CE

BOILER GUN

BG44 BOILER GUN

OPERATING MANUAL

H&S TOOL
A CLIMAX COMPANY

P/N 100190
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Revision 1

CLIMAX Family of Brands | BORTECH | CALDER TESTERS | H&S TOOL

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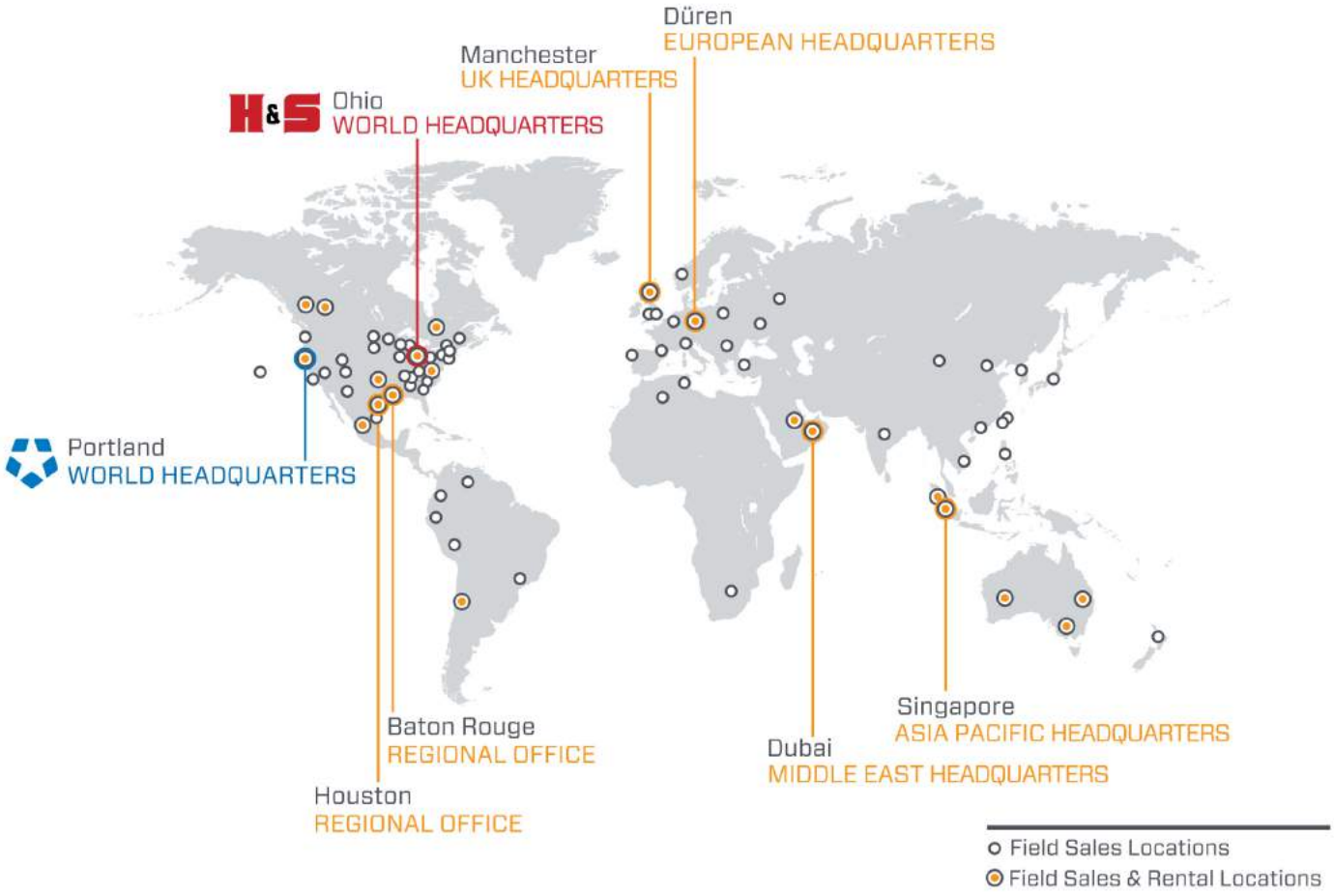
CLIMAX GLOBAL LOCATIONS



CE DOCUMENTATION

CE Certification is pending

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About this manual

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1 INTRODUCTION

IN THIS CHAPTER:

1.1 How to use this manual - - - - - 1
1.2 Safety alerts - - - - - 1
1.3 General safety precautions - - - - - 2
1.4 Machine-specific safety precautions - - - - - 3
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1.1 How to use this manual

This manual describes information necessary for the setup, operation, maintenance, storage, shipping, and decommissioning of the BG44 Boiler Gun.

The first page of each chapter includes a summary of the chapter contents to help you locate specific information. The appendices contain supplemental product information to aid in setup, operation, and maintenance tasks.

Read this entire manual to familiarize yourself with the BG44 Boiler Gun before attempting to set it up or operate it.

1.2 Safety alerts

Pay careful attention to the safety alerts printed throughout this manual. Safety alerts will call your attention to specific hazardous situations that may be encountered when operating this machine.

Examples of safety alerts used in this manual are defined here[1]:

⚠ DANGER

indicates a hazardous situation which, if not avoided, ***WILL*** result in death or severe injury.

⚠ WARNING

indicates a hazardous situation which, if not avoided, ***COULD*** result in death or severe injury.

⚠ CAUTION

indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

indicates a hazardous situation which, if not avoided, could result in property damage, equipment failure, or undesired work results

1. For more information on safety alerts, refer to *ANSI/NEMA Z535.6-2011, Product safety Information in Product Manuals, Instructions, and Other Collateral Materials*.

1.3 GENERAL SAFETY PRECAUTIONS

H&S leads the way in promoting the safe use of portable machine tools. Safety is a joint effort. You, the end user, must do your part by being aware of your work environment and closely following the operating procedures and safety precautions contained in this manual, as well as your employer's safety guidelines.

Observe the following safety precautions when operating or working around the machine.

Training – Before operating this or any machine tool, you should receive instruction from a qualified trainer. Contact H&S for machine-specific training information.

Risk assessment – Working with and around this machine poses risks to your safety. You, the end user, are responsible for conducting a risk assessment of each job site before setting up and operating this machine.

Intended use – Use this machine in accordance with the instructions and precautions in this manual. Do not use this machine for any purpose other than its intended use as described in this manual.

Personal protective equipment – Always wear appropriate personal protective gear when operating this or any other machine tool. Flame-resistant clothing with long sleeves and legs is recommended when operating the machine. Hot chips from the workpiece may burn or cut bare skin.

Work area – Keep the work area around the machine clear of clutter. Restrain cords and hoses connected to the machine. Keep other cords and hoses away from the work area.

Lifting – Many H&S machine components are very heavy. Whenever possible, lift the machine or its components using proper hoisting equipment and rigging. Always use designated lifting points on the machine. Follow lifting instructions in the setup procedures of this manual.

Lock-out/tag-out – Lock-out and tag-out the machine before performing maintenance.

Moving parts – H&S machines have numerous exposed moving parts and interfaces that can cause severe impact, pinching, cutting, and other injuries. Except for stationary operating controls, avoid contact with moving parts by hands or tools during machine operation. Remove gloves and secure hair, clothing, jewelry, and pocket items to prevent them from becoming entangled in moving parts.

Sharp edges – Cutting tools and workpieces have sharp edges that can easily cut skin. Wear protective gloves and exercise caution when handling a cutting tool or workpiece.

Hot surfaces – During operation, motors, pumps, HPUs, and cutting tools can generate enough heat to cause severe burns. Pay attention to hot surface labels, and avoid contact with bare skin until the machine has cooled.

1.4 MACHINE-SPECIFIC SAFETY PRECAUTIONS

Eye hazard - This machine produces metal chips during operation. Always wear eye protection when operating the machine.

Hazardous environments - Do not operate the machine in environments where potentially explosive materials, toxic chemicals, or radiation may be present.

Sound level - This machine produces potentially harmful sound levels. Hearing protection is required when operating this machine or working around it. During testing, the machine produced the sound levels[1] listed in Table 1-1.

TABLE 1-1. SOUND LEVELS

	Pneumatic Motor
Average sound pressure	90.6 dBA
Operator sound pressure	91.5 dBA
Bystander sound pressure	89.4 dBA
	Electric Motor
Average sound pressure	85 dBA
Operator sound pressure	85 dBA
Bystander sound pressure	85 dBA

1. Machine sound testing was conducted in accordance with European Harmonized Standards EN ISO 3744:2010 and EN 11201:2010.

1.5 RISK ASSESSMENT AND HAZARD MITIGATION

Machine Tools are specifically designed to perform precise material-removal operations.

Stationary Machine Tools include lathes and milling machines and are typically found in a machine shop. They are mounted in a fixed location during operation and are considered to be a complete, self-contained machine. Stationary Machine Tools achieve the rigidity needed to accomplish material-removal operations from the structure that is an integral part of the machine tool.

In contrast, Portable Machine Tools are designed for on-site machining applications. They typically attach directly to the workpiece itself, or to an adjacent structure, and achieve their rigidity from the structure to which it is attached. The design intent is that the Portable Machine Tool and the structure to which it is attached become one complete machine during the material-removal process.

To achieve the intended results and to promote safety, the operator must understand and follow the design intent, set-up, and operation practices that are unique to Portable Machine Tools valve testers.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of portable machining applications hydrostatic testing, identifying one or more hazards that must be addressed is typical.

When performing the on-site risk assessment, it is important to consider the Portable Machine Tool valve tester and the workpiece as a whole.

1.6 RISK ASSESSMENT CHECKLIST

The following checklist is not intended to be an all inclusive list of things to watch out for when setting up and operating this Portable Machine Tool.

However, these checklists are typical of the types of risks the assembler and operator should consider. Use these checklists as part of your risk assessment:

TABLE 1-2. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

	Before set-up
☐	I took note of all the warning labels on the machine.
☐	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
☐	I considered the need for personnel safety guarding and installed any necessary guards.
☐	I read the machine setup instructions (Section 3.2) and took inventory of all the items required but not supplied (Section 2.5).
☐	I considered how this machine operates and identified the best placement for the controls, cabling, and the operator.
☐	I evaluated and mitigated any other potential risks specific to my work area.

TABLE 1-3. RISK ASSESSMENT CHECKLIST AFTER SET-UP

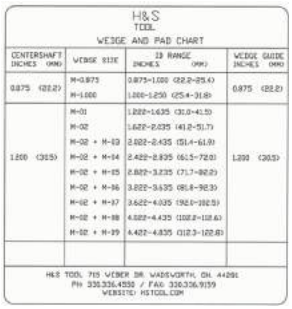
	After set-up
☐	I checked that the machine is safely installed (according to Section 3) and the potential fall path is clear. If the machine is installed at an elevated position, I checked that the machine is safeguarded against falling.
☐	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.
☐	I planned for containment of any chips or swarf produced by the machine.
☐	I followed the required Maintenance Intervals (Section 5.1) with the recommended lubricants (Section 5.2).
☐	I checked that all affected personnel have the recommended personal protective equipment, as well as any site-required or regulatory equipment.
☐	I checked that all affected personnel understand and are clear of the danger zone.
☐	I evaluated and mitigated any other potential risks specific to my work area.

1.7 LABELS

1.7.1 Label identification

The following warning labels should be on your machine. If any are defaced or missing, contact H&S Tool immediately for replacements.

TABLE 1-4. BG44 BOILER GUN LABELS

	P/N 100196 HV Boiler gun label P/N 100197 LV Boiler gun label		P/N 100199 H&S company label
	P/N 100198 H&S serial plate crank feed only		P/N 802112 Multi-Prep label
	P/N 87259 H&S serial plate wrench feed only		P/N 100200 H&S serial plate crank feed only
	P/N 87271 Warning label: use eye and ear protection, and read the operating manual		P/N 100248 Wedge and pad chart label

1.7.2 Label location

The following figures display the location of the labels on each of the components of the BG44 Boiler Gun.

FIGURE 1-1. BG44 BOILER GUN- CRANK FEED, PNEUMATIC LABEL LOCATION

Label P/N: 100196 or 100197, 100198, 100199, 802112, 100200, 87271

FIGURE 1-2. BG44 BOILER GUN- WRENCH FEED, PNEUMATIC LABEL LOCATION

Label P/N: 87271

FIGURE 1-3. BG44 BOILER GUN- WRENCH FEED, ELECTRIC LABEL LOCATION

Label P/N: 87259

2 OVERVIEW

IN THIS CHAPTER:

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2.2 Controls - - - - - - - - - - -10
2.2.1 Pneumatic motor controls - - - - - - - - - - -10
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2.5 Items required but not supplied - - - - - - - - - - -12

2.1 Features and components

The BG44 is a portable, gear-driven, inside-diameter (ID)-mounted, single or dual-point beveling and facing machine for use on workpieces with a range of .875” (22.2mm) I.D. to 5.00” (127mm) O.D.

Principle components include the following:

Drive options: Available with either a 1.625 HP pneumatic motor or a 1.5 HP electric motor.

High Velocity (HV) or Low Velocity (LV) gearing—HV delivers higher speeds to turn specialty carbide insert cutters while LV is geared for heavy wall and hard alloys.

Mounting systems—Either a wedge or collet mounting system secures the BG44 to the workpiece. They are both self-centering and adapt to a wide range of pipe sizes.

Tool holders—Available with either fixed or sliding tools holders, in multiple sizes.

Torque free operation—Once securely mounted the BG44 requires no additional effort to operate aside from feeding the cutting tool.

Wrench feed—Advances the cutting tools in confined areas with a ratcheting system. This system has a smaller footprint.

Crank feed—Advances the cutting tools with a fast and convenient side-mounted crank.

Speed wheel—Provides a quicker way advance the locking rod nut before fully tightening with the wrench.

Figure 2-1. BG44 and shipping container

2.2 CONTROLS

Depending on the users requirements, the BG44 Boiler Gun can be powered by either a pneumatic or electric motor. The controls for each type of motor follow.

⚠ WARNING

Always stop the machine and disconnect any power supply before making adjustments to controls or machine components. Failure to follow this safety precaution may result in severe injury.

2.2.1 Pneumatic motor controls

The pneumatic motor used on the BG44 features a throttle lever. The safety lock must be disengaged by pressing and holding up while depressing the throttle lever. The throttle lever actuates the motor; when released, the motor will stop and the safety lock will re-engage.

This is an on or off control only.

FIGURE 2-2. PNEUMATIC MOTOR THROTTLE LEVER

2.2.2 Electric motor controls

The electric motor controls are similar to a drill or drill driver. The trigger is squeezed to actuate the motor, when released the motor will stop.

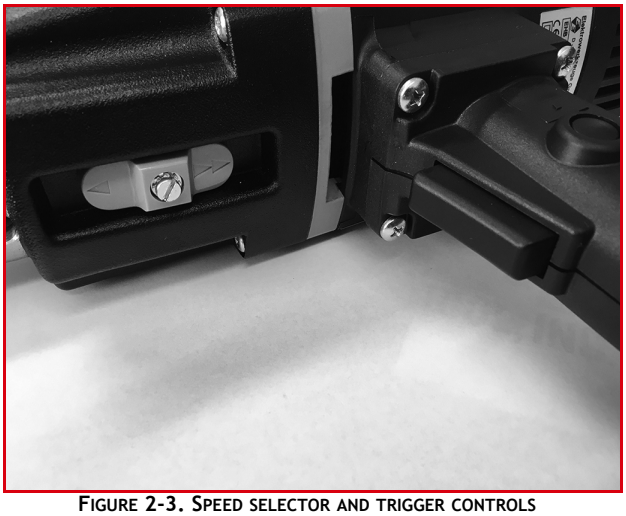

FIGURE 2-3. SPEED SELECTOR AND TRIGGER CONTROLS

This is an on and off control only.

A two speed gearing selector is located at the front of the motor. The BG44 is designed to be used with the electric motor in the low setting ONLY.The low setting is indicated with a single arrow while the high setting is indicated with two arrows.

To adjust, if the motor is not in the low setting, push in and slide the selector. The spindle may need turned by hand to fully engage, when fully engaged the selector will spring back up. If not fully engaged the drive motor will not function properly.

⚠ WARNING

Do not take any measures to lock the throttle or the trigger in the on position. Failure to follow this safety precaution may result in severe injury.

2.3 DIMENSIONS

Figures 2-4 and 2-5 show the machine and operating dimensions.

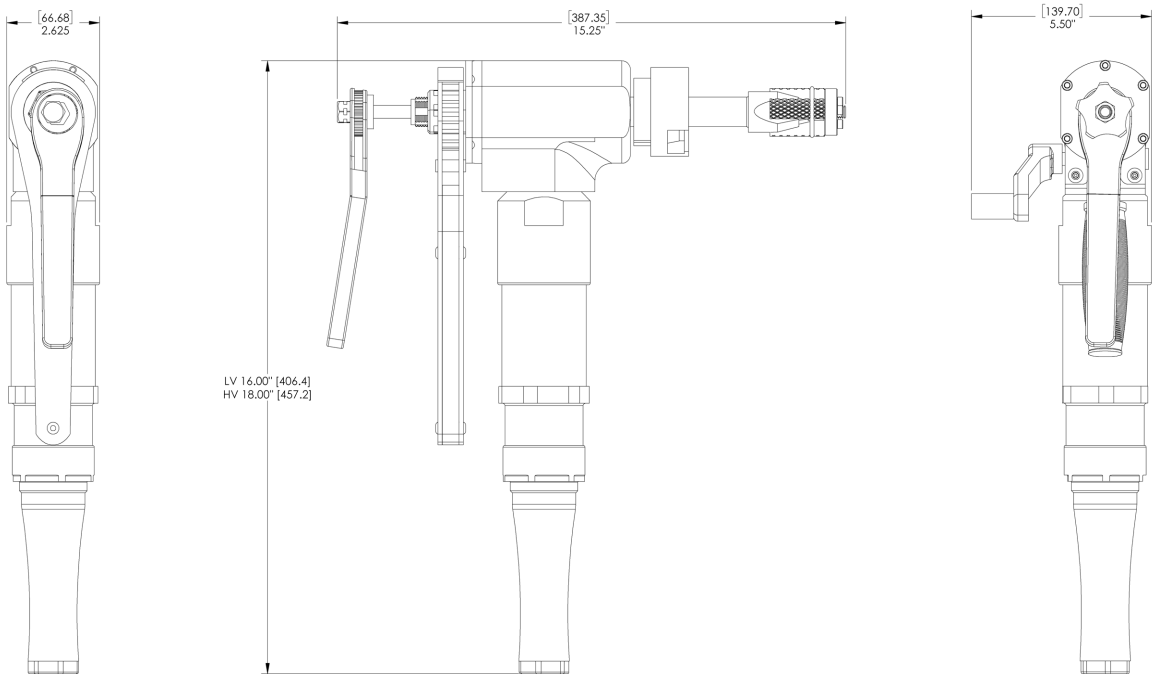

FIGURE 2-4. BG44 BOILER GUN PNEUMATIC DIMENSIONS

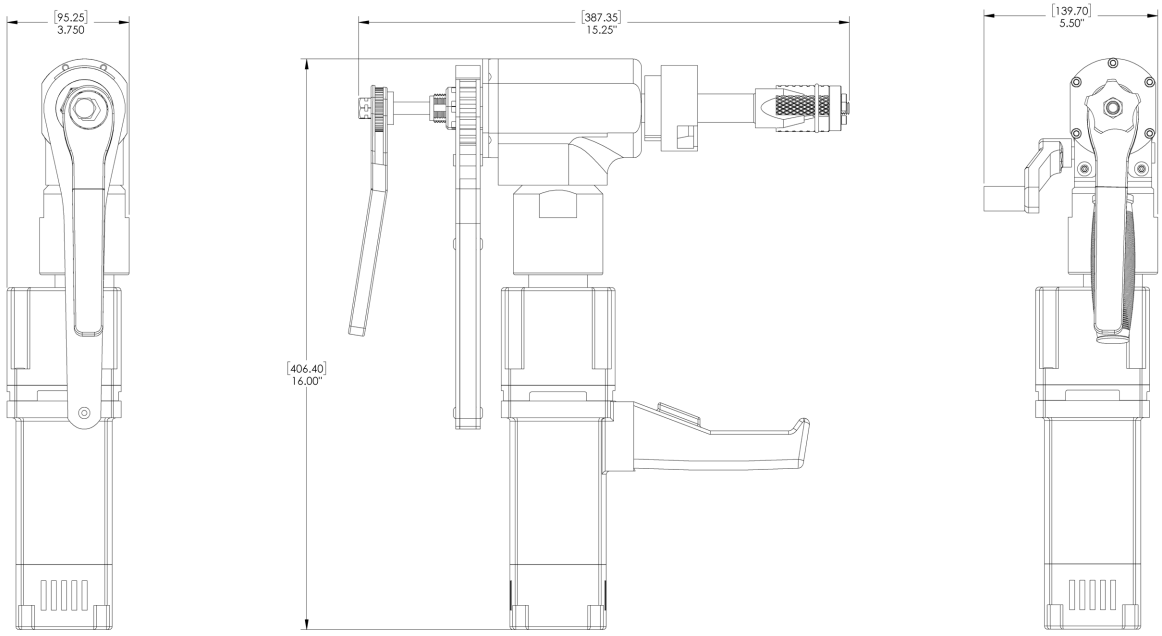

FIGURE 2-5. BG44 BOILER GUN ELECTRIC DIMENSIONS

2.4 SPECIFICATIONS

TABLE 2-1. SUB-COMPONENT MASS

P/N	Component	Mass in lbs (kg)
BG44	BG44 Boiler Gun Pneumatic	21 (9.5)
BG44	BG44 Boiler Gun Electric	25 (11.3)

2.5 ITEMS REQUIRED BUT NOT SUPPLIED

The following items may be required but not supplied in your H&S product kit:

- Tape measure or steel ruler
- Rubber mallet
- Pliers

3 SETUP

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3.5 Motors -20
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3.5.2 Electric motor -20

This section describes the setup procedures for the BG44 Boiler Gun.

3.1 Receipt and inspection

Your H&S product was inspected and tested prior to shipment then packaged for normal shipment conditions. H&S does not guarantee the condition of your machine upon delivery.

When you receive your H&S product, perform the following receipt checks:

1. Inspect the shipping containers for damage.
2. Check the contents of the shipping containers against the included invoice to make sure that all components have been shipped.
3. Inspect all components for damage.

Contact H&S immediately to report damaged or missing components.

NOTICE

Keep the shipping container and all packing materials for future storage and shipping of the machine.

3.2 MACHINE SETUP

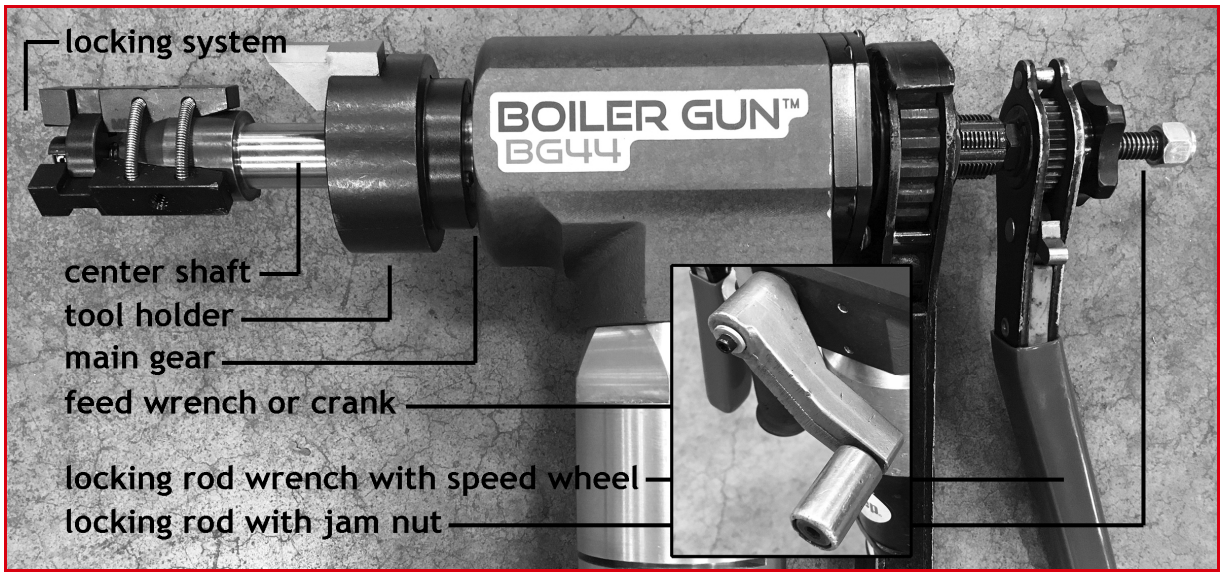

FIGURE 3-1. BG44 BOILER GUN MAIN COMPONENTS

Do the following to setup the BG44 Boiler Gun:

3.2.1 Wedge locking system

1. Complete the risk assessment checklist in Table 1-2 on page 5.
2. Position the machine on a solid support for installation of the wedge set.
3. Measure the I.D. of the pipe to be machined and determine the size of the wedge extension set to be used, if required. The wedge bases can also be used without extensions.
4. If installing wedge extensions, secure three of the same size range onto the base wedges with the screws.

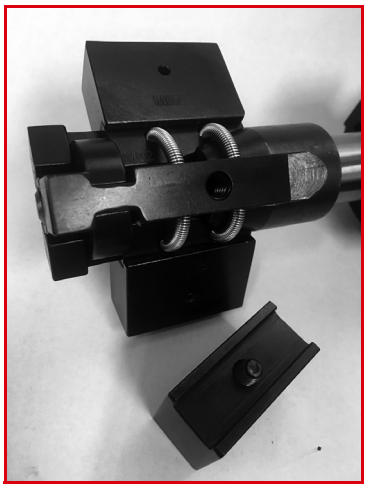

FIGURE 3-2. WEDGE EXTENSIONS INSTALLATION

3.2.1.1 Interchanging the M-01 and M-02 base wedge sets

The M-01 and M-02 wedge sets can use the same center shaft. Do the following to change between the wedge set sizes:

1. Return the machine to a solid support for removal and installation of the wedge sets.
2. To remove: Pull out on the wedge set enough to slide them up and over the wedge guide.
3. To install: Expand the wedge bases enough to slide the wedge set over the wedge guide and onto the center shaft.

4. Align the wedges sets with the slots in the center shaft and seat the other ends on the wedge guide.

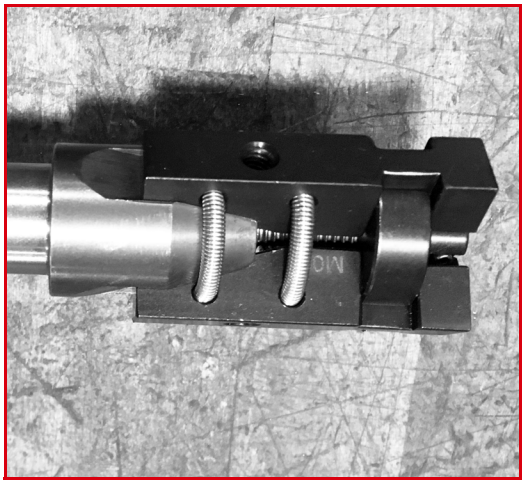

FIGURE 3-3. INSTALLED WEDGE SET

3.2.1.2 Interchanging the .875” and 1.200” wedge mounting systems

The .875” wedge mounting system uses a dedicated center shaft.

FIGURE 3-4. THE .875 WEDGE SET

Do the following to change between a 1.200” wedge set and the .875” wedge set:

1. Return the machine to a solid support for removal and installation of the wedge sets.
2. Remove the jam nut from the end of the locking rod.
3. Remove the locking rod wrench from the locking rod. The direction of the ratchet mechanism may need to be switched to feed off instead of on.
4. Slide the wedge set with locking rod out of the center shaft from the wedge end of the machine.
5. On the crank feed machine, turn the crank opposite of the feed direction until the threads of the center shaft are free of the feed nut.

   On the wrench feed machine, turn the wrench opposite of the feed direction until the threads of the center shaft are free of the feed nut.
6. Slide the center shaft out from the front of the machine.
7. Insert the center shaft of the .875” wedge set, threaded end first, through the tool holder and into center shaft lock, aligning the slots in the threaded shaft with splines in the center shaft lock. Continue to insert the center shaft until it stops against the feed nut.
8. On the crank feed machine, turn the crank to advance the center shaft.

   On the wrench feed machine, turn the wrench to advance the center shaft. The direction of the ratchet mechanism may need switched to feed in instead of off.
9. Advance the center shaft until approximately .50” (12.7mm) of threads protrude past the rear of the machine or the feed wrench.
10. Reinstall the locking rod wrench until .50” (12.7mm) of the locking rod protrudes.

11. Reinstall the jam nut on the end of the locking rod.

3.2.2 Collet locking system

1. Complete the risk assessment checklist in Table 1-2 on page 5.
2. Position the machine on a solid support for installation of the collet set.
3. Measure the I.D. of the pipe to be machined and determine the size of the collet set to be used.
4. Based on size, locate the center shaft that matches the collet set required.
5. To install the center shaft:
   a) Insert the center shaft through the tool holder and into the center shaft lock, aligning the slots in the threaded shaft with the splines on the center shaft lock. Continue to insert the center shaft until it stops against the feed nut.
   b) On the crank feed machine, turn the crank to advance the center shaft.

      On the wrench feed machine, turn the wrench to advance the center shaft. The direction of the ratchet mechanism may need switched to feed in instead of off.
6. Slide a locking rod into the center shaft from the rear of the machine.
7. Thread the required collet set on the end of the locking rod until the collets begin to engage the center shaft. If flat are present on the center shaft, align the collets with the flats.

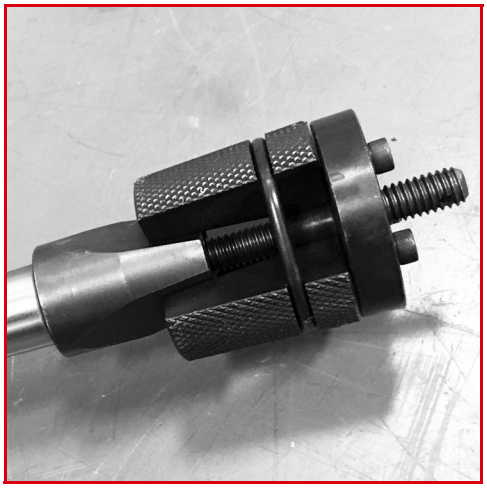

FIGURE 3-5. THE 1.25" COLLET SET INSTALLED

8. Insert a cotter pin through the hole in the locking rod and open the splines to secure.
9. If not installed, slide the locking rod wrench onto the locking rod nut and secure with a retaining clip.
10. To remove the center shaft, reverse steps 5-8.

3.2.2.1 Interchanging the collet sets

The .875" collet system has a range of .875 to 1.25". It uses three collet sets, in .125" increments and the .875" center shaft.

The 1.25" collet system has a range of 1.25 to 4.75". The collet sets are in .125" increments and use the 1.25" center shaft.

Do the following to change between the collet sets:

1. Return the machine to a solid support.
2. Remove the cotter pin from the end of the locking rod.
3. Remove the collet set from the locking rod.
4. Install the collet set on the locking rod. If flats are present on the center shaft, align the collet segments with the flats.
5. Reinstall the cotter pin.
6. See Section 3.2.2, Steps 5-8 to interchange the center shafts.

FIGURE 3-6. THE .875" COLLET SET

3.2.3 Tool holders

The BG44 Boiler Gun can be used with two styles of tool holders in several different sizes.

Do the following to switch between tool holders:

To remove:

1. Loosen the set screw in the body of the tool holder.
2. The tool holder has an interference fit with the main gear. Strike the back face of the tool holder to remove it towards the front of the machine.
3. The shaft key may come loose from the main gear during removal. Retain it for reuse.

To install:

1. Check that the set screw in the body of the tool holder is backed out or remove completely.
2. Install the shaft key in the key slot on the main gear.
3. Slide the tool holder onto the main gear, aligning the key way with the shaft key.
4. Tap into place until seated against the shoulder on the main gear.
5. Reinstall or tighten the set screw in the tool holder body until secure.

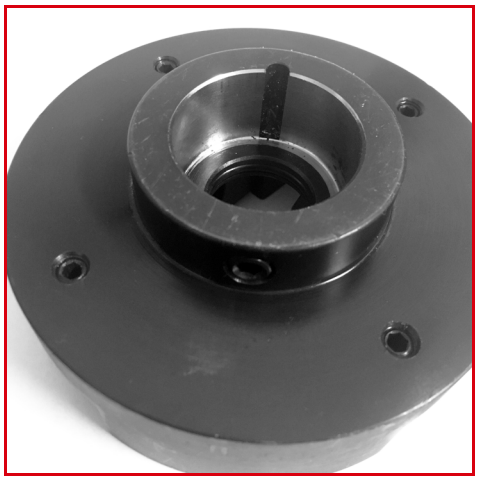

FIGURE 3-7. TOOL HOLDER SET SCREW AND KEY SLOT

3.3 MACHINE MOUNTING

Do the following to mount the BG44 on the workpiece:

1. Insert the mounting system end of the BG44 into the workpiece until there is approximately .50” (12.7mm) between the end of the mounting system and the face of the workpiece. This will provide enough material for most procedures.

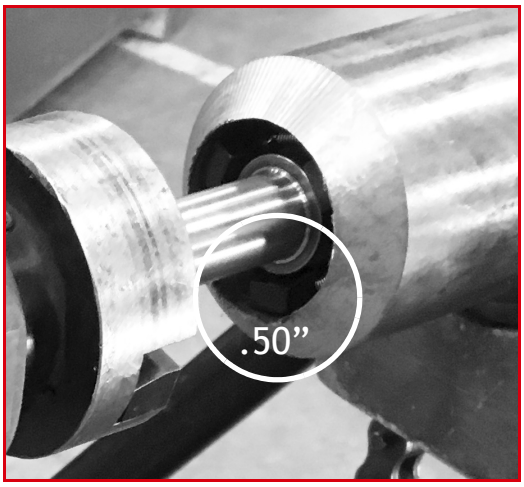

FIGURE 3-8. BG44 INSTALLED IN WORKPIECE

2. Tighten the mounting system by turning the lock rod clock-wise using either the rod wrench or the speed wheel. Once snug, verify that the mounting system position in the workpiece has been maintained. Completely tighten the mounting system using the locking rod wrench.

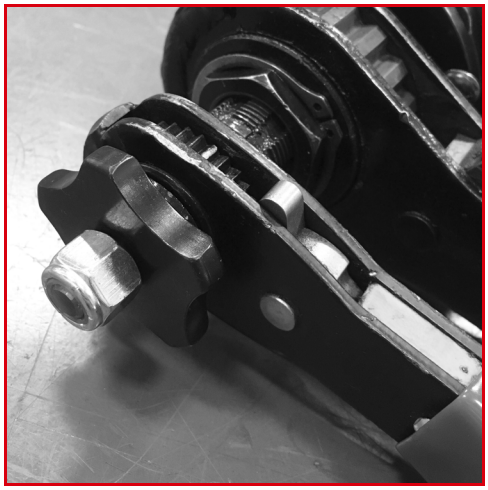

FIGURE 3-9. LOCKING ROD WRENCH WITH SPEED WHEEL

⚠ WARNING

Check that the mounting system has been fully tightened. After the machine has made 2-3 revolutions during operation, recheck the mounting system for tightness in the pipe. If loose, the machine itself could rotate causing severe injury to the operator.

3.4 INSTALLING THE CUTTING TOOLS

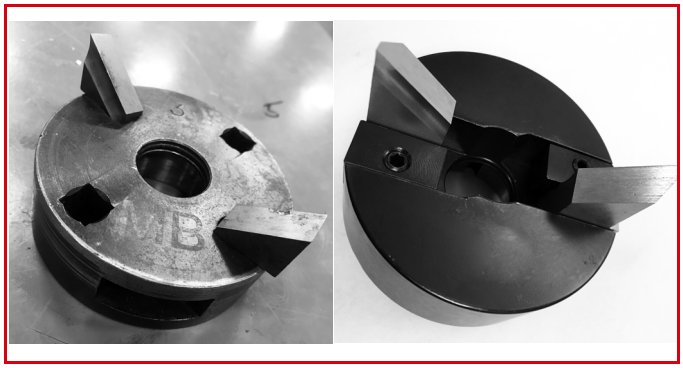

FIGURE 3-10. FIXED (L) AND SLIDING (R) TOOL HOLDERS WITH CUTTING BITS.

Do the following to install the cutting bit(s):

1. Advance the tool holder towards the workpiece to help with alignment of the cutting bit(s).
2. On a fixed tool holder:
   a) Loosen the set screw for the cutting tool slot.
   b) Fully insert the cutting bit into the slot with the beveled cutting edge facing the direction of rotation.
   c) Tighten the set screw(s).
3. On a sliding tool holder:
   a) Loosen the set screws in the blade locks.
   b) Slide the cutting bit into the channel with the beveled cutting edge facing the direction of rotation.
   c) Align the cutting edge of the tool to cut the full width of the workpiece wall.
4. Tighten the set screw(s) to secure the cutting bit(s) to the tool holder.
5. If using two blades, install the second blade opposite (180°) to the first. Orientate the beveled cutting edge facing the direction of rotation.

TIP:

The BG44 Boiler Gun can be operated with one blade. Smoother operation on harder materials or thicker pipe walls will result with the use of two blades.

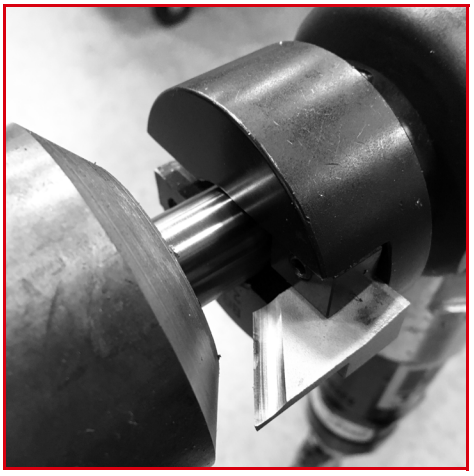

FIGURE 3-11. CUTTING BIT INSTALLED

3.5 MOTORS

The BG44 Boiler Gun is powered by either a pneumatic motor or an electric motor. The following subsections explain how to set up each for operation.

3.5.1 Pneumatic motor

Do the following to prepare the pneumatic motor for use (See Section 2.2 for controls):

1. Connect the air supply line to the in-line oiler/ filter end of the air hose assembly with the universal coupler. Secure with the lock pin.
2. Connect the air hose assembly to the pneumatic drive motor using the quick disconnect coupler.

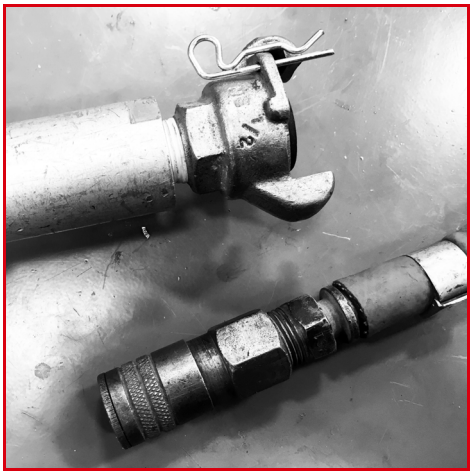

FIGURE 3-12. UNIVERSAL COUPLER (TOP) AND QUICK DISCONNECT (BOTTOM)

3.5.2 Electric motor

Do the following to prepare the electric motor for use (See Section 2.2 for controls):

1. Verify that the speed control is set to low. The selector switch should be at the single arrow position.

FIGURE 3-13. SPEED CONTROL SET TO LOW

2. Plug the drive into an OSHA certified power source or consult a licensed electrician for additional power supply options.

4 OPERATION

IN THIS CHAPTER:

4.1 PRE-OPERATION CHECKS -21
4.2 OPERATION -21
4.2.1 PNEUMATIC MOTOR -21
4.2.2 ELECTRIC MOTOR -22

4.1 PRE-OPERATION CHECKS

Do the following checks before operating the machine:

1. Complete the risk assessment checklist in Table 1-3 on page 5.
2. Check that the work area is clear of non-essential personnel and equipment.
3. Check that the machine control/observation area will not be in the path of hot flying chips during machine operation.
4. Check the machine is securely mounted to the workpiece, according to Section 3.3 on page 14.
5. Check that hoses and electric cords are routed and secured to avoid tripping, entanglement, damage from hot chips, or other damage should an air hose or connection fail.
6. Check the cutting tool condition and sharpness.
7. On the in-line air lubricator, verify that oil is present in the sight glass. (See Section 5.3.1)
8. Check that all hand tools are removed from inside the machine and the work area.

4.2 OPERATION

The BG44 Boiler Gun can machine both O.D. and I.D. bevels and face or shorten pipes. Aside from the use of different blades, operation is the same for all the machining processes. See Section 2.2 for controls information.

4.2.1 Pneumatic motor

To operate the BG44 Boiler Gun with the pneumatic motor do the following:

1. Actuate the motor by unlocking the safety lock then squeeze and hold the throttle lever.
2. With the other hand turn the crank handle or the feed wrench to advance the cutting tool into the workpiece.
3. Continue to turn either the crank handle or feed wrench until the required machining is complete. Base the feed rate on the motor's feedback, if the RPMs drop or the machine stalls slow the feed rate.
4. Once complete, allow the machine to make a few revolutions without feeding the cutting tool to clean up the machined surface.
5. Release the throttle lever to stop the machine.

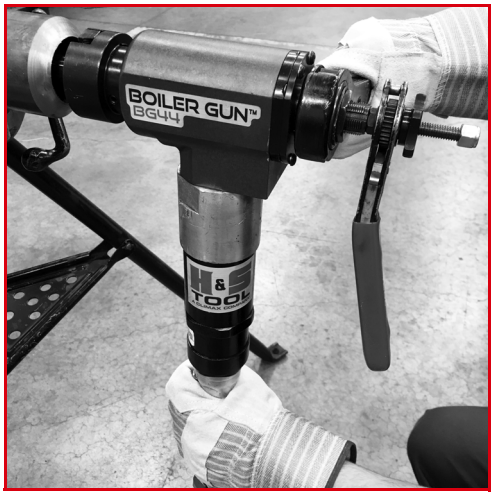

FIGURE 4-1. HAND POSITIONING ON THE PNEUMATIC BG44.

6. Reverse the rotation of the crank handle or feed wrench 2-3 revolutions to back the cutting tool away from the workpiece.
7. To remove the BG44 from the workpiece do the following:

a) Turn off the air supply at the source. Disconnect the air hose assembly from the machine.
b) Turn the locking wrench to loosen the locking system from the workpiece.
c) Slide the BG44 straight out from the workpiece using the body of the machine to support it's weight.

⚠ WARNING

Always pick up and move the BG44 Boiler Gun by body of the machine. Never pick up the BG44 Boiler Gun by the throttle lever section of the air motor, actuation of the motor could occur and lead to severe injury. Never pick up the BG44 Boiler Gun by the air hose assembly as it could become detached and result in injury or damage to the machine. Do not pick up and move the machine by either of the wrenches as damage to the machine could occur.

4.2.2 Electric motor

To operate the BG44 Boiler Gun with the electric motor do the following:

1. Start the motor by squeezing and holding the trigger.
2. With the other hand turn either the crank handle or feed wrench to advance the cutting tool into the workpiece.
3. Continue to turn either the crank handle or feed wrench until the required machining is complete. Base the feed rate on the machine's feedback, if the RPMs drop or the motor stalls slow the feed rate.
4. Once complete, allow the machine to make a few revolutions without feeding the cutting tool to clean up the machined surface.
5. Release the trigger to stop the machine.

FIGURE 4-2. BG44 WITH ELECTRIC MOTOR

6. Reverse the rotation on the crank handle or feed wrench 2-3 revolutions to back the cutting tool away from the workpiece. The ratchet mechanism on the feed wrench will need switched to feed out instead of in.
7. To remove the BG44 from the workpiece do the following:
   a) Unplug or disconnect the power supply from drive motor. Lock out/tag out where applicable.
   b) Turn the locking wrench to loosen the locking system from the workpiece.
   c) Slide the BG44 straight out from the workpiece using the body of the machine to support it's weight.

⚠ WARNING

Always pick up and move the BG44 Boiler Gun using the body of the machine or combination of the center shaft and machine body. Never pick up the BG44 Boiler Gun by the handle section of the electric driver, actuation of the motor could occur and lead to severe injury. Never pick up the BG44 Boiler Gun by electrical cord as it could result in damage to the machine. Do not pick up and move the machine by either of the wrenches as damage to the machine could occur.

5 MAINTENANCE

IN THIS CHAPTER:

5.1 MAINTENANCE CHECKLIST -23
5.2 APPROVED LUBRICANTS -23
5.3 MAINTENANCE TASKS -24
5.3.1 CHECKING AND FILLING THE IN-LINE OILER RESERVOIR -24
5.3.2 SERVICING THE FILTER ELEMENT -24
5.3.3 ADJUSTING THE OIL FLOW RATE OF THE IN-LINE OILER -24
5.3.4 TOOL HOLDERS -25
5.3.5 GREASING THE DRIVE AND PINION GEARS -25
5.4 TROUBLESHOOTING -25
5.4.1 THE MACHINE ISN'T TURNING -25
5.4.2 THE MACHINE ISN'T FEEDING -25
5.4.3 THE MACHINE IS PERFORMING POORLY -25

5.1 MAINTENANCE CHECKLIST

Table 5-1 lists maintenance intervals and tasks

TABLE 5-1. MAINTENANCE INTERVALS AND TASKS

Interval	Task	Reference
Before each use	Check that oil is present in the sight glass on the in-line oiler, refill as needed.	5.3.1
	Check air lines for damage and wear.	--
	Check the cutting tool for sharpness. Replace as necessary.	--
Before and after each use	Remove debris, oil, and moisture from machine surfaces.	--
Every ten operation cycles	Lubricate center shaft threads.	--
	Adjustment of the oil flow rate	5.3.3
	Filter element service	5.3.2

5.2 APPROVED LUBRICANTS

H&S recommends using the following lubricants at the locations indicated.

Failure to use the appropriate lubricants can result in damage and premature machine wear.

⚠ CAUTION

Avoid damage, premature machine wear, and protect your warranty by using only approved lubricants.

TABLE 5-2. APPROVED LUBRICANTS

Application Area	Lubricant	Biodegradable Lubricant	Viscosity (cSt)	Quantity	Frequency
Threads of the center shaft	WD-40 or lightweight spray lube	N/A		Light coating applied by spray	Daily during machine use
In-line oiler	MOBIL ALMO 525 or 10W SAE oil	N/A	46 @ 40C	Fill oil lubricator body	Each use
Unpainted Surfaces	LPS1 or LPS2	N/A	38 @ 25C	As required	Each use, and before storage
Drive and pinion gears	NOOK PAG-1 grease	N/A	113 @ 100C	Light coating applied by hand	Weekly during machine use

5.3 MAINTENANCE TASKS

Maintenance tasks are described in the following sections.

5.3.1 Checking and filling the in-line oiler reservoir

Do the following to check and fill the in-line oiler:

1. Check sight glass on the oil reservoir for the presence of oil.
2. To refill: Remove the cap, fill the reservoir and replace the cap.

FIGURE 5-1. IN-LINE OILER SIGHT GLASS

5.3.2 Servicing the filter element

See Figure A-20.

Do the following service the filter element:

1. Remove the filter nut to access the filter element.
2. Slide the filter element out of the filter housing.
3. Clean the filter element with a solvent and compressed air.
4. Reassemble the filter and replace the filter nut.

5.3.3 Adjusting the oil flow rate of the in-line oiler

⚠ WARNING

To adjust the oil flow rate the machine must be mounted as if being used. ALL operating and safety precautions must be taken to avoid injuries.

Different lubricants and environments may effect the rate of the in-line oiler.

Do the following to adjust the oil flow rate:

1. Remove the cap and check the oil level. Refill as needed.

2. Set the oiler valve to '3' as a baseline for the flow rate.
3. Replace the cap.
4. Mount and setup the machine (see Section 3.2-3.5)
5. Squeeze and hold the throttle lever to run the machine.
6. Hold a sheet of white paper approximately 4" (101mm) in front of the exhaust ports on the pneumatic motor. If adjusted correctly, there will be a light splatter of oil on the paper after a few seconds of operation.
7. If the oil rate needs adjusted, disconnect the air supply line from the air filter end of the air hose assembly.
8. Repeat Step 1.
9. The larger the number on the oiler valve the higher the oil flow rate. Adjust as required.
10. Replace the cap and retest the machine for corrected oil flow rate.

5.3.4 Tool holders

Do the following to service the tool holders:

1. Monitor and replace as necessary, the o-rings on the I.D. of the tool holder.
2. Monitor and replace as necessary, the key stock between the main gear and the tool holders.

5.3.5 Greasing the drive and pinion gears

Do the following to grease the drive and pinion gears:

1. On either drive type, remove the four screws in the gearbox adapter.
2. Slide the entire motor, gearbox and gearbox adapter out of the machine housing.
3. Both the drive and pinions gears are now accessible and can be greased.
4. Reverse the process to reassemble.

5.4 TROUBLESHOOTING

This section is intended to help you solve basic machine performance problems. For serious maintenance or if you have questions on the following procedures, contact H&S.

5.4.1 The machine isn't turning

If the machine is not rotating, check the following:

1. The air supply line is connected and sufficient air pressure is present (pneumatic motor only).
2. The power source is connected and energized (electric motor only).
3. The Low/High setting on the electric motor is not in the neutral position (between gears).

5.4.2 The machine isn't feeding

If the machine isn't feeding properly, check the following:

1. The center shaft is properly installed in the machine and 1/2" (12.7mm) projects through either the back of the machine or the back of the feed wrench.
2. The feed wrench or crank handle are being turned the wrong direction.

5.4.3 The machine is performing poorly

If the machine is performing poorly, check the following:

1. The cutting tool is installed correctly.
2. That the set screw on the tool holder is tight to the center shaft.
3. The machine is tight to the workpiece.
4. The cutting tool or insert is sharp and has the correct geometry for the material and type of cut.
5. Electric motor:
   a) The low/high gear is set correctly.
6. Pneumatic motor:
   a) There is oil in the in-line oiler.
   b) The air supply to the machine is sufficient in both quantity and pressure. Optimal levels are: 90PSI at 38CFM.
7. After 40 hours of use, monitor the wear of the bronze bushings. Replace when play is observed between the components for best performance.

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6 STORAGE AND SHIPPING

IN THIS CHAPTER:

6.1 Storage -27
6.1.1 Short-term storage -27
6.1.2 Long-term storage -27
6.2 Shipping -28
6.3 Decommissioning -28

6.1 Storage

Proper storage of the BG44 Boiler Gun will extend its usefulness and prevent undue damage.

Store the BG44 Boiler Gun in its original shipping container. Keep all packing materials for repackaging the machine (see Figure 6-1).

6.1.1 Short-term storage

Do the following for short-term storage (three months or less):

1. Remove the tooling.
2. Remove hoses.
3. Clean the machine to remove dirt, grease, metal chips, and moisture.
4. Drain all liquids from the in-line pneumatic oiler.
5. Spray all unpainted surfaces with LPS-2 to prevent corrosion.
6. Store the BG44 Boiler Gun in its original shipping box (see Figure 6-1).

6.1.2 Long-term storage

Do the following for long-term storage (longer than three months):

1. Follow the short-term storage instructions, but use LPS-3 instead of LPS-2.
2. Add a desiccant pouch to the shipping container. Replace according to manufacturer instructions.
3. Store the shipping container in an environment out of direct sunlight with temperature < 70°F (21°C) and humidity < 50%.

6.2 SHIPPING

The BG44 Boiler Gun can be shipped in its original shipping container, as shown in Figure 6-1.

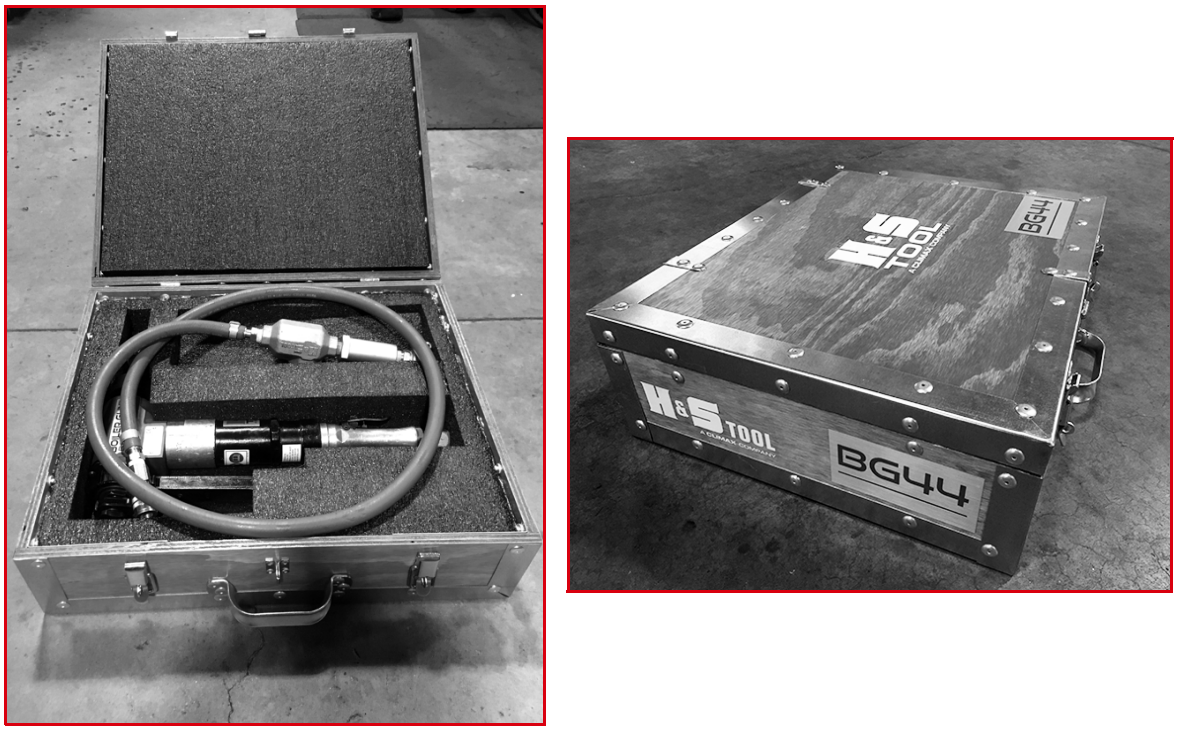

FIGURE 6-1. BG44 SHIPPING CONTAINER

6.3 DECOMMISSIONING

To decommission the BG44 Boiler Gun prior to disposal, remove the drive motor and dispose of it separately from the rest of the machine components. Refer to Appendix A for component assembly information.

APPENDIX A ASSEMBLY DRAWINGS

Drawing list

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FIGURE A-3. BG44 BOILER GUN - HIGH VELOCITY, WRENCH FEED ASSEMBLY (P/N BG44HVWR) - - - - - - -32
FIGURE A-4. BG44 BOILER GUN - HIGH VELOCITY, WRENCH FEED PARTS LIST (P/N BG44HVWR) - - - - - - -33
FIGURE A-5. BG44 BOILER GUN - LOW VELOCITY, CRANK FEED ASSEMBLY (P/N BG44LVCR) - - - - - - - -34
FIGURE A-6. BG44 BOILER GUN - LOW VELOCITY, CRANK FEED PARTS LIST - - - - - - - - - - - - - - - - - -35
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FIGURE A-8. BG44 BOILER GUN - LOW VELOCITY, WRENCH FEED PARTS LIST - - - - - - - - - - - - - - - - -37
FIGURE A-9. BG44 BOILER GUN - ELECTRIC, CRANK FEED ASSEMBLY (P/N BG44CR-E) - - - - - - - - - - -38
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FIGURE A-22. TOOL KIT -51

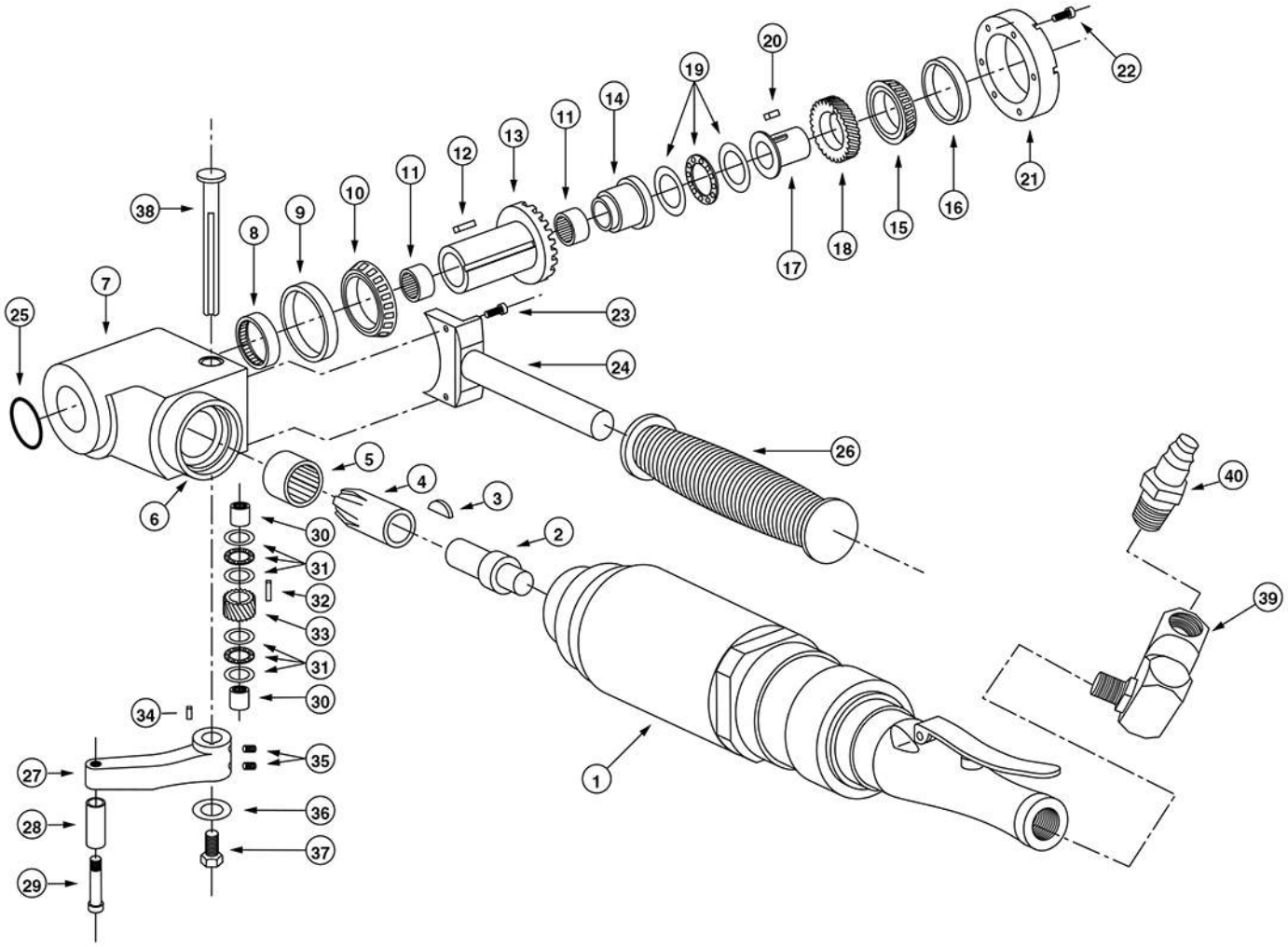


FIGURE A-1. BG44 BOILER GUN - HIGH VELOCITY, CRANK FEED ASSEMBLY (P/N BG44HVCR)

20	1	KEY, 1/4 X 1/2"	100124	40	1	MALE PLUG, 3/8" NPT	100143
19	1	THRUST BEARING	100123	39	1	DROP SWIVEL, 3/8" NPT	100142
18	1	HELICAL GEAR	100122	38	1	CRANK SHAFT	100141
17	1	FEED NUT	100121	37	1	SOCKET HEAD CAP SCREW, 8-32 X 1/2"	100140
16	1	BEARING CUP	100120	36	1	WASHER, #8 (SAE)	100139
15	1	TAPERED ROLLER BEARING	100119	35	2	SOCKET HEAD CAP SCREW 1/4-20 X 1/4"	100464
14	1	CENTERPIECE	100118	34	1	KEY, 1/8 X 3/4"	100138
13	1	MAIN GEAR	100117	33	1	HELICAL GEAR	100137
12	1	KEY, 3/16 X 5/8"	100116	32	1	KEY, 1/8 X 1/2"	100136
11	2	NEEDLE BEARING	100115	31	2	THRUST BEARING	100135
10	1	TAPERED ROLLER BEARING	100114	30	2	NEEDLE BEARING	100134
9	1	BEARING CUP	100113	29	1	SHOULDER BOLT, 3/8 X 1"	100133
8	1	NEEDLE BEARING	100112	28	1	FEED HANDLE KNOB	100132
7	1	HOUSING	100111	27	1	FEED HANDLE	100131
6	1	ADAPTER	100110	26	1	RUBBER GRIP	100130
5	1	NEEDLE BEARING	100109	25	1	O-RING	100129
4	1	PINION GEAR	100108	24	1	HANDLE	100128
3	1	KEY, 3/16 X 5/8"	100107	23	2	BUTTON HEAD CAP SCREW 1/4-20 X 3/4"	100127
2	1	DRIVE SHAFT	100106	22	6	SOCKET HEAD CAP SCREW 10-24 X 1"	100126
1	1	AIR MOTOR	100105	21	1	CENTERSHAFT LOCK	100125
ITEM NO.	**QTY.**	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**QTY.**	**PART NAME**	**PART NUMBER**

FIGURE A-2. BG44 BOILER GUN - HIGH VELOCITY, CRANK FEED PARTS LIST (P/N BG44HVCR)

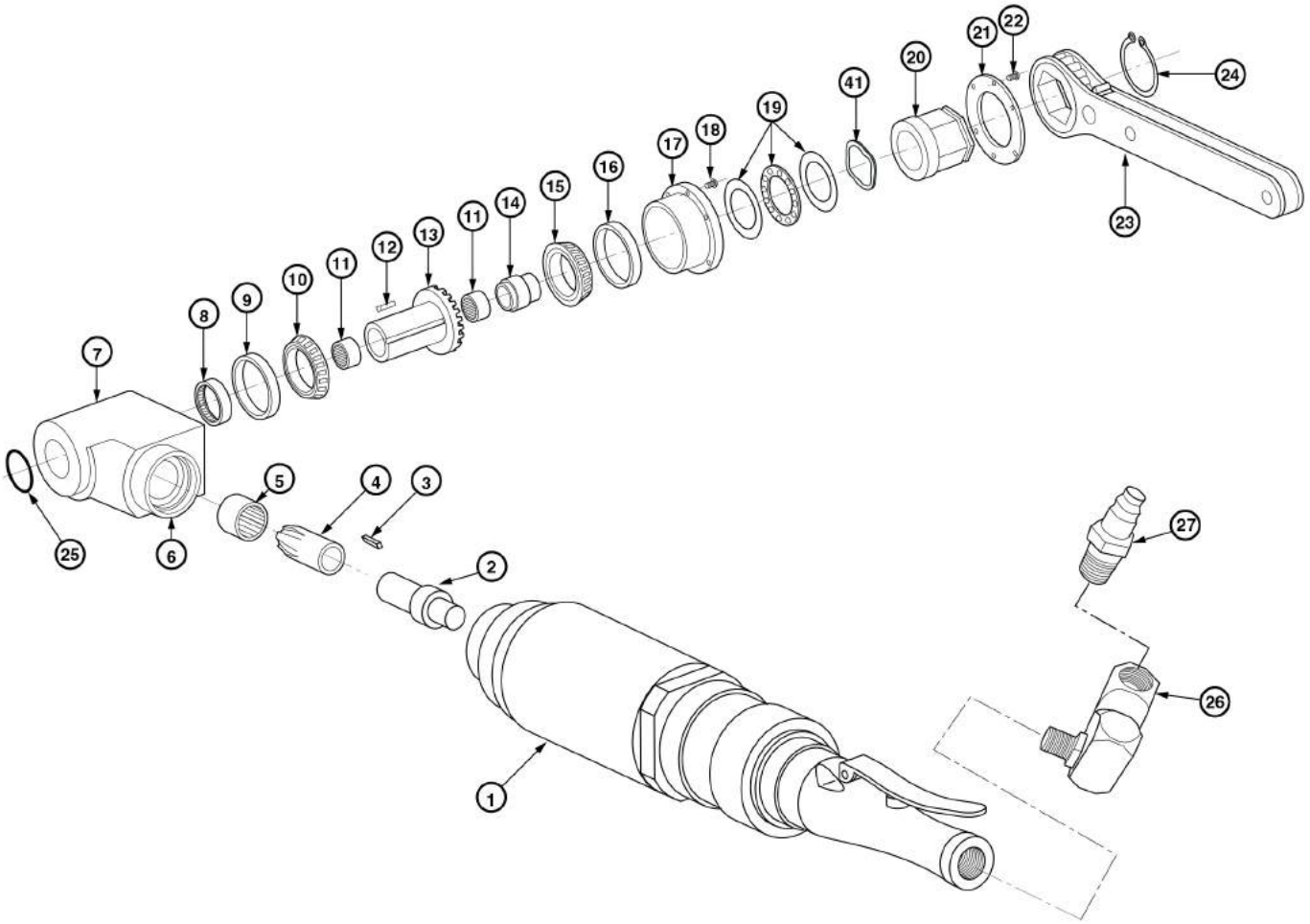


FIGURE A-3. BG44 BOILER GUN - HIGH VELOCITY, WRENCH FEED ASSEMBLY (P/N BG44HVWR)

14	CENTERPIECE	100145	41	SPRING WASHER	100061
13	MAIN GEAR	100117	27	MALE PLUG, 3/8" NPT	100143
12	KEY, 3/16 X 5/8"	100116	26	DROP SWIVEL, 3/8" NPT	100142
11	NEEDLE BEARING	100115	25	HOUSING O-RING	100129
10	TAPERED ROLLER BEARING	100114	24	FEED NUT SNAP RING	100152
9	BEARING CUP	100113	23	FEED WRENCH, 1-1/4"	100151
8	NEEDLE BEARING	100112	22	BUTTON HEAD CAP SCREW 10-24 X 3/8"	100150
7	HOUSING	100144	21	RETAINER PLATE	100149
6	ADAPTER	100110	20	FEED NUT	100148
5	NEEDLE BEARING	100109	19	THRUST BEARING	100123
4	PINION GEAR	100108	18	SOCKET HEAD CAP SCREW 10-24 X 1/2"	100147
3	KEY, 3/16 X 5/8"	100107	17	CENTERSHAFT LOCK	100146
2	DRIVE SHAFT	100106	16	BEARING CUP	100120
1	AIR MOTOR	100105	15	TAPERED ROLLER BEARING	100119
ITEM NO.	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**PART NAME**	**PART NUMBER**

FIGURE A-4. BG44 BOILER GUN - HIGH VELOCITY, WRENCH FEED PARTS LIST (P/N BG44HVWR)

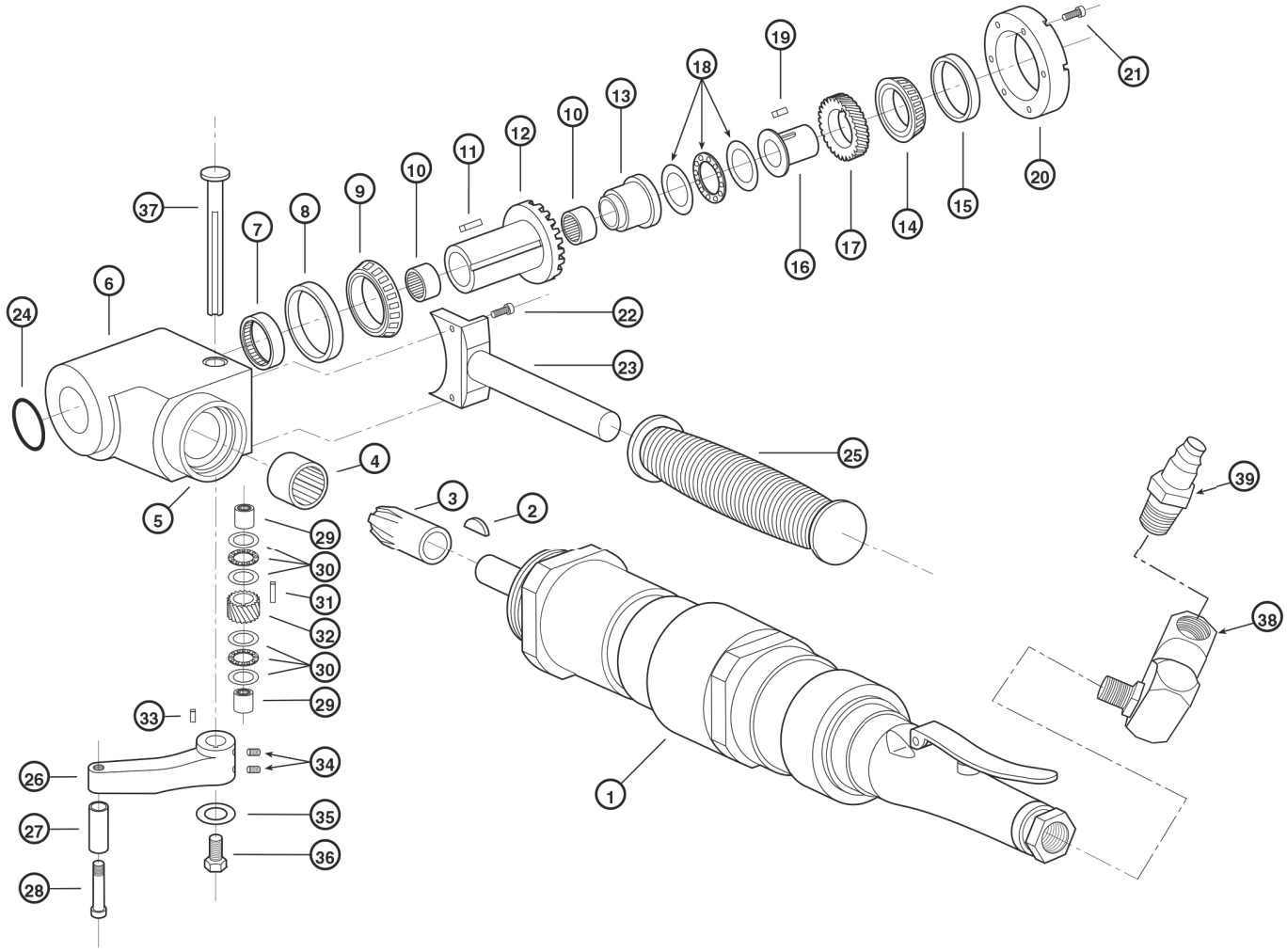


FIGURE A-5. BG44 BOILER GUN - LOW VELOCITY, CRANK FEED ASSEMBLY (P/N BG44LVCR)

20	1	CENTERSHAFT LOCK	100125				
19	1	KEY, 1/4 X 1/2"	100124	39	1	MALE PLUG, 1/2" NPT	DCP2504
18	1	THRUST BEARING	100123	38	1	DROP SWIVEL, 1/2" NPT	95462
17	1	HELICAL GEAR	100122	37	1	CRANK SHAFT	100141
16	1	FEED NUT	100121	36	1	SOCKET HEAD CAP SCREW, 8-32 X 1/2"	100140
15	1	BEARING CUP	100120	35	1	WASHER, #8 (SAE)	100139
14	1	TAPERED ROLLER BEARING	100119	34	2	SOCKET HEAD CAP SCREW 1/4-20 X 1/4"	100464
13	1	CENTERPIECE	100118	33	1	KEY, 1/8 X 3/4"	100138
12	1	MAIN GEAR	100117	32	1	HELICAL GEAR	100137
11	1	KEY, 3/16 X 5/8"	100116	31	1	KEY, 1/8 X 1/2"	100136
10	2	NEEDLE BEARING	100115	30	2	THRUST BEARING	100135
9	1	TAPERED ROLLER BEARING	100114	29	2	NEEDLE BEARING	100134
8	1	BEARING CUP	100113	28	1	SHOULDER BOLT, 3/8 X 1"	100133
7	1	NEEDLE BEARING	100112	27	1	FEED HANDLE KNOB	100132
6	1	HOUSING	100111	26	1	FEED HANDLE	100131
5	1	ADAPTER	100110	25	1	RUBBER GRIP	100130
4	1	NEEDLE BEARING	100109	24	1	O-RING	100129
3	1	PINION GEAR	100108	23	1	HANDLE	100128
2	1	WOODRUFF KEY	MB003489	22	2	BUTTON HEAD CAP SCREW 1/4-20 X 3/4"	100127
1	1	AIR MOTOR	CML3488	21	6	SOCKET HEAD CAP SCREW 10-24 X 1"	100126
ITEM NO.	**QTY.**	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**QTY.**	**PART NAME**	**PART NUMBER**

FIGURE A-6. BG44 BOILER GUN - LOW VELOCITY, CRANK FEED PARTS LIST

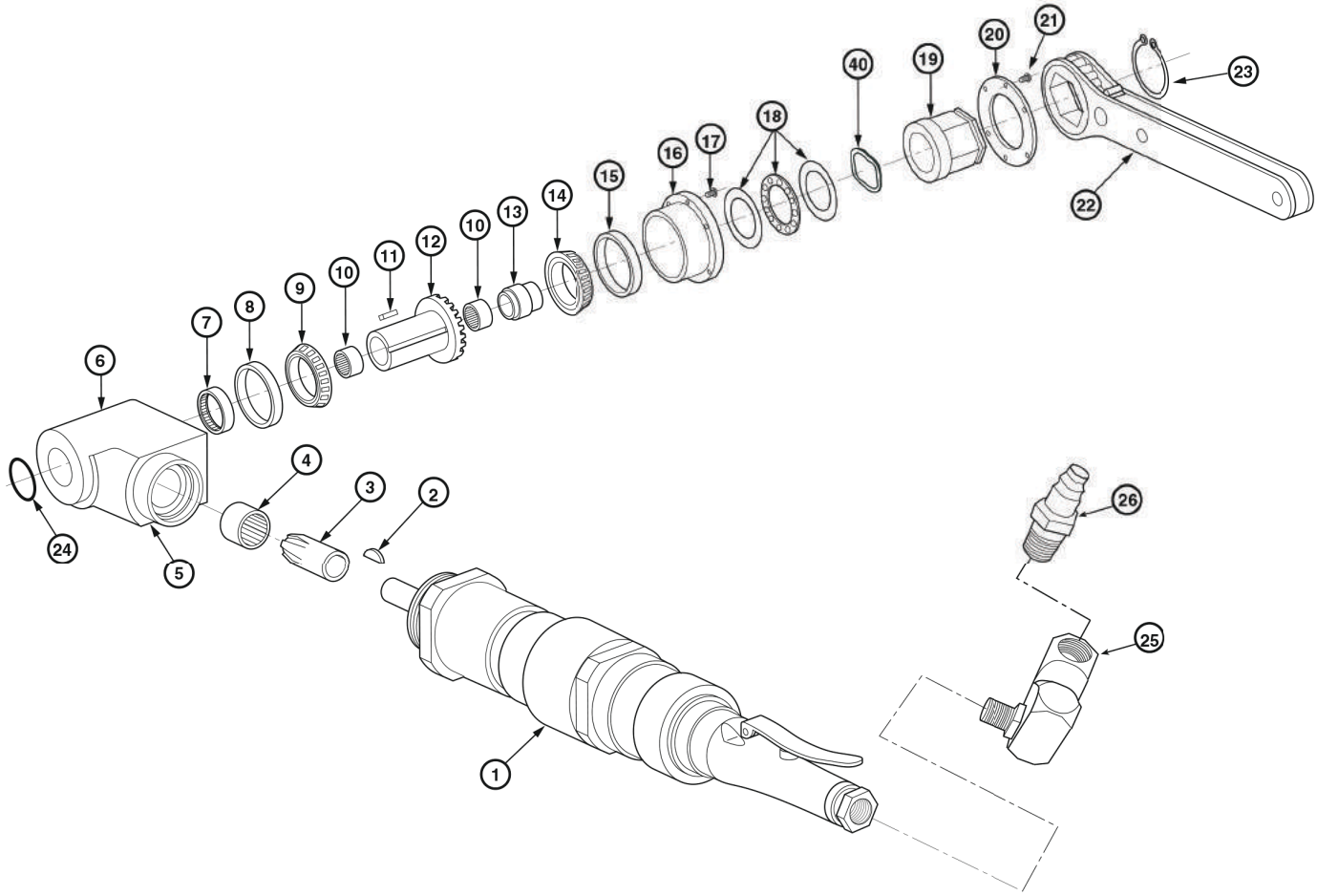


FIGURE A-7. BG44 BOILER GUN - LOW VELOCITY, WRENCH FEED ASSEMBLY (P/N BG44LVWR)

14	TAPERED ROLLER BEARING	100119			
13	CENTERPIECE	100145	40	SPRING WASHER	100061
12	MAIN GEAR	100117	26	MALE PLUG, 3/8" NPT	DCP2504
11	KEY, 3/16 X 5/8"	100116	25	DROP SWIVEL, 3/8" NPT	95462
10	NEEDLE BEARING	100115	24	HOUSING O-RING	100129
9	TAPERED ROLLER BEARING	100114	23	FEED NUT SNAP RING	100152
8	BEARING CUP	100113	22	FEED WRENCH, 1-1/4"	100151
7	NEEDLE BEARING	100112	21	BUTTON HEAD CAP SCREW 10-24 X 3/8"	100150
6	HOUSING	100144	20	RETAINER PLATE	100149
5	ADAPTER	100110	19	FEED NUT	100148
4	NEEDLE BEARING	100109	18	THRUST BEARING	100123
3	PINION GEAR	100108	17	SOCKET HEAD CAP SCREW 10-24 X 1/2"	100147
2	WOODRUFF KEY	911-0012	16	CENTERSHAFT LOCK	100146
1	AIR MOTOR	CML3488	15	BEARING CUP	100120
ITEM NO.	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**PART NAME**	**PART NUMBER**

FIGURE A-8. BG44 BOILER GUN - LOW VELOCITY, WRENCH FEED PARTS LIST

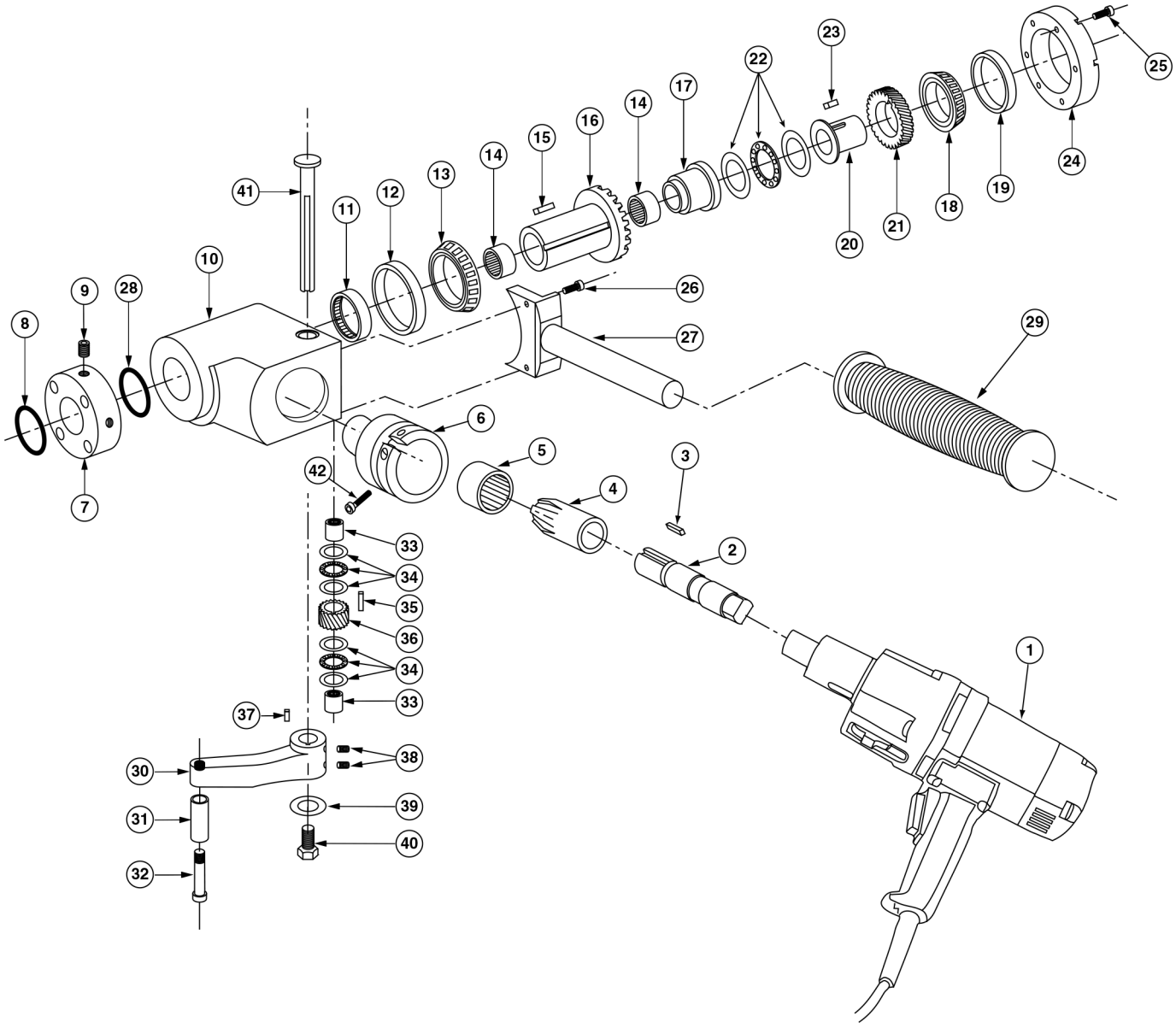


FIGURE A-9. BG44 BOILER GUN - ELECTRIC, CRANK FEED ASSEMBLY (P/N BG44CR-E)

21	1	HELICAL GEAR	100122	42		SOCKET HEAD CAP SCREW	500-1074
20	1	FEED NUT	100121	41	1	CRANK SHAFT	100141
19	1	BEARING CUP	100120	40	1	SOCKET HEAD CAP SCREW	100140
18	1	TAPERED ROLLER BEARING	100119	39	1	WASHER	100139
17	1	CENTERPIECE	100118	38	2	SOCKET HEAD SET SCREW	100464
16	1	MAIN GEAR	100117	37	1	KEY STOCK	100138
15	1	SHAFT KEY	100116	36	1	HELICAL GEAR	100137
14	1	NEEDLE BEARING	100115	35	1	KEY STOCK	100136
13	1	TAPERED ROLLER BEARING	100114	34	2	THRUST BEARING	100135
12	1	BEARING CUP	100113	33	2	NEEDLE BEARING	100134
11	2	NEEDLE BEARING	100112	32	1	SHOULDER BOLT	100133
10	1	HOUSING	100111	31	1	FEED HANDLE KNOB	100132
9	1	SOCKET HEAD SET SCREW	903-0003	30	1	FEED HANDLE	100131
8	1	O-RING	MB003572	29	1	RUBBER GRIP	100130
7	1	TOOL HOLDER	A/R	28	1	O-RING	100129
6	1	ADAPTER	EMB003613	27	1	HANDLE	100128
5	1	NEEDLE BEARING	100109	26	2	BUTTON HEAD CAP SCREW	100127
4	1	PINION GEAR	100108	25	6	SOCKET HEAD CAP SCREW	100126
3	1	SHAFT KEY	EMB003612	24	1	CENTERSHAFT LOCK	100125
2	1	DRIVE SHAFT	EMS003511	23	1	SHAFT KEY	100124
1	1	AIR MOTOR	EMB003610	22	1	THRUST BEARING	100123
ITEM NO.	**QTY.**	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**QTY.**	**PART NAME**	**PART NUMBER**

FIGURE A-10. BG44 BOILER GUN - ELECTRIC, CRANK FEED PARTS LIST

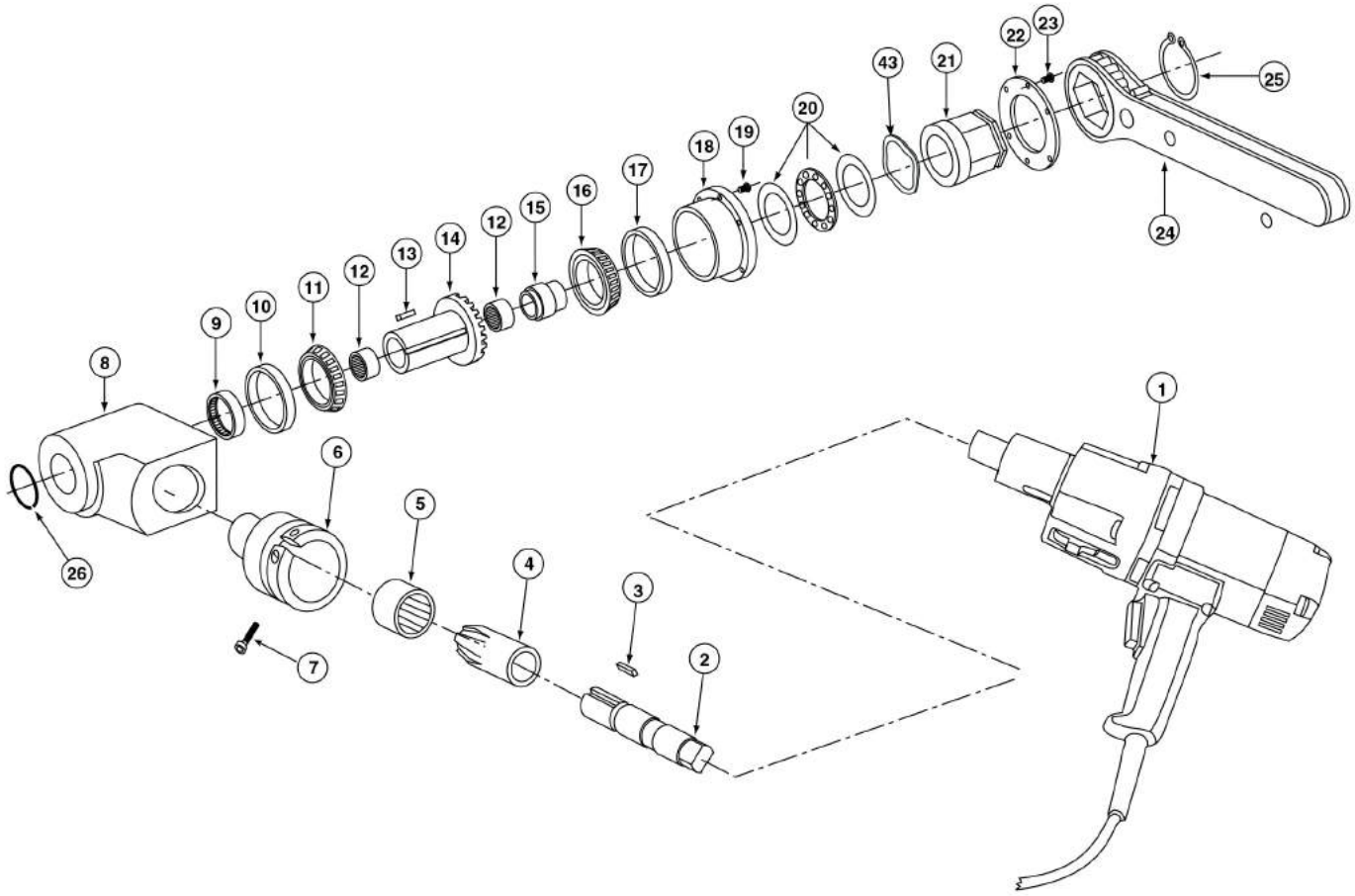
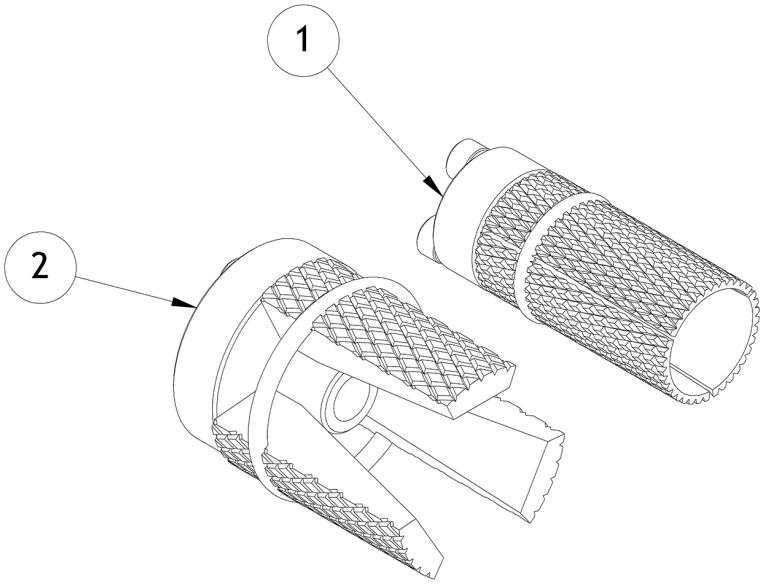


FIGURE A-11. BG44 BOILER GUN - WRENCH FEED, ELECTRIC ASSEMBLY (P/N BG44WR-E)

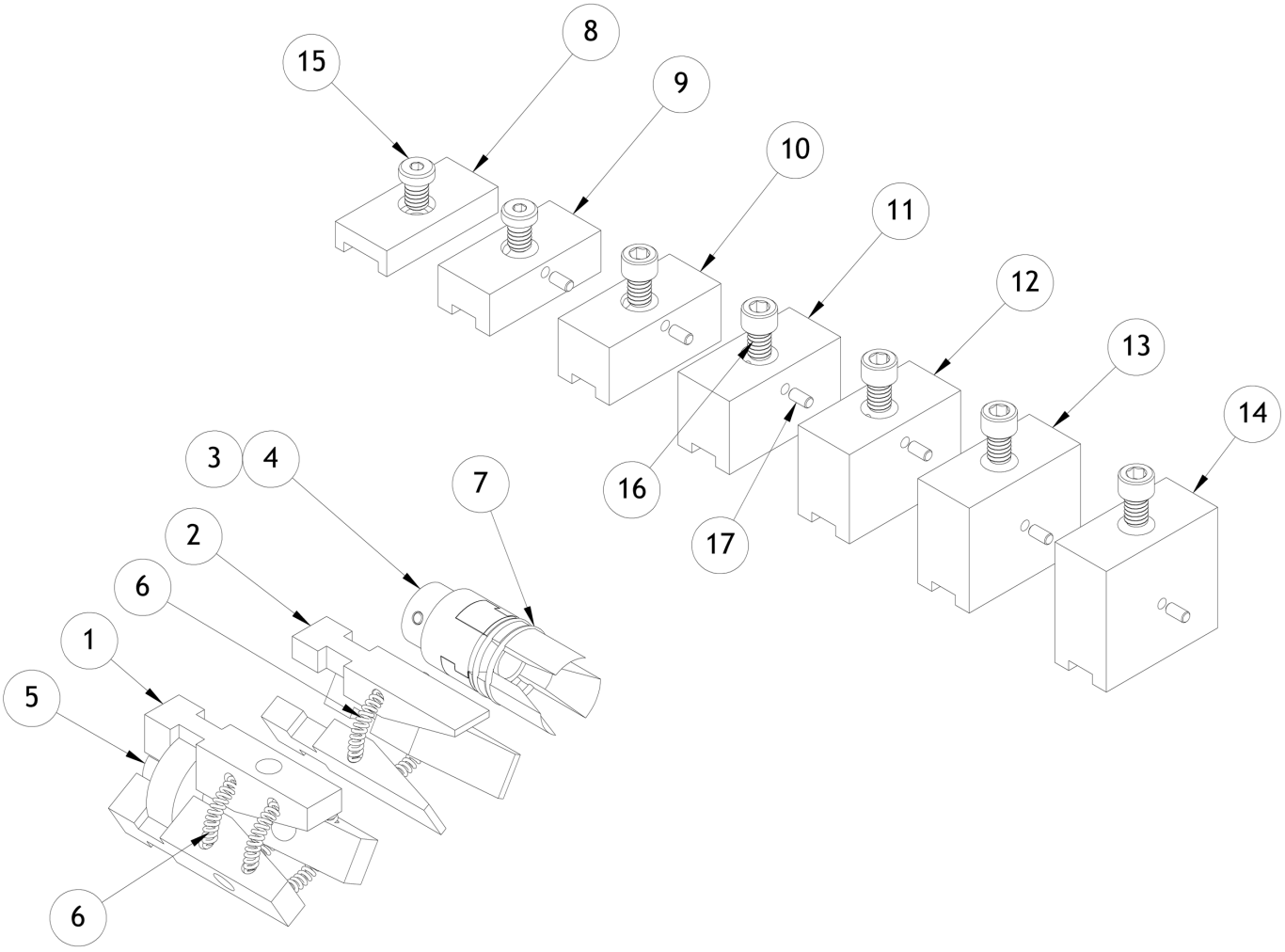
14	MAIN GEAR	100117			
13	KEY, 3/16 X 5/8"	100116	43	SPRING WASHER (2)	100061
12	NEEDLE BEARING (2)	100115	26	HOUSING O-RING	100129
11	TAPERED ROLLER BEARING	100114	25	FEED NUT SNAP RING	100152
10	BEARING CUP	100113	24	FEED WRENCH, 1-1/4"	100151
9	NEEDLE BEARING	MB000228	23	BUTTON HEAD CAP SCREW 10-24 X 3/8" (5)	100150
8	HOUSING	100144	22	RETAINER PLATE	100149
7	SOCKET HEAD CAP SCREW	500-1074	21	FEED NUT	100148
6	ADAPTER	EMB003613	20	THRUST BEARING	100123
5	NEEDLE BEARING	100109	19	SOCKET HEAD CAP SCREW 10-24 X 1/2" (6)	100147
4	PINION GEAR	100108	18	CENTERSHAFT LOCK	100146
3	SHAFT KEY	EMB003612	17	BEARING CUP	100120
2	DRIVE SHAFT	EMS003511	16	TAPERED ROLLER BEARING	100119
1	ELECTRIC MOTOR	EMB003610	15	CENTERPIECE	100145
ITEM NO.	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**PART NAME**	**PART NUMBER**

FIGURE A-12. BG44 BOILER GUN - WRENCH FEED, ELECTRIC PARTS LIST



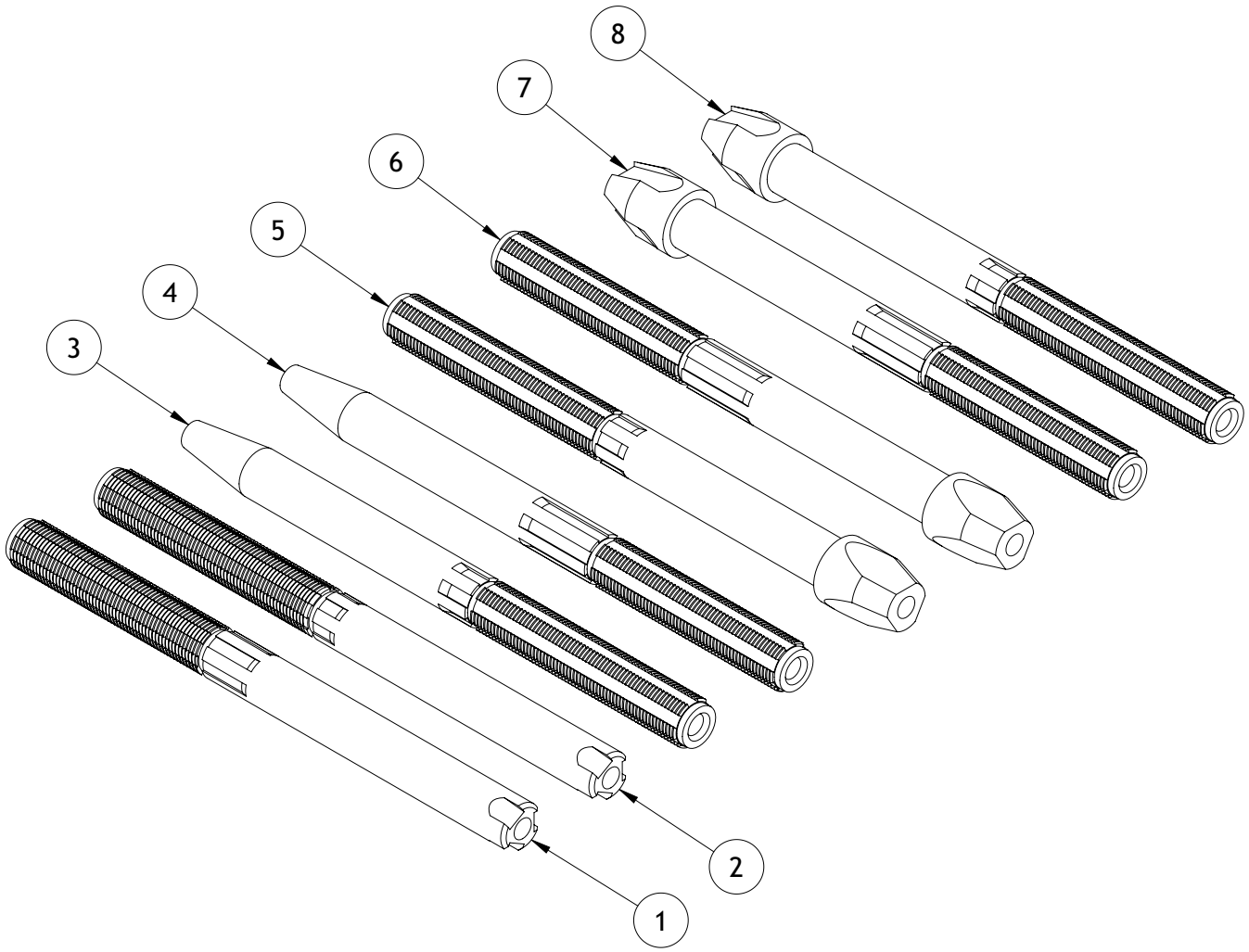
2	2.875" COLLET SET	MC2-78			
2	2.75" COLLET SET	MC2-34	2	4.875" COLLET SET	MC4-78
2	2.625" COLLET SET	MC2-58	2	4.75" COLLET SET	MC4-34
2	2.50" COLLET SET	MC2-12	2	4.625" COLLET SET	MC4-58
2	2.375" COLLET SET	MC2-38	2	4.50" COLLET SET	MC4-12
2	2.25" COLLET SET	MC2-14	2	4.375" COLLET SET	MC4-38
2	2.125" COLLET SET	MC2-18	2	4.25" COLLET SET	MC4-14
2	2" COLLET SET	MC2	2	4.125" COLLET SET	MC4-18
2	1.875" COLLET SET	MC1-78	2	4" COLLET SET	MC4
2	1.75" COLLET SET	MC1-34	2	3.875" COLLET SET	MC3-78
2	1.625" COLLET SET	MC1-58	2	3.75" COLLET SET	MC3-34
2	1.50" COLLET SET	MC1-12	2	3.625" COLLET SET	MC3-58
2	1.375" COLLET SET	MC1-38	2	3.50" COLLET SET	MC3-12
2	1.25" COLLET SET	MC1-14	2	3.125" COLLET SET	MC3-38
1	1.125-1.25" COLLET SET	MC1-18	2	3.25" COLLET SET	MC3-14
1	1-1.125" COLLET SET	MC1	2	3.125" COLLET SET	MC3-18
1	.875-1" COLLET SET	MC78	2	3" COLLET SET	MC3
ITEM NO.	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**PART NAME**	**PART NUMBER**

FIGURE A-13. COLLET SETS



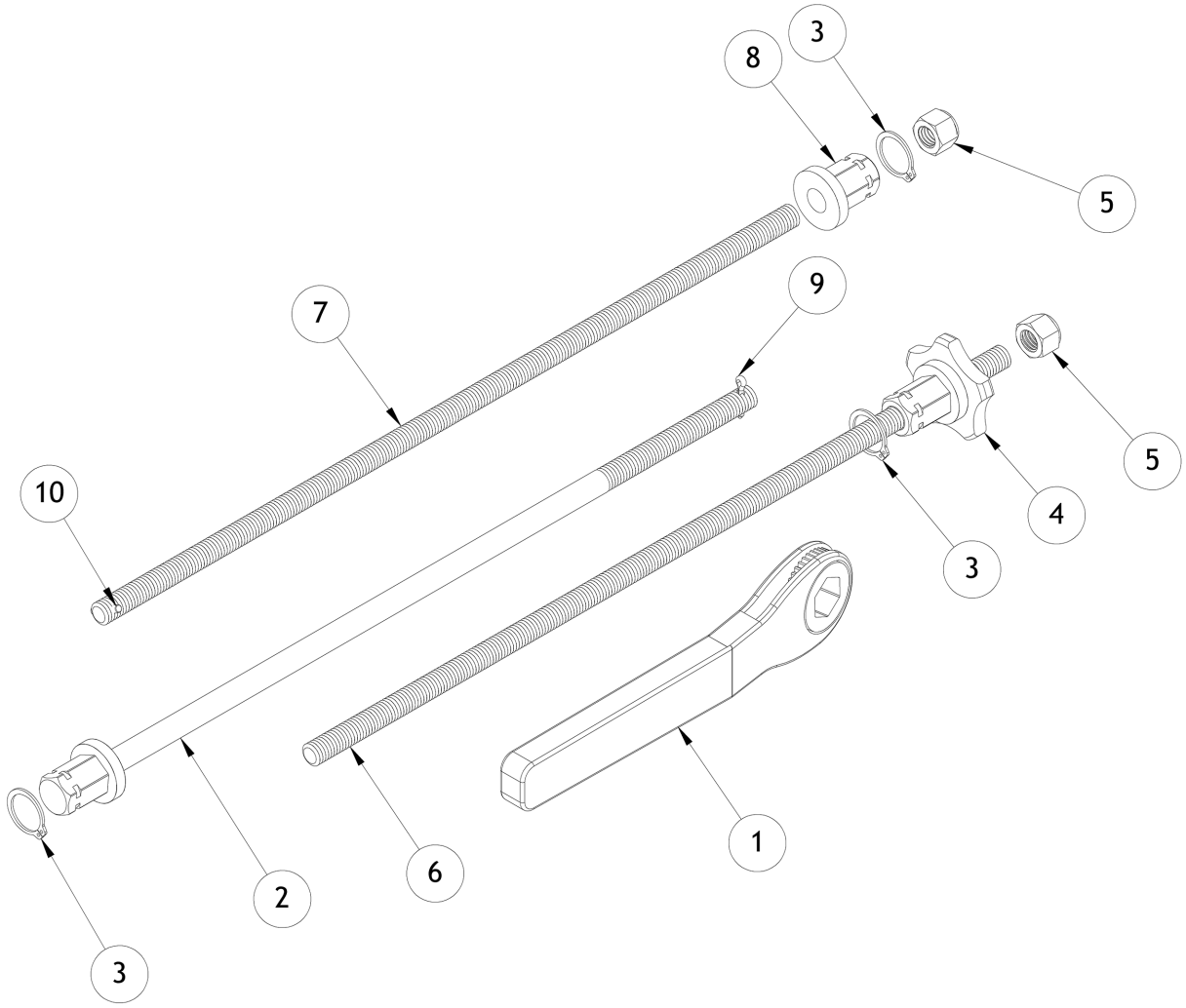
9	3	M-03 WEDGE EXTENSION (2.022-2.435")	100179	18	3	SLOTTED SPRING PIN	100048
8	2	1.000 O-RING	100237	17	3	SOCKET HEAD CAP SCREW	100045
7	2	.875 O-RING	100236	16	3	LOW PROFILE SOCKET HEAD CAP SCREW	100045
6	A/R	SPRING	100203	15	3	M-09 WEDGE EXTENSION (4.422-4.835")	100185
5	1	WEDGE GUIDE 1.200	100176	14	3	M-08 WEDGE EXTENSION (4.022-4.435")	100184
4	1	WEDGE SET (1.00-1.25")	BW1	13	3	M-07 WEDGE EXTENSION (3.622-4.035")	100183
3	1	WEDGE SET (.875-1.00")	BW875	12	3	M-06 WEDGE EXTENSION (3.222-3.635")	100182
2	1	WEDGE SET M-02 (1.622-2.035")	100178	11	3	M-05 WEDGE EXTENSION (2.822-3.235")	100181
1	1	WEDGE SET M-01 (1.222-1.635")	100177	10	3	M-04 WEDGE EXTENSION (2.422-2.835")	100180
ITEM NO.	**QTY.**	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**QTY.**	**PART NAME**	**PART NUMBER**

FIGURE A-14. WEDGE SETS AND WEDGE EXTENSIONS



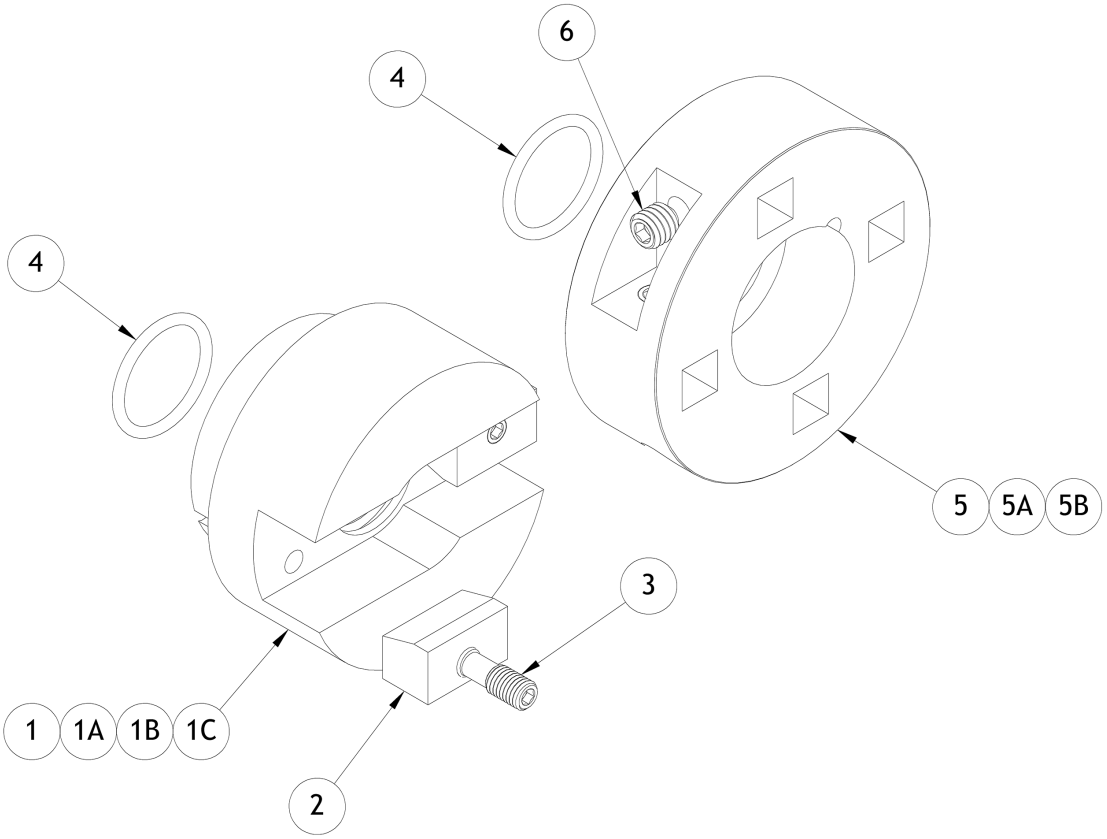
8	1.25" WRENCH FEED, WEDGE	100160
7	1.25" CRANK FEED, WEDGE	100159
6	1.25" CRANK FEED, COLLET	MB003549
5	1.25" WRENCH FEED, COLLET	MB003550
4	.875" CRANK FEED, COLLET	MB003545
3	.875" WRENCH FEED, COLLET	MB003546
2	.875 WRENCH FEED, WEDGE	100154
1	.875" CRANK FEED, WEDGE	100153
ITEM NO.	**PART NAME**	**PART NUMBER**

FIGURE A-15. CENTER SHAFTS



ITEM NO.	PART NAME	PART NUMBER
10	SPRING PIN	100060
9	COTTER PIN	923-1001
8	.875 WEDGE LOCKING ROD NUT	MB003563
7	.875 WEDGE LOCKING ROD	100167
6	1.25" WEDGE LOCKING ROD	100166
5	JAM LOCK NUT	XXXXXX
4	WEDGE ROD NUT WITH SPEED WHEEL	100164
3	RETAINER RING	921-1001
2	COLLET LOCKING ROD	MS004250
1	LOCKING ROD WRENCH	23081119900

FIGURE A-16. LOCKING RODS



6	SET SCREW (BLADE AND SHAFT)	903-0003
5B	5" FIXED TOOL HOLDER	MB003586
5A	4" FIXED TOOL HOLDER	MB003581
5	3" FIXED TOOL HOLDER	MB003570
4	O-RING	MB003572
3	DIFFERENTIAL SCREW	917-0001
2	BLADE LOCK	000875
1C	5.5" SLIDING TOOL HOLDER	MB003583
1B	4" SLIDING TOOL HOLDER	MB003584
1A	3" SLIDING TOOL HOLDER	MB003573
1	2.625" SLIDING TOOL HOLDER	100186
ITEM NO.	**PART NAME**	**PART NUMBER**

FIGURE A-17. TOOL HOLDERS

Reference No.	Part No.	Description
1	1014646	Hose Adapter
2	1032011	Throttle Body
3	1005094	Screen
4	1014687	Spring
5	1017082	Lever
6	1014838	Steel Ball (9/16" Dia.)
7	1017292	Bushing
8	1008110	O-Ring
9	1024781	Push Rod
10	1024419	Valve
13	1009371	O-Ring
14	1009039	Nozzle
15	1009786	Pin
16	1011482	Spring Seat
17	1009699	Retaining Ring
18	1009099	Key (2)
19	1011483	Shim (as required)
20	1009025	Spring
21	1009120	Governor Valve
22	1009119	Governor Hub
23	1009118	Governor Weight (2)
24	1008839	Pin (2)
25	1022113	Nut Assembly (Incl: #1012329 Set Screw)
26	1009459	Clamp Ring
27	1008935	Rear Plate
28	1001473	Key (2)
29	1008867	Rotor Blade (4)
30	1009323	Front Plate
31	1006843	Retaining Ring
32	1009530	Retaining Ring
33	1009333	Ball Bearing
34	1009598	Planet Cage
35	1009592	Planet Cage Washer
36	1009551	Internal Gear
37	1009333	Ball Bearing
38	1010947	Planet Cage
39	1010747	Internal Gear
40	1009593	Planet Cage Washer
41	1010755	Ball Bearing
42	1110237	Nose
44	1009017	Ball Bearing
45	1008840	Pin
46	1008864	Cylinder (Incl: #45)
47	1008865	Rotor
48	1008936	Sleeve
49	1010948	Motor Housing
50	1009015	Ball Bearing
51	1004639	Bearing Retainer
52	1009324	Rotor Shaft
53	1010828	Baffle Ring
54	1009331	(3) Planet Pin
55	1009303	(6) Needle Bearing
56	1009332	(3) Planet Gear
57	1005003	Ball Bearing
58	1010229	(2) O-Ring
59	1009303	(6) Needle Bearing
60	1009594	(3) Planet Gear
61	1009331	(3) Planet Pin

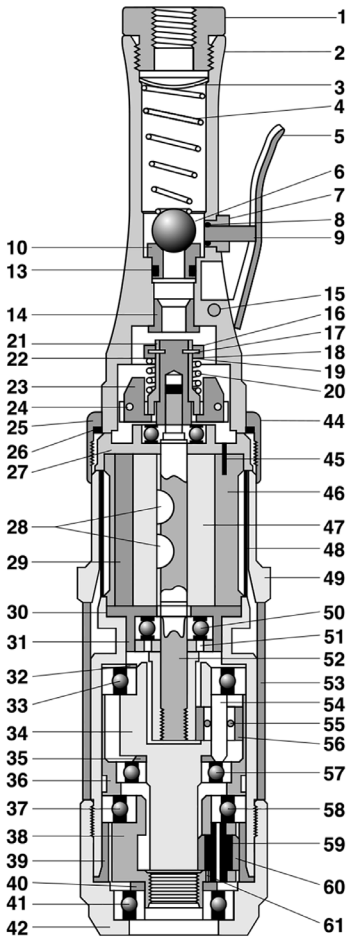
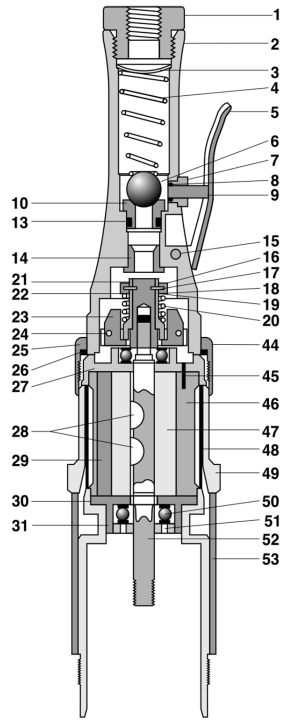
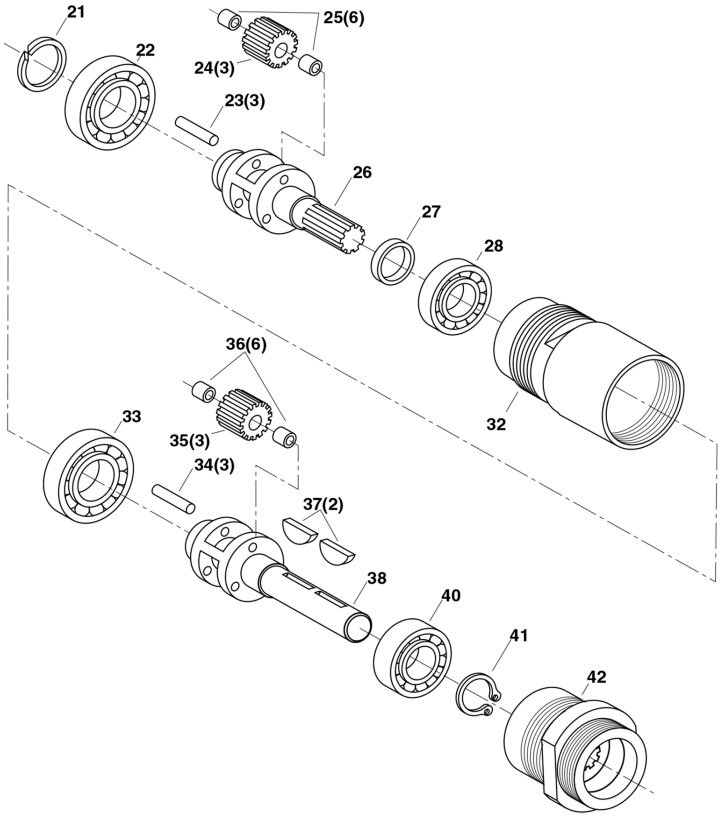


FIGURE A-18. HV AIR MOTOR ASSEMBLY AND PARTS LIST (P/N 100105)



THROTTLE, GOVERNOR & MOTOR ASSEMBLIES

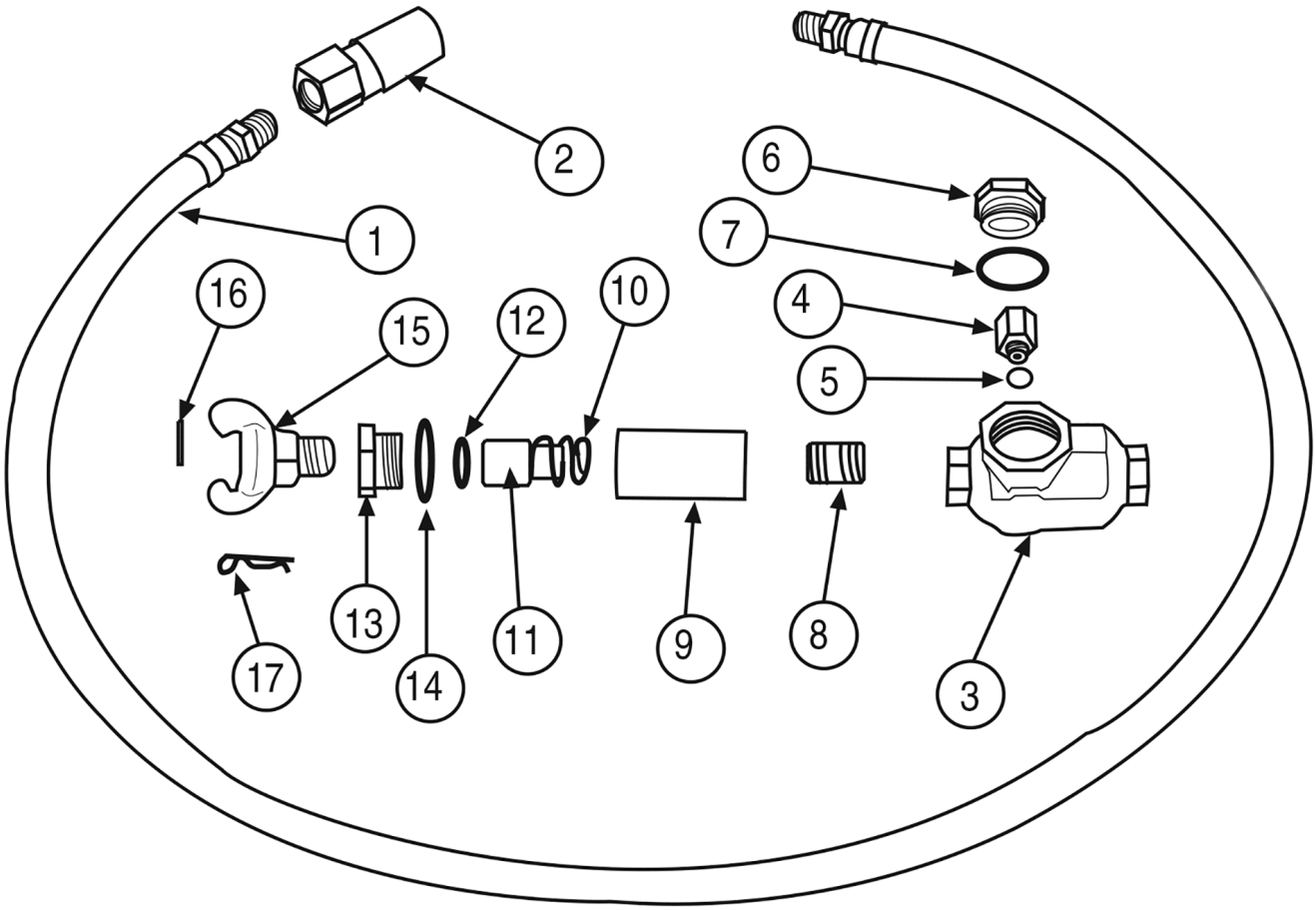
Reference No.	Part No.	Description
1	1014645	Hose Adapter
2	1032011	Throttle Body
3	1005094	Screen
4	1014687	Spring
5	1017082	Lever
6	1014838	Steel Ball (9/16" Dia.)
7	1017292	Bushing
8	1008110	O-Ring
9	1024781	Push Rod
10	1024419	Valve
13	1009371	O-Ring
14	1009039	Nozzle
15	1009786	Pin
16	1011482	Spring Seat
17	1009699	Retaining Ring
18	1009099	Key (2)
19	1011483	Shim (as required)
20	1009024	Spring
21	1009120	Governor Valve
22	1009121	Governor Hub
23	1009118	Governor Weight (2)
24	1008839	Pin (2)
25	1022113	Nut Assembly (Incl: #1012329 Set Screw)
26	1009459	Clamp Ring
27	1008935	Rear Plate
28	1001473	Key (2)
29	1008867	Rotor Blade (4)
30	1009323	Front Plate
31	1006843	Retaining Ring
44	1009017	Ball Bearing
45	1008840	Pin
46	1008864	Cylinder (Incl: #45)
47	1008865	Rotor
48	1008936	Sleeve
49	1009325	Motor Housing
50	1009015	Ball Bearing
51	1004639	Bearing Retainer
52	1009324	Rotor Shaft
53	1009326	Baffle Ring



PLANETARY GEARING

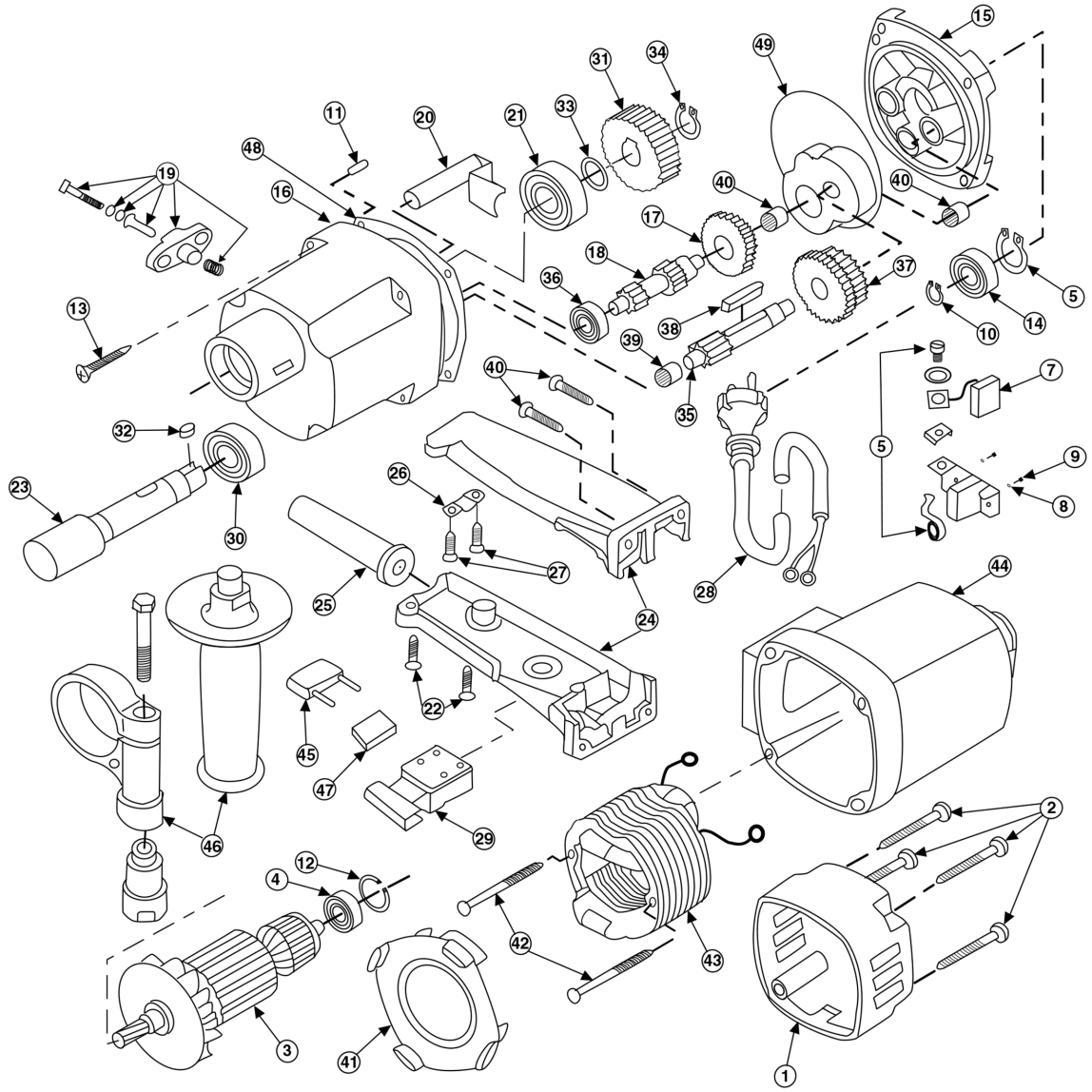
Reference No.	Part No.	Description
21	1009530	Retaining Ring
22	1009333	Ball Bearing
23	1009331	Planet Pin (3)
24	1009332	Planet Gear (3)
25	1009303	Needle Bearing (6)
26	1009599	Planet Cage
27	1009592	Planet Cage Washer
28	1005003	Ball Bearing
32	1013858	Internal Gear
33	1009333	Ball Bearing
34	1009331	Planet Pin (3)
35	1009332	Planet Gear (3)
36	1009303	Needle Bearing (6)
37	1001311	Woodruff Key (2)
38	1015644	Planet Cage (Incl: #1015357 Retaining Ring)
41	1012796	Retaining Ring
42	1015641	Internal Gear

FIGURE A-19. LV AIR MOTOR ASSEMBLY AND PARTS LIST (P/N CML3488)



	1	FILTER ASSEMBLY	HS50-507				
8	1	1/2" NIPPLE	HS50-517	17	1	SAFETY CLIP	HS50-526
7	1	CAP O-RING	HS50-516	16	1	RUBBER WASHER	HS50-525
6	1	CAP	HS50-515	15	1	UNIVERSAL COUPLER	HS50-524
5	1	VALVE O-RING	HS50-514	14	1	NUT O-RING	HS50-523
4	1	OILER VALVE	HS50-513	13	1	FILTER NUT	HS50-522
3	1	LUBRICATOR BODY	HS50-512	12	1	ELEMENT O-RING	HS50-521
		LUBRICATOR ASSEMBLY	HS50-505	11	1	FILTER ELEMENT	HS50-520
2	1	QUICK DISCONNECT COUPLER	HS50-511	10	1	SPRING	HS50-519
1	1	1/2" HOSE WITH FITTINGS	HS50-510	9	1	FILTER HOUSING	HS50-518
ITEM NO.	**QTY.**	**PART NAME**	**PART NUMBER**	**ITEM NO.**	**QTY.**	**PART NAME**	**PART NUMBER**

FIGURE A-20. AIR HOSE ASSEMBLY AND PARTS LIST (P/N HS 50-509)



Reference No.	Part No.	Description
1	80900093	Cap, Motor
2	80201267	(4) Screw
3	7132D100	Armature, 120V
	7132A100	Armature, 230V
4	80410011	Bearing
5	80201333	Safety Ring
6	80201196	Brush Holder
7	80700013	Brush
8	80201385	Lock Washer
9	80201180	Screw
10	80201320	Safety Ring
11	80200582	Notched Pin
12	83000036	O-Ring
13	80201449	(4) Screw, 120V
	80201284	(4) Screw, 230V
14	80410031	Bearing
15	7132A610	Gear Cap
16	71323400	Gear Housing
17	7132A470	Gear

Reference No.	Part No.	Description
18	71323500	Gear Shaft
19	71540545	Gear Switch
20	71323520	Shift Arm
21	80410130	Bearing
22	80201271	(2) Screw
23	71323420	Drive Shaft
24	80900097	Handle Halves
25	83000004	Cable Sleeve
26	85000020	Clip
27	80201270	(2) Screw
28	77319262	Connection Cable, 120V
	80600060	Connection Cable, 230V
29	80600143	Switch, 120V
	80600125	Switch, 230V
30	80410152	Ball Bearing
31	71323430	Gear
32	80200601	Key
33	80020504	Fitting Washer
34	80201322	Locking Ring

Reference No.	Part No.	Description
35	71223460	Gear Shaft
36	80410011	Bearing
37	71323440	Gear
38	80200602	Key
39	80420110	(2) Needle Sleeve
40	80201280	(2) Screw
41	80900286	Air Guiding Ring, 120V
	80900094	Air Guiding Ring, 230V
42	80201226	(2) Screw
43	7132D150	Field, 120V
	7132A150	Field, 230V
44	80900092	Motor Housing, 120V
	7132A200	Motor Housing, 230V
45	80500010	Condensor
46	7132A695	Handle Assembly
47	73320210	Contact Washer
48	82000058	Seal, Gear Box
49	80900119	Grease Chamber

FIGURE A-21. ELECTRIC MOTOR ASSEMBLY AND PARTS LIST (P/N EMB003610)

3	RETAINING CLIP PLIERS	SNAP
2	FOLD UP KEY SET 5/64-1/4"	100093
1	1/8" HEX KEY, LONG ARM (SLIDING TOOL HOLDER ONLY)	ODWR
1	5/32" HEX KEY, LONG ARM (FIXED TOOL HOLDER ONLY)	05471107
ITEM NO.	**PART NAME**	**PART NUMBER**

FIGURE A-22. TOOL KIT

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APPENDIX B SDS

SDS list

LPS 1 55
LPS 2 64
ExxonMobil Mobil Almo 525 73
Nook PAG-1 Grease 82
WD-40 90

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SAFETY DATA SHEET

1. Identification

Product identifier **LPS® 1 (Aerosol)**

Other means of identification

Part Number 00116

Recommended use An industrial lubricant designed to displace moisture from mechanical and electrical equipment, provide light-duty lubrication and short-term rust prevention.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Manufacturer

Company name LPS Laboratories, a division of Illinois Tool Works, Inc.

Address 4647 Hugh Howell Rd.
Tucker, GA 30084

Country (U.S.A.)

In Case of Emergency Tel: +1 770-243-8800
1-800-424-9300 (inside U.S.)
+001 703-527-3887 (outside U.S.)

Website www.lpslabs.com

E-mail sds@lpslabs.com

2. Hazard(s) identification

Physical hazards	Flammable aerosols	Category 1
	Gases under pressure	Compressed gas
Health hazards	Skin corrosion/irritation	Category 2
	Sensitization, skin	Category 1B
	Specific target organ toxicity, single exposure	Category 3 narcotic effects

Environmental hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Extremely flammable aerosol. Contains gas under pressure; may explode if heated. Causes skin irritation. May cause an allergic skin reaction. May cause drowsiness or dizziness.

Precautionary statement

Prevention Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not spray on an open flame or other ignition source. Pressurized container: Do not pierce or burn, even after use. Avoid breathing gas. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves.

Response If on skin: Wash with plenty of water. Take off contaminated clothing and wash before reuse. Specific treatment (see this label). If skin irritation or rash occurs: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell.

Storage Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight. Do not expose to temperatures exceeding 50°C/122°F.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Distillates Petroleum, Hydroteated Light		64742-47-8	70 - 80
Distillates Petroleum Hydrotreated Med		64742-46-7	10 - 20
Carbon Dioxide		124-38-9	1 - 5
Sorbitan trioleate		26266-58-0	1 - 3
Calcium Sulfonate		61789-86-4	0.1 - 1

4. First-aid measures

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

Skin contact Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Ingestion In the unlikely event of swallowing contact a physician or poison control center. Rinse mouth. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Most important symptoms/effects, acute and delayed May cause drowsiness and dizziness. Headache. Nausea, vomiting. Rash. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media Alcohol resistant foam. Water spray. Water fog. Dry chemical powder. Dry chemicals. Carbon dioxide (CO2).

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical Contents under pressure. Pressurized container may explode when exposed to heat or flame. During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

Fire fighting equipment/instructions In case of fire: Stop leak if safe to do so. Move containers from fire area if you can do so without risk. Cool containers exposed to heat with water spray and remove container, if no risk is involved. Containers should be cooled with water to prevent vapor pressure build up. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials. Move containers from fire area if you can do so without risk. Cool containers exposed to flames with water until well after the fire is out. In the event of fire and/or explosion do not breathe fumes.

General fire hazards Extremely flammable aerosol. Contents under pressure. Pressurized container may explode when exposed to heat or flame.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Wear appropriate protective equipment and clothing during clean-up. Avoid breathing gas. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. Use personal protection recommended in Section 8 of the SDS.

Methods and materials for containment and cleaning up

Refer to attached safety data sheets and/or instructions for use. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak if you can do so without risk. Move the cylinder to a safe and open area if the leak is irreparable. Use water spray to reduce vapors or divert vapor cloud drift. Isolate area until gas has dispersed. Dike far ahead of spill for later disposal. Scoop up used absorbent into drums or other appropriate container. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Pressurized container: Do not pierce or burn, even after use. Do not use if spray button is missing or defective. Do not spray on a naked flame or any other incandescent material. Do not smoke while using or until sprayed surface is thoroughly dry. Do not cut, weld, solder, drill, grind, or expose containers to heat, flame, sparks, or other sources of ignition. Do not re-use empty containers. Avoid breathing gas. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Use only in well-ventilated areas. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Level 1 Aerosol.

Store locked up. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50°C/122 °F. Do not puncture, incinerate or crush. Do not handle or store near an open flame, heat or other sources of ignition. Store in original tightly closed container. Store in a well-ventilated place. Keep out of the reach of children. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

U.S. - OSHA

Components	Type	Value	Form
Distillates Petroleum, Hydroteated Light (CAS 64742-47-8)	PEL	5 mg/m3	Oil mist

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Carbon Dioxide (CAS 124-38-9)	PEL	9000 mg/m3 5000 ppm

ACGIH

Components	Type	Value	Form
Distillates Petroleum, Hydroteated Light (CAS 64742-47-8)	TWA	5 mg/m3	Oil mist

US. ACGIH Threshold Limit Values

Components	Type	Value
Carbon Dioxide (CAS 124-38-9)	STEL	30000 ppm
	TWA	5000 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Carbon Dioxide (CAS 124-38-9)	STEL	54000 mg/m3 30000 ppm
	TWA	9000 mg/m3 5000 ppm

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment	
Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin protection	
Hand protection	Chemical resistant gloves are recommended.
Other	Avoid contact with the skin. Wear appropriate chemical resistant clothing.
Respiratory protection	When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
Thermal hazards	Not applicable.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	Liquid.
Physical state	Gas.
Form	Aerosol.
Color	Amber.
Odor	Characteristic.
Odor threshold	Not available.
pH	Not applicable
Melting point/freezing point	< -58 °F (< -50 °C)
Initial boiling point and boiling range	415.4 °F (213 °C)
Flash point	174.2 °F (79.0 °C) Tag Closed Cup (dispensed liquid)
Evaporation rate	< 0.1 (BuAc = 1)
Flammability (solid, gas)	Flammable gas.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	0.6 %
Flammability limit - upper (%)	7 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 0.05 mm Hg @ 20°C
Vapor density	> 1 (air = 1)
Relative density	0.79 - 0.81 @ 20°C
Solubility(ies)	
Solubility (water)	Not soluble
Partition coefficient (n-octanol/water)	< 1
Auto-ignition temperature	> 442.4 °F (> 228 °C)
Decomposition temperature	Not established
Viscosity	< 3.8 cSt @ 25°C
Other information	
Heat of combustion	Not established
Percent volatile	95 - 96 %
VOC (Weight %)	0.4 % per US State & Federal Consumer Product Regulations

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.

Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Oxidizing agents.
Hazardous decomposition products	Carbon oxides.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Vapors have a narcotic effect and may cause headache, fatigue, dizziness and nausea.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	May be fatal if swallowed and enters airways.
Symptoms related to the physical, chemical and toxicological characteristics	Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Skin irritation. Exposure may cause temporary irritation, redness, or discomfort. Defatting of the skin. Rash. Vapors have a narcotic effect and may cause headache, fatigue, dizziness and nausea. Decrease in motor functions. Behavioral changes.

Information on toxicological effects

Acute toxicity Narcotic effects. May cause an allergic skin reaction.

Components	Species	Test Results
Calcium Sulfonate (CAS 61789-86-4)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg, 24 Hours
	Rat	> 2000 mg/kg, 24 Hours
Inhalation		
LC50	Rat	> 1.9 mg/l, 4 Hours
Oral		
LD50	Rat	10000 - 20000 mg/kg
Distillates Petroleum Hydrotreated Med (CAS 64742-46-7)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg, 24 Hours
Inhalation		
LC50	Rat	7640 mg/m3, 4 Hours
		1.72 mg/l, 4 Hours
Distillates Petroleum, Hydroteated Light (CAS 64742-47-8)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
		> 2000 mg/kg, 24 Hours
Inhalation		
LC50	Cat	> 6.4 mg/l, 6 Hours
	Rat	> 7.5 mg/l, 6 Hours
		> 4.3 mg/l, 4 Hours
		> 0.1 mg/l, 8 Hours
Oral		
LD50	Rat	> 5000 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	May cause an allergic skin reaction.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Narcotic effects.
Specific target organ toxicity - repeated exposure	Based on available data, the classification criteria are not met.
Aspiration hazard	Not likely, due to the form of the product.
Chronic effects	Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Components		Species	Test Results
Distillates Petroleum, Hydroteated Light (CAS 64742-47-8)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	2.9 mg/l, 96 hours

Persistence and degradability	Not inherently biodegradable.
Bioaccumulative potential	Not available.

Partition coefficient n-octanol / water (log Kow)

LPS® 1 (Aerosol) < 1

Mobility in soil	No data available.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Consult authorities before disposal. Contents under pressure. Do not puncture, incinerate or crush. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	D003: Waste Reactive material
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied. Do not re-use empty containers.

14. Transport information

DOT

UN number	UN1950
UN proper shipping name	Aerosols, flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	
Marine pollutant	No
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	N82
Packaging exceptions	306

Packaging non bulk	None
Packaging bulk	None

IATA

UN number	UN1950
UN proper shipping name	Aerosols, flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Packing group	Not applicable.
Environmental hazards	No
ERG Code	10L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Other information	
Passenger and cargo aircraft	Allowed.
Cargo aircraft only	Allowed.

IMDG

UN number	UN1950
UN proper shipping name	AEROSOLS, Flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	
Marine pollutant	No
EmS	F-D, S-U
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code This substance/mixture is not intended to be transported in bulk.

DOT

IATA; IMDG

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - Yes
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. Massachusetts RTK - Substance List

Carbon Dioxide (CAS 124-38-9)

US. New Jersey Worker and Community Right-to-Know Act

Carbon Dioxide (CAS 124-38-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Carbon Dioxide (CAS 124-38-9)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 10-01-2014

Version # 01

Disclaimer LPS Laboratories cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

1. Identification

Product identifier **LPS® 2 (Aerosol)**

Other means of identification

Part Number 00216

Recommended use An industrial lubricant designed to displace moisture from equipment, provide heavy-duty lubrication and rust prevention.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Manufacturer

Company name LPS Laboratories, a division of Illinois Tool Works, Inc.

Address 4647 Hugh Howell Rd.
Tucker, GA 30084

Country (U.S.A.)
Tel: +1 770-243-8800

In Case of Emergency 1-800-424-9300 (inside U.S.)
+001 703-527-3887 (outside U.S.)

Website www.lpslabs.com

E-mail sds@lpslabs.com

2. Hazard(s) identification

Physical hazards	Flammable aerosols	Category 1
	Gases under pressure	Compressed gas
Health hazards	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Specific target organ toxicity, single exposure	Category 3 narcotic effects

Environmental hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Extremely flammable aerosol. Contains gas under pressure; may explode if heated. Causes skin irritation. Causes serious eye irritation. May cause drowsiness or dizziness.

Precautionary statement

Prevention Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not spray on an open flame or other ignition source. Pressurized container: Do not pierce or burn, even after use. Avoid breathing gas. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves. Wear eye/face protection.

Response If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor if you feel unwell. Specific treatment (see this label). If skin irritation occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

Storage Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight. Do not expose to temperatures exceeding 50°C/122°F.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Distillates Petroleum, Hydroteated Light		64742-47-8	70 - 80
Petroleum Oil		64742-52-5	10 - 20
Carbon Dioxide		124-38-9	1 - 5

4. First-aid measures

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing. For breathing difficulties, oxygen may be necessary. Call a physician if symptoms develop or persist.

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Ingestion Call a physician or poison control center immediately. Only induce vomiting at the instruction of medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Most important symptoms/effects, acute and delayed Dermatitis. Rash. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Skin irritation. May cause redness and pain.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically.

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Call a POISON CENTER or doctor/physician if you feel unwell.

5. Fire-fighting measures

Suitable extinguishing media Powder. Alcohol resistant foam. Water. Water spray. Dry chemicals. Carbon dioxide (CO2).

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical Contents under pressure. Pressurized container may explode when exposed to heat or flame.

Special protective equipment and precautions for firefighters Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

Fire fighting equipment/instructions In case of fire: Stop leak if safe to do so. Move containers from fire area if you can do so without risk. Cool containers exposed to heat with water spray and remove container, if no risk is involved. Containers should be cooled with water to prevent vapor pressure build up. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials. Move containers from fire area if you can do so without risk. Cool containers exposed to flames with water until well after the fire is out. In the event of fire and/or explosion do not breathe fumes.

General fire hazards Extremely flammable aerosol.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. Use personal protection recommended in Section 8 of the SDS.

Methods and materials for containment and cleaning up Refer to attached safety data sheets and/or instructions for use. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak if you can do so without risk. Move the cylinder to a safe and open area if the leak is irreparable. Isolate area until gas has dispersed. Use water spray to reduce vapors or divert vapor cloud drift. Scoop up used absorbent into drums or other appropriate container. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.

Environmental precautions Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Pressurized container: Do not pierce or burn, even after use. Do not use if spray button is missing or defective. Do not spray on a naked flame or any other incandescent material. Do not smoke while using or until sprayed surface is thoroughly dry. Do not cut, weld, solder, drill, grind, or expose containers to heat, flame, sparks, or other sources of ignition. All equipment used when handling the product must be grounded. Do not re-use empty containers. Avoid prolonged or repeated contact with skin. Avoid prolonged exposure. Use only in well-ventilated areas. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Level 3 Aerosol.

Store locked up. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50°C/122 °F. Do not puncture, incinerate or crush. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS). Keep out of the reach of children.

8. Exposure controls/personal protection

Occupational exposure limits

U.S. - OSHA

Components	Type	Value	Form
Distillates Petroleum, Hydroteated Light (CAS 64742-47-8)	PEL	5 mg/m3	Oil mist
Petroleum Oil (CAS 64742-52-5)	PEL	5 mg/m3	Oil mist

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Carbon Dioxide (CAS 124-38-9)	PEL	9000 mg/m3
		5000 ppm

ACGIH

Components	Type	Value	Form
Distillates Petroleum, Hydroteated Light (CAS 64742-47-8)	TWA	5 mg/m3	Oil mist
Petroleum Oil (CAS 64742-52-5)	TWA	5 mg/m3	Oil mist

US. ACGIH Threshold Limit Values

Components	Type	Value
Carbon Dioxide (CAS 124-38-9)	STEL	30000 ppm
	TWA	5000 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Carbon Dioxide (CAS 124-38-9)	STEL	54000 mg/m3
		30000 ppm
	TWA	9000 mg/m3
		5000 ppm

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields (or goggles).

Skin protection	
Hand protection	Chemical resistant gloves are recommended.
Other	Wear suitable protective clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
Thermal hazards	Not applicable.
General hygiene considerations	When using, do not eat, drink or smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	Liquid.
Physical state	Gas.
Form	Aerosol.
Color	Brown
Odor	Slight petroleum odor, Cherry
Odor threshold	Not established
pH	Not applicable
Melting point/freezing point	< -58 °F (< -50 °C)
Initial boiling point and boiling range	383 °F (195 °C) @ 101 kPa
Flash point	174.2 °F (79.0 °C) Tag Closed Cup (dispensed liquid)
Evaporation rate	< 0.1 BuAc
Flammability (solid, gas)	Flammable gas.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	0.6 %
Flammability limit - upper (%)	7 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 0.05 mm Hg @ 20ºC (dispensed liquid)
Vapor density	4.7 (air = 1)
Relative density	Not available.
Solubility(ies)	
Solubility (water)	< 3 %
Partition coefficient (n-octanol/water)	< 1
Auto-ignition temperature	> 442.4 °F (> 228 °C)
Decomposition temperature	Not established
Viscosity	< 7 cSt
Viscosity temperature	77 °F (25 °C)
Other information	
Heat of combustion	> 30 kJ/g
Percent volatile	92 - 95 %
Specific gravity	0.82 - 0.86 @ 20°C

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials.

Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Carbon oxides.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Vapors have a narcotic effect and may cause headache, fatigue, dizziness and nausea.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye irritation.
Ingestion	May cause discomfort if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Irritating to eyes, respiratory system and skin. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Exposure may cause temporary irritation, redness, or discomfort. Vapors have a narcotic effect and may cause headache, fatigue, dizziness and nausea.

Information on toxicological effects

Acute toxicity Narcotic effects.

Components	Species	Test Results
Distillates Petroleum, Hydroteated Light (CAS 64742-47-8)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
		> 2000 mg/kg, 24 Hours
Inhalation		
LC50	Cat	> 6.4 mg/l, 6 Hours
	Rat	> 7.5 mg/l, 6 Hours
		> 4.3 mg/l, 4 Hours
		> 0.1 mg/l, 8 Hours
Oral		
LD50	Rat	> 5000 mg/kg
Petroleum Oil (CAS 64742-52-5)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
		> 2000 mg/kg, 24 Hours
Inhalation		
LC50	Rat	2.18 mg/l, 4 Hours
Oral		
LD50	Rat	5000 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye irritation.
Respiratory or skin sensitization	
Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Narcotic effects.

Specific target organ toxicity - repeated exposure	Based on available data, the classification criteria are not met.
Aspiration hazard	Not likely, due to the form of the product.
Chronic effects	Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
Distillates Petroleum, Hydroteated Light (CAS 64742-47-8)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	2.9 mg/l, 96 hours

Persistence and degradability	Not inherently biodegradable.
Bioaccumulative potential	Not available.
Partition coefficient n-octanol / water (log Kow)	
LPS® 2 (Aerosol)	< 1
Mobility in soil	No data available.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Consult authorities before disposal. Contents under pressure. Do not puncture, incinerate or crush. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	D003: Waste Reactive material
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied. Do not re-use empty containers.

14. Transport information

DOT

UN number	UN1950
UN proper shipping name	Aerosols, flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	
Marine pollutant	No
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling. Read safety instructions, SDS and emergency procedures before handling.
Packaging exceptions	306
Packaging non bulk	None
Packaging bulk	None

IATA

UN number	UN1950
UN proper shipping name	Aerosols, flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	No.
ERG Code	10L

Special precautions for user	Read safety instructions, SDS and emergency procedures before handling. Read safety instructions, SDS and emergency procedures before handling.
Other information	
Passenger and cargo aircraft	Allowed.
Cargo aircraft only	Allowed.

IMDG

UN number	UN1950
UN proper shipping name	AEROSOLS, flammable
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	
Marine pollutant	No
EmS	Not available.
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling. Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable.

DOT

IATA; IMDG

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - Yes
Reactivity Hazard - No

SARA 302 Extremely hazardous substance
Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)
Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)
Not listed.

US. Massachusetts RTK - Substance List
Carbon Dioxide (CAS 124-38-9)

US. New Jersey Worker and Community Right-to-Know Act
Carbon Dioxide (CAS 124-38-9)

US. Pennsylvania Worker and Community Right-to-Know Law
Carbon Dioxide (CAS 124-38-9)

US. Rhode Island RTK
Not regulated.

US. California Proposition 65
California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 09-22-2014

Version # 01

Disclaimer	The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
Revision Information	Product and Company Identification: Product Uses Composition / Information on Ingredients: Ingredients Physical & Chemical Properties: Multiple Properties Ecological Information: Ecotox Property Data Transport Information: Proper Shipping Name/Packing Group Regulatory Information: United States HazReg Data: North America GHS: Classification

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBIL ALMO 525**
Product Description: Base Oil and Additives
Product Code: 603183-00, 970924
Intended Use: Lubricant

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
MSDS Requests	713-613-3661
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

No Reportable Hazardous Substance(s) or Complex Substance(s).

SECTION 3 HAZARDS IDENTIFICATION

This material may be considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

This product may be used in certain applications where misting can occur. Excessive exposure to liquids and mists may cause skin and eye irritation. In addition, excessive exposure to mists may cause respiratory irritation and damage and aggravate pre-existing emphysema or asthma. Low order of toxicity. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use

adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Pressurized mists may form a flammable mixture.

Hazardous Combustion Products: Aldehydes, Oxides of carbon, Smoke, Fume, Sulfur oxides, Incomplete combustion products

FLAMMABILITY PROPERTIES

Flash Point [Method]: >188C (370F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry

creeks. The National Response Center can be reached at (800)424-8802.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid breathing mists or vapors. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists / aerosols can occur, the following are recommended: 5 mg/m³ - ACGIH TLV, 10 mg/m³ - ACGIH STEL, 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use

with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
Particulate air-purifying respirator approved for dust / oil mist is recommended.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Work conditions can greatly affect glove durability; inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended. Chemical type goggles should be worn during misting operations.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS
See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION
Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION
Relative Density (at 15 C): 0.883
Flash Point [Method]: >188C (370F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316C (600F)
Vapor Density (Air = 1): > 2 at 101 kPa

Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible
Viscosity: 46 cSt (46 mm2/sec) at 40 C | 7.3 cSt (7.3 mm2/sec) at 100C
Oxidizing Properties: See Sections 3, 15, 16.

OTHER INFORMATION
Freezing Point: N/D
Melting Point: N/A
Pour Point: -24°C (-11°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data.	Elevated temperatures or mechanical action may form vapors, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS
For the product itself:

Oil Mist (highly refined oils): Animals exposed to high concentrations of mist developed oil retention, inflammation, and oil granulomas in the respiratory tract. Oils exposed to high temperatures, cracking conditions, or mixing with tramp / used oils may introduce polycyclic aromatic compounds or microbial contaminants that could result in cancer or severe respiratory hazards.

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT) : Not Regulated for Land Transport

LAND (TDG) : Not Regulated for Land Transport

SEA (IMDG) : Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA) : Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.

NATIONAL CHEMICAL INVENTORY LISTING: TSCA

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The Following Ingredients are Cited on the Lists Below:

Chemical Name	CAS Number	List Citations
CHLORINE (ELEMENTAL ANALYSIS)	7782-50-5	1, 4
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	15

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 13: Empty Container Warning was modified.
Section 09: Boiling Point C(F) was modified.
Section 08: Hand Protection was modified.
Section 09: Vapor Pressure was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 08: Respiratory Protection was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 06: Notification Procedures was modified.
Section 12: Bioaccumulation - Header was added.
Section 12: Ecological Information - Bioaccumulation was added.
Section 12: Ecological Information - Bioaccumulation was added.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was deleted.
Section 15: SARA 313 - Chemical Name - Header was deleted.
Section 15: SARA 313 - CAS Number - Header was deleted.
Section 15: SARA313 - Typical Value - Header was deleted.

PRECAUTIONARY LABEL TEXT:
Caution! Excessive exposure to mist may cause skin and eye irritation. In addition, excessive exposure to mist may cause respiratory irritation and damage, and aggravate pre-existing emphysema and asthma. Use with adequate ventilation. If inhaled and symptoms develop, remove to fresh air and get medical attention.

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DGN: 2008031XUS (545270)

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MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name:	Omniguard
MSDS Number:	778589
Intended Use:	Lubricating Grease

COMPANY INDENTIFICATION

Supplier	Nook Industries 4950 East 49th Street Cleveland, Oh 44125
24 Health Emergency:	Chemtrec: 800-424-9300 (24 Hours)
MSDS Requests`	800-321-7800
MSDS Internet Address	http://www.nookindustries.com/r/msds

SECTION 2 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance: Tan
Physical Form: Semi-Solid
Odor: Petroleum

POTENTIAL HEALTH EFFECTS

Eye: Eye irritant. Contact may cause stinging, watering, redness, and swelling.
Skin: Contact may cause mild skin irritation including redness and a burning sensation. Repeated exposure may cause skin dryness or cracking. No information available on skin absorption.
Inhalation (Breathing): No information available on acute toxicity. Inhalation is not an expected route of exposure.
Ingestion (Swallowing): Low degree of toxicity by ingestion.
Signs and Symptoms: Inhalation of oil mists or vapors generated at elevated temperatures may cause respiratory irritation. Accidental ingestion can result in minor irritation of the digestive tract, nausea and diarrhea.
Pre-Existing Medical Conditions: Conditions which may be aggravated by exposure include eye disorders and skin disorders.

See Section 11 for additional Toxicity Information.

SECITION 3 COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CASRN	CONCENTRATION[1]
Lubricant Base Oil (Petroleum)	VARIOUS	50 - 80
Additives	PROPRIETARY	15 - 40
Calcium Dodecylbenzenesulfonate	26264-06-2	1 - 3

[1] All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4 FIRST AID MEASURES

Eye Contact: For direct contact, remove contact lenses if present and easy to do. Immediately hold eyelids apart and flush the affected eye(s) with clean water for at least 15 minutes. Seek immediate medical attention.

Skin Contact: Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops and persists, seek medical attention. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician. (see Note to Physician)

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. If symptoms persist, seek medical attention.

Ingestion (Swallowing): First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

Notes to Physician: High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. These injuries often require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury. Early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

SECTION 5 FIRE-FIGHTING MEASURES

NFPA 704 Hazard Class

Health:	1
Flammability:	1
Instability:	0

(0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

Unusual Fire & Explosion Hazards: This material may burn, but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F / 100°C. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Fire Fighting Instructions: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion.

Oxides of sulfur, nitrogen or phosphorus may also be formed.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal Precautions: This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release. Stay upwind and away from spill/release. Avoid direct contact with material. For larges spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: If spill/release in excess of EPA reportable quantity (see Section 15) is made into the environment, immediately notify the National Response Center (phone number 800-424-8802). Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Methods for Containment and Clean-Up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling: Keep away from flames and hot surfaces. Wear eye/face protection. Wash thoroughly after handling.

Use good personal hygiene practices and wear appropriate personal protective equipment.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes.

Conditions for safe storage: Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated area away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Product Name: Nook Industries PAG-1 Grease
(Part number NLU-1001)
Revision Date: 23 Sept 2013

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

COMPONENT	US-ACGIH	OSHA	OTHER
Lubricant Base Oil (Petroleum)	TWA: 5mg/m^3 STEL: 10 mg/m^3 as Oil Mist, if generated	TWA: 5 mg/m^3 as Oil Mist, if generated	---

NOTE: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Suggested protective materials: Nitrile

Respiratory Protection: Respiratory protection is not normally required under intended conditions of use. Emergencies or conditions that could result in significant airborne exposures may require the use of NIOSH approved respiratory protection. An industrial hygienist or other appropriate health and safety professional should be consulted for specific guidance under these situations.

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

NOTE: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

Appearance:	Tan
Physical Form:	Semi-Solid
Odor:	Petroleum
Odor Threshold:	No data
pH:	Not applicable
Vapor Pressure:	<0.1 mm Hg
Vapor Density (air=1):	> 5
Initial Boiling Point/Range:	No data
Melting/Freezing Point:	No data
Solubility in Water:	Insoluble
Solubility in Other Solvents:	Soluble
Partition Coefficient (n-octanol/water) (Kow):	No data
Specific Gravity (water=1):	0.9943 @ 60°F (15.6°C)
Bulk Density:	8.29 lbs/gal

Evaporation Rate (nBuAc=1):	<1
Flash Point:	464°F / 240°C
Test Method:	Cleveland Open Cup (COC), ASTM D92
Lower Explosive Limits (vol % in air):	No data
Upper Explosive Limits (vol % in air):	No data
Auto-ignition Temperature:	No data

SECTION 10 STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated conditions of use.

Conditions to Avoid: Extended exposure to high temperatures can cause decomposition. Avoid all possible sources of ignition.

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous Decomposition Products: Not anticipated under normal conditions of use.

Hazardous Polymerization: Not known to occur.

SECTION 11 TOXICOLOGICAL INFORMATION

CHRONIC TOXICITY:

Lubricant Base Oil (Petroleum)

Carcinogenicity: The petroleum base oils contained in this product have been highly refined by a variety of processes including severe hydrocracking/hydroprocessing to reduce aromatics and improve performance characteristics. All of the oils meet the IP-346 criteria of less than 3 percent PAH's and are not considered carcinogens by NTP, IARC, or OSHA.

ACUTE TOXICITY:

COMPONENT	ORAL LD50	DERMAL LD50	INHALATION LC50
Lubricant Base Oil (Petroleum)	> 5 g/kg	> 2 g/kg	> 5 mg/L
Calcium Dodecylbenzenesulfonate	1,300 mg/kg	No data	No data

SECTION 12 ECOLOGICAL INFORMATION

Ecotoxicity: Experimental studies show that acute aquatic toxicity values are greater than 1000 mg/l. These values are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions. However, there is insufficient information available on the toxicity of the thickening agents used in greases. Should therefore be regarded as capable of causing long term adverse effects in the aquatic environment.

Mobility: Volatilization to air is not expected to be a significant fate process due to the low vapor pressure of this material.

Components may behave differently in the aquatic environment with soaps dispersing and dissolving to some extent in water while the hydrocarbons will float on the surface due to their low water solubility. The hydrocarbon portion would be expected to show low mobility in soil and water. The major environmental fate would be expected to be biodegradion.

Persistence and degradability: The base oil constituents of greases are expected to be inherently, but no readily biodegradable.

Some of the thickening agents may be readily biodegradable.

Bioaccumulation Potential: Log Kow values measured for the hydrocarbon components of this material range from 4 to over 6, and therefore regarded as having the potential to bioaccumulate. In practice, metabolic processes may reduce bioconcentration.

SECTION 13 DISPOSAL CONSIDERATIONS

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

This material under most intended uses would become "Used Oil" due to contamination by physical or chemical impurities. Whenever possible, Recycle Used Oil in accordance with applicable federal and state or local regulations. Container contents should be completely used and containers should be emptied prior to discard.

SECTION 14 TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

Shipping Description: Not regulated

NOTE: If shipped by land in a packaging having a capacity of 3,500 gallons or more, the provisions of 49 CFR, Part 130 apply. (Contains oil)

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

Shipping Description: Not regulated

NOTE: U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 25.

INTERNATIONAL CIVIL AVIATION ORG. INTERNATIONAL AIR TRANSPORT ASSOC. (ICAO/IATA)

UN/ID #: Not regulated

NOTE: U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 24.

	LTD. QTY	PASSENGER AIRCRAFT	CARGO AIRCRAFT ONLY
Packaging Instruction #:	---	---	---
Max. Net Qty. Per Package:	---	---	---
Packaging Instruction # after 12/31/2010:			

SECTION 15 REGULATORY INFORMATION

CERCLA/SARA

Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA

Section 311/312 (Title III Hazard Categories)

Acute Health:	Yes
Chronic Health:	No
Fire Hazard:	No
Pressure Hazard:	No
Reactive Hazard:	No

COMPONENT	RQ
Calcium Dodecylbenzenesulfonate	1000 lb

CALIFORNIA PROPOSITION 65

WARNING: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

COMPONENT	TYPE OF TOXICITY
1-Naphthylamine	Cancer
2-Naphthylamine	Cancer

CANADIAN REGULATIONS

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the Regulations.

WHMIS Hazard Class D2B

NATIONAL CHEMICAL INVENTORIES:

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA.

All components are either on the DSL, or are exempt from DSL listing requirements.

U.S. Export Control Classification Number: EAR99

SECTION 16 OTHER INFORMATION

Date of Issue:	06-Aug-2010
Status:	**FINAL**
Previous Issue Date:	27-Aug-2007
MSDS Number:	778589

Guide to Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists

CASRN = Chemical Abstracts Service Registry Number

CEILING = Ceiling Limit (15 minutes)

CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act

EPA = Environmental Protection Agency

IARC = International Agency for Research on Cancer

LEL = Lower Explosive Limit

NE = Not Established

NFPA = National Fire Protection Association

NTP = National Toxicology Program

OSHA = Occupational Safety and Health Administration

PEL = Permissible Exposure Limit (OSHA)

SARA = Superfund Amendments and Reauthorization Act

STEL = Short Term Exposure Limit (15 minutes)

TLV = Threshold Limit Value (ACGIH)

TWA = Time Weighted Average (8 hours)

UEL = Upper Explosive Limit

WHMIS = Worker Hazardous Materials Information System (Canada)

Material Safety Data Sheet

1 - Chemical Product and Company Identification

Manufacturer: WD-40 Company **Address: 1061 Cudahy Place (92110)** **P.O. Box 80607** **San Diego, California, USA** **92138 –0607** **Telephone:** **Emergency only: 1-888-324-7596 (PROSAR)** **Information: 1-888-324-7596** **Chemical Spills: 1-800-424-9300 (Chemtrec)** **1-703-527-3887 (International Calls)**	**Chemical Name: Organic Mixture** **Trade Name: WD-40 Aerosol** **Product Use: Lubricant, Penetrant, Drives Out Moisture, Removes and Protects Surfaces From Corrosion** **MSDS Date Of Preparation: 6/8/12**

2 – Hazards Identification

Emergency Overview:
DANGER! Flammable aerosol. Contents under pressure. Harmful or fatal if swallowed. If swallowed, may be aspirated and cause lung damage. May cause eye irritation. Avoid eye contact. Use with adequate ventilation. Keep away from heat, sparks and all other sources of ignition.

Symptoms of Overexposure:
Inhalation: High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal.
Skin Contact: Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis.
Eye Contact: Contact may be irritating to eyes. May cause redness and tearing.
Ingestion: This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. This product is an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis, severe lung damage and death.
Chronic Effects: None expected.
Medical Conditions Aggravated by Exposure: Preexisting eye, skin and respiratory conditions may be aggravated by exposure.

Suspected Cancer Agent:
Yes No X

3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent
Aliphatic Hydrocarbon	64742-47-8	45-50
Petroleum Base Oil	64742-58-1 64742-53-6 64742-56-9 64742-65-0	<25
LVP Aliphatic Hydrocarbon	64742-47-8	12-18
Carbon Dioxide	124-38-9	2-3
Non-Hazardous Ingredients	Mixture	<10

4 – First Aid Measures

Ingestion (Swallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately.
Eye Contact: Flush thoroughly with water. Remove contact lenses if present after the first 5 minutes and continue flushing for several more minutes. Get medical attention if irritation persists.
Skin Contact: Wash with soap and water. If irritation develops and persists, get medical attention.

Inhalation (Breathing): If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.

5 – Fire Fighting Measures

Extinguishing Media: Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.
Special Fire Fighting Procedures: Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.
Unusual Fire and Explosion Hazards: Contents under pressure. Keep away from ignition sources and open flames. Exposure of containers to extreme heat and flames can cause them to rupture often with violent force. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back.

6 – Accidental Release Measures

Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area. Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

7 – Handling and Storage

Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use only with adequate ventilation. Keep away from heat, sparks, pilot lights, hot surfaces and open flames. Unplug electrical tools, motors and appliances before spraying or bringing the can near any source of electricity. Electricity can burn a hole in the can and cause contents to burst into flames. To avoid serious burn injury, do not let the can touch battery terminals, electrical connections on motors or appliances or any other source of electricity. Wash thoroughly with soap and water after handling. Keep containers closed when not in use. Keep out of the reach of children. Do not puncture, crush or incinerate containers, even when empty.
Storage: Store in a cool, well-ventilated area, away from incompatible materials. Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure Limits
Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Petroleum Base Oil	5 mg/m3 TWA, 10 mg/m3 STEL ACGIH TLV 5 mg/m3 TWA OSHA PEL
LVP Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Carbon Dioxide	5000 ppm TWA (OSHA/ACGIH), 30,000 ppm STEL (ACGIH)
Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product
Engineering Controls: Use in a well-ventilated area.
Personal Protection:
Eye Protection: Avoid eye contact. Always spray away from your face.
Skin Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.
Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended
Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.
Personal Protection:
Eye Protection: Safety goggles recommended where eye contact is possible.

Skin Protection: Wear chemical resistant gloves.
Respiratory Protection: None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice.
Work/Hygiene Practices: Wash with soap and water after handling.

9 – Physical and Chemical Properties

Boiling Point:	361 - 369°F (183 - 187°C)	Specific Gravity:	0.8 – 0.82 @ 60°F
Solubility in Water:	Insoluble	pH:	Not Applicable
Vapor Pressure:	95-115 PSI @ 70°F	Vapor Density:	Greater than 1
Percent Volatile:	70-75%	VOC:	412 grams/liter (49.5%)
Coefficient of Water/Oil Distribution:	Not Determined	Appearance/Odor	Light amber liquid/mild odor
Flash Point:	122°F (49°C) Tag Open Cup (concentrate)	Flammable Limits: (Solvent Portion)	LEL: 0.6% UEL: 8.0%
Pour Point:	-63°C (-81.4°F) ASTM D-97	Kinematic Viscosity:	2.79-2.96cSt @ 100°F

10 – Stability and Reactivity

Stability: Stable
Hazardous Polymerization: Will not occur.
Conditions to Avoid: Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.
Incompatibilities: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide and carbon dioxide.

11 – Toxicological Information

The oral toxicity of this product is estimated to be greater than 5,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard.
None of the components of this product is listed as a carcinogen or suspected carcinogen or is considered a reproductive hazard.

12 – Ecological Information

No data is currently available.

13 - Disposal Considerations

If this product becomes a waste, it would be expected to meet the criteria of a RCRA ignitable hazardous waste (D001). However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Dispose in accordance with federal, state, and local regulations.

14 – Transportation Information_

DOT Surface Shipping Description: Consumer Commodity, ORM-D
After 1/1/2014 UN1950, Aerosols, 2.1 Ltd. Qty (Note: Shipping Papers are not required for Limited Quantities unless transported by air or vessel – each package must be marked with the Limited Quantity Mark)
IMDG Shipping Description: UN1950, Aerosols, 2.1, LTD QTY
ICAO Shipping Description: UN1950, Aerosols, flammable, 2.1 NOTE: WD-40 does not test aerosol cans to assure that they meet the pressure and other requirements for transport by air. We do not recommend that our aerosol products be transported by air.

15 – Regulatory Information

U.S. Federal Regulations:
CERCLA 103 Reportable Quantity: This product is not subject to CERCLA reporting requirements, however, oil spills are reportable to the National Response Center under the Clean Water Act and many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.
SARA TITLE III:
Hazard Category For Section 311/312: Acute Health, Fire Hazard, Sudden Release of Pressure
Section 313 Toxic Chemicals: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None
Section 302 Extremely Hazardous Substances (TPQ): None
EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory.
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): This product does not contain chemicals regulated under California Proposition 65.
VOC Regulations: This product complies with the consumer product VOC limits of CARB, the US EPA and states adopting the OTC VOC rules.
Canadian Environmental Protection Act: One of the components is listed on the NDSL. All of the other ingredients are listed on the Canadian Domestic Substances List or exempt from notification.
Canadian WHMIS Classification: Class B-5 (Flammable Aerosol)
This MSDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

16 – Other Information:

HMIS Hazard Rating:
Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Reactivity – 0 (minimal hazard)

SIGNATURE: _____ TITLE: Adm. Scientific Manager

REVISION DATE: June 2012 SUPERSEDES: March 2010


CLIMAX
Family of Brands
BORTECH
CALDER
TESTERS
H&S TOOL