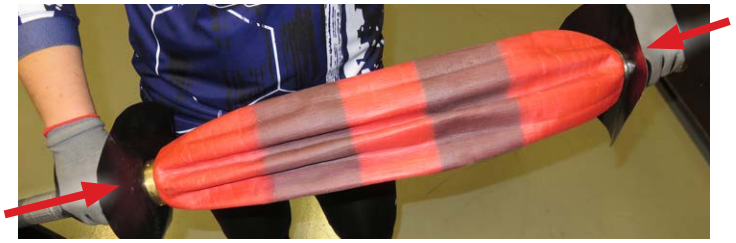
OK Examples:
Coating is coming off, but individual threads are not showing.



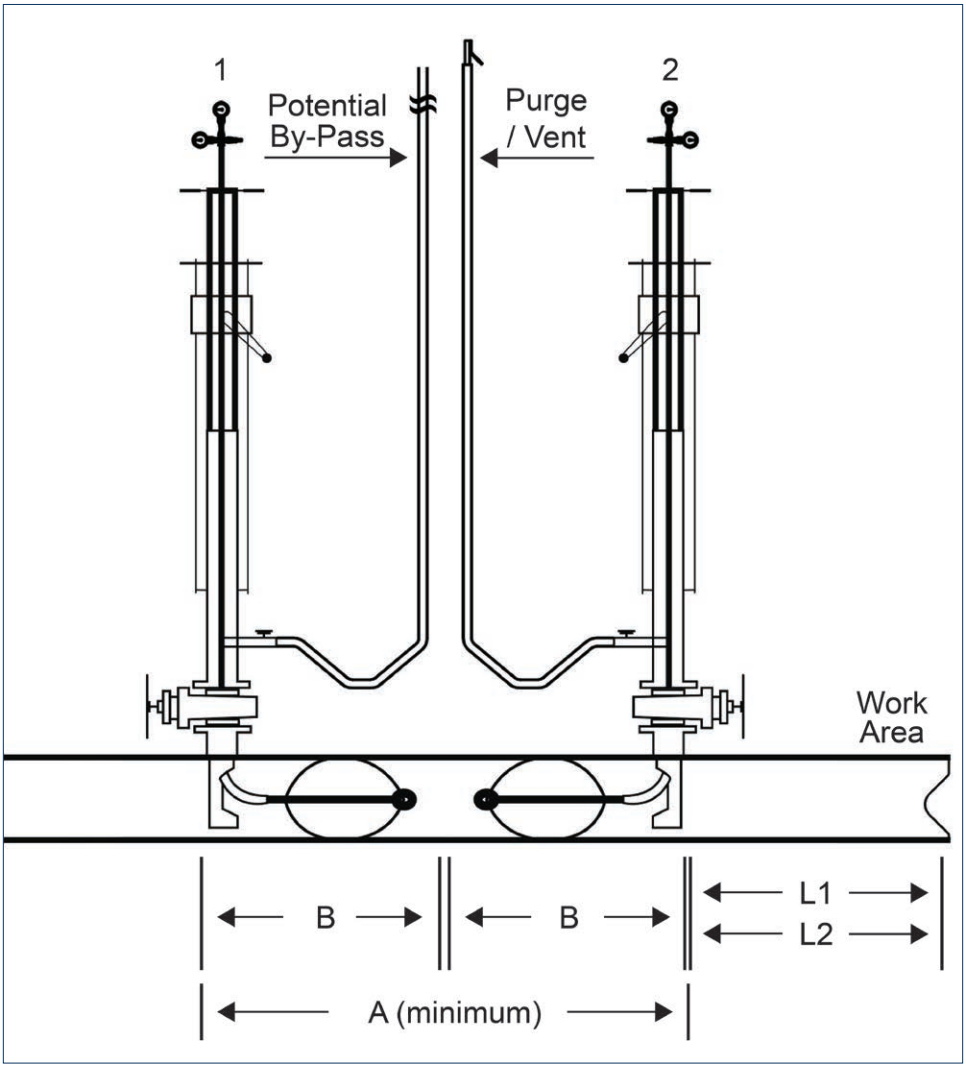
Bad Examples:
Discard stoppers shown below since individual threads are exposed, starting to fray, and loose from coating.





☐	Verify internal spring mechanism is still working.	
☐	Pull a vacuum (negative pressure) on the stopper. This can be done on the complete stopper rod of the tower (to ensure complete system is intact before a job) or using the MDS Stopper Test Adapter [12242200]. Verify fiber gasket in either device is intact. Verify negative pressure is maintained for 5 minutes.	*Using rod:*  *Using MDS Stopper Test Adapter:* 
☐	If the condition of the stopper is still uncertain or additional stopper testing is desired, insert the stopper into a piece of pipe within the stopper's pipe ID range. (Make certain the test set up is in a safe place where the open end of the test pipe is pointed away from people.) Inflate the stopper to the maximum allowable pressure either by using the stopper rod or a MDS Stopper Test Adapter as noted in the previous step. After the stopper stabilizes, wait 10 minutes to make certain the same pressure is maintained within the MDS Stopper. **NOTE: Do not inflate the stopper outside of a pipe as it can damage the stopper.**	*Using rod:*  *Using MDS Stopper Test Adapter:* 

Example I – Stoppers Positioned Towards Each Other [Illustration of One Side of Work Area]



STOPPING TOWER DISTANCES

Nominal Pipe Size	A (minimum)	B	L1* = Steel Welding	L2** = PE, CI, and Mechanical
20”	120”	60”	40”	48”
24”	120”	60”	40”	48”

A = minimum distance between towers

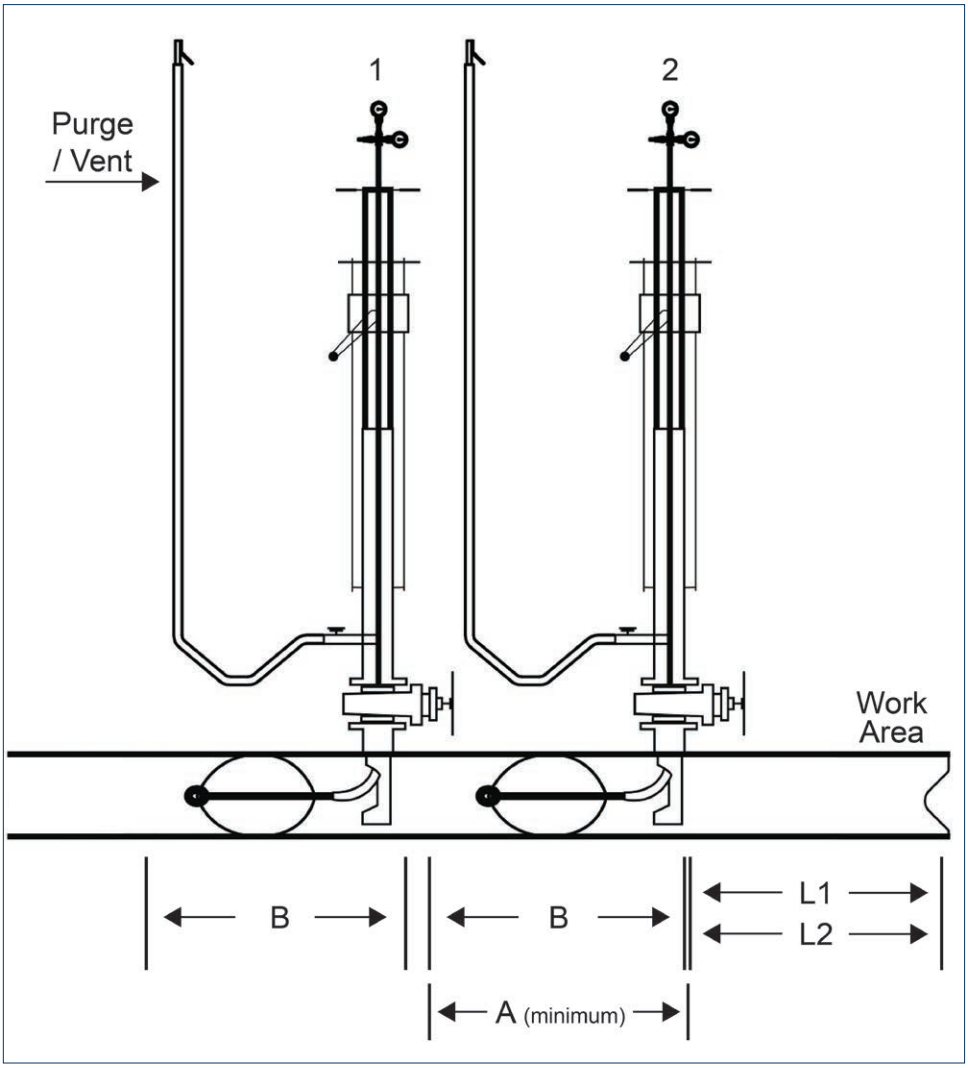
B = stopper length

L1 = distance from stopper/tower to work area - use standard industry & company practices to minimize heat transfer & sparks reaching the inflatable stopper*

*L2** = distance from stopper/tower to work area - measurement is a guide only, follow manufacturer’s fitting recommendations*

NOTE: Always inflate stopper #2 first, if possible.

Example II – Both Stoppers Positioned Away From Work Area [Illustration of One Side of Work Area]



STOPPING TOWER DISTANCES

Nominal Pipe Size	A (minimum)	B	L1* = Steel Welding	L2* = PE, CI, and Mechanical
20”	60”	60”	40”	48”
24”	60”	60”	40”	48”

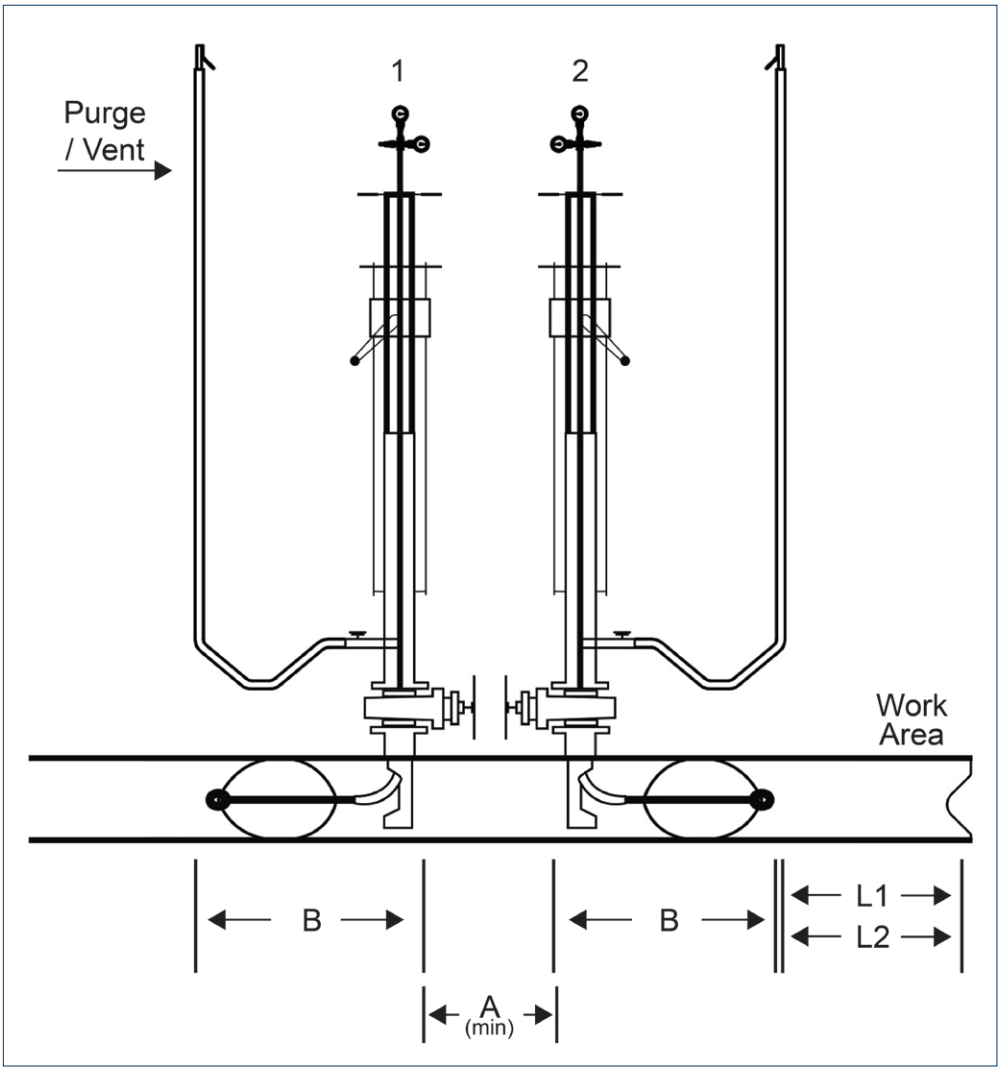
A = minimum distance between towers

B = stopper length

L1 = distance from stopper/tower to work area - use standard industry & company practices to minimize heat transfer & sparks reaching the inflatable stopper*

*L2** = distance from stopper/tower to work area - measurement is a guide only, follow manufacturer’s fitting recommendations*

Example III – Stoppers Positioned Away From Each Other [Illustration of One Side of Work Area]



STOPPING TOWER DISTANCES

Nominal Pipe Size	A (minimum)	B	L1* = Steel Welding	L2** = PE, CI, and Mechanical
20”	42”	60”	40”	48”
24”	42”	60”	40”	48”

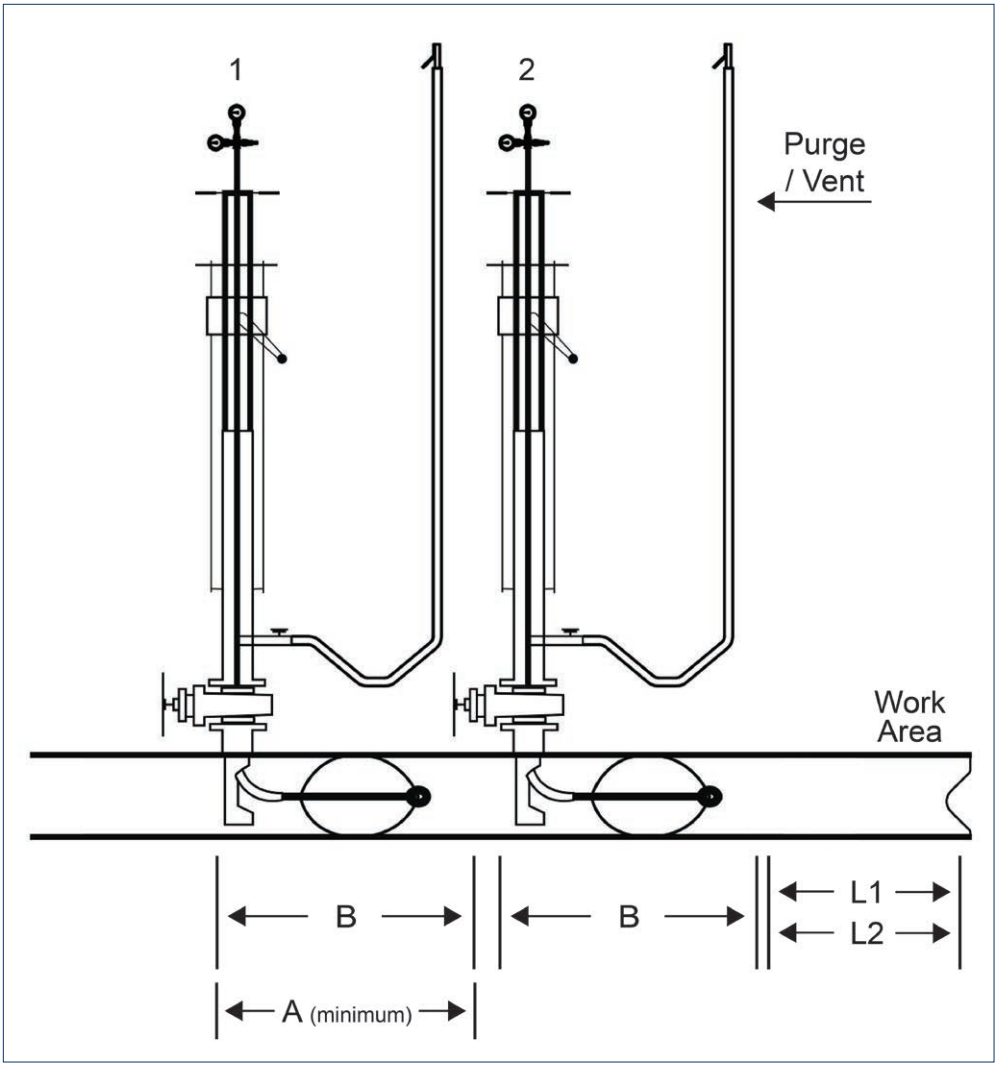
A = minimum distance between towers

B = stopper length

L1 = distance from stopper/tower to work area - use standard industry & company practices to minimize heat transfer & sparks reaching the inflatable stopper*

*L2** = distance from stopper/tower to work area - measurement is a guide only, follow manufacturer’s fitting recommendations*

Example IV – Both Stoppers Positioned Towards Work Area [Illustration of One Side of Work Area]



STOPPING TOWER DISTANCES

Nominal Pipe Size	A (minimum)	B	L1* = Steel Welding	L2** = PE, CI, and Mechanical
20”	60”	60”	40”	48”
24”	60”	60”	40”	48”

A = minimum distance between towers

B = stopper length

L1 = distance from stopper/tower to work area - use standard industry & company practices to minimize heat transfer & sparks reaching the inflatable stopper*

*L2** = distance from stopper/tower to work area - measurement is a guide only, follow manufacturer’s fitting recommendations*

APPENDIX C: Manual Updates

V15 June 2020

1) Removed recommended distance from stopper to steel weld
2) Changed nominal pipe size on chart to OD range for cast iron
3) Added new style stopper with metal tip
4) Added step to make sure stopper is oriented in the proper position
5) Added grease stopper rod
6) Added new step about retracting the cutter after tapping is complete
7) Added air motor guidelines
8) Added notes on heat transfer & sparks reaching the inflatable stopper

V16 October 2022

1) Slide gate valve hardware removed from parts list
2) Removed 2” vent stack from accessories page and from stopping procedure
3) Updated bolt designation number in section 5.1: Alignment Operation
4) Updated bolt designation number in section 6.0: Tapping Operation
5) Added bolt designation number in section 7.0: Stopping Operation
6) Update stopper removal procedure to include using the gear box

V17 January 2024

1) Added to Section 3.0 and Section 5.0 - avoid launching or inflating stopper near fittings, joints, or other obstructions

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(V17 January 2024)