ALH System-One

Gas-Free Tapping System for ¾" to 2½" NPT tapped holes

(60psig Maximum Allowable Operating Pressure)

Operating Manual

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INTRODUCTION:

The ALH System-One tapping machine cuts and taps ¾" – 2 ½" NPT holes gas-free in cast iron and steel live mains operating at up to 60psig and 3" – 48" diameter. The system is mostly aluminum with a very low-profile sliding gate valve making it extremely compact and lightweight. Modular components allow multiple operations from the ALH valve platform to be completed quickly and safely in a completely gas-free environment.

Some of its gas-free operations are:

- Metallic and brass based polyethylene tee insertion.
- Plug insertion/extraction.
- Live camera inspection.
- Mains internal visual examination through the inspection canopy.
- By-pass and bagging off platform.
- Vent and purge.
- Gas-Free gutless tee extraction/replacement/abandonment.

IMPORTANT – Tapping a 3" Main

You MUST remove the holesaw, or shell cutter, from the tap before tapping a 3" main to eliminate the risk of cutting into the bottom of the pipe.

1. Cut the hole as usual but do not engage the tap at this stage.
2. Lift the drill head into the canopy and close the slide valve.
3. Remove the drill head from the valve.
4. Remove the cutter from the tap.
5. Replace the drill head and open the slide valve.
6. Tap the hole.

OPERATING PROCEDURE

Initial Set Up

1. Clean all components of the System-One prior to use paying particular attention to any "O" rings, grooves and matching surfaces. Any dirt in these areas should be wiped off.

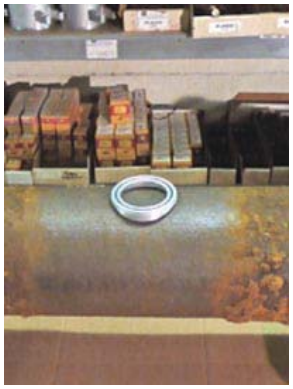
2. Clean the area of the pipe where the saddle will be positioned, removing all corrosion and scale so that the saddle rubber will seal properly.

3. Also clean the area around the pipe where the chains will contact it to remove heavy scale. This will ensure the chains will seat correctly and not loosen when any scale under them is crushed.

4. Failure to carry out 2 and 3 may allow the saddle to move and gas to escape.

5. Select the correct size of saddle to match the pipe size and place it on the pipe *(Photo 1).*

   *When working on **steel pipe** an appropriate sized PLCS adhesive silicone gasket must first be attached to the underside/rubber side of the saddle. To attach silicone gasket first clean and dry the saddle rubber, peel off the protective paper backing, stick the silicone gasket to the underside of the saddle and press firmly.*



(Photo 1)

(Photo 2)

6. Install the valve on top of the saddle and secure it to the pipe using the chains.

7. Push the chain bolts through the holes in the pivot pins, add the washers and screw the nuts on one thread only by hand.

8. Install the other ends of the chains in the chain pull up hooks making sure that two pins from each chain are installed in the two slots.

9. Close the valve gate at this stage to stiffen the whole valve and prevent it flexing.

10. Tighten the chains equally and alternately using the valve wrench. Do not completely tighten one chain before tightening the other. Always use the short ALH wrench (part # 46-A0012). DO NOT overtighten or use a longer wrench as this may put too much tension on the chains and could damage the valve.

11. Tap the chains lightly with a hammer to ensure that all links lie flat against the pipe.

12. Re-tighten the chains making sure you use the chain steady wrench around the closest link to the eyebolt, to prevent the chain twisting. Do not over-tighten *(Photo 2)*.
    (Note - Check the condition of the chains frequently and lubricate with a light oil to prevent rusting. Occasionally clean with a wire brush.)

13. Operate the valve gate with the valve wrench and check it opens and closes fully and easily. If the gate does not operate easily you may have over-tightened the chains causing the valve to flex.

IMPORTANT – NEVER stand on the valve to use as a step when climbing out of the excavation. You may damage the valve or cause it to slip around the pipe.

Preparing the Drill Head

1. Screw the drill head feed cap down until the grub screw(s) are exposed at the bottom of the drill shaft.

2. Wipe the tapered hole in the shaft clean with a rag to ensure there is no dirt in it to prevent the tap seating properly. Similarly wipe the tap shank.

3. **Cutting Cast Iron or Malleable Iron Pipe**: Select the correct tap and holesaw combination. Where required, use only the supplied box wrench to attach the holesaw to the tap; a wrench with more leverage might break the tap. Where possible install a PLCS rare earth magnet (Part #46-B5010) in the holesaw to collect swarf and help retain the coupon.

   Cutting Steel Pipe: Select the correct tap and shell cutter combination. A 1" shell cutter screws directly onto the threads of its corresponding sized NPT tap. A 1¼" ONLY is attached to the tap using a special nut and wrench. Use ONLY the special nut and wrench to attach the shell cutter to the tap; a wrench with more leverage could damage the tap. All other sizes are attached using the supplied box wrench and tap half nut. If possible install a PLCS rare earth magnet (Part #46-B5010) in the shell cutter to collect metal chips and help retain the coupon.

4. After attaching the holesaw/shell cutter install the tap in the drill shaft tapered hole making sure the two flats on the tap fit within the recess in the shaft.

5. Place a piece of wood over the end of the holesaw/shell cutter and give it a light rap with a hammer to perfectly seat the tap in the tapered hole *(Photo 3).*

(Photo 3)

(Photo 4)

(Photo 5)

6. Now tighten the grub screw(s) down onto the tap shank, using the T-Handle hex wrench provided, to prevent the tap dropping out of the shaft once it has been unscrewed from the newly tapped hole. The grub screw(s) should not be over-tightened *(Photo 4)*.

   IMPORTANT – On Steel Pipe it is vital that the shell cutter is kept cool during the cutting operation. To accomplish this fill the saddle with a biodegradable coolant such as Kool-Mist 77 (PLCS Part # 46-11365K61) prior to starting the cutting operation. We also recommend coating the inner and outer surfaces of the cutter and tap threads with TREFOLEX compound paste. TREFOLEX extends the cutters and taps work life while producing a cleaner cut edge with less frictional force.
   The use of cutting paste on **Cast Iron** pipe is optional.

7. Screw the feed cap back until the holesaw/shell cutter is inside the drill head casting *(Photo 5)*

8. Pull up on the shaft by its retaining pin and turn the shaft until its square section can enter the square recess inside the top of the feed cap.

9. Lock the shaft in place by the thumbscrew to prevent it and the holesaw/shell cutter dropping onto the valve gate during assembly.

10. Mount the drill head on the valve and clamp it into position using the two swing bolts and tighten using the valve wrench.

11. Open the valve gate fully with the valve wrench until the arrow mark on the gate shaft lines up with the "Open" mark on the valve body. Remove the valve wrench.

12. Pressures test the ALH system through the drill head ball valve to the gas mains actual operating pressure x 1.5 but not greater than 60psi. For leaks around the drill head base, re-tighten the swing bolts. For leaks around the saddle, re-tighten the chain bolts. CAUTION – Always use the short ALH valve wrench. DO NOT OVERTIGHTEN.

Operating the Drill Head

IMPORTANT – Tapping a 3" Main

You MUST remove the holesaw, or shell cutter, from the tap before tapping a 3" main to eliminate the risk of cutting into the bottom of the pipe.

1. *Cut the hole as usual but do not engage the tap at this stage.*
2. *Lift the drill head into the canopy and close the slide valve.*
3. *Remove the drill head from the valve.*
4. *Remove the cutter from the tap.*
5. *Replace the drill head and open the slide valve.*
6. *Tap the hole*.

1. While holding the drill shaft with one hand, loosen the thumbscrew in the feed cap and carefully lower the shaft until the pin contacts the top of the feed cap *(Photo 6)*.

(Photo 6)

(Photo 7)

(Photo 8)

2. Screw the feed cap down until resistance is felt, indicating that the holesaw/shell cutter is touching the pipe, and then back off ¼ turn.

3. Install the **shaft collar** onto the tapered pin to prevent it catching the operator's gloves and insert the **nylon "C" split collar** between the tapered pin and the feed cap *(Photo 7)*.

   IMPORTANT - The purpose of the "C" split collar is to prevent the tap dropping fully into the cut hole and immediately grabbing while still under power.

4. Install the air power drive and socket onto the drill shaft to operate in a clockwise direction.

5. Hold the power drive with one hand so that it will be pulling away from you under load. If the cutter jams the power drive will be pulled from your grasp and will stop automatically as your fingers are released from the trigger. If operated towards you it may swing around and hit you in the chest before you can release the trigger *(Photo 8).*

6. Operate the trigger and start the drill.

7. The power drive simply powers the drill shaft around. To feed the drill, slowly turn the feed cap down with the other hand until the holesaw/shell cutter starts to cut, extra care is required when using the shell cutter on steel pipe to generate chips not ribbon swarf. *(We recommend that the drive and feed are both operated by one man, so that he can feel the correct amount of feed pressure to apply.)*

8. Continue to turn the feed cap down slowly without putting too much load on the holesaw/shell cutter. This would be noticed by a reduction in speed and change in pitch of the air motor.

9. Use less feed cap pressure on small holes since overload conditions are more likely to occur.

10. A sudden increase in speed, reduction of load, higher pitch note of the air motor and the drill shaft drops a little indicates that the holesaw/shell cutter is through the pipe. *Remove the power drive from the drill shaft and isolate it from the air supply. Inject a few drops of pneumatic oil directly into the tool air inlet, re-attach the power drive to the air supply and depress the trigger for one second. This procedure will prevent moisture from forming rust under the vanes of the air motor and seizing the tool.*

11. Remove the nylon "C" split collar.

Tapping the Cut Hole

1. We highly recommend tapping by hand and not under power.

2. Turn the feed cap down as far as possible. Then back off ¼ turn.

3. Place the ratchet wrench on the drive shaft hex and operate by hand in a clockwise direction. The tap will now pull itself into the hole. Maintain separation between the shaft pin and the feed cap during this process by turning down the feed cap as you go *(Photo 9).*

(Photo 9)

(Photo 10)

4. Reverse the ratchet for half a turn from time to time if the tap starts to bind. This will release the swarf from the tap's teeth and make cutting easier.

5. Tapping is complete when the tap rear stops come into contact with the pipe crown. The stops are there to prevent over-tapping of a tapered hole. Do not force the stops over the crown of the pipe as the tap will be very difficult to unscrew and may break the stops off. (This is very easy to do if you are power tapping, which is one more reason we recommend against this practice.)

6. Turn the ratchet wrench over and remove the tap from the pipe by operating the wrench in a counter-clockwise direction. **IMPORTANT – Do Not try to remove the tap by simply winding up the feed cap, this will break the top off the tap.**

7. At the same time, wind the feed cap up to follow the shaft making sure it never makes contact with the shaft retaining pin at this stage.

8. When the tap is fully removed from the pipe you will feel and hear a noticeable bump/skip as the leading edge of the tap's thread disengages from the threaded hole.

9. Grip the shaft by its retaining pin and you should be able to lift it a little. This guarantees that the tap is free of the threads.

10. Wind the feed cap up to the retaining pin and then continue winding up until the first brass thread is exposed on the drill base *(Photo 10)*. Remove shaft collar.

11. Lift up the drive shaft once more by its retaining pin and turn the shaft until its square section can enter the square recess inside the top of the feed cap.

12. Lock the shaft in place by the thumbscrew

13. Close the gate valve and vent the drill head to remove pressure.

14. Unclamp the drill head and remove it from the valve.

IMPORTANT – NEVER stand on the valve to use as a step when climbing out of the excavation. You may damage the valve or cause it to slip around the pipe making alignment with the tapped hole and or insertion of tees/plugs very difficult.

Installing Malleable Iron Plug (Please skip this section if you are using the Magnetic Plug Holder).

1. Select the correct size plug carrier to suit the plug to be installed and fit it to the fitting spindle using the T-Handle hex wrench to tighten the large setscrew *(Photo 11).*

(Photo 11)

(Photo 12)

2. Screw the plug, square end first, into the carrier about two threads deep *(Photo 12).*

3. Tighten the small setscrew to hold the plug in place.

4. Lubricate the plug fitting shaft with a little silicone paste.

5. Place the plug end of the shaft on a flat surface, place the canopy over the shaft and push the canopy down the shaft.

6. Apply pipe dope or PLCS Thread-Seal on the plug threads and withdraw the plug to the top of the canopy by pulling on the shaft.

7. Place the canopy on the valve and attach with the swing bolts.
8. Tighten the bolts alternately with the short valve wrench until snug *(Photo 13).*
9. Lift the plug off the valve gate by pulling up the shaft and then open the slide valve (*Photo 14).*

(Photo 13)

(Photo14)

(Photo 15)

10. Lower the shaft down to the tapped hole.
11. Using the valve wrench, turn the shaft counter-clockwise until you feel the plug skip over the leading thread of the hole.
12. Now turn the shaft clockwise and screw the plug in snug *(photo 15)*.
13. Open the vent on top of the canopy to vent off any gas trapped in the canopy. A continuous stream of escaping gas indicates that the plug did not enter the hole correctly. In this case unscrew and reinstall the plug.
14. Undo the swing bolt nuts and remove the canopy, lifting it by its ears.
15. Undo the gate valve chains and remove the valve and its saddle from the pipe.
16. Undo the large setscrew and remove the shaft.
17. Undo the small setscrew and unscrew the plug carrier from the plug. (IMPORTANT – Look into plug carrier to make sure you are not unscrewing the plug from the pipe).
18. Tighten the plug to the recommended torque with a pipe wrench.
19. Soap test the plug to ensure a gas tight seal has been achieved.

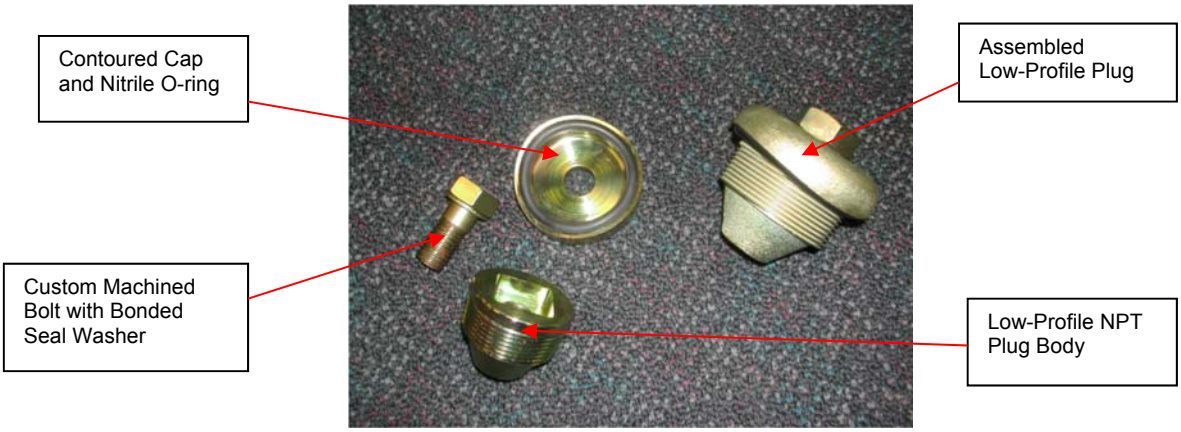
Installing Malleable Iron Plug using the Magnetic Plug Holder

1. Select the correct sized magnetic plug carrier to suit the plug being installed and attach it to the plug fitting spindle using the T-Handle hex wrench to tighten the large set screw (Photo 16).

(Photo 16)

2. Insert the square head of the plug into the square recess where a powerful magnet will hold the plug in place.
3. Lubricate the plug insertion shaft with a little silicone paste.
4. Place the plug end of the shaft on a flat surface, position the canopy centrally over the shaft and push the canopy down the shaft.
5. Apply pipe dope or PLCS Thread-Seal to the plug threads and withdraw the plug up into the top of the canopy by pulling upwards on the shaft.
6. Place the canopy on the valve and attach with the swing bolts.
7. Tighten the bolts alternately with the short valve wrench until snug *(Photo 13).*
8. Make sure the plug is not resting on the valve gate by pulling up on the shaft *(Photo 14)* and then open the slide valve.
9. Lower the shaft down to the tapped hole.
10. Using the valve wrench, turn the shaft counter-clockwise until you feel the plug skip over the leading thread of the tapped hole.
11. Now turn the shaft clockwise and screw the plug in snug *(Photo 15).*
12. Open the vent on top of the canopy to vent off any gas trapped in the canopy. A continuous stream of escaping gas indicates that the plug did not enter the hole correctly. In this case unscrew the plug and try again.
13. Undo the swing bolt nuts and remove the canopy, lifting it by its ears.
14. Undo the gate valve chains and remove the valve and its saddle from the pipe.
15. With an upwards motion pull the plug fitting shaft off the plug.
16. Tighten the plug to the recommended torque with a pipe wrench.
17. Soap test the tee to ensure a gas tight seal has been achieved.

Installing a PLCS Low-Profile Plug



Instructions and tooling is ONLY intended for the installation of PLCS/ALH Low-Profile plugs

Low-Profile plugs are available for insertion gas-free through the ALH System-One in the following sizes:

PLCS Part #	Description
46-A0163	1 ¼" Plug/Cap to fit 4" Pipe Profile
46-A0164	1 ¼" Plug/Cap to fit 6" Pipe Profile
46-A0165	1 ¼" Plug/Cap to fit 8"-12" Pipe Profile
46-A0158	1 ½" Plug/Cap to fit 4" Pipe Profile
46-A0159	1 ½" Plug/Cap to fit 6" Pipe Profile
46-A0160	1 ½" Plug/Cap to fit 8"-12" Pipe Profile
46-A0110	2" Plug/Cap to fit 8"-12" Pipe Profile
46-A0157	2 ½" Plug/Cap to fit 8"-12" Pipe Profile
46-A0161	1 ¼"- 1½" Plug Insertion Tool (Adaptor)
46-A0111	2 – 2 ½" Plug Insertion Tool (Adaptor)

1. To install a PLCS Low-Profile plug first separate the plug into its three separate components.
2. Using the large cap screw supplied with the Plug Insertion tool adaptor join the plug body and adaptor by lining up the square and snug up cap screw with a hex wrench (DO NOT OVERTIGHTEN).
3. Attach the adaptor/plug to the plug fitting spindle using the T-Handle hex wrench to tighten the shaft cap screw.
4. Lubricate the plug insertion shaft with a little silicone paste or spray.
5. Place the plug end of the shaft on a flat surface, position the canopy centrally over the shaft and push the canopy down the shaft
6. Apply PLCS Thread-Seal or pipe dope to the plug threads and withdraw the plug up into the top of the canopy by pulling upwards on the shaft.
7. Place the canopy on the valve and attach with the swing bolts.
8. Tighten the bolts alternately with the short valve wrench until snug *(Photo 13).*
9. Make sure the plug is not resting on the valve gate by pulling up on the shaft *(Photo 14)* and then open the slide valve.

10. Lower the shaft/plug down to the tapped hole.

11. Using the valve wrench, turn the shaft counter-clockwise until you feel the plug skip over the leading thread of the tapped hole.

12. Now turn the shaft clockwise and screw the plug in tightly *(Photo 15).*

13. Open the vent on top of the canopy to vent off any gas trapped in the canopy. A continuous stream of escaping gas indicates that the plug did not enter the hole correctly. In this case unscrew the plug and try again.

14. Undo the swing bolt nuts and remove the canopy, lifting it by its ears.

15. Undo the gate valve chains and remove the valve and its saddle from the pipe.

16. Undo the large setscrew and remove the shaft.

17. Using a hex wrench remove the cap screw from inside the adaptor and plug.

18. Apply a small amount of silicone/O-ring lube to the plug cap O-ring to ease installation.

19. Align the cap to match the curve of the pipe and while maintaining downward pressure on the cap/O-ring and insert the plug bolt into the threaded plug body recess. Tighten the bolt ensuring the cap DOES NOT rotate.

20. Soap test the Low-Profile plug to ensure a gas tight seal has been achieved.

Installing Brass Based Polyethylene Tees

1. Select the correct sized PE tee carrier.

2. Remove the PE tee cap.

3. Slide the tee carrier onto the plug fitting shaft and attach using the set screw and tighten (Photo 17).

4. Insert the PE tee fully into the carrier and secure by tightening the grub screws snugly against the tee metal collar (Photo 18).

5. Slide the tee and tee carrier into the torque hood (Photo 19).

(Photo 17)

(Photo 18)

(Photo 19)

6. Lubricate the tee insertion shaft with a little silicone paste and add pipe dope or PLCS Thread-Seal to brass threads.

7. Stand the tee carrier shaft upright on a flat surface, place the canopy over the shaft/tee carrier and push the canopy down the shaft making sure the tee is fully inside the canopy (Photo 20).

(Photo 20)

(Photo 21)

(Photo 22)

8. Place the canopy on the valve and attach the swing bolts (Photo 21).
9. Tighten the bolts alternately with the short valve wrench until snug (Photo 13).
10. Make sure the tee is not resting on the valve gate by pulling up on the shaft (Photo 14) and then open the slide valve.
11. Using the valve wrench, turn the shaft counter-clockwise until you feel the tee skip over the leading thread of the tapped hole.
12. Now turn the shaft clockwise and screw the tee in snug (Photo 15).
13. Open the vent on top of the canopy to vent off any trapped gas. A continuous stream of escaping gas indicates that the plug did not enter the hole correctly, in this case unscrew the tee and try again.
14. Undo the swing bolts and remove the canopy, lifting it by its ears (Photo 22).
15. Undo the gate valve chains and remove the valve and saddle from the pipe.
16. Undo the tee carrier grub screws and remove the shaft/carrier.
17. Tighten the tee into the main to the recommended torque with a wrench.
18. Soap test the tee to ensure a gas tight seal has been achieved.
19. Follow company procedures for the service tie in.

System-One tap breakage

ALWAYS Remove the tap from the tapped hole by turning the shaft anti-clockwise.

NEVER try to remove it by winding up the feed cap – this will break the top off the tap.

Very occasionally a tap is returned to us with the top of the tap shank broken off near the tang. Investigations and experiments to replicate the mode of failure all point to one result; unfortunately the operator has failed to follow the correct procedure. To understand what has happened an explanation of the engineering of the drill and tap and the correct operating procedure is necessary:

The tap shank has two tapered lands, which are ground to fit into the tapered hole in the shaft. The purpose of this is to align the center of the shaft with the center of the tap.

NOTE – The tapered hole and the tap shank must be wiped clean with a rag prior to inserting the tap to insure that there is no dirt on either surface that would prevent the tap seating properly. Then a piece of wood should be placed over the end of the tap/holesaw and given a light blow with a hammer to perfectly seat the tap in the taper.

There are two flats at the base of the threaded portion, which fit into a matching recess in the shaft. The drive from the shaft is transmitted to the tap via these flats. The tap is not driven from the taper.

A grub screw is screwed through the shaft to the tap shank between the two ground lands. The purpose of this is to prevent the tap dropping out once it has been unscrewed from the newly tapped hole. This grub screw should not be over-tightened.

Correct Procedure:

Once the tapping is complete, turn the ratchet wrench over and remove the tap from the main by operating the wrench in an anti-clockwise direction. At the same time wind the feed cap up making sure it never makes contact with the shaft-retaining pin at this stage. When the tap is fully removed from the main you will feel and hear a noticeable bump/skip as the leading edge of the tap's thread disengages from the threaded hole.

Grip the shaft by its retaining pin and you should be able to lift it a little. This guarantees that the tap is free of the threads. Wind the feed cap up to the shaft-retaining pin and then continue winding up until the first brass thread is exposed on the drill base. Lift up the drive shaft once more using the shaft-retaining pin. Locate the shaft into its square internal seat and lock into position with the shaft locking screw. Close the gate valve and remove the drill head.

Incorrect Procedure:

We have tried to duplicate the mode of breakage of these taps and all our tests show that the only way they can be broken in this exact manner is by forgetting to wind the tap out of the hole using the shaft. Instead the operator inadvertently tries to withdraw the tap by winding up the feed cap. The tap stays in the pipe and pulls the shaft taper from the tapered hole. This action forces the top land of the tap hard against the grub screw. Excessive unscrewing force on the cap handles will cause the tap to go off center and rotate around the grub screw, which digs in and breaks the top off the shank just like taking a bottle cap off. Don't forget that taps are extremely hard and consequently very brittle.

The amount of force necessary to do this is not excessive, though noticeable. We did not use a cheater bar. The mechanical advantage of a screw thread is sufficient. System-One tapping machines are designed for ease of operation. Excessive force should never be needed during normal operation. If abnormal force is required **STOP** and investigate the cause before attempting to continue.

Neodymium Magnet Safety

The neodymium magnets we sell are extremely strong, and must be handled with care to avoid personal injury and damage to the magnets. Fingers and other body parts can get severely pinched between two attracting magnets. Neodymium magnets are brittle, and can peel, crack or shatter if allowed to slam together. Eye protection should be worn when handling these magnets, because shattering magnets can launch pieces at great speeds.

The strong magnetic fields of neodymium magnets can also damage magnetic media such as floppy disks, credit cards, magnetic I.D. cards, cassette tapes, video tapes or other such devices. They can also damage televisions, VCRs, computer monitors and other CRT displays. Never place neodymium magnets near electronic appliances.

Children should not be allowed to handle neodymium magnets as they can be dangerous. Small magnets pose a choking hazard and should never be swallowed or inserted into any part of the body.

Never allow neodymium magnets near a person with a pacemaker or similar medical aid. The strong magnetic fields of the magnet can affect the operation of such devices.

Eye protection should be worn when handling these magnets.

Neodymium magnets are brittle and prone to chipping and cracking. They do not take kindly to machining.

Neodymium magnets will lose their magnetic properties if heated above 175°F (80°C).

Neodymium magnets should never be burned, burning them will create toxic fumes.

Like any tool or toy, neodymium magnets can be fun and useful, but must always be treated with care.

Choosing the correct holesaw or cutter size for an NPT tapered hole.

Pipe sizes are “nominal” sizes not “actual” sizes.

A ¾” pipe is actually 1” diameter

A 1” pipe is actually 1 ¼” diameter

A 1 ¼” pipe is actually 1 ⅝” diameter

A 1 ½” pipe is actually 1 ¾” diameter

A 2” pipe is actually 2 ⅜” diameter

A 2 ½” pipe is actually 2 ¾” diameter

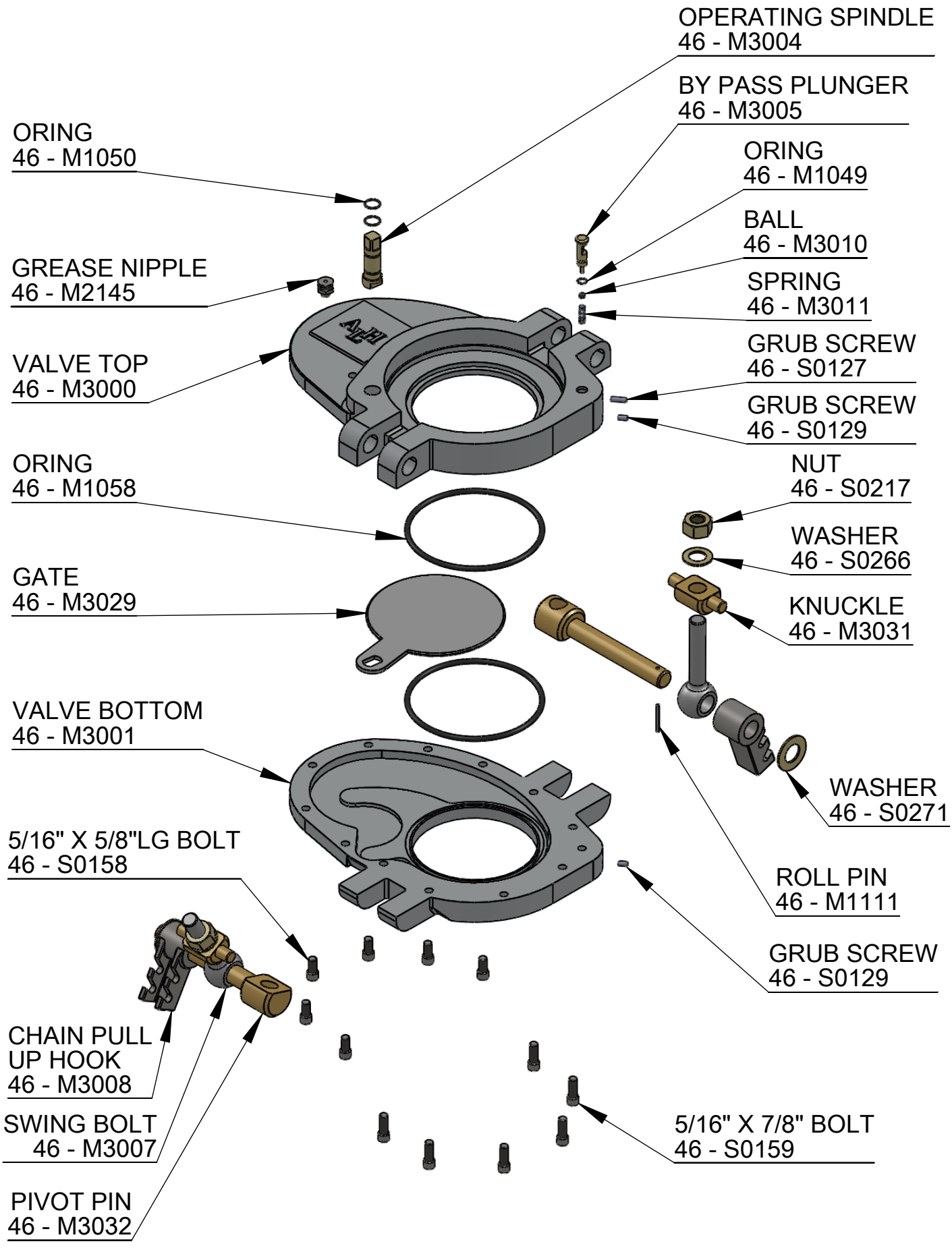
To cut an NPT thread we must use a tapered tap. The holesaw/cutter must cut a hole that allows the tap to enter but is not larger than the root of the cut thread at the bottom of the hole. This creates a full thread depth throughout the length of the cut hole without having to remove a lot of metal.

The perfect sizes to cut a hole to suit standard NPT threads are as shown in the chart.

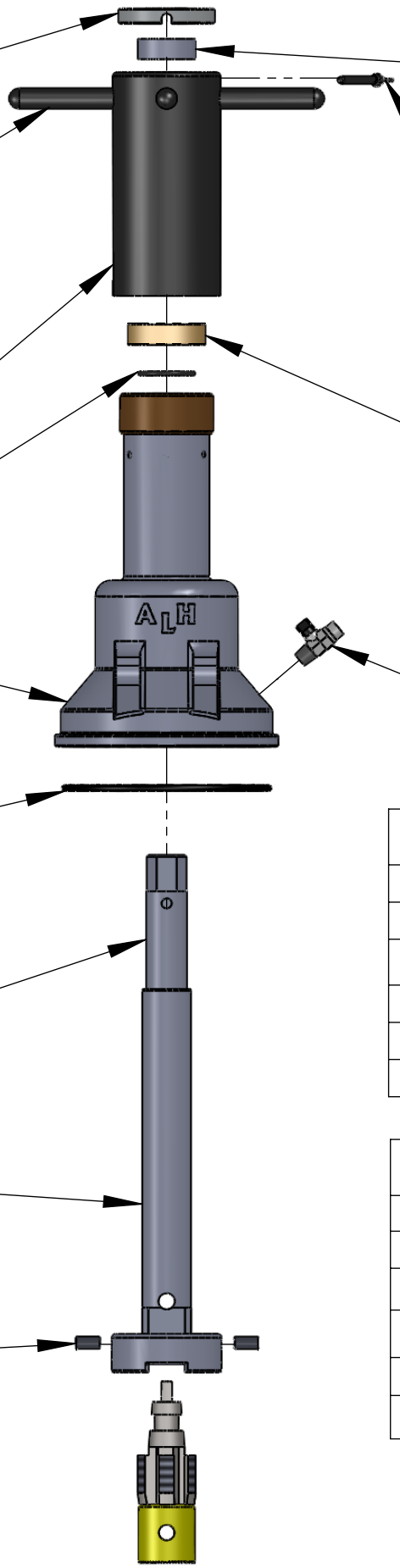
PLCS/ALH Hole Saw Identification Chart

Part #	Actual Size ***Shown on Label & Stamped on Holesaw***	USA - NPT Tap Size
46-A0265	24mm	¾”
46-A0266	30mm	1”
46-A0267	38mm	1 ¼”
46-A0268	44mm	1 ½”
46-A0269	56mm	2”
46-A0270	68mm	2 ½”

ALH SYSTEM-ONE CONTROL VALVE

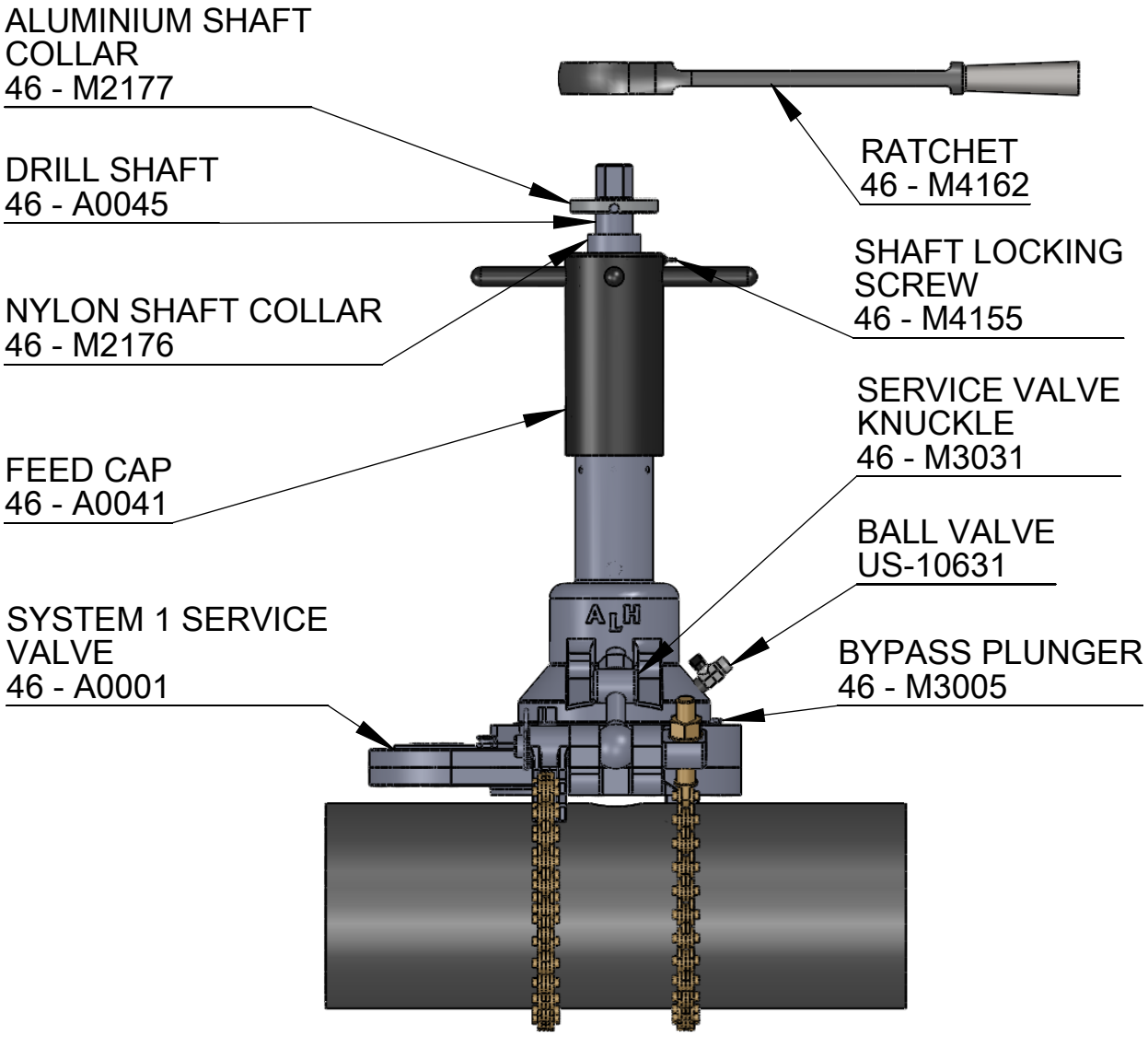


ALH SYSTEM-ONE DRILLING MACHINE
46 - A4500



NPT TAP	PART NO.
3/4"	46 - B0260
1"	46 - B0261
1 1/4"	46 - B0262
1 1/2"	46 - B0263
2"	46 - B0264
2 1/2"	46 - B0265

HOLESAW	PART NO.
3/4"	46 - A0265
1"	46 - A0266
1 1/4"	46 - A0267
1 1/2"	46 - A0268
2"	46 - A0269
2 1/2"	46 - A0270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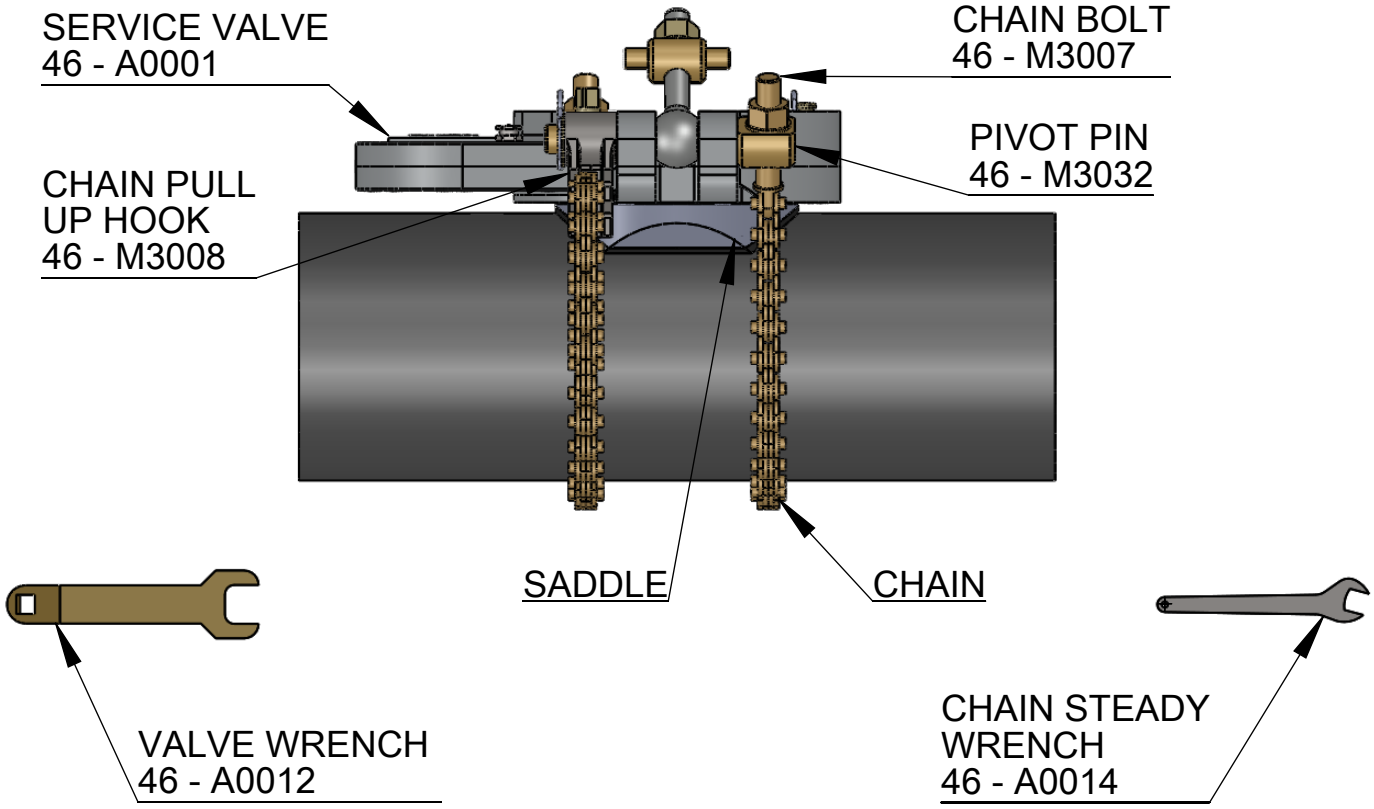
46 - M2177
DRILL SHAFT
46 - A0045
NYLON SHAFT COLLAR
46 - M2176
FEED CAP
46 - A0041
SYSTEM 1 SERVICE VALVE
46 - A0001
RATCHET
46 - M4162
SHAFT LOCKING SCREW
46 - M4155
SERVICE VALVE KNUCKLE
46 - M3031
BALL VALVE
US-10631
BYPASS PLUNGER
46 - M3005



Saddles

SIZE	PART #
3"	46-A0003A
4"	46-A0003
6"	46-A0005
8"	46-A0007
10"	46-A0009
12"	46-A0010
16"	46-A0072
20"	46-A0073
24"	46-A0074
30" - 42"	46-A0422

Chains

SIZE	PART #
3" - 12"	46-A0013
12" - 24"	46-A2900
24" - 36"	46-A2941
36" - 48"	46-A2942