PD3000

PORTABLE DRILL

OPERATING MANUAL

CLIMAX

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- Telephone number
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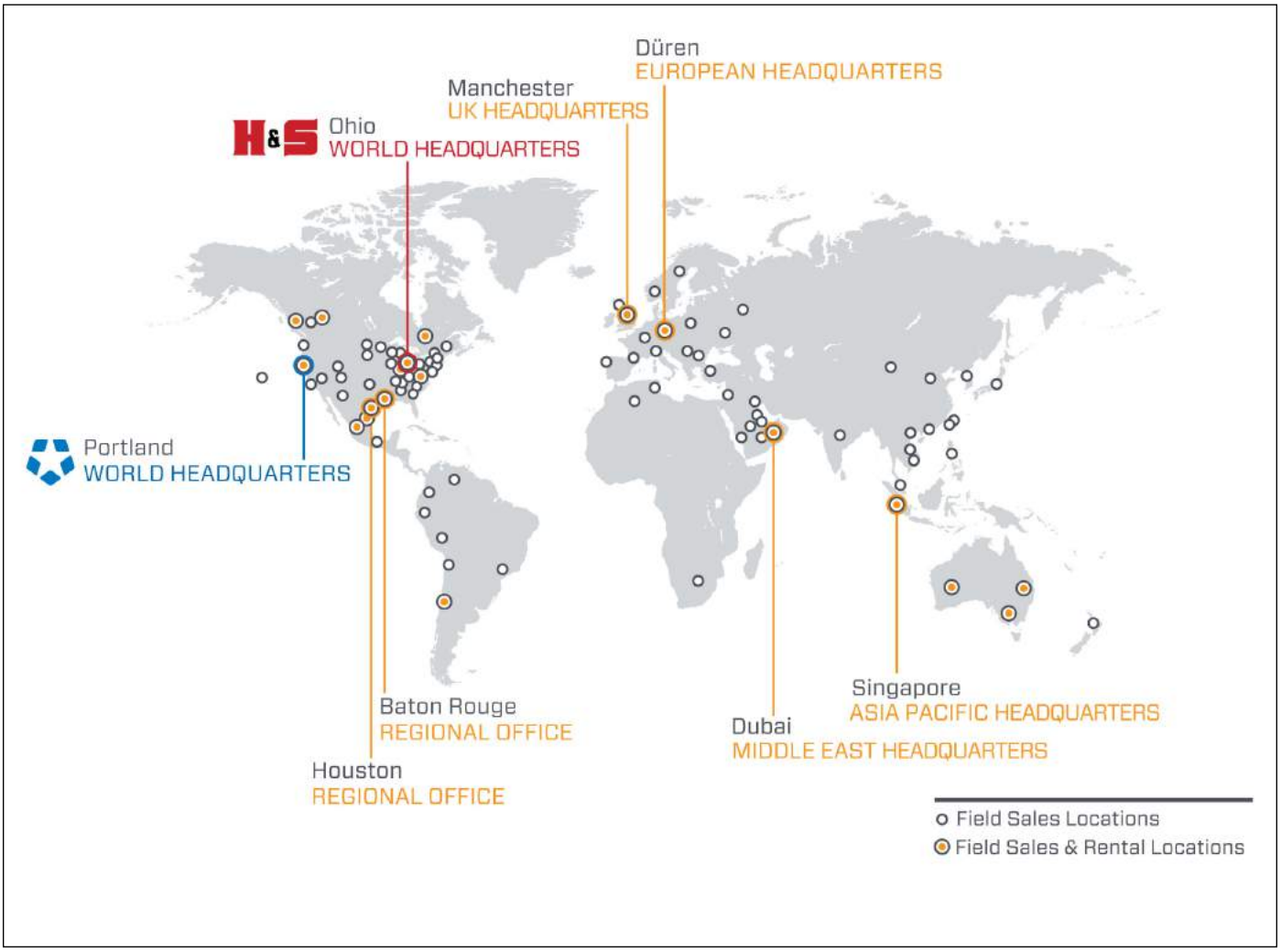

LIMITED WARRANTY

Climax Portable Machining & Welding Systems, Inc. (hereafter referred to as “Climax”) warrants that all new machines are free from defects in materials and workmanship. This warranty is available to the original purchaser for a period of one year after delivery. If the original purchaser finds any defect in materials or workmanship within the warranty period, the original purchaser should contact its factory representative and return the entire machine, shipping prepaid, to the factory. Climax will, at its option, either repair or replace the defective machine at no charge and will return the machine with shipping prepaid.

Climax warrants that all parts are free from defects in materials and workmanship, and that all labor has been performed properly. This warranty is available to the customer purchasing parts or labor for a period of 90 days after delivery of the part or repaired machine or 180 days on used machines and components. If the customer purchasing parts or labor finds any defect in materials or workmanship within the warranty period, the purchaser should contact its factory representative and return the part or repaired machine, shipping prepaid, to the factory. Climax will, at its option, either repair or replace the defective part and/or correct any defect in the labor performed, both at no charge, and return the part or repaired machine shipping prepaid.

These warranties do not apply to the following:

- Damage after the date of shipment not caused by defects in materials or workmanship
- Damage caused by improper or inadequate machine maintenance
- Damage caused by unauthorized machine modification or repair
- Damage caused by machine abuse
- Damage caused by using the machine beyond its rated capacity

All other warranties, express or implied, including without limitation the warranties of merchantability and fitness for a particular purpose are disclaimed and excluded.

Terms of sale

Be sure to review the terms of sale which appear on the reverse side of your invoice. These terms control and limit your rights with respect to the goods purchased from Climax.

About this manual

Climax provides the contents of this manual in good faith as a guideline to the operator. Climax cannot guarantee that the information contained in this manual is correct for applications other than the application described in this manual. Product specifications are subject to change without notice.

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1 INTRODUCTION

IN THIS CHAPTER:

1.1 HOW TO USE THIS MANUAL

This manual describes the setup, operation, maintenance, storage, shipping and decommissioning of the PD3000 Portable Drill.

NOTICE

For maximum safety and performance, read this entire manual before attempting to set up or operate the machine.

The first page of each chapter includes a list of the chapter contents to help you locate specific information.

The appendices contain supplemental product information to aid in setup, operation and maintenance tasks.

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 serious injury.

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*.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, ***COULD*** result in death or serious 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.

1.3 GENERAL SAFETY PRECAUTIONS

Climax leads the way in promoting the safe use of portable machine tools. Safety is a joint effort. You must do your part by:

- Being aware of your work environment
- Closely following the operating procedures and safety precautions contained in this manual
- Closely following your employer's safety guidelines

When operating or working around the machine, observe the safety precautions contained in this manual

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

Risk assessment – Working with and around this machine poses risks to your safety. Conduct a risk assessment of each job site before setting up and operating this machine (see Section 1.5 and Section 1.6 on page 7).

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 equipment (PPE) when operating this or any other machine tool. Wear flame-resistant clothing with long sleeves and legs when operating the machine, as hot flying chips from the workpiece may burn or cut bare skin.

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

Danger zone – The danger zone of this machine is defined as being inside of 22" (559 mm) from the spindle of the machine.

Lifting – This Climax machine weighs approximately 53 lbs. Whenever necessary, use the proper hoisting equipment and rigging to lift the machine or its components. Always use the lifting points designated on the machine. Follow the lifting instructions in Section 3.1. Use caution. Never drop equipment as this may damage the components.

Lock out/tag out – Lock out and tag out the machine before performing maintenance, or before reaching into the danger zone of this machine.

Moving parts – Climax machines have numerous exposed moving parts and interfaces that can cause severe impact, pinching, cutting, and other injuries. During machine operation:

- Keep hands and tools away from moving parts.
- Secure hair, clothing, jewelry, and pocket items to prevent them from becoming entangled in moving parts.

Sharp edges – Drill bits and workpieces have sharp edges that can easily cut skin. Wear protective gloves and exercise caution when handling a drill bit or workpiece.

Hot surfaces – During operation, motors, pumps, HPUs, and drill bits can generate enough heat to cause severe burns. Pay attention to hot-surface warning 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.

Sound level – This machine produces potentially harmful sound levels. Always wear hearing protection when operating the machine or working around it. During testing, the machine produced the following sound levels.[1]

TABLE 1-1. SOUND LEVELS

	Pneumatic
Sound power	99.3 dBA
Operator sound pressure	95.1 dBA
Bystander sound pressure	91 dBA

Hazardous environments – Do not operate the machine in environments where explosive materials, toxic chemicals, or radiation may be present. Do not expose the machine to rain or wet conditions.

Rotating machinery – Rotating machinery can cause serious injuries. Lock out all power sources before performing any adjustment, lubrication, or maintenance.

Hoses – Keep hoses away from heat, oil, sharp edges, and moving parts. Always examine hoses for damage before use.

Adjustments and maintenance – Stop the machine and lock out all power sources before performing any adjustment, lubrication, or maintenance.

Controls – The machine controls are designed to withstand the rigors of normal use. The on/off switches are clearly visible and identifiable. When you leave the machine, disconnect all power sources to the machine. Either disconnect the air hose or turn the lock-out/tag-out valve to the lock position.

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

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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.

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.

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, 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 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 be considering. 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 Assembly instructions (Section 3).
☐	I took inventory of all the items required but not supplied (Section 1.9 on page 9).
☐	I considered how the machine operates and identified the best placement for hose(s) and the operator.
☐	I have assessed any additional risks unique to this application of the portable machine tool.

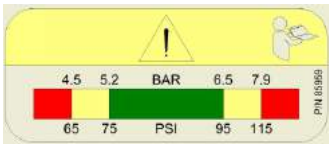
TABLE 1-3. RISK ASSESSMENT CHECKLIST AFTER SET-UP

	After Set-up
☐	I checked that the machine is safely installed (according to Section 3). If the machine is installed at an elevated position, I checked that the machine is safeguarded against falling, and that the fall path is clear and marked.
☐	I identified all possible pinch points, such as those caused by rotating or traveling parts, and informed the affected personnel.
☐	I planned for containment of any chips or debris produced by the machine.
☐	I performed any required maintenance outlined in Maintenance Intervals (Section 5.2).
☐	I checked that all affected personnel have the recommended personal protective equipment, as well as any equipment required by the site or other regulations.
☐	I checked that all affected personnel understand the danger zone and are clear of it.
☐	I have assessed for additional risks unique to this application of the portable machine tool.

1.7 LABELS

Table 1-4 shows the labels that should be on your machine. If any are defaced or missing, contact Climax immediately for replacements.

TABLE 1-4. LABELS

	P/N 35740 Climax serial number, year, and model number plate		P/N 70226 Label Climax logo
	P/N 79328 Refer to the instruction manual label		P/N 78748 Hearing and eye protection required label
	P/N 80510 Warning sharp rotating equipment label		P/N 85959 Operating pressure range label
	P/N 80089 Yellow safety background label		

1.8 PLACEMENT OF LABELS

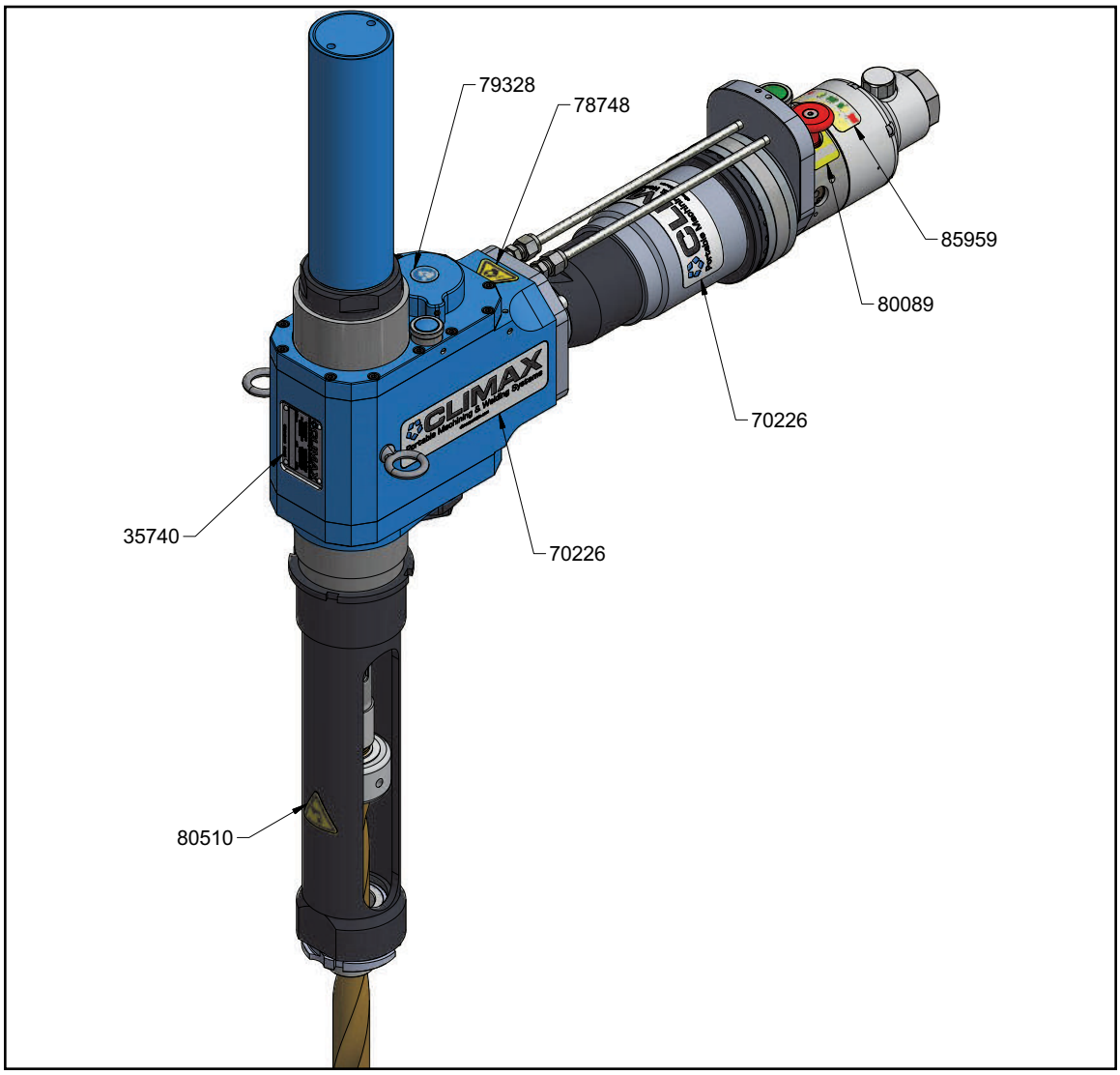


FIGURE 1-5. PD3000 LABEL PLACEMENT BY PART NUMBER

1.9 ITEMS REQUIRED BUT NOT SUPPLIED

During setup, you will need the following items that may not be included with the product:

- Drill bit (e.g. drill/reamer) with a #3 MT shank
- Drill bushing (e.g. Carr-Lane 25000 series)
- Workpiece hole template
- Drill bushing taper-lok screw (P/N Climax P/N 86186)
- Cutting fluid/lubricant (e.g. Unist Typhoon System)
- Air supply line connection fittings
- Air filter & lubricator installed in air supply line

1.10 RECEIPT AND INSPECTION

Your Climax product was inspected and tested before shipment and packaged for normal shipment conditions. Climax does not guarantee the condition of your machine upon delivery.

When you receive your Climax product:

1. Inspect the shipping container for damage.
2. Check the contents of the shipping container against the included invoice to make sure that all components have been shipped.
3. Inspect all components for damage.
4. Contact Climax immediately to report damaged or missing components.

NOTICE

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

The machine ships from Climax with a heavy coating of LPS 3. The recommended cleaner is LPS PreSolve Orange Degreaser. During machine use, an alternate long-term corrosion preventative may have been used. Be sure to use the correct cleaner for the applied protective coating.

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2 OVERVIEW

IN THIS CHAPTER:

The PD3000 Portable Drill is designed for automatic precision drilling and reaming to a preset depth, followed by fast automatic retraction of the tool and automatic shutoff.

The PD3000 is highly configurable with a variety of options and accessories. The machine you purchased may not have all of these. If you require additional accessories, please contact Climax for assistance.

2.1 FEATURES AND COMPONENTS

High power and torque in a compact design – The PD3000 utilizes a 3 hp motor which delivers higher power and torque to produce the fastest drilling times on the market.

Improved quality and reliability – Each gear set is fully supported by two bearings. The clutch system prevents the drill from destroying itself. An innovative shutoff mechanism and dedicated chip wiper bushing help prevent chips and debris from entering the gearbox.

Operator safety – The drill controls have an integrated low-pressure drop-out system to protect the operator from an unexpected startup.

Automatic retract – The depth collar determines the hole depth, and then automatically triggers a retract cycle. The drill retracts at approximately 10 times the drill feed rate.

Manual retract – The drill will retract when the operator presses the manual retract button.

2.1.1 Performance characteristics

TABLE 2-1. PERFORMANCE CHARACTERISTICS

Characteristic	Value(s)
Feed rate	0.003" or 0.006" ipr (.076 or .152 mmpr) Feed rate depends on the gearset installation, see Section Section 5.5 on page 39.
Maximum cutting depth	6.5 inch or 4.0 inch (16.5 cm or 10.16 cm) Cutting depth depends on the machine configuration.
Spindle size	Morse taper #3
Drill size	0.69" – 1.38" (1.75 cm - 3.5 cm)
Spindle speed	Variable, 300 RPM free speed

2.1.2 Components

PD3000 components are shown in Figure 2-2.

FIGURE 2-2. PD3000 COMPONENTS

NOTICE

The drill bit and drill bushing shown are not supplied by CLIMAX.

2.2 RIGGING AND LIFTING INFORMATION

There are two lifting eyes on the gearbox assembly that can be used to lift the machine. See Section 3-1 on page 22 for information about lifting the PD3000 using the lifting eyes. The weight for sub-assembly configurations are listed in Table 2-4.

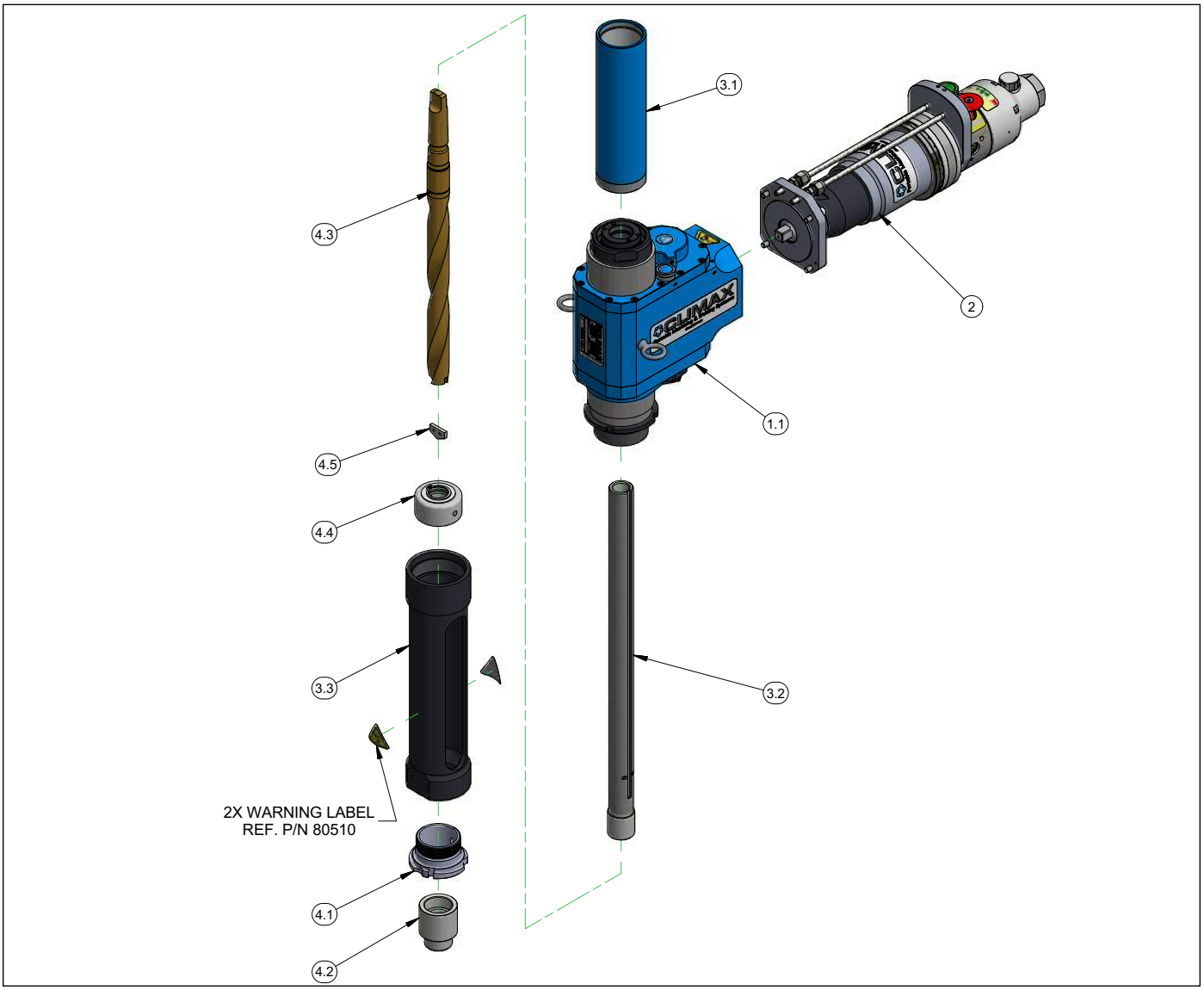

FIGURE 2-3. SUB-ASSEMBLY COMPONENTS

To transport the machine without exceeding a 50-lb (22.7 kg) lift, do the following procedure:

1. Assemble all sub-assemblies except the air motor assembly (item 2 in Table 2-4).
2. Mount the machine to the workpiece.

3. Once the machine is mounted to the workpiece, attach the air motor assembly.

For complete instructions on machine assembly, see Section 3 on page 21.

Component weights are shown in Table 2-4.

TABLE 2-4. SUB-ASSEMBLY WEIGHTS

Item	Sub-assembly	Mass lbs (kg)
1	Gearbox assembly	26.2 (11.9)
2	Air motor assembly	26.2 (11.9)
3	Spindle components	8.4 (3.8)
4	Spade drill kit	4.0 (1.8)
--	Pelican shipping container (not shown)	28 (12.7)
--	Gearbox assembly, spindle components, and spade drill kit combined	38.6 (17.5)

2.3 CONTROLS

Machine controls are pneumatic. Control functions are listed in Table 2-5. Drill controls are shown in Figure 2-6.

⚠ WARNING

Machine controls require clean, dry air for proper function. Do not operate the machine with air that does not meet the requirements listed in Section 2.4.1.

TABLE 2-5. CONTROL FUNCTIONS

Control		Function	Settings
Operator controls (Figure 2-6)	Start button	Press and hold for 1-2 seconds to start the drill cycle.	Latching
	Emergency stop button	Press to do all of the following: • De-energizes the drill motor • Vent the pneumatic control circuit • Reset the spindle direction to feed Pull to re-enable operation.	Down: stop Up: reset/ready to run
	Manual retract button	During operation, press and release to retract fully in a rapid retract mode.	NA
Automatic controls (Figure 2-6)	Automatic retract switch	When tripped by the top depth collar during operation, the switch retracts the spindle in a rapid retract mode.	Latching
	Automatic stop switch	During operation, the switch stops machine operation when it is pressed by the bottom depth collar.	Momentary

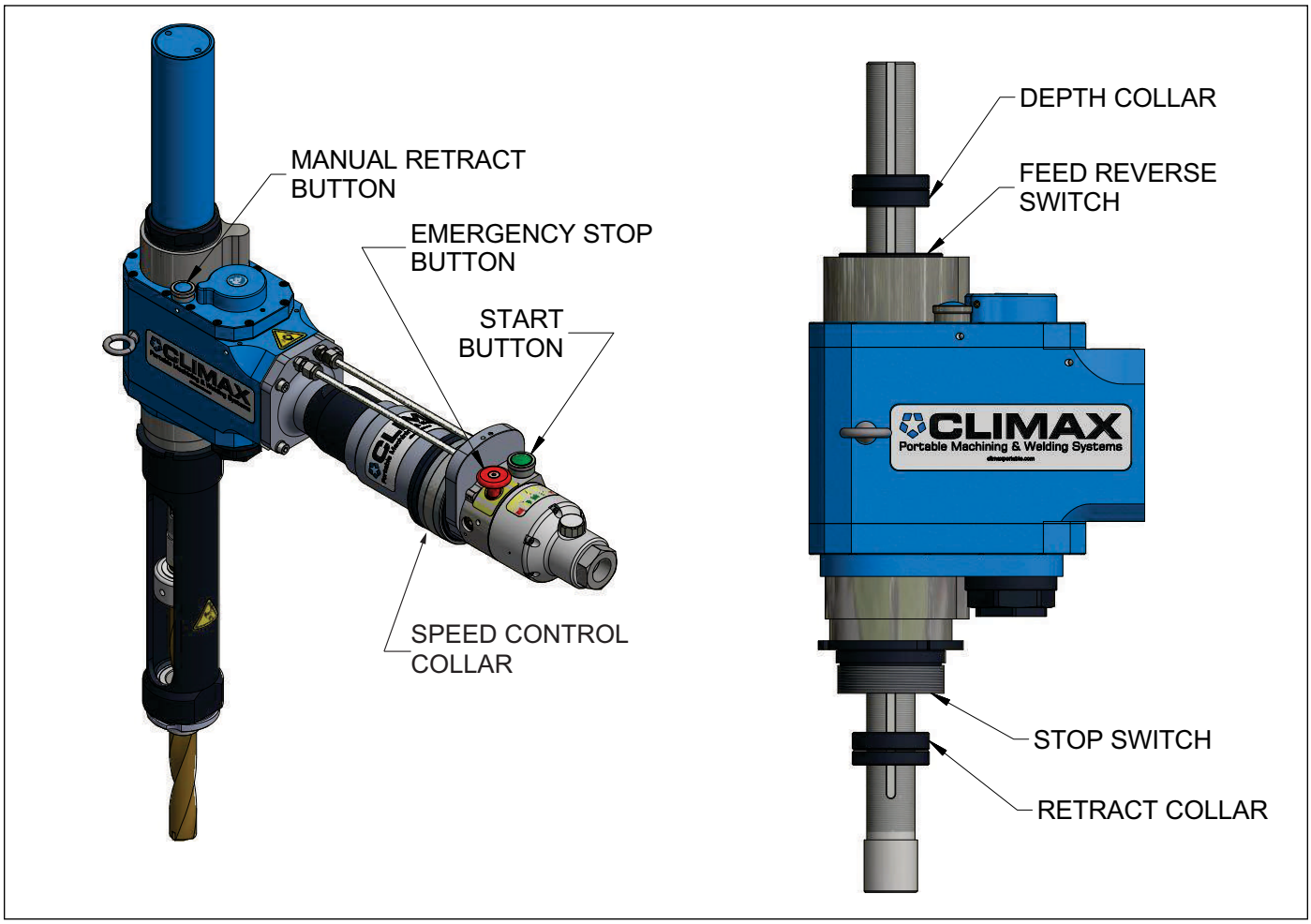

FIGURE 2-6. OPERATOR CONTROLS (LEFT), AUTOMATIC CYCLE CONTROLS (RIGHT)

2.3.1 Customer-supplied PCU requirements

The customer is responsible for providing their own pneumatic conditioning unit (PCU). The PD3000 requires air with the following properties at the inlet of the drill:

- 87 psig air (6 bar)
- The oil used to lubricate the air must have a viscosity between 40 and 380 cst (centi-stokes) depending upon temperature. (1 drop = approximately 15 mm^3)
- Particulate filtered to 5 micron, and free of water droplets

It is the customer's responsibility to place the lubrication source as close as is necessary to the air motor to make sure sufficient motor lubrication. Climax strongly recommends that the customer use a 3/4" or larger air line. Significant (unacceptable) air line pressure losses will occur if using 1/2" or smaller hose.

2.4 MACHINE SPECIFICATIONS

2.4.1 Power and utility information

The PD3000 requires a customer air supply meeting the specifications listed in Table 2-7.

TABLE 2-7. SHOP AIR SUPPLY SPECIFICATIONS

Recommended operating pressure	80–90 psi (5.5–6.0 bar)
Required air flow	71 scfm (2,000 slpm)
Particulate filter size (supplied by the customer)	5 micron
Maximum dew point	40 °F (4.4 °C) or 20 degrees below ambient temperature, whichever is lower
Oil application rate	7-8 drops/min @ 71 scfm (2,000 l/min)
Minimum hose/inlet size	3/4" (19 mm)

2.4.2 Operating and storage condition requirements

The PD3000 can be operated and stored in the conditions outlined in Figure 2-6**.**

TABLE 2-8. OPERATING AND STORAGE CONDITION REQUIREMENTS

Operating temperature	35–105 ºF (1.6–40.5 °C)
Operating humidity	10–95% RH
Operating elevation	maximum of 4,000 ft (1,220 m) above sea level
Storage temperature	35–110 ºF (1.6–43.3 °C)
Storage humidity	10–60% RH
Storage location	Out of weather and direct sunlight

2.4.3 Dimensions

Figure 2-9 shows the PD3000 length and width for the 6.5" (165 mm) hole depth configuration.

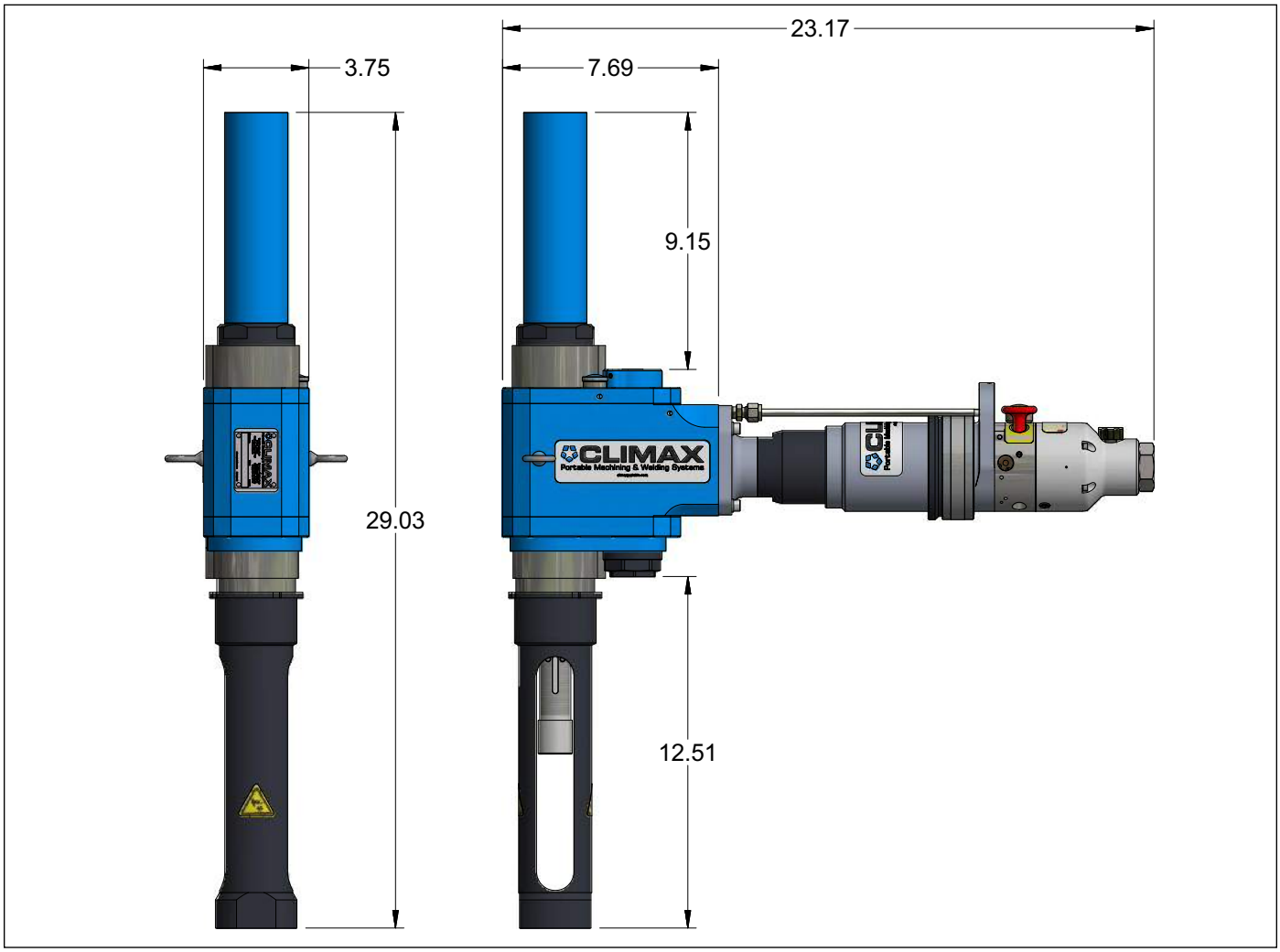

FIGURE 2-9. PD3000 DIMENSIONS

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3 SETUP

IN THIS CHAPTER:

This section describes the setup and assembly procedures for the PD3000 Portable Drill.

3.1 LIFTING AND RIGGING

DANGER

To prevent serious injury to yourself and others, always follow the operating procedures outlined in this manual, your own company rules, and local regulations for lifting. Falling machinery may cause serious injury or death. Use caution when lifting the portable drill.

Machine installation is usually done by hand (see Section 2.2). However, the machine is supplied with two optional lifting eyes if rigging of the machine is required.The location of the lifting eyes is shown in Figure 3-1.

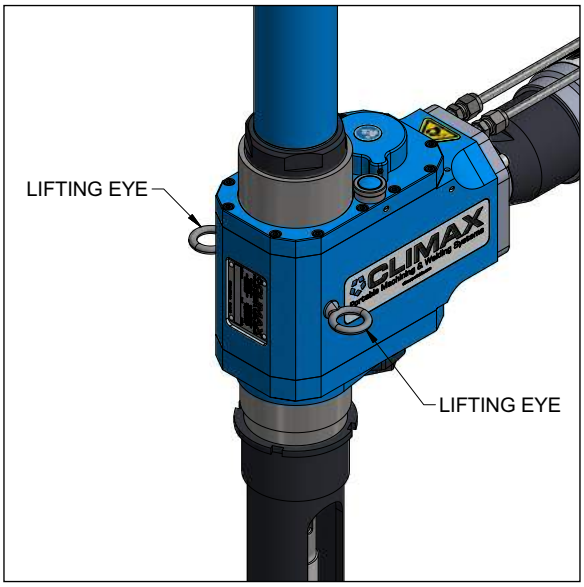

FIGURE 3-1. LOCATION OF LIFTING EYES

3.2 PREPARING THE MACHINE FOR USE

3.2.1 Cleaning the machine

Inspect and clean the machine before each use.

1. Visually check that the machine is free from dirt, chips, and other debris from previous use.
2. Remove all debris.
3. Use solvent to remove any protective coatings.

   The machine ships from Climax with a heavy coating of LPS3. The recommended cleaner is LPS PreSolve Orange Degreaser. During machine use, an alternate long-term corrosion preventative may be used. Be sure to use the correct cleaner for the applied protective coating.

⚠ CAUTION

Metal chips and other debris can damage the machine and degrade its performance. Remove all metal chips and other debris from the machine before and after each use.

3.2.2 Maintaining the machine

1. Complete all required preventative maintenance (Section 5.2 on page 38).
2. Complete any required repairs.

3.2.3 Assessing the work area

The PD3000 is often used in dangerous locations (in elevated positions, near other operating equipment, overhead, etc.) Climax cannot foresee where this machine will be used; therefore, you must perform a site-specific risk assessment (Section 1.5 and Section 1.6 on page 7) for each job before starting work.

⚠ WARNING

Always follow safe work practices, including site-specific safety requirements. It is your responsibility to perform a risk assessment before you set up the machine and each time before you operate the machine.

3.3 SETTING UP THE MACHINE

3.3.1 Adjusting the collars

Refer to Figure 3-2 while you do the following:

1. Determine the desired cutting depth.

FIGURE 3-2. DEPTH AND LOCK COLLARS

2. Adjust the depth and retract collars by hand until the desired cutting depth/ shutoff depth is achieved. Refer to Figure 3-3.

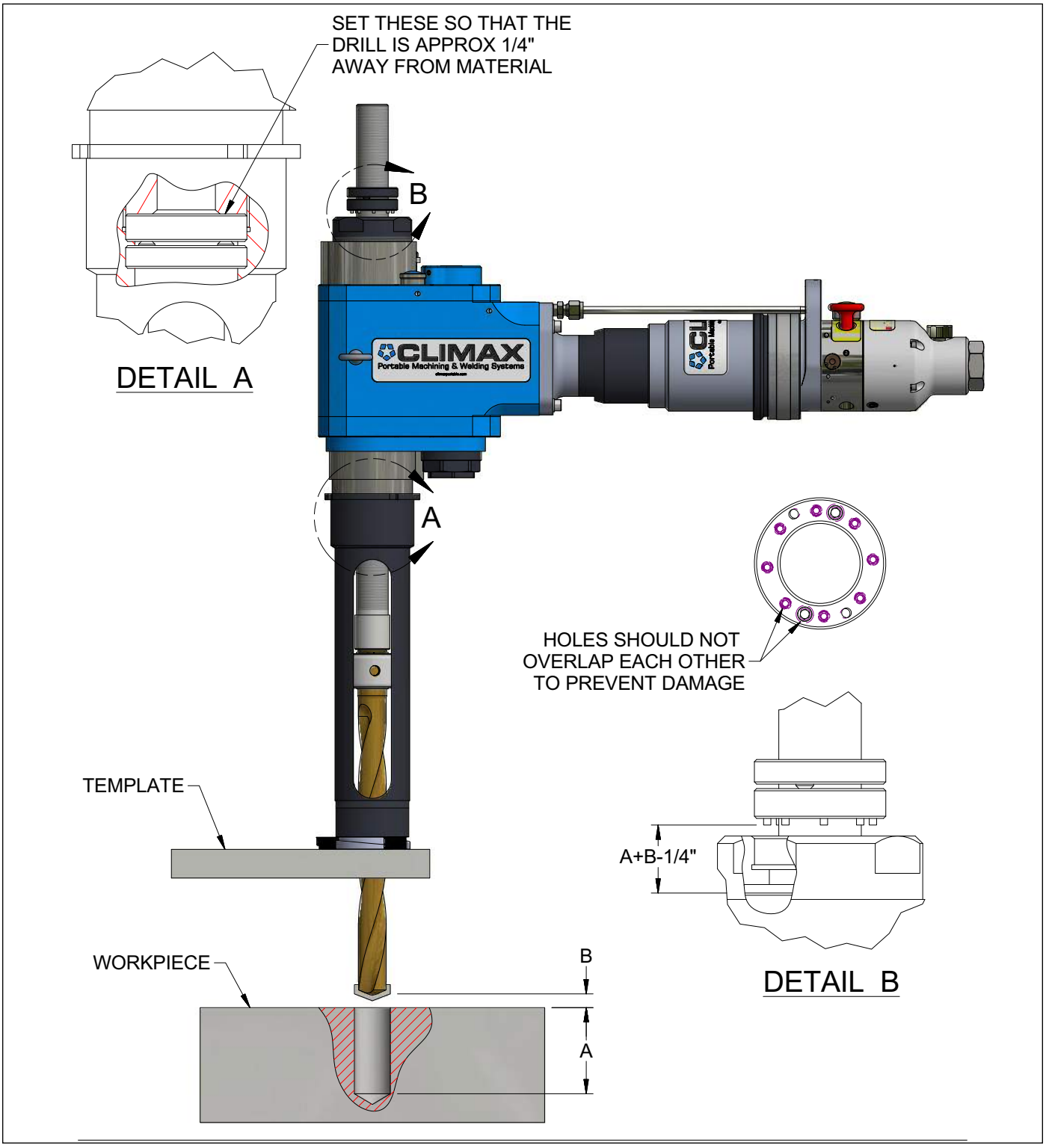

FIGURE 3-3. DRILL SETUP

NOTICE

Do not overlap the set screw holes in the collars, as that may damage the collars.

3. Lock the depth and retract collars in place by adjusting the lock collar until they are within 1/16 inch from the depth and retract collar.
4. Extend the two M6x1setscrews against the depth and retract collar, locking both collars in place.

NOTICE

Do not adjust the six M4 screws on the depth and retract collars.These were factory set.

3.3.2 Installing the spindle guard

Refer to Figure 3-4 while you do the following tasks.

1. Slide the spindle guard over the spindle.
2. Thread the spindle guard into the guard retaining nut (right-hand thread).
3. Tighten the spindle guard hand tight.

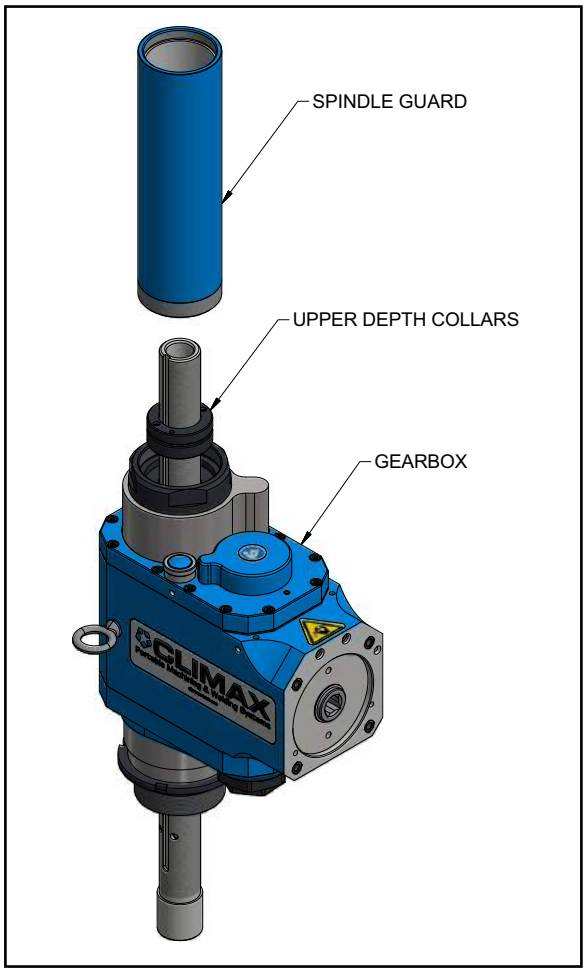

FIGURE 3-4. INSTALLING THE SPINDLE GUARD

3.3.3 Installing the nose-piece bushing

Do the following to install the nose-piece bushing:

1. Thread the appropriate nose-piece bushing (drill size and drill template specific) onto the nose-piece (left-hand thread).
2. Check that the correct drill bushing is pressed into the collar Carr Lane 25000 series before installing the bushing into the nose piece.
3. Tighten the drill busing wrench tight.

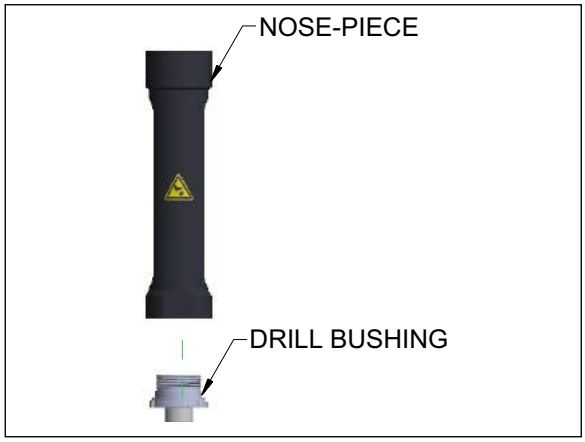

FIGURE 3-5. INSTALLING THE NOSE PIECE BUSHING

3.3.4 Installing the drill bit in the spindle

Before you install the drill bit in the spindle, inspect the spindle and drill bit taper surfaces for wear or damage. If you detect wear or damage to the taper surfaces, replace the spindle (Section 5.5) and/or the drill bit.

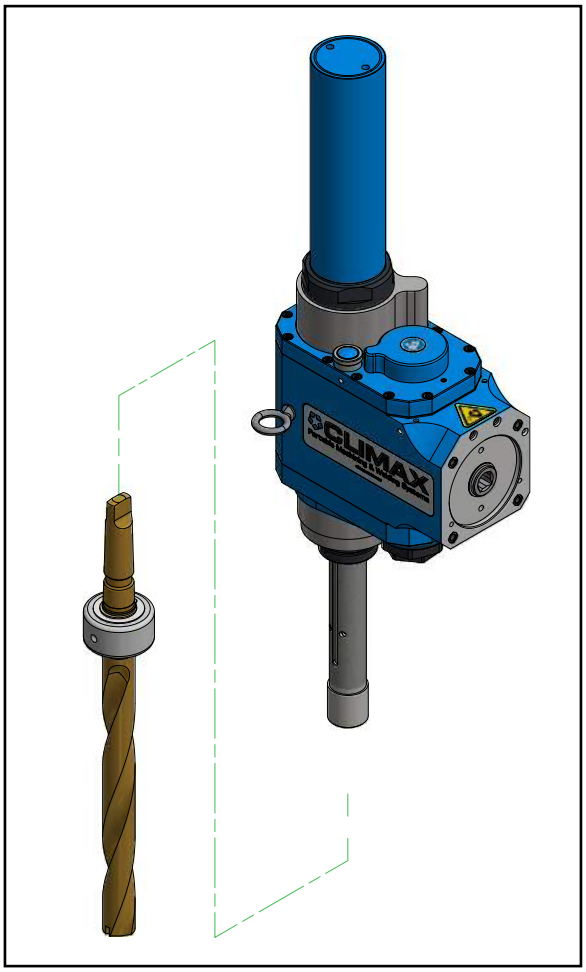

FIGURE 3-6. SPINDLE AND DRILL BIT

⚠ WARNING

The drill bit has very sharp cutting edges. Use caution to avoid injury to your hands.

Refer to Figure 3-6 while you do the following:

1. While holding the drill bit with a gloved hand, align the tang at the taper end of the drill bit with the drive tang slot (gap between two dowel pins) in the lower end of the spindle.
2. With a quick motion, insert the taper end of the tool into the lower end of the spindle to seat the tool in the spindle.

NOTICE

If the drill bit is not fully seated in the spindle it may fall out prior to drilling.

3.3.5 Installing the nose-piece on the gearbox

Refer to Figure 3-3 while doing the following:

1. Install the drill bit in the spindle (Section 3.3.4).
2. Install a drill bushing into the end of the nose-piece (left-hand thread). Tighten the drill bushing wrench tight.
3. Slide the nose-piece over the drill bit.
4. Turn the nose-piece onto the gearbox threads (left-hand thread).

5. Use the two provided spanner wrenches to tighten the nose-piece to the gearbox wrench tight.

NOTICE

The nose-piece threads are left-handed. As the machine runs, the nose-piece will tighten on the gearbox. After you run the machine, you might need to put the gearbox in a vise to remove the nose-piece.

3.3.6 Installing the spade drill insert

With the drill tip extending beyond the nose-piece drill bushing, install the spade drill insert per the manufacturers instructions.

3.4 SETTING UP THE MACHINE ON THE WORKPIECE

The PD3000 is shipped with a spade drill, but a customer-supplied twist drill may be used instead.

3.4.1 Attaching the drill template to the workpiece

The drill attaches to the work-piece by means of a customer-supplied drill template. The template needs to be attached to the workpiece with sufficient rigidity to support both the weight of the drilling machine as well as the drilling torque and thrust.

NOTICE

The drill template design and mounting has a significant impact on the location, straightness, and size of the holes drilled. Consult Climax for additional recommendations concerning the design of the drill template.

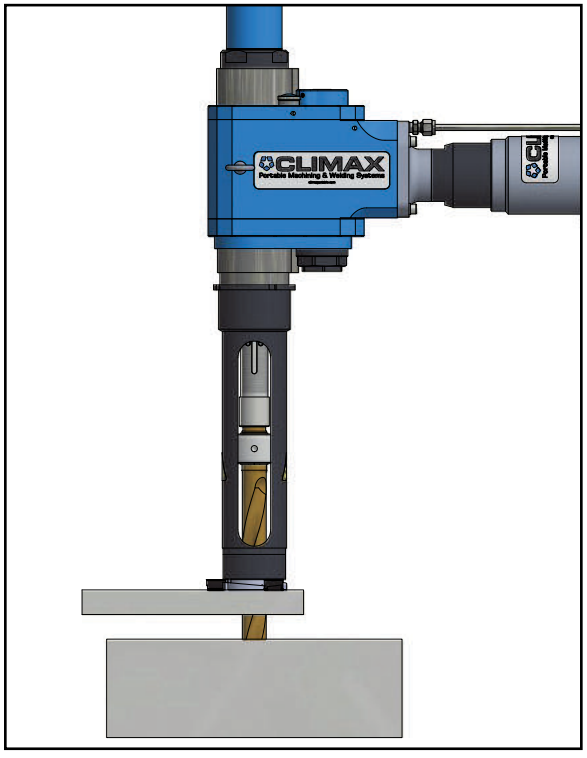

FIGURE 3-7. DRILL, TEMPLATE, AND WORKPIECE

3.4.1.1 Using a twist drill

If using a twist drill, refer to Figure 3-8. The template should be flush to the workpiece.

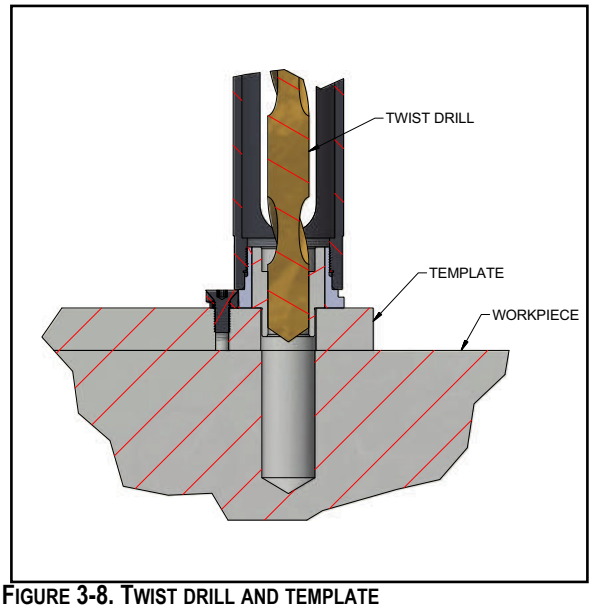

FIGURE 3-8. TWIST DRILL AND TEMPLATE

3.4.1.2 Using a spade drill

Climax recommends that a standoff be used when attaching the drill template to the workpiece that is at least 1" wide or 1x the drill diameter whichever is larger. A gap will allow the chips to be cleared away without having to travel through the nose-piece drill bushing.

⚠ WARNING

Attach the drill template to the workpiece with sufficient rigidity and strength to support both the weight of the drilling machine as well as the drilling thrust and torque loads.

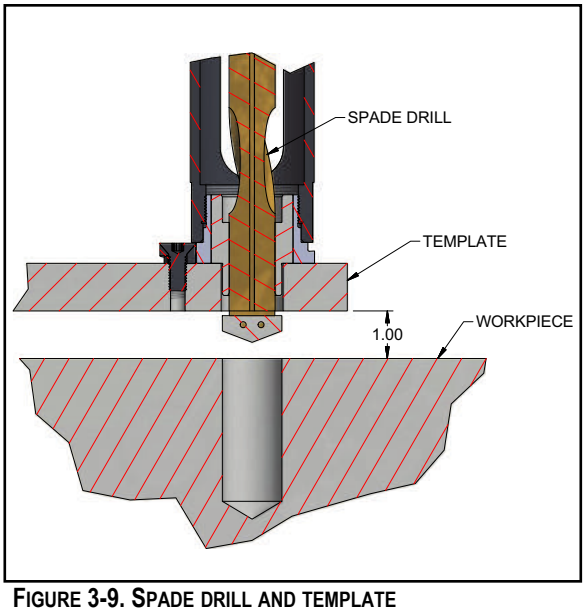

FIGURE 3-9. SPADE DRILL AND TEMPLATE

3.4.2 Attach the drill to the drill template

NOTICE

The AFL lock screws take time to install properly on the drill template to ensure that all three screws are aligned properly and carry the load easily. Once the screws are properly installed, there is no need to remove or adjust them to install or remove the PD3000.

Do the following to attach the drill to the drill template:

1. Attach the customer-supplied template to the workpiece (see Section 3.4.1).
2. Install the customer-supplied drill bushing lock screws into the customer-supplied template.
3. Insert the nose-piece drill bushing into the template hole.
4. Rotate the drill to engage the 3 cam locks of the nose-piece with the lock-screws.i

DANGER

Do not use drill bushing screws which may be loaded in bending (e.g., Carr-Lane LS Lockscrews). Lock screws loaded in bending may fail during drill use, allowing the machine to come loose, damage to equipment, or operator injury.

NOTICE

The PD3000 machine must be used with drill bushing lock screws which can't be loaded in bending during use (e.g., Climax P/N 86186). Lock screws must be torqued to a minimum of 32 ft/lbs (3.6 Nm) (plain dry fasteners) for approximately 5,000 lbf preload.

3.4.3 Install the air motor on the gearbox

Refer to Figure 3-10 while you do the following:

1. Partially insert the motor square drive shaft with the gearbox square drive socket.
2. With the motor shaft inserted rotate the air motor to align the two air supply tubes with the corresponding holes on the gearbox.
3. Fully seat the air motor. This seats the air motor tubes inside of radial o-rings making the pneumatic connections at the same time.
4. Tighten the four captive M6 socket head cap screws to 106 in-lb (12 Nm).

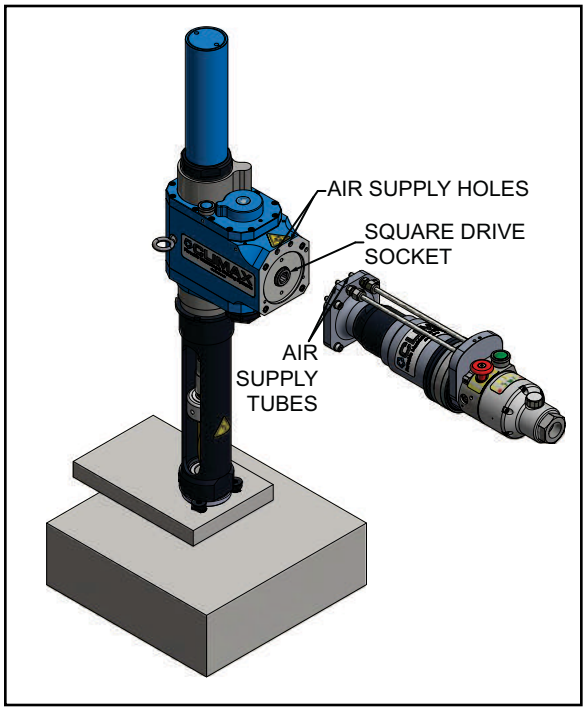

FIGURE 3-10. INSTALLING THE AIR MOTOR TO THE GEARBOX

3.4.4 Connect the air supply to the machine

1. Install a 3/4" (19 mm) fitting to connect the air motor to the air supply.
2. Make sure that the shop air source can supply 71 scfm at 87 psi (see Table 2-7).

NOTICE

Do not restrict the air flow below 71 scfm with fittings or hoses smaller than 3/4", or with a filter or lubricator that are not appropriately sized.

3.4.5 Connect the tool lubrication system to the machine (optional)

Climax recommends that you use a misting lubrication system (not supplied) with the drill bit. Follow the manufacturers instructions when installing the misting lubrication system. For more information, contact Climax.

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4 OPERATION

IN THIS CHAPTER:

4.1 OVERVIEW

When the start button is pressed, the air motor is energized and begins turning and advancing the spindle. The pneumatic motor causes the spindle to rotate through a pair of gear sets with differing gear ratios. The gear ratio difference between the two gear sets causes the threaded spindle to feed toward the workpiece in proportion to its rotation.

When the spindle reaches the retract depth set by the position of the upper depth collar, the auto retract switch causes the spindle to retract in a rapid mode. Then the spindle retracts until the lower depth collar triggers the auto shutoff switch; the machine automatically de-energizes the air motor and resets the pneumatic circuit for the next drilling cycle.

The spindle feed rate can be changed by replacing the differential gear set with a different gear set.

4.1.1 Emergency stop

When the emergency stop button is pressed during drill operation, the air motor is de-energized and the pneumatic circuit is vented. When the emergency stop button is reset (pulled out), the drill can be restarted by pressing the start button again. If the drill is restarted, it will complete its operation cycle from the point of interruption unless the emergency stop button is pressed again.

4.1.2 Manual retract

When the manual retract button is pressed, the spindle will retract in a rapid mode until the auto shutoff switch is tripped. The auto shutoff switch then de-energizes the air motor and resets the pneumatic circuit for the next drilling cycle.

4.2 OPERATION

The PD3000 Portable Drill is designed for automatic precision drilling and reaming to a preset depth, followed by fast automatic retraction of the tool and automatic shutoff. Refer to Figure 2-6 on page 17 for machine control locations.

4.2.1 Pre-operation checks

Before each use of the machine, do the following:

1. Check that the machine is connected to an air source meeting the specifications listed in Table 2-7.
2. Check that the air source filtration is replaced systematically per the manufacturer recommendations.
3. Check that the air motor is installed properly (Section 3.4.3).
4. Check that all drill bushing lock screws are of the proper style and installed to the proper torque (Section 3.4).
5. Check that the nose-piece and drill bushing are installed properly (Section 3.3.3 and Section 3.3.3 on page 26).
6. Check that the drill bit (drill/reamer) is in good condition.
7. Perform a drill function check to make sure all machine functions are operating properly. (Section 4.2.2).

4.2.2 Drill function check

Before performing a drill function check, make sure the drill is properly supported and the spindle has sufficient clearance to travel without hitting any obstacles.

Do the following to perform a drill function check:

1. Start the machine by holding the green start button to start the drill. Make sure that the feed latches.
2. Depress the e-stop button to make sure the machine stops.
3. Reset the e-stop.
4. Start the machine by holding the green start button to start the drill.
5. Press the blue retract button. Make sure that the machine retracts fully and automatically shuts off.

If the above functions all operate as intended the function check is complete. Otherwise consult the trouble shooting section of the manual. (Section 5.6)

4.2.3 Starting the machine

To start a cutting cycle, press and hold the start button for 1-2 seconds. This moves the lower depth collar pair off of an automatic stop switch and latches the machine in feed mode.

NOTICE

Small air leaks from machine orifices during operation are normal.

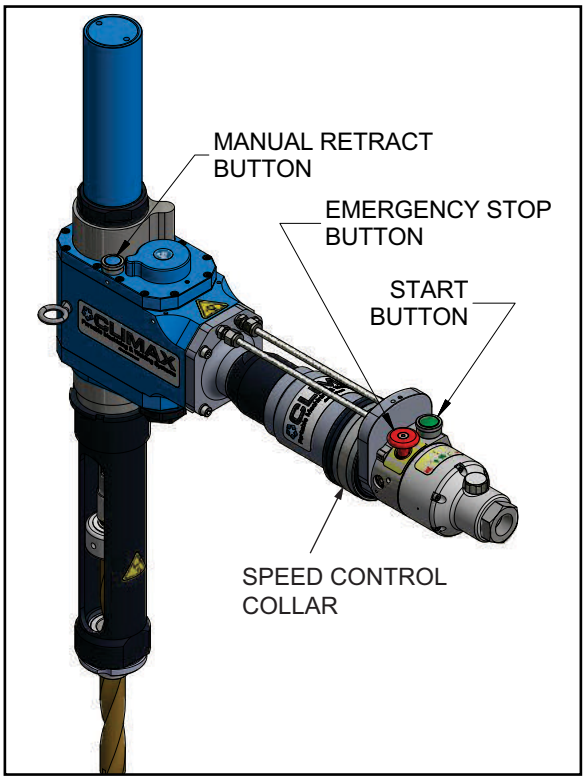

FIGURE 4-1. OPERATOR CONTROLS

4.2.4 Stopping the machine in an emergency

To immediately stop machine operation and de-energize the system, press the emergency stop button.

4.2.5 Resetting the machine

To re-enable machine operation after an emergency stop, pull the emergency stop button out.

4.2.6 Controlling the drill speed

To adjust the speed of the machine during operation, rotate the speed control collar clockwise to slow the drill, or rotate counter-clockwise to increase the speed. See Figure 4-1.

4.2.7 Manually retracting the tool

To retract the spindle during machine operation before the spindle reaches its preset cutting depth, press the manual retract button.

4.2.8 Stopping the machine

During normal operation, the machine will stop automatically at the end of the cutting cycle.To stop the machine in an emergency, press the emergency stop button (see Figure 4-1).

4.2.9 Lock-out/tag-out

Disconnect the air supply hose from the air motor. Follow your organizations additional lock-out/tag-out procedures.

5 MAINTENANCE AND TROUBLESHOOTING

IN THIS CHAPTER:

5.1 OVERVIEW

This chapter explains periodic maintenance intervals and provides troubleshooting guidance.

⚠ CAUTION

Failure to properly clean and maintain the machine can result in machine damage and void the warranty.
Always keep moving parts clear of metal chips.

Follow the required maintenance schedule and these guidelines to obtain normal machine life:

- Keep all machine components in clean, working condition.
- Make sure parts such as mounting surfaces, fittings, and the tools are free of metal chips, nicks, and burrs.
- To prevent corrosion, rinse any machine parts that are exposed to salt water with an evaporative metal cleaner such as evapo-wash, then coat parts with light oil.
- Gear life, or the life expectancy of the drill, is a function of the diameter of the holes being made by the drill. Consistently drilling large holes will mean fewer years of functionality for the drill. Proper set up of the machine will increase gear life.

5.2 MAINTENANCE INTERVALS

TABLE 5-1. MAINTENANCE TASKS AND INTERVALS

Interval	Task	Section ref.
After every operation cycle	Remove chips from the spindle threads	--
Whenever the gearset or spindle are changed or every year	Grease the gear surfaces	5.4
Annually	Inspect input bevel gear	5.3
	Replace the seals	5.4.1
After the torque limiter is engaged for 120 seconds (consecutive)	Send the gear assembly to Climax for overhaul	--

5.3 INSPECTING THE INPUT BEVEL GEAR

Do the following to inspect the input bevel gear:

1. Using a spanner wrench un-thread the gear retaining nut at the rear of the gearbox.

NOTICE

Take care not to lose the shims under the nut flange. Reassembly without the correct shim thickness will result in damage or premature wear to the gear.

2. Inspect the spiral bevel gear teeth for cracks, yielding, or abnormal wear.
3. Contact Climax if a replacement gear is needed.

5.4 REPLACE THE SEALS

Do the following to replace the seals:

1. Using a dental pick or similar tool remove the o-rings from the groove.
2. Insert the replacement o-rings into the groove.

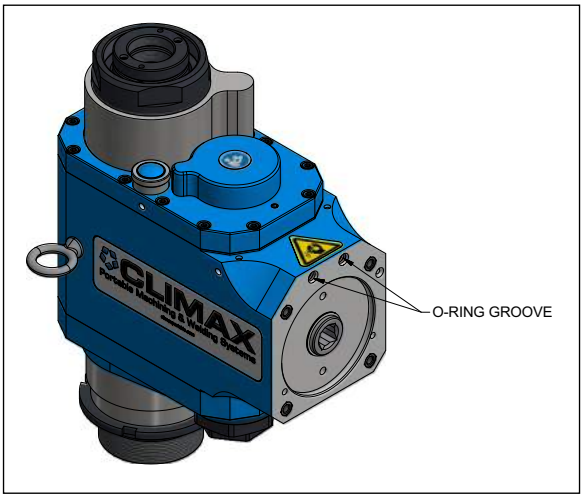

FIGURE 5-2. LOCATION OF O-RING GROVE

5.5 CHANGING THE FEED GEAR

5.5.1 Preparing the gearbox for disassembly

Do the following to prepare the gearbox for disassembly:

1. Remove the spindle guard from the gearbox (Section 3.3.2).
2. Remove the nose-piece from the gearbox (Section 3.3.2).
3. Remove the drill bit from the spindle (Section 3.3.4).
4. Remove the upper lock and depth collars from the spindle (Section 3.3.1).

5.5.2 Disassembling the gearbox

Do the following to disassemble the gearbox:

1. Remove the eleven M4 x 16mm socket head cap screws from the lower housing cover.
2. Separate the lower housing cover and spindle from the gearbox until the upper end of the spindle is free of the main gearbox. (Figure 5-4).
3. You now have access to the differential gear set and the spindle (Figure 5-4). To replace the differential gear set, refer to Section 5.4.4 through Section 5.4.8. To replace the spindle, refer to Section 5.4.9.

Refer to Figure 5-4 or Figure 5-6 while you do the tasks in Sections 5.4.4 through 5.4.9.

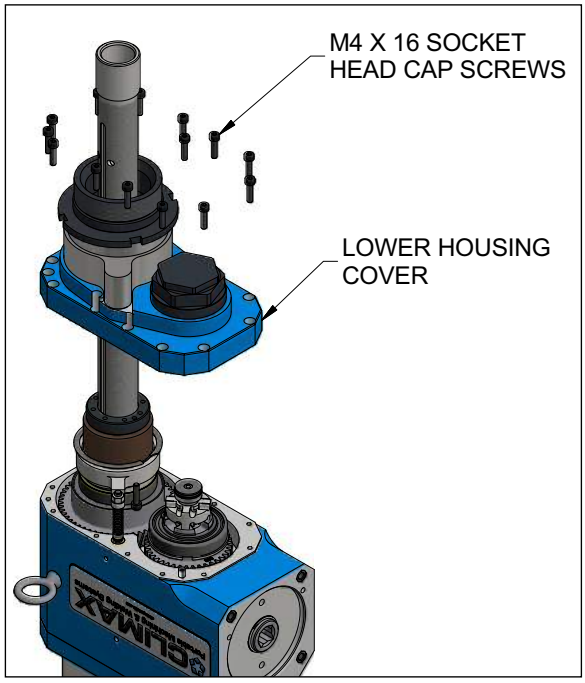

FIGURE 5-3. REMOVE THE LOWER HOUSING COVER

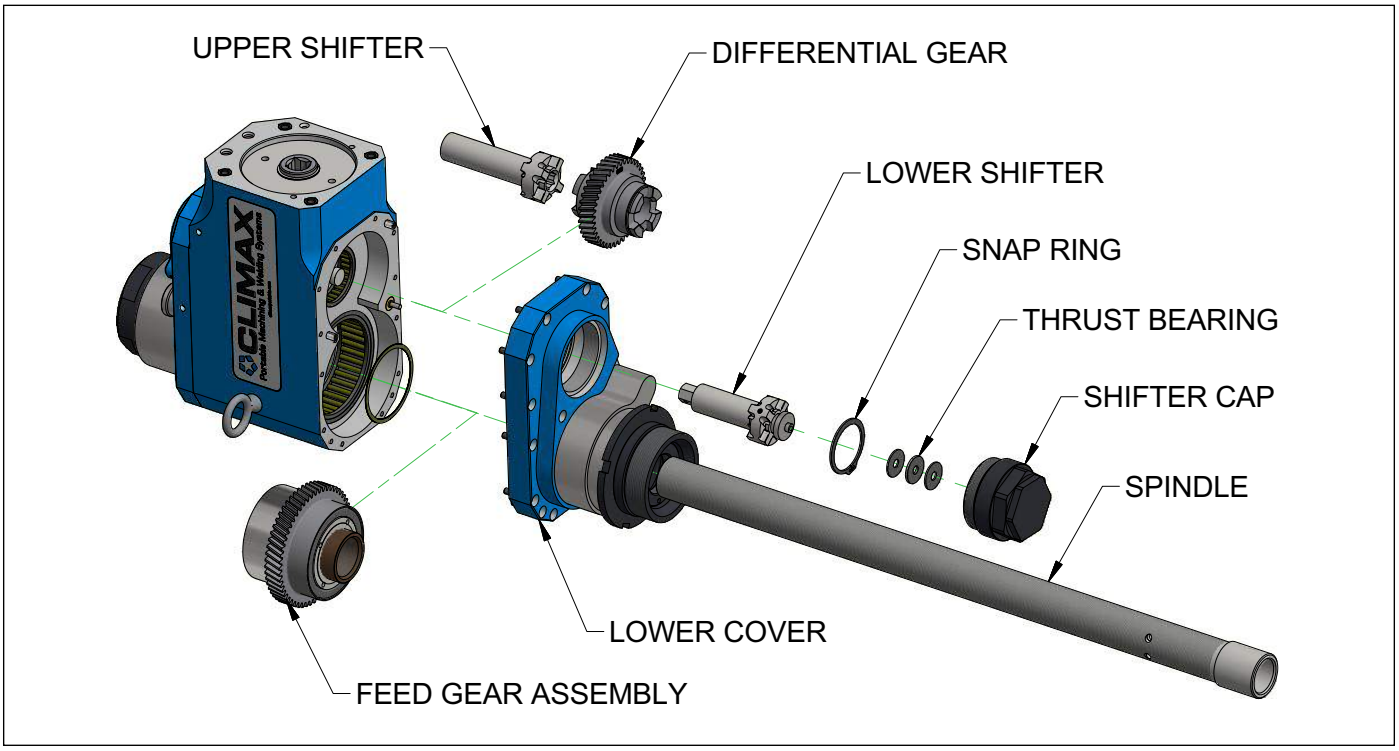

FIGURE 5-4. GEARBOX ASSEMBLY

5.5.3 Remove the feed gear assembly and spindle from the gearbox

Do the following to remove the feed gear assembly and spindle from the gearbox:

1. Turn by hand the feed gear assembly off of the upper end of the spindle.

NOTICE

The spindle has a left-hand thread.

2. Slide the spindle out of the lower cover.
3. Use a clean cloth to wipe chips and debris from the spindle surface.

5.5.4 Remove the differential gear

Refer to Figure 5-4 while you do the following:

1. Remove the shifter cap (right hand thread) from the lower housing cover.
2. Remove the upper shifter from the lower shifter by loosening the setscrew.
3. Remove the lower shifter assembly from the differential gear.
4. Remove the snap ring from the differential gear.
5. Remove the differential gear from the lower cover bearing.

5.5.5 Select a differential gear set

Select the feed and differential gears for the desired tool feed rate from the gear pairs listed in Table 5-5.

TABLE 5-5. DIFFERENTIAL GEAR SETS

Feed rate (inch/rotation)	Feed gear assembly P/N (1)	Differential gear P/N (2)
.003	80639	80350
.006	80577	80352

NOTICE

Differential gear sets must be installed in pairs as listed in Table 5-5, and cannot be mixed.

5.5.6 Install the differential gear in the lower cover

Do the following to install the differential gear in the lower cover:

1. Lubricate the differential gear teeth and needle roller contact surfaces with Mobilith SHC 460 grease.

2. Insert the differential gear into the lower bearing.
3. Replace the snap ring on the bottom of the differential gear.
4. Replace the lower shifter assembly in the differential gear.
5. Install the upper shifter onto the lower shifter and tighten the locking set-screw wrench tight.

NOTICE

If the shifter assembly is properly assembled the shifter cap should not be difficult to tighten until approximately the final 1/8".

5.5.7 Install the feed gear and spindle in the lower cover

Do the following to install the feed gear and spindle in the lower cover:

1. Lubricate the feed gear teeth and needle roller contact surfaces with Mobilith SHC 460 grease.
2. Slide the upper end of the spindle through the lower cover bushing.
3. Turn the new feed gear onto the upper end of the spindle at least 4 1/2". The thread used here is left handed.
4. Seat the feed gear in the lower cover bearing.

5.5.8 Install the spindle and differential gearset assembly in the gearbox

Do the following to install the spindle and differential gearset assembly in the gearbox:

1. Slide the upper end of the spindle into the gearbox until it touches the rotational drive gear.
2. Align the rotational drive gear key with the spindle keyway.
3. Make sure the upper shifter tang is aligned with a recess on the upper gear.
4. Slide the spindle completely into the gearbox.
5. Seat the lower cover on the gearbox.
6. Attach the lower cover to the gearbox with eleven M4 x 16mm socket head cap screws. Torque to 36 in-lb (4 Nm).
7. Turn the top depth and lock collars onto the end of the spindle.
8. Install the shifter cap.

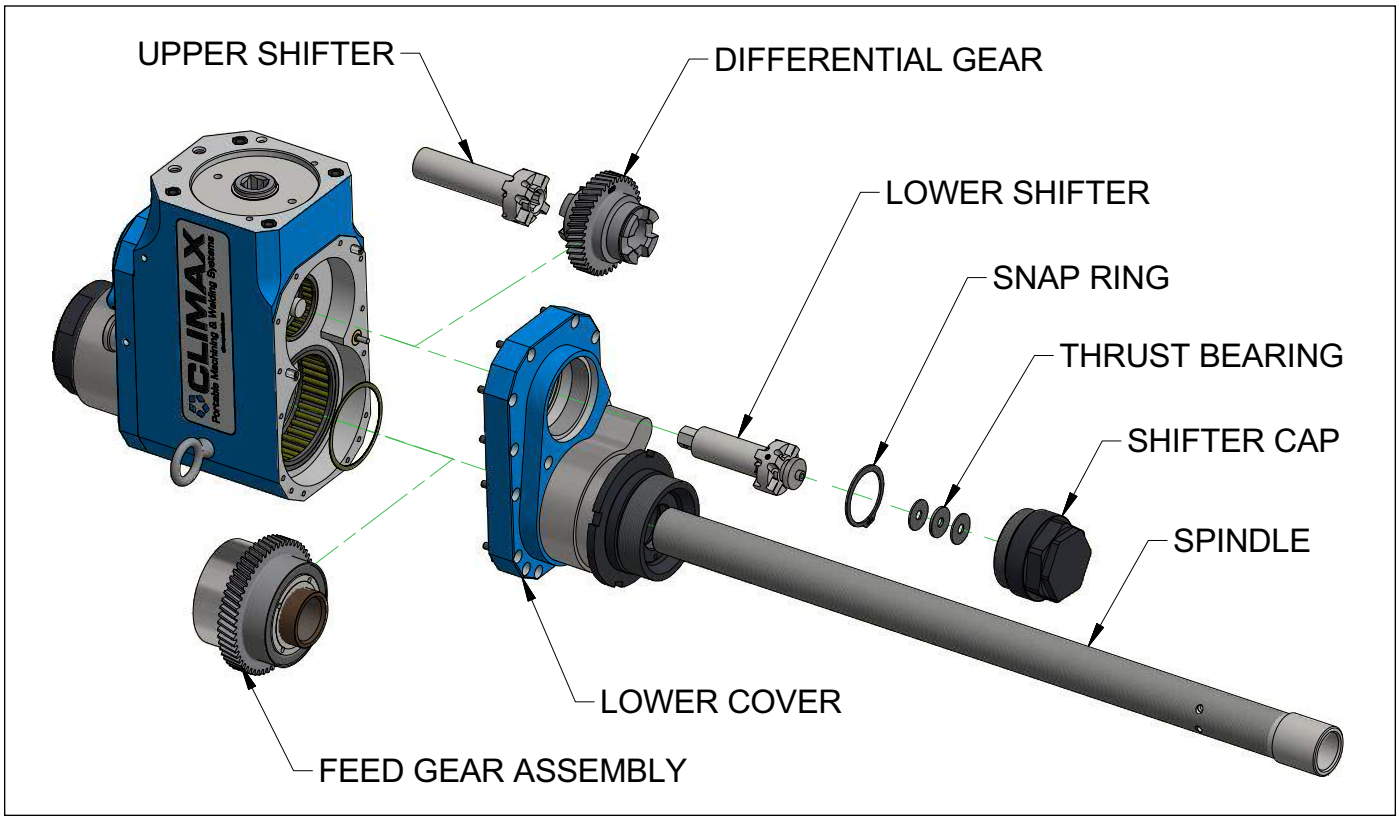

FIGURE 5-6. GEARBOX REASSEMBLY

5.6 OVERHAUL INSTRUCTIONS

For information on machine overhaul, contact Climax.

5.7 TROUBLESHOOTING

If a corrective action in listed Table 5-7 does not fix the problem, or if you experience a problem with your machine that is not listed in Table 5-7, contact Climax.

TABLE 5-7. TROUBLESHOOTING

Problem	Possible cause	Corrective action
The cutting depth is too deep.	The upper depth collar is positioned too high on the spindle.	Move the upper depth collar lower on the spindle.
The cutting depth is too shallow.	The upper depth collar is positioned too low on the spindle.	Move the upper depth collar higher on the spindle.
The drill bit does not retract far enough.	The lower depth collar is positioned too high on the spindle.	Move the lower depth collar lower on the spindle.
The drill bit retracts too far.	The lower depth collar is positioned too low on the spindle.	Move the lower depth collar higher on the spindle.
The spindle retracts unexpectedly.	The retract piston orifice has become clogged.	Clean or replace the retract piston orifice.
The drill speed surges while drilling, a clicking noise is present.	The drill is operating beyond the intended capacity.	Reduce the drill feed rate or reduce the drill size.
The drill has bound up against the housing either feeding or retracting.	The drill shutoff switch as failed.	Consult Climax for instructions to unbind the spindle.

5.8 TOOL KIT

TABLE 5-8. PD3000 TOOL KIT

P/N	Description	Piece	UOM
38678	WRENCH HEX SET 1.5- 10MM BONDHUS BALL END (KB)	1	Piece
58350	WRENCH END 46mm X 8-9/16 LONG TIGHT ACCESS	1	Piece
80818	ROD TOOL KNOCKOUT	1	Piece
81223	WRENCH END 40mm (SINGLE OPEN END TIGHT ACESS)	1	Piece
81225	WRENCH SPANNER 3-5/32 TO 3-5/64 5MM THICK	1	Piece
81482	WRENCH SPANNER RING PRELOAD	1	Piece
82171	WRENCH END 65MM (SINGLE OPEN END SERVICE STYLE)	1	Piece

5.9 SPARE PARTS LIST

Table 5-9 lists items most frequently replaced due to wear, loss or damage. Avoid downtime by maintaining a small inventory of these critical parts.

TABLE 5-9. PD3000 SPARE PARTS LIST

P/N	Description	Piece	UOM
26060	BRG THRUST 1.575 ID X 2.362 OC X .118	1	Piece
26061	WASHER THRUST 1.575 ID X 2.362 OC X .037	2	Piece
32275	RING SNAP 2-1/8 ID X .078 TH	1	Piece
44042	SPRING COMP .28 OD X .028 WIRE X 1-3/8 3.5LB	2	Piece
62498	RING SNAP 1-3/8 ID X .05 TH BLACK FINISH	1	Piece
70226	LABEL CLIMAX LOGO 1.5 X 5.5	1	Piece
78748	LABEL WARNING - FLYING DEBRIS/LOUD NOISE GRAPHIC 1.13" TRIANGLE YEL-LOW	1	Piece
79296	GASKET PNEUMATIC VALVE	1	Piece
79307	CARTRIDGE VALVE POPPET 2-WAY NORMALLY-CLOSED	3	Piece
79308	CARTRIDGE VALVE POPPET 3-WAY NORMALLY-CLOSED	1	Piece
79309	RING SNAP 5/8 ID X .018 STAINLESS	1	Piece
79310	RING SNAP 12 MM X 1 MM EXTERNAL STAINLESS	1	Piece
79328	LABEL WARNING - CONSULT OPERATOR'S MANUAL GRAPHIC .75 DIA	1	Piece
80089	LABEL BACKGROUND YELLOW STOP BUTTON	1	Piece
80094	SPRING PLUNGER 10-32 X .513 SS BALL WITH THREAD LOCK	1	Piece
80293	BRG ROLLER 1.1811 ID X 1.8504 OD X .4331	1	Piece
80295	BRG BALL 1.3780 ID X 2.1654 OD X .3937	5	Piece
80377	BRG NEEDLE 1.378 ID X 1.6535 OD X .4724	2	Piece
85959	LABEL NOTICE - OPERATING PRESSURE RANGE 65-90 PSI	1	Piece

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6 SHIPPING AND STORAGE

IN THIS CHAPTER:

6.1 SHIPMENT AND SHORT-TERM STORAGE

The PD3000 Portable Drill can be stored and shipped in the provided Pelican shipping container (Figure 6-1). Short-term storage is defined as less than three months.

Do the following for short-term storage:

1. Disassemble the machine.
2. Remove chips, dirt and oil from the machine components.
3. Spray a light layer of oil on all unpainted metal surfaces.
4. Place the components in the storage case as shown in Figure 6-1.

Drill bushings and tools can also be stored in the additional storage compartment in the case.

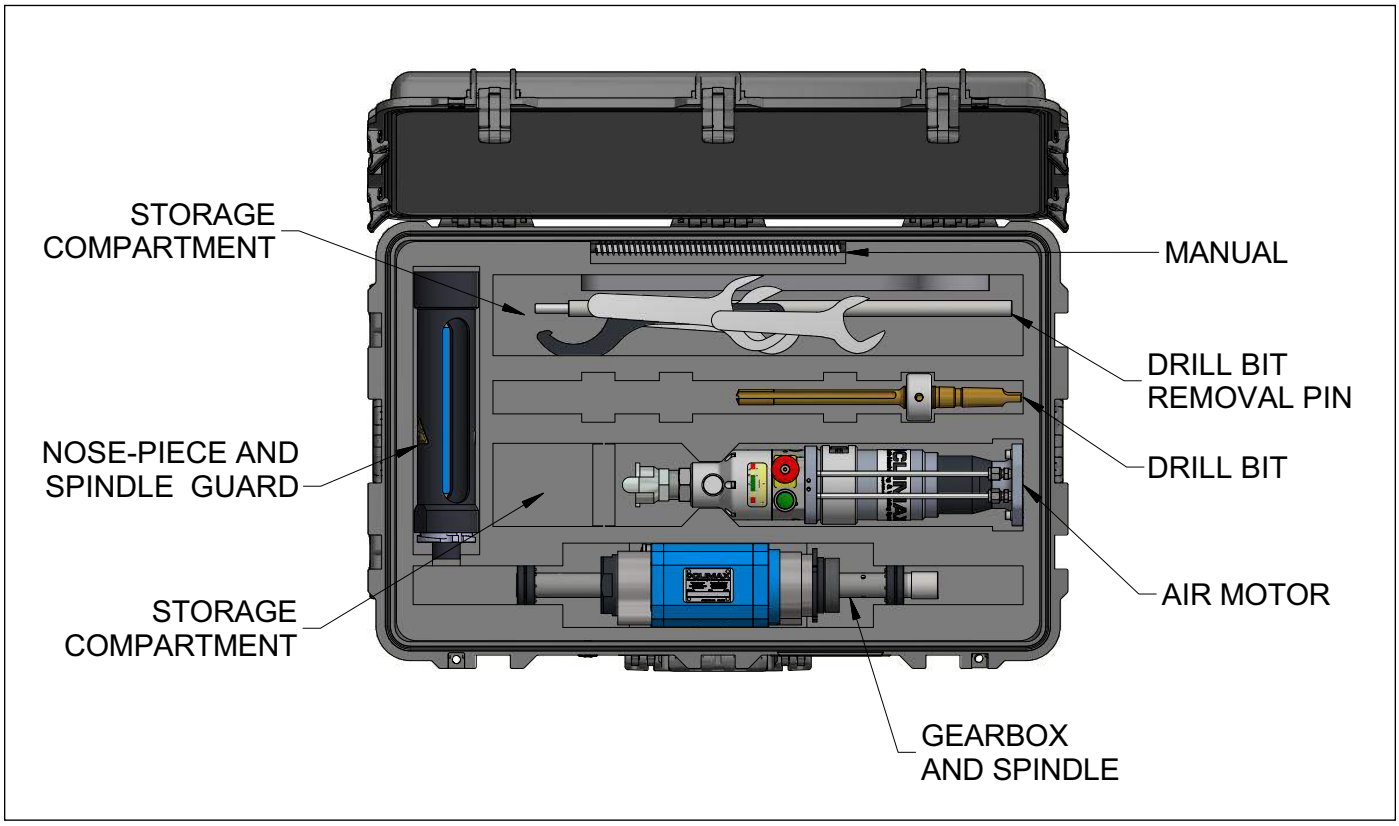

FIGURE 6-1. PD3000 CASE LAYOUT

The required storage conditions are listed in Table Figure 6-1.

TABLE 6-2. STORAGE CONDITION REQUIREMENTS

Storage temperature	35 ºF (1.6 °C) to 110 ºF (43.3 °C)
Storage humidity	10-60% RH
Storage location	Out of weather and direct sunlight

6.2 LONG-TERM STORAGE

In addition to the steps listed in Section 6.1, do the following to prepare the machine for long-term storage. Long-term storage is defined as more than three months.

Do the following for long-term storage:

1. Spray all unpainted machine surfaces with a layer of LPS3 or equivalent.
1. Add a desiccant pouch to the shipping container. Replace according to manufacturer instructions.
2. Inspect the case seal before long term storage. Replace as necessary.
3. Store the case in an environment that meets the requirements listed in Table 6-2.

APPENDIX A EXPLODED VIEWS AND PARTS LISTS

Drawing list

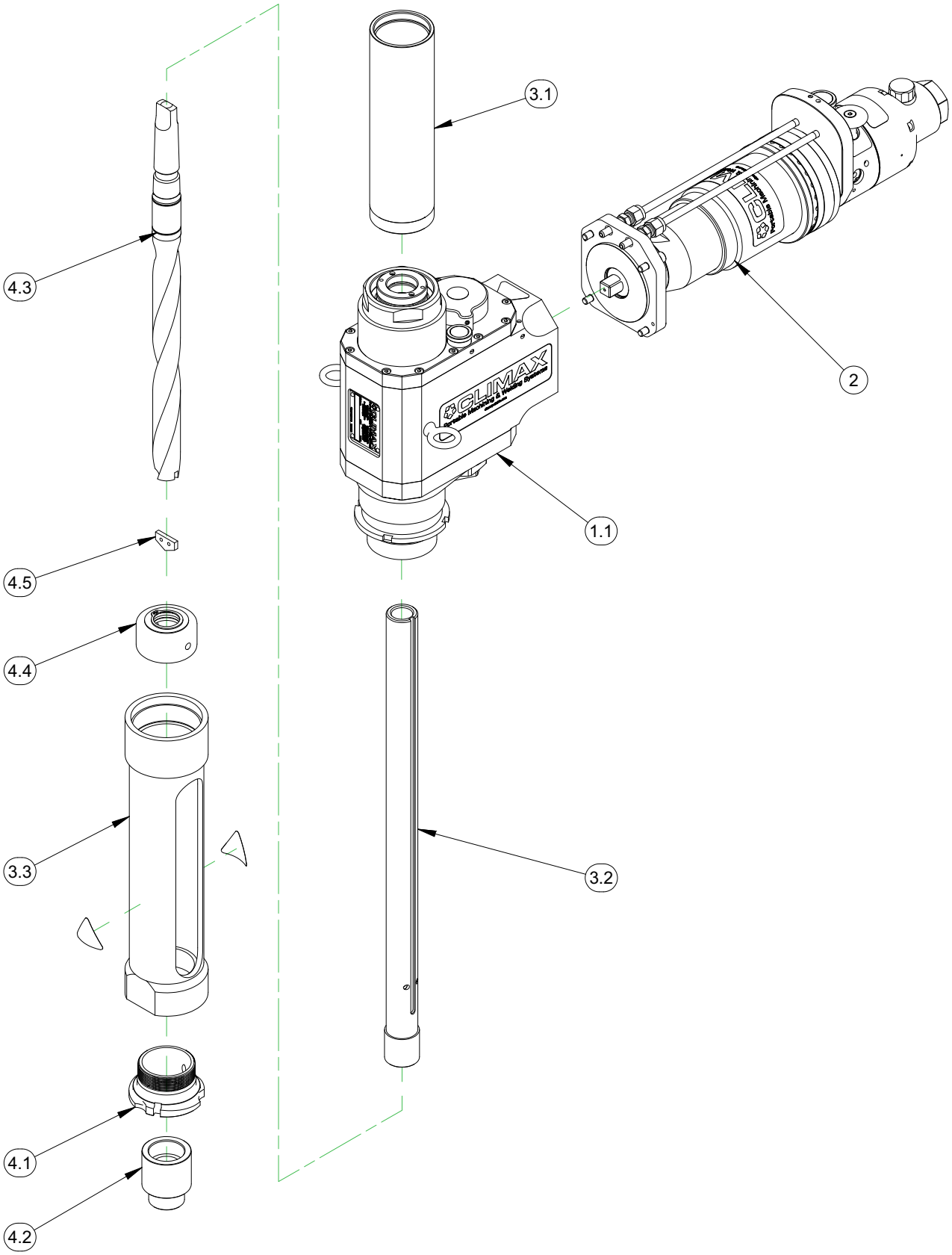

FIGURE A-1.P/N 85825 PD3000 PORTABLE DRILL ASSEMBLY

TABLE - FEED GEAR ASSEMBLIES	
P/N	DESCRIPTION
85833	SET FEED GEARS .003 IPR
85836	SET FEED GEARS .006 IPR

PARTS USED WITH z 4 IN. HOLE CONFIG.

PARTS USED WITH z 6.5 IN. HOLE CONFIG.

PARTS LIST					
4	6.5	ITEM	QTY	P/N:	DESCRIPTION
X	X	1	1	85825	BASE UNIT PD3000 PORTABLE DRILL DOMESTIC PNEUMATIC PELICAN CASE
X	X	1.1	1	85590	ASSY GEAR BOX RIGHT ANGLE - LESS FEED GEARS
X	X	1.2	1	85848	(NOT SHOWN) CONTAINER SHIPPING PELICAN CASE WITH INSERT MODEL PD3000
X	X	1.3	1	85847	(NOT SHOWN) KIT TOOL MODEL PD3000
X	X	1.4	1	85846	(NOT SHOWN) MANUAL INSTRUCTION MODEL PD3000
X	X	2	1	85624	ASSEMBLY AIR MOTOR WITH CONTROLS
	X	3	1	85827	COMMON COMPONENTS FOR 6.5 INCH DEEP HOLE
X				85826	(NOT SHOWN) COMMON COMPONENTS FOR 4 INCH DEEP HOLE
	X	3.1	1	80803	COVER TUBE SPINDLE 12 INCH STANDARD
X				85854	(NOT SHOWN) COVER TUBE SPINDLE 6 INCH STANDARD
	X	3.2	1	85817	SPINDLE MT3 19.00 INCH
X				85818	(NOT SHOWN) SPINDLE MT3 16.75 INCH
	X	3.3	1	85850	NOSEPIECE STANDARD 2 7/16-16 UNS LH X 2-16 UNS LH BUSHING 11.75 INCH
X				85851	(NOT SHOWN) NOSEPIECE STANDARD 2 7/16-16 UNS LH X 2-16 UNS LH BUSHING 9.25 INCH
	X	4	1	85829	KIT SPADE DRILL 15/16" DIA 6.5 INCH DEEP HOLE
X				85828	(NOT SHOWN) KIT SPADE DRILL 15/16" DIA 4 INCH DEEP HOLE
X	X	4.1	1	80740	BUSHING DRILL AIR FEED CARR LANE 25000 FOR 6.5 INCH HOLE
X	X	4.2	1	81293	25000 SHANK 1.2500 OD X .9560 ID X .675 LENGTH FOR 6.5 INCH HOLE
	X	4.3	1	86080	DRILL .969-1.378 DIA / 9.25 DEPTH HELICAL FLUTE MT3 FOR 6.5 INCH HOLE
X				TBD	(NOT SHOWN) DRILL FOR 4 INCH HOLE
X	X	4.4	1	79654	ADAPTER ROTARY COOLANT 2T-3SR FOR 6.5 INCH HOLE
X	X	4.5	1	86074	TA HSS DRILL INSERT 31/32" AM200 COATING TC CHIP BREAKER
X	X	4.6	1	86076	(NOT SHOWN) TA HSS DRILL INSERT 1-3/8" AM200 COATING TC CHIP BREAKER
X	X	5	1	TABLE	(NOT SHOWN) SET FEED GEARS - SEE 85590 GEAR BOX ASSEMBLY DRAWING

FIGURE A-2.P/N 85825 PD3000 PORTABLE DRILL ASSEMBLY PARTS LIST

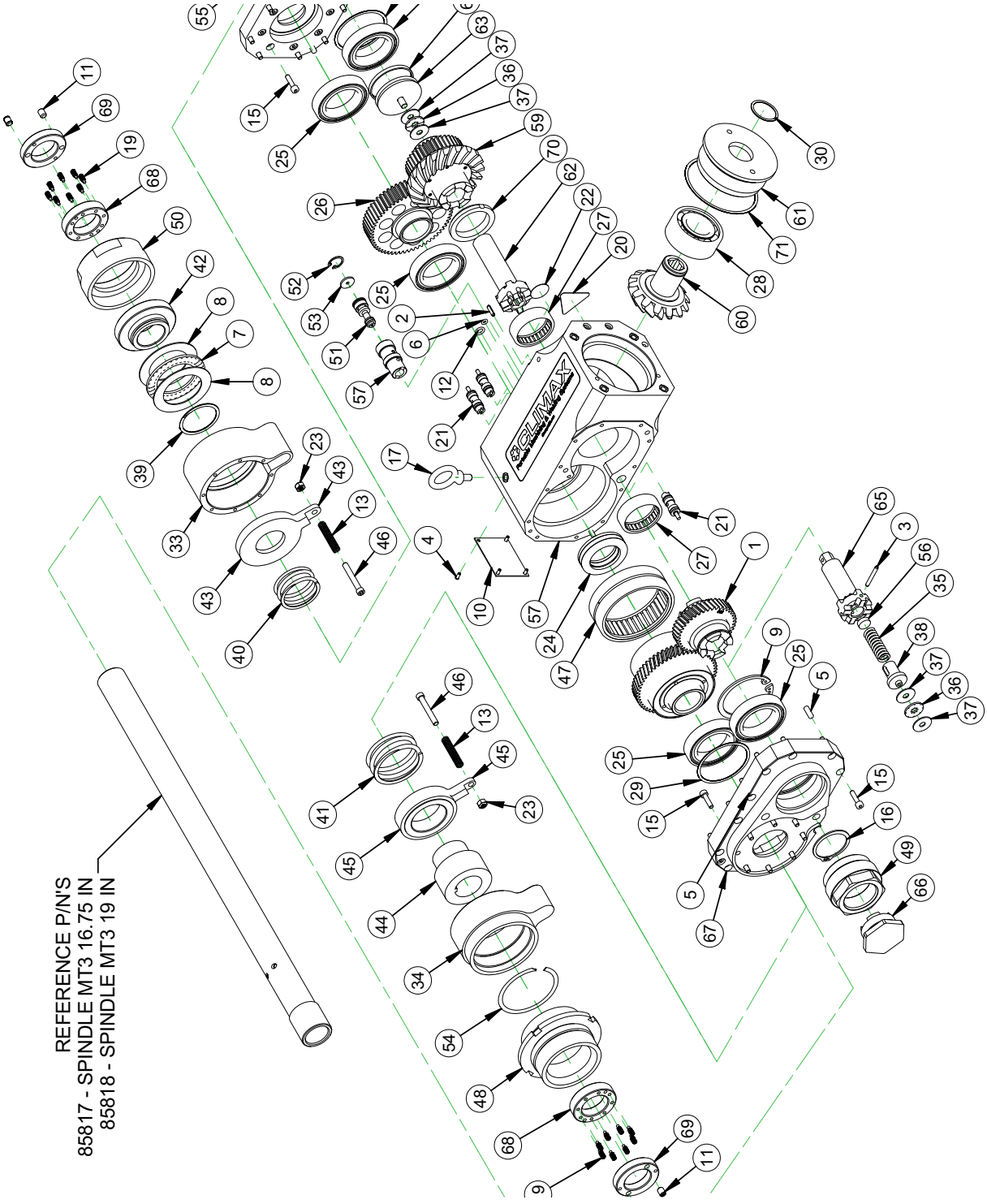

FIGURE A-3.P/N 85590 PD3000 RIGHT ANGLE GEARBOX ASSEMBLY

PARTS LIST					PARTS LIST	
P/N:	DESCRIPTION	ITEM	QTY	P/N:	DESCRIPTION	
-	SEE TABLE - FEED GEAR ASSEMBLIES	38	1	80615	GUIDE SHIFTER	
10133	PIN ROLL 1/8 DIA X 1/2	39	1	80629	RING SNAP 1-3/8 ID X .050 TH SPIRAL HEAVY DUTY	
10166	PIN ROLL 1/8 DIA X 1	40	1	80633	SPRING COMP 1.595 OD X .125 WIRE X .99 LENGTH	
10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089	41	1	80634	SPRING COMP 1.922 OD X .156 WIRE X 1.35 LENGTI	
13948	PIN DOWEL 3/16 DIA X 1/2	42	1	80635	BUSHING RETRACT	
15263	RING O 1/16 X 1/8 ID X 1/4 OD	43	1	80636	TRIGGER RETRACT	
26060	ROLLER THRUST BEARING FNT-4060	44	1	80637	BUSHING SPINDLE	
26061	THRUST WASHER 40MM X 60MM X 1MM	45	1	80638	TRIGGER STOP	
32275	RING SNAP 2-1/8 ID	46	2	80646	SCREW MODIFIED M5 X 0.8 X 35 MM	
35740	PLATE SERIAL YEAR MODEL 1.5 X 2.0	47	1	80650	BRG NEEDLE ROLLER 65MM ID X 78MM OD X 25MM	
42852	SCREW M6 X 1.0 X 8 mm SSSFP	48	1	80660	ADAPTER NOSEPIECE STANDARD 2-7/16-16 UNS LI	
42854	RING O 1/16 X 1/4 ID X 3/8 OD	49	1	80687	ADAPTER CAP SHIFTER	
44042	SPRING COMP .28 OD X .028 WIRE X 1-3/8 3.5LB	50	1	80769	NUT SPINDLE COVER	
46637	SCREW M5 X .8 X 6mm SSSFP	51	1	80850	PILOT CARTRIDGE VALVE	
58672	SCREW M4 X 0.7 X 16MM SHCS	52	1	80851	RING SNAP 7/16 OD X .035 TH INTERNAL	
62498	RING SNAP 1-3/8 ID X .05 TH BLACK FINISH	53	1	80852	WASHER PRECISION 3MM ID X 14MM OD X 1.5	
63954	LIFTING EYE M6 X 1 X 12 THREAD 19 ID 460 LBS 210 KG	54	1	81651	RING SNAP 2.375 ID X .031 TH SPIRAL LIGHT DUTY	
70226	LABEL CLIMAX LOGO 1.5 X 5.5	55	1	82051	ORIFICE .015 DIA 10-32 X 3/16 BRASS	
76477	SCREW M4 X 0.7 X 10 MM SSSHDP	56	1	82098	SPACER SPRING .160 INCH	
78748	LABEL WARNING FLYING DEBRIS/LOUD NOISE	57	1	85589	HOUSING RIGHT ANGLE	
79307	CARTRIDGE VALVE POPPET 2-WAY NORMALLY-CLOSED	58	1	85591	COVER HOUSING UPPER	
79328	LABEL WARNING - CONSULT OPERATOR'S MANUAL	59	1	85592	GEAR ASSEMBLY BEVEL & SPUR	
80249	NUT M5 X 0.8 NYLON INSERT LOCKNUT ZINC PLATED	60	1	85593	GEAR SPIRAL BEVEL 6PD 14T 20PA 35DEG SPIRAL	
80293	BRG ROLLER 1.1811 ID X 1.8504 OD X .4331	61	1	85594	NUT BEVEL GEAR	
80295	BRG BALL 1.3780 ID X 2.1654 OD X .3937	62	1	85595	ROD SHIFTER UPPER	
80346	GEAR SPUR 18DP 59T 20PA .58 FACE	63	1	85596	PISTON SHIFTER	
80377	BRG NEEDLE 1.378 ID X 1.6535 OD X .4724	64	1	85718	SEAL PISTION 37.5MM ID X 45MM OD X 3.8MM PNEUMATIC	
80384	BRG BALL DOUBLE ROW .9843 ID X 2.0472 OD X .8110					
80415	SHIM SET 1.90 ID X 2.15 OD .001/.002/.005 THICK	65	1	85724	ROD SHIFTER LOWER	
80442	RING SNAP 1 ID X .042 THICK EXTERNAL SPIRAL	66	1	85725	CAP SHIFTER	
80510	(NOT SHOWN) LABEL WARNING ENTANGLEMENT OF HAND/ROTATING SHAFT GRAPHIC 1.13 TALL TRIANGLE	67	1	85729	COVER HOUSING LOWER	
		68	2	85781	COLLAR DEPTH	
80586	PUSH BUTTON ASSY MANUAL RETRACT	69	2	85782	COLLAR LOCK	
80603	COVER RETRACT TRIGGER	70	1	85987	BEARING PLAIN THRUST	
80604	COVER STOP TRIGGER	71	1	86070	SHIM SET 2.77 ID X 2.990 OD .001/.002/.005 THICK S	
80605	SPRING .480 OD X .080 X 2 MUSIC WIRE					
80606	BRG THRUST 6MM ID X 19MM OD X 2MM					
80607	WASHER THRUST 6MM ID X 19MM OD X 1MM					

FIGURE A-4.P/N 85590 PD3000 RIGHT ANGLE GEARBOX ASSEMBLY PARTS LIST

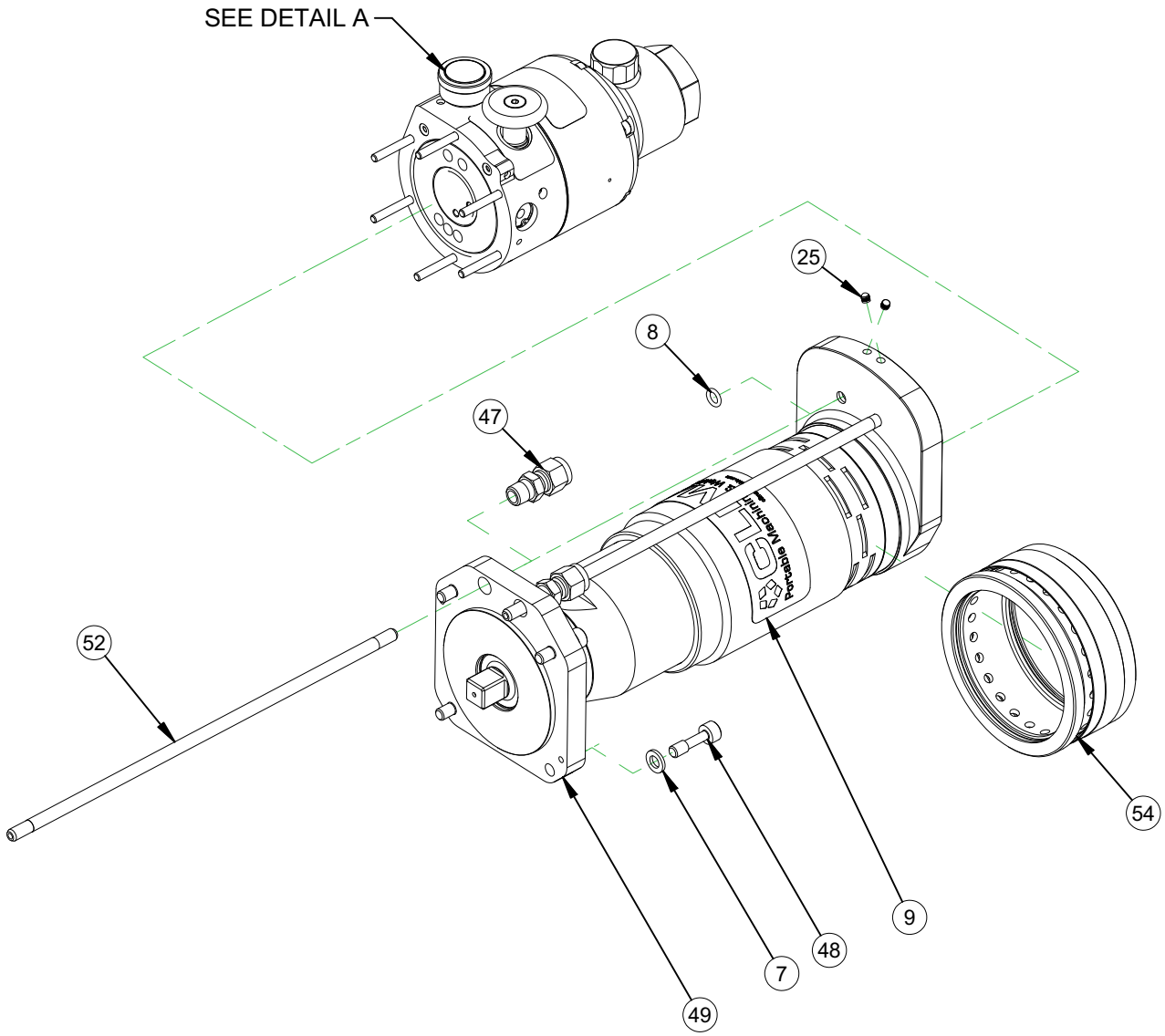

FIGURE A-5.P/N 85624 PD3000 AIR MOTOR ASSEMBLY WITH CONTROLS

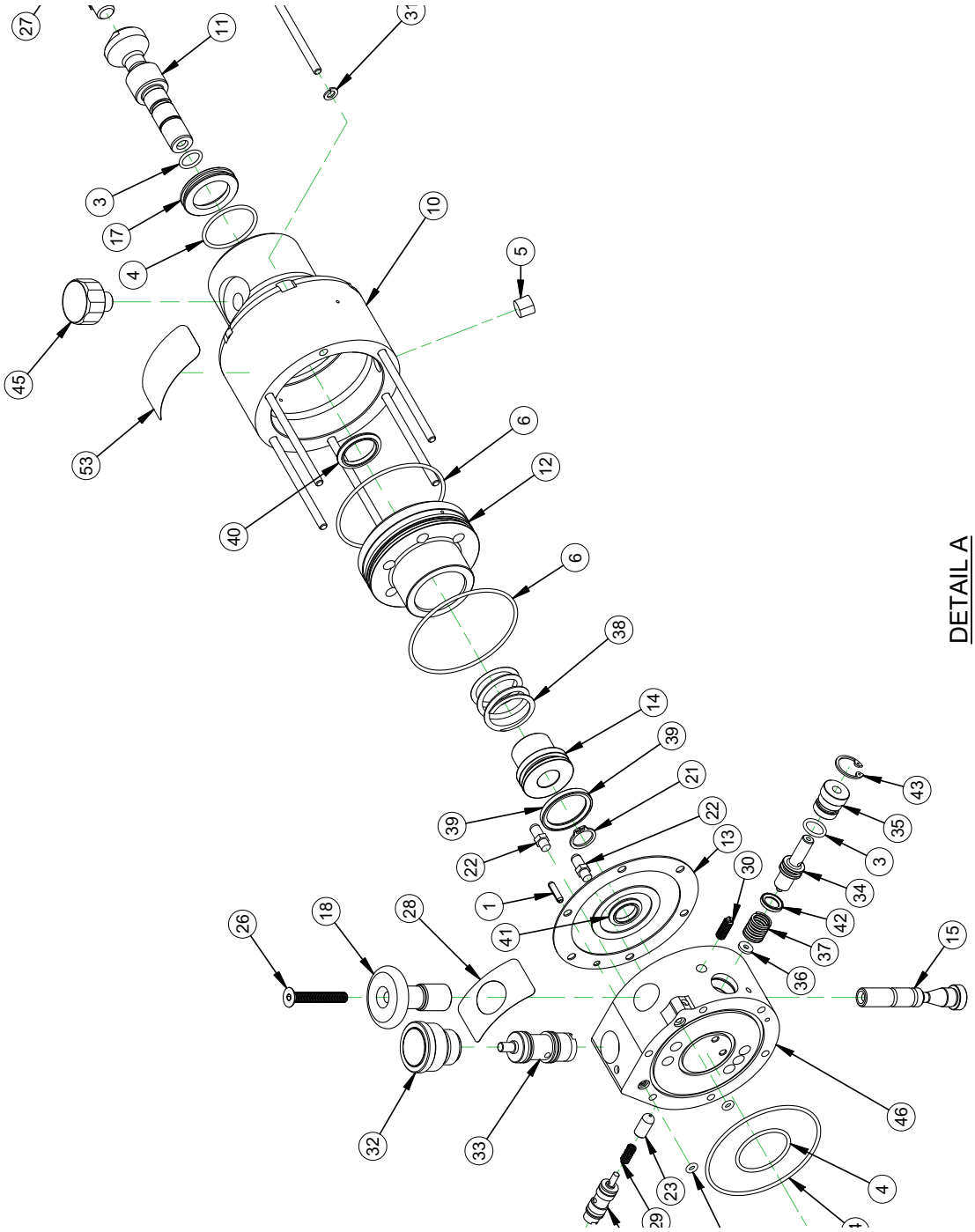

FIGURE A-6.P/N 85624 PD3000 AIR MOTOR ASSEMBLY WITH CONTROLS

PARTS LIST		PARTS LIST			
P/N:	DESCRIPTION	ITEM	QTY	P/N:	DESCRIPTION
10133	PIN ROLL 1/8 DIA X 1/2	30	1	80094	SPRING PLUNGER 10-32 X .513 SS BALL WITH TI
15263	RING O 1/16 X 1/8 ID X 1/4 OD	31	6	80676	WASHER LOCK M4 (LOCW) 4.4 MM ID X 7.6 MM O TH STEEL ZINC
21797	RING O 1/16 X 3/8 X 1/2 OD				
24541	RING O 1/16 X 1-1/16 ID X 1-3/16 OD	32	1	81140	ASSY START BUTTON LARGE
26204	FTG PLUG 1/8 NPT FLUSH SOCKET BRASS	33	1	81148	CARTRIDGE VALVE POPPET 2-WAY NORMALLY-(DIA
33856	RING O 1/16 X 2-1/4 ID X 2-3/8 OD				
35891	WASHER M6 FLTW DIN 12.5	34	1	81209	VALVE LOW PRESSURE DROPOUT
42854	RING O 1/16 X 1/4 ID X 3/8 OD	35	1	81211	RETAINER LOW PRESSURE DROPOUT VALVE
70226	LABEL CLIMAX LOGO 1.5 X 5.5	36	1	81214	WASHER SEAL .105 ID X .300 OD X .050 THCK FIE REINFORCED DIAPHGRAM
79291	BODY INLET 6275-S1				
79293	POPPET MAIN VALVE	37	1	81226	SPRING COMP 0.420 OD X .045 WIRE X 1.00 LG 1
79294	SLEEVE PISTON MAIN VALVE	38	1	81244	SPRING COMP 1.053 OD X .105 WIRE X .88 LENG STAINLESS
79296	GASKET PNEUMATIC VALVE				
79297	PISTON MAIN VALVE	39	1	81260	SEAL PISTON 28MM OD X 22MM ID X 2.85MM
79298	ROD STOP	40	1	81261	SEAL ROD 18MM ID X 24MM OD X 2.85MM
79301	PLUG RETAINING 6275-S1	41	1	81263	SEAL ROD 12MM ID X 18MM OD X 2.85MM
79302	SEAT MAIN VALVE 6275-S1	42	1	81264	SEAL PISTON 12MM OD X 8MM ID X 2MM
79305	STOP KNOB 6275-S1	43	1	81265	RING SNAP 9/16 ID X .035 TH STAINLESS
79306	VENT BREATHER 1/16 NPTM 13 MAX SCFM 1/2 HEIGHT	44	6	81266	SCREW M4 X 0.7 X 105MM SHCS
79308	CARTRIDGE VALVE POPPET 3-WAY NORMALLY-CLOSED	45	1	85282	GAUGE PRESSURE MINIATURE
79310	RING SNAP 12 MM X 1 MM EXTERNAL STAINLESS	46	1	85623	BODY MANIFOLD 6275-S1
79311	MUFFLER 10-32 UNF MALE 5/8 HEIGHT BRONZE	47	2	85649	FTG CONNECTOR MALE 1/8 NPTM X 1/4 TUBE BC THROUGH
79313	ACTUATING PLUNGER 6275-S1				
79395	RING O 1/16 X 2-3/8 ID X 2-1/2 OD	48	4	85655	SCREW M6 X 1.0 X 22MM SHCS CAPTIVE 8 THD S
79412	PLUG SEALING 5/32 ID	49	1	85661	AIR MOTOR CUSTOM RH TURN
79414	SCREW M5 X 0.8 X 35MM FHSCS SS	52	2	85830	TUBING PNEUMATIC O-RING CONNECTION
79889	FTG ORB 1-5/16-12 WITH SCREEN ASSY	53	1	85959	LABEL NOTICE - OPERATING PRESSURE RANGE
80089	LABEL BACKGROUND YELLOW STOP BUTTON	54	1	86288	SPEED CONTROL SERIES 25
80092	SPRING COMP .24 OD X .024 WIRE X .38 LONG				

FIGURE A-7.P/N 85624 PD3000 AIR MOTOR ASSEMBLY WITH CONTROLS PARTS LIST

APPENDIX B SCHEMATICS

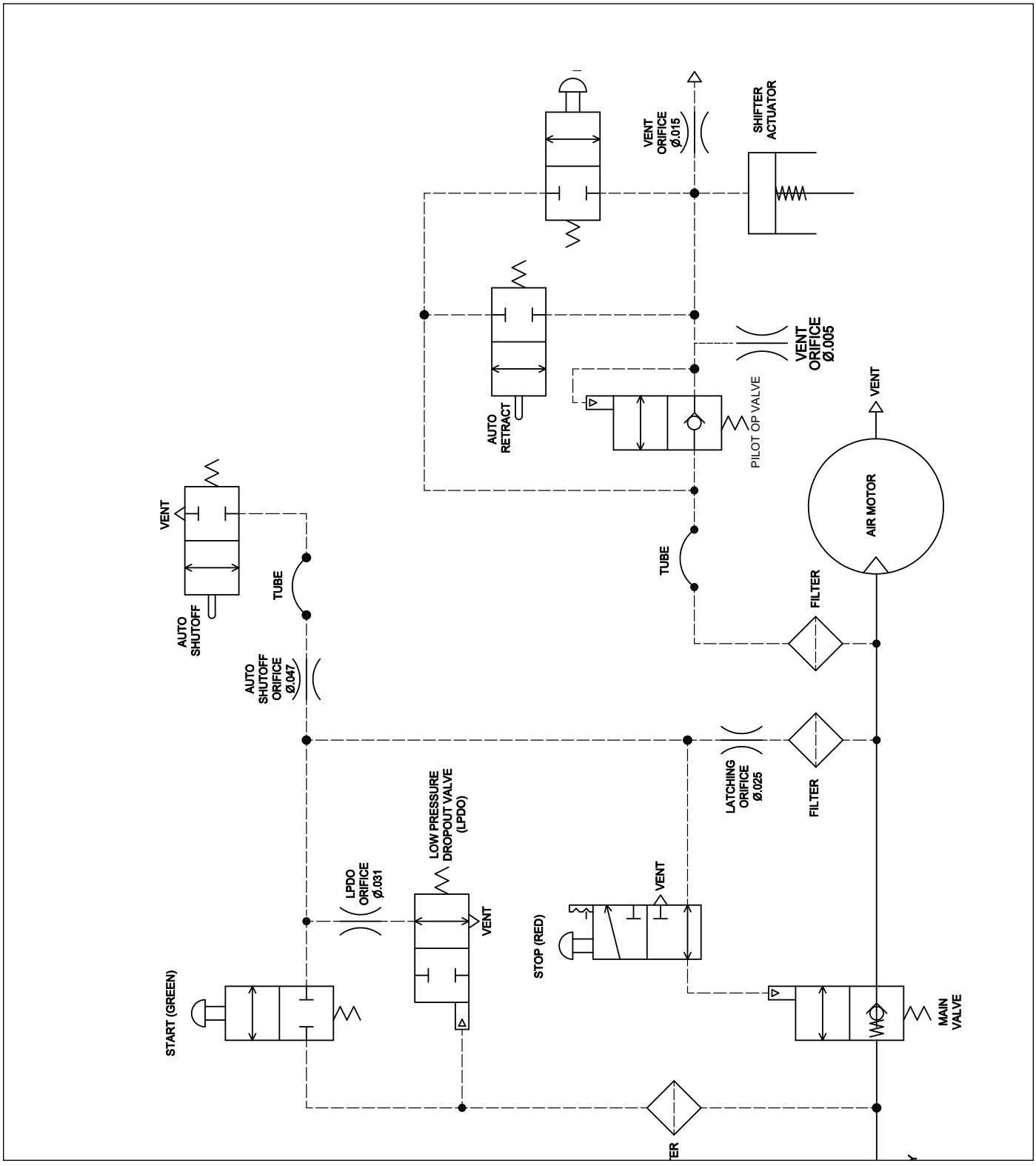

FIGURE B-1. PNEUMATIC SCHEMATIC P/N 82077

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APPENDIX C MSDS

MSDS LIST:

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

LPS 3

SAFETY DATA SHEET

1. Identification

Product identifier **LPS 3® (Bulk)**

Other means of identification

Part Number 00322, 03128, 00305, 00355

Recommended use A specialized soft-film coating designed to prevent rust and corrosion on steel, aluminum and other metals.

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 liquids	Category 3
Health hazards	Specific target organ toxicity, repeated exposure	Category 1
	Aspiration hazard	Category 1

Environmental hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Flammable liquid and vapor. Causes damage to organs through prolonged or repeated exposure. May be fatal if swallowed and enters airways.

Precautionary statement

Prevention Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe mist or vapor. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/eye protection/face protection.

Response In case of fire: Use appropriate media to extinguish. If swallowed: Immediately call a poison center/doctor. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Get medical advice/attention if you feel unwell.

Storage Store in a well-ventilated place. Keep cool. Store locked up.

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	%
Light Mineral Spirits		64742-88-7	60 - 70
Distillates Petroleum Hydrotreated Heavy		64742-54-7	1 - 10
Distillates Petroleum, Hydrotreated Light		64742-47-8	1 - 10
1-butoxy-2-propanol		5131-66-8	1 - 5

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Take off immediately all contaminated clothing. Rinse skin with water/shower. 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. Get medical attention if irritation develops and persists.

Ingestion Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Most important symptoms/effects, acute and delayed Aspiration may cause pulmonary edema and pneumonitis. Direct contact with eyes may cause temporary irritation. Prolonged exposure may cause chronic effects.

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 Take off all contaminated clothing immediately. If you feel unwell, seek medical advice (show the label where possible). 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. 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 Vapors may form explosive mixtures with air. Vapors may travel considerable distance to a source of ignition and flash back. During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards Flammable liquid and vapor.

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. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist or vapor. 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

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Take precautionary measures against static discharge. Use only non-sparking tools. Keep combustibles (wood, paper, oil, etc.) away from spilled material. The product is immiscible with water and will spread on the water surface.

Large Spills: Stop the flow of material, if this is without risk. Use water spray to reduce vapors or divert vapor cloud drift. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water.

Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. 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

Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Explosion-proof general and local exhaust ventilation. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Do not breathe mist or vapor. Avoid prolonged exposure. When using, do not eat, drink or smoke. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep away from heat, sparks and open flame. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

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

Components	Type	Value
Xylene (CAS 1330-20-7)	PEL	435 mg/m3 100 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value
Xylene (CAS 1330-20-7)	STEL	150 ppm
	TWA	100 ppm

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Xylene (CAS 1330-20-7)	1.5 g/g	Methylhippuric acids	Creatinine in urine	*

* - For sampling details, please see the source document.

Appropriate engineering controls

Explosion-proof general and local exhaust ventilation. 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

For prolonged or repeated skin contact use suitable protective gloves. Chemical resistant gloves are recommended.

Other

Avoid contact with the skin. Wear appropriate chemical resistant clothing.

Respiratory protection	No personal respiratory protective equipment normally required. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	When using do not 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	
Physical state	Liquid.
Form	Liquid.
Color	Brown.
Odor	Mild. Cherry.
Odor threshold	Not Established
pH	Not Applicable
Melting point/freezing point	Not Established
Initial boiling point and boiling range	320 - 392 °F (160 - 200 °C)
Flash point	104.5 °F (40.3 °C) Tag Closed Cup
Evaporation rate	0.2 (butyl acetate = 1)
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	0.6 %
Flammability limit - upper (%)	6 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	2.6 mm Hg @ 20°C
Vapor density	4.8 (air = 1)
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Insoluble
Partition coefficient (n-octanol/water)	Not Established
Auto-ignition temperature	446 °F (230 °C) (concentrate)
Decomposition temperature	Not Established
Viscosity	200 - 800 cP @ 25°C
Other information	
Density	6.82
Percent volatile	78.45 %
Specific gravity	0.81 @ 20°C
VOC (Weight %)	75.58 % per U.S. State and 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	Strong oxidizing agents.

Hazardous decomposition products	Carbon oxides.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Causes damage to organs through prolonged or repeated exposure by inhalation.
Skin contact	Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.
Symptoms related to the physical, chemical and toxicological characteristics	Aspiration may cause pulmonary edema and pneumonitis. Direct contact with eyes may cause temporary irritation. Exposure may cause temporary irritation, redness, or discomfort.

Information on toxicological effects

Acute toxicity May be fatal if swallowed and enters airways.

Components	Species	Test Results
1-butoxy-2-propanol (CAS 5131-66-8)		
Acute		
Dermal		
LD50	Rabbit	1400 mg/kg, 24 Hours
		1.59 ml/kg, 24 Hours
	Rat	> 2000 mg/kg, 24 Hours
Inhalation		
LC50	Rat	> 651 ppm, 4 Hours
Oral		
LD50	Rat	3300 mg/kg
		2.83 ml/kg
Distillates Petroleum Hydrotreated Heavy (CAS 64742-54-7)		
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
Distillates Petroleum, Hydrotreated 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

Components	Species	Test Results
Light Mineral Spirits (CAS 64742-88-7)		
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
Xylene (CAS 1330-20-7)		
Acute		
Dermal		
LD50	Rabbit	> 5000 ml/kg, 4 Hours
		12126 mg/kg, 24 Hours
Inhalation		
LC50	Mouse	3907 mg/l, 6 Hours
	Rat	6350 mg/l, 4 Hours
		5922 ppm, 4 Hours
Oral		
LD50	Mouse	5251 mg/kg
	Rat	3523 mg/kg
		10 ml/kg

Skin corrosion/irritation Prolonged skin contact may cause temporary 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 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.

ACGIH Carcinogens

Xylene (CAS 1330-20-7) A4 Not classifiable as a human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Xylene (CAS 1330-20-7) 3 Not classifiable as to carcinogenicity to humans.

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 Not classified.

Specific target organ toxicity - repeated exposure Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard May be fatal if swallowed and enters airways.

Chronic effects Causes damage to organs through prolonged or repeated exposure.

Further information None known.

12. Ecological information

Ecotoxicity Not expected to be harmful to aquatic organisms.

Components		Species	Test Results
Distillates Petroleum, Hydrotreated Light (CAS 64742-47-8)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	2.9 mg/l, 96 hours
Xylene (CAS 1330-20-7)			
Aquatic			
Fish	LC50	Bluegill (Lepomis macrochirus)	7.711 - 9.591 mg/l, 96 hours

Persistence and degradability Not inherently biodegradable.

Bioaccumulative potential No data available.

Partition coefficient n-octanol / water (log Kow)

Xylene	3.12 - 3.2

Mobility in soil No data available.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. 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 The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

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.

14. Transport information

DOT

UN number UN1268
UN proper shipping name Petroleum distillates, n.o.s. or Petroleum products, n.o.s. Mixture
Transport hazard class(es)
Class 3
Subsidiary risk -
Label(s) 3
Packing group III
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Special provisions 144, B1, IB3, T4, TP1, TP29
Packaging exceptions 150
Packaging non bulk 203
Packaging bulk 242

IATA

UN number UN1268
UN proper shipping name Petroleum products, n.o.s. Mixture
Transport hazard class(es)
Class 3
Subsidiary risk -
Packing group III
Environmental hazards No.
ERG Code 3L
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 UN1268

UN proper shipping name	PETROLEUM DISTILLATES, N.O.S. or PETROLEUM PRODUCTS, N.O.S. MIXTURE
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Packing group	III
Environmental hazards	
Marine pollutant	No.
EmS	F-E, S-E
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	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.
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)

Xylene (CAS 1330-20-7) 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 - Yes
Fire Hazard - Yes
Pressure Hazard - No
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

Xylene (CAS 1330-20-7)

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

Xylene (CAS 1330-20-7)

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

Xylene (CAS 1330-20-7)

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

Xylene (CAS 1330-20-7)

US. Rhode Island RTK

Xylene (CAS 1330-20-7)

US. California Proposition 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
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)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	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 06-03-2013

Revision date 12-04-2014

Version # 06

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.

Revision Information Physical & Chemical Properties: Multiple Properties
Regulatory Information: Risk Phrases - Labeling

LPS Presolve Orange Degreaser

SAFETY DATA SHEET

1. Identification

Product identifier	**LPS® PreSolve (Aerosol)**
Other means of identification	
Part Number	01420
Recommended use	A solvent degreasing agent designed for removing tar, adhesives, grease, oil and other residues from metal and other hard surfaces.
Recommended restrictions	None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Manufacturer

Company name	ITW Pro Brands
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	lpssds@itwprobrands.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 2
	Sensitization, skin	Category 1
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 an allergic skin reaction.
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. Wear eye/face protection. Avoid breathing gas. Wash thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves.
Response	If on skin: Wash with plenty of water. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. Specific treatment (see this label). If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Storage	Store in a well-ventilated place. 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	Not applicable.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Distillates Petroleum Hydrotreated Light		64742-47-8	60 - 70
3-Methoxy-3-methyl-1-butanol (MMB)		56539-66-3	10 - 20
d-limonene		5989-27-5	10 - 20
Carbon Dioxide		124-38-9	1 - 3

4. First-aid measures

Inhalation
Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a POISON CENTER or doctor/physician if you feel unwell.

Skin contact
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if irritation develops and persists.

Eye contact
Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. 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
Irritant effects. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Defatting of the skin. Rash. Symptoms of overexposure can include shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances and vomiting, and are reversible if exposure is stopped.

Indication of immediate medical attention and special treatment needed
Provide general supportive measures and treat symptomatically. In case of shortness of breath, give oxygen. Keep victim under observation. Symptoms may be delayed.

General information
In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media
Alcohol resistant foam. Water fog. Dry chemical powder. 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. Structural firefighters protective clothing will only provide limited protection.

Fire fighting equipment/instructions
In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials. Move containers from fire area if you can do so without risk. Water runoff can cause environmental damage.

Specific methods
Use standard firefighting procedures and consider the hazards of other involved materials. Move container from fire area if it can be done without risk. 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. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid inhalation of vapors or mists. 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

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Take precautionary measures against static discharge. Use only non-sparking tools. Keep combustibles (wood, paper, oil, etc.) away from spilled material. This material is classified as a water pollutant under the Clean Water Act and should be prevented from contaminating soil or from entering sewage and drainage systems which lead to waterways.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Use water spray to reduce vapors or divert vapor cloud drift. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid release to the environment. Contact local authorities in case of spillage to drain/aquatic environment. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Do not smoke. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Avoid breathing mist or vapor. Avoid contact with skin. Avoid contact with eyes. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Wash hands thoroughly after handling. Avoid release to the environment. Do not empty into drains.

Conditions for safe storage, including any incompatibilities

Level 3 Aerosol.

Contents under pressure. Keep away from heat, sparks and open flame. Keep container tightly closed. Store in a cool, dry place out of direct sunlight. Store in a well-ventilated place. Keep in an area equipped with sprinklers.

8. Exposure controls/personal protection

Occupational exposure limits

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

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). Eye wash fountain is recommended.

Skin protection

Hand protection

Chemical resistant gloves are recommended.

Other	Avoid contact with clothing. Wear suitable protective clothing. Chemical resistant gloves.
Respiratory protection	No personal respiratory protective equipment normally required. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.
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	
Physical state	Gas.
Form	Aerosol.
Color	Clear, Off-white.
Odor	Orange
Odor threshold	Not established
pH	Not applicable
Melting point/freezing point	Not established
Initial boiling point and boiling range	> 302 °F (> 150 °C)
Flash point	104.0 °F (40.0 °C) Tag Closed Cup
Evaporation rate	> 0.1 BuAc
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	0.7 %
Flammability limit - upper (%)	6 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 5 mm Hg @ 20°C
Vapor density	> 1 (air = 1)
Relative density	Not available.
Solubility(ies)	
Solubility (water)	< 15 %
Partition coefficient (n-octanol/water)	Not established
Auto-ignition temperature	> 392 °F (> 200 °C)
Decomposition temperature	Not established
Viscosity	< 3 cSt @ 25°C
Other information	
Heat of combustion	> 30 kJ/g
Percent volatile	100 %
Specific gravity	0.82 - 0.86 @ 20°C
VOC (Weight %)	97.2 % per U.S. State and Federal Consumer Product Regulations CARB

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	Heat, flames and sparks. Avoid temperatures exceeding the flash point.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Carbon oxides.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes skin irritation. May cause sensitization by skin contact.
Eye contact	Causes eye irritation.
Ingestion	May cause discomfort if swallowed. However, ingestion is not likely to be a primary route of occupational exposure.
Symptoms related to the physical, chemical and toxicological characteristics	Irritant effects. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Defatting of the skin. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.

Information on toxicological effects

Acute toxicity Based on available data, the classification criteria are not met.

Components	Species	Test Results
3-Methoxy-3-methyl-1-butanol (MMB) (CAS 56539-66-3)		
Acute		
Dermal		
LD50	Rat	> 2000 mg/kg, 24 Hours
Distillates Petroleum Hydrotreated 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
d-limonene (CAS 5989-27-5)		
Acute		
Oral		
LD50	Mouse	5600 - 6600 mg/kg
	Rat	> 2000 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization	Based on available data, the classification criteria are not met.
Skin sensitization	May cause sensitization by skin contact.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	Based on available data, the classification criteria are not met.

IARC Monographs. Overall Evaluation of Carcinogenicity

d-limonene (CAS 5989-27-5) 3 Not classifiable as to carcinogenicity to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	Based on available data, the classification criteria are not met.
Specific target organ toxicity - single exposure	Based on available data, the classification criteria are not met.
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 exposure may cause chronic effects.

12. Ecological information

Ecotoxicity Toxic to aquatic life with long lasting effects.

Components		Species	Test Results
Distillates Petroleum Hydrotreated Light (CAS 64742-47-8)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	2.9 mg/l, 96 hours
d-limonene (CAS 5989-27-5)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia pulex)	69.6 mg/l, 48 hours
Fish	LC50	Fathead minnow (Pimephales promelas)	0.619 - 0.796 mg/l, 96 hours

Persistence and degradability	Not inherently biodegradable.
Bioaccumulative potential	No data available.

Partition coefficient n-octanol / water (log Kow)

d-limonene	4.232

Mobility in soil	Readily absorbed into soil.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazardous waste code	D001: Waste Flammable material with a flash point <140 F 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.

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	Not available.
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	-
Label(s)	2.1
Packing group	Not applicable.
Environmental hazards	No.
Special precautions for user	Not available.
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	Yes
EmS	F-D, S-U
Special precautions for user	Not available.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not available.

DOT

IATA; IMDG

Marine pollutant

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 No

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)	Yes
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	Yes
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 06-10-2015

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 and Company Identification
Composition / Information on Ingredients: Disclosure Overrides
Accidental release measures: Environmental precautions
Ecological information: Other adverse effects
Regulatory Information: Other
GHS: Classification

SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBILITH SHC 460**
Product Description: Synthetic Base Stocks and Additives
Product Code: 2015A0204050, 643551-00, 970748
Intended Use: Grease

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
22777 Springwoods Village Parkway
Spring, TX. 77389 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300 or 703-527-3887 CHEMTREC
Product Technical Information	800-662-4525
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 HAZARDS IDENTIFICATION

This material is not hazardous according to regulatory guidelines (see (M)SDS Section 15).

Other hazard information:

HAZARD NOT OTHERWISE CLASSIFIED (HNOC): None as defined under 29 CFR 1910.1200.

PHYSICAL / CHEMICAL HAZARDS

No significant hazards.

HEALTH HAZARDS

High-pressure injection under skin may cause serious damage. Excessive exposure may result in eye, skin, or respiratory irritation.

ENVIRONMENTAL HAZARDS

No significant hazards.

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 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
1H-BENZOTRIAZOLE-1-METHANAMINE, N,N-BIS(2-ETHYLHEXYL)-METHYL-	94270-86-7	0.1 - < 1%	H315, H317, H401, H411
BENZENAMINE, N-PHENYL-, REACTION PRODUCTS WITH 2,4,4-TRIMETHYLPENTENE	68411-46-1	1 - < 5%	H402, H412
LITHIUM HYDROXIDE MONOHYDRATE	1310-66-3	0.1 - < 1%	H302, H314(1B)
LITHIUM SALT OF ALIPHATIC ACID	CONFIDENTIAL	1 - < 5%	H302
METHYLENE BIS(DIBUTYLDITHIOCARBAMATE)	10254-57-6	1 - < 5%	H413
ZINC DITHIOPHOSPHATE	68649-42-3	1 - < 2.5%	H315, H318, H401, H411

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

SECTION 4 FIRST AID MEASURES

INHALATION

Under normal conditions of intended use, this material is not expected to be an inhalation hazard.

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.

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

FLAMMABILITY PROPERTIES

Flash Point [Method]: >204°C (400°F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
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. 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.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Scrape up spilled material with shovels into a suitable container for recycle or disposal.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

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

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers. Keep away from incompatible materials.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit / Standard			NOTE	Source
LITHIUM HYDROXIDE MONOHYDRATE		Ceiling	1 mg/m3		N/A	OARS WEEL

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

No biological limits allocated.

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:

No protection is ordinarily required under normal conditions of use and with adequate ventilation.

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. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. 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.

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

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Solid
Form: Semi-fluid
Color: Red
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 1
Flammability (Solid, Gas): N/D
Flash Point [Method]: >204°C (400°F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 316°C (600°F) [Estimated]
Decomposition Temperature: N/D
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 460 cSt (460 mm2/sec) at 40 °C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/D

NOTE: Most physical properties above are for the oil component in the material.

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: See sub-sections below.

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.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

Hazard Class	Conclusion / Remarks
Inhalation	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin Corrosion/Irritation: No end point data for material.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Serious Eye Damage/Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.
Sensitization	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: No end point data for material.	Not expected to be a skin sensitizer. Based on assessment of the components.
Aspiration: Data available.	Not expected to be an aspiration hazard. Based on physico-chemical properties of the material.
Germ Cell Mutagenicity: No end point data for material.	Not expected to be a germ cell mutagen. Based on assessment of the components.
Carcinogenicity: No end point data for material.	Not expected to cause cancer. Based on assessment of the components.
Reproductive Toxicity: No end point data for material.	Not expected to be a reproductive toxicant. Based on assessment of the components.
Lactation: No end point data for material.	Not expected to cause harm to breast-fed children.
Specific Target Organ Toxicity (STOT)	

Single Exposure: No end point data for material.	Not expected to cause organ damage from a single exposure.
Repeated Exposure: No end point data for material.	Not expected to cause organ damage from prolonged or repeated exposure. Based on assessment of the components.

OTHER INFORMATION

For the product itself:

Component concentrations in this formulation would not be expected to cause skin sensitization, based on tests of the components or similar formulations.

Contains:

Synthetic base oils: Not expected to cause significant health effects under conditions of normal use, based on laboratory studies with the same or similar materials. Not mutagenic or genotoxic. Not sensitizing in test animals and humans.

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.

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

Marine Pollutant: No

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: This material is not considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

Listed or exempt from listing/notification on the following chemical inventories: AICS, IECSC, KECI, TSCA

Special Cases:

Inventory	Status
NDSL	Restrictions Apply
PICCS	Restrictions Apply

EPCRA SECTION 302: This material contains no extremely hazardous substances.

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

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
ZINC DITHIOPHOSPHATE	68649-42-3	1 - < 2.5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
NAPHTHENIC ACIDS, ZINC SALTS	12001-85-3	15
ZINC DITHIOPHOSPHATE	68649-42-3	13, 15, 17, 19
ZINC NEODECANOATE	27253-29-8	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

KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):
H302: Harmful if swallowed; Acute Tox Oral, Cat 4
H314(1B): Causes severe skin burns and eye damage; Skin Corr/Irritation, Cat 1B
H315: Causes skin irritation; Skin Corr/Irritation, Cat 2
H317: May cause allergic skin reaction; Skin Sensitization, Cat 1
H318: Causes serious eye damage; Serious Eye Damage/Irr, Cat 1
H401: Toxic to aquatic life; Acute Env Tox, Cat 2
H402: Harmful to aquatic life; Acute Env Tox, Cat 3
H411: Toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 2
H412: Harmful to aquatic life with long lasting effects; Chronic Env Tox, Cat 3
H413: May cause long lasting harmful effects to aquatic life; Chronic Env Tox, Cat 4

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Updates made in accordance with implementation of GHS requirements.

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