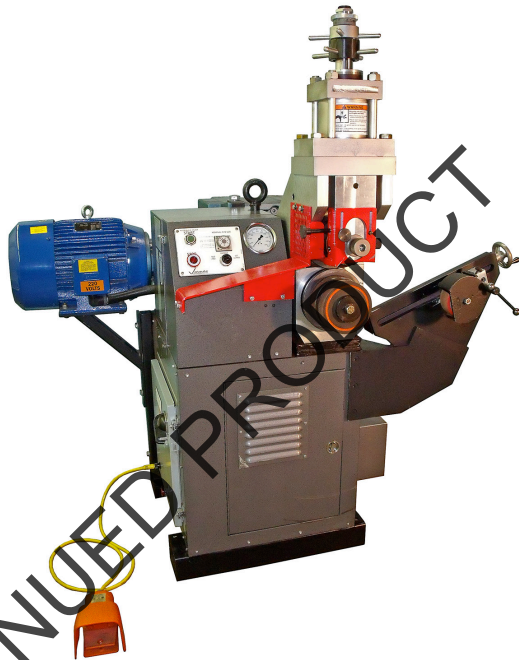


VE872

PIPE ROLL GROOVING TOOL



WARNING



! WARNING



Failure to follow instructions and warnings could result in serious personal injury, property damage, and/or product damage.

- Before operating or servicing the VE872 Roll Grooving Tool, read all instructions in this manual and all warning labels on the tool.
- Wear safety glasses, hardhat, foot protection, and hearing protection while working around this tool.
- Save this operating and maintenance manual.

If you need additional copies of any literature, or if you have questions concerning the safe and proper operation of this tool, contact Victaulic, P.O. Box 31, Easton, PA 18044-0031, Phone: 1-800-PICK VIC, E-Mail: pickvic@victaulic.com.

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HAZARD IDENTIFICATION

Definitions for identifying the various hazard levels are provided below.



This safety alert symbol indicates important safety messages. When you see this symbol, be alert to the possibility of personal injury.

Carefully read and fully understand the message that follows.



DANGER

- The use of the word **“DANGER”** identifies an immediate hazard with a likelihood of death or serious personal injury if instructions, including recommended precautions, are not followed.



WARNING

- The use of the word **“WARNING”** identifies the presence of hazards or unsafe practices that could result in death or serious personal injury if instructions, including recommended precautions, are not followed.



CAUTION

- The use of the word **“CAUTION”** identifies possible hazards or unsafe practices that could result in personal injury and product or property damage if instructions, including recommended precautions, are not followed.

NOTICE

- The use of the word **“NOTICE”** identifies special instructions that are important but not related to hazards.

OPERATOR SAFETY INSTRUCTIONS

The VE872 is designed only for roll grooving pipe. Use of these tools requires dexterity and mechanical skills, as well as sound safety habits. Although these tools are manufactured for safe, dependable operation, it is impossible to anticipate all combinations of circumstances that could result in an accident. The following instructions are recommended for safe operation of these tools. The operator is cautioned to always practice “safety first” during each phase of use, including setup and maintenance. It is the responsibility of the owner, lessee, or user of these tools to ensure that all operators read this manual and fully understand the operation of these tools.

Read this manual before operating or servicing these tools. Become familiar with the tool's operations, applications, and limitations. Be particularly aware of its specific hazards. Store this manual in a clean area where it is always readily available. Additional copies of this manual are available upon request through Victaulic.

1. The VE872 tool is designed **ONLY** for roll grooving pipe sizes, materials, and wall thicknesses listed in the applicable “Tool Rating and Roll Selection” section.
2. **Avoid using the tool in dangerous environments.** Do not expose the tool to rain, and do not use the tool in damp or wet locations. Do not use the tool on sloped or uneven surfaces. Keep the work area well lit. Allow sufficient space to operate the tool properly.
3. **Ground the tool to protect the operator from electric shock.** Tool components are grounded to the frame of the tool. Make sure the frame is grounded properly.
4. **Prevent back injury.** DO NOT attempt to lift tool components without the use of mechanical lifting equipment.


5. **Inspect the equipment.** Before using the tool, check all moveable parts for any obstructions. Make sure guards and tool components are installed and adjusted properly.
6. **Prevent accidental startups.** Place the switch on the side of the tool to the "OFF" position when the tool is not in use.
7. **Wear proper apparel.** Do not wear loose clothing, jewelry, or anything that can become entangled in moving parts.
8. **Wear protective items when working with tools.** Always wear safety glasses, hardhat, foot protection, and hearing protection.
9. **Stay alert.** Do not operate the tool if you are drowsy from medication or fatigue. Avoid horseplay around the equipment.
10. **Keep visitors away from the immediate work area.** All visitors should be kept a safe distance from the equipment at all times.
11. **Keep work areas clean.** Keep the work area around the tool clear of any obstructions that could limit the movement of the operator. Clean up any oil or other spills.
12. **Secure the work, tool, and accessories.** Make sure the tool is stable. Refer to the applicable "Tool Setup" section.
13. **Support the work.** Support long pipe lengths with a pipe stand that is secured to the floor or the ground.
14. **Operate the tool only with a safety foot switch.** The power drive must be operated with a safety foot switch that is located for easy operator access. Never reach across moving parts. If the tool does not contain a safety foot switch, contact Victaulic.
15. **Keep hands and tools away from grooving rolls and stabilizer roller during the grooving operation.** Grooving rolls can crush or cut fingers and hands.
16. **Do not reach inside the pipe ends during tool operation.** Pipe edges can be sharp and can snag gloves, hands, and shirt sleeves. Fingers and hands can be crushed between the pipe and lower roll.
17. **Do not over-reach.** Maintain proper footing and balance at all times. Make sure the safety foot switch is easily accessible for the operator.
18. **Do not force the tool.** Do not force the tool or accessories to perform any functions beyond their capabilities. Do not overload the tool.
19. **Do not operate the tool at ram speeds exceeding those specified in this manual.**
20. **Do not abuse the foot switch cord.** Keep the cord away from heat, oil, and sharp objects.
21. **Always turn off the main power supply to the tool before servicing the tool.** Only authorized personnel should attempt to perform maintenance on the tool. Always turn off the main power supply to the tool before servicing or adjusting the tool.
22. **Maintain tools with care.** Keep tools clean at all times to ensure proper and safe performance. Follow the instructions for lubricating tool components.
23. **Use only Victaulic replacement parts and accessories.** Use of any other parts may result in a voided warranty, improper operation, and hazardous situations.
24. **Do not remove any labels from the tool.** Replace any damaged or worn labels.
25. **Always use handrails when ascending or descending the tool platforms.**

INTRODUCTION

NOTICE

- Drawings and/or pictures in this manual may be exaggerated for clarity.
- The tool, along with this operating and maintenance instructions manual, contains trademarks, copyrights, and/or patented features that are the exclusive property of Victaulic Company.

The VE872 Roll Grooving Tool is a fully motorized, semi-automatic, hydraulic-feed tool for roll grooving pipe to receive Victaulic grooved pipe products. The standard VE872 tool is supplied with rolls for grooving 8–12-inch/219.1–323.9-mm carbon steel pipe to original groove specifications and 14–24-inch/355.6–610-mm carbon steel pipe to Advanced Groove Specifications (AGS). VE872 rolls are marked with the size and part number, and they are color coded to identify the pipe material. For roll grooving to other specifications and materials, refer to the applicable “Tool Rating and Roll Selection” section. Grooving tools for other specifications, sizes, and materials must be purchased separately.

 CAUTION

- These tools must be used ONLY for roll grooving pipe designated in the applicable “Tool Rating and Roll Selection” section of this manual.

Failure to follow this instruction could overload the tool, resulting in reduced tool life and/or damage to the tool.

RECEIVING THE TOOL

VE872 tools are palletized individually and enclosed in a wooden or cardboard sleeve, which is designed for use in re-shipping the tool back to Victaulic upon completion of the rental contract, when applicable. The stabilizer assembly and additional roll sets are shipped in a separate container.

Upon receipt of the tool, make sure all necessary parts are included. If any parts are missing, contact Victaulic.

VE872 LARGE CONTAINER CONTENTS

Qty.	Description
1	VE872 Pipe Roll Grooving Tool
1	Roll Set for 8 – 12-inch/219.1 – 323.9-mm Carbon Steel Pipe Mounted on the Tool (Unless Ordered Otherwise) - Original Groove System Specifications
	TM-VE872 Operating and Maintenance Instructions Manual
2	RP-VE872 Repair Parts List
1	Stabilizer Mounting Hardware (Installed Loose in Mounting Holes for Stabilizer)
1	Pipe Diameter Tape
1	Hydraulic System Bleeder Tube
1	Safety Foot Switch with Detachable Line Cord

VE872 SMALL CONTAINER CONTENTS

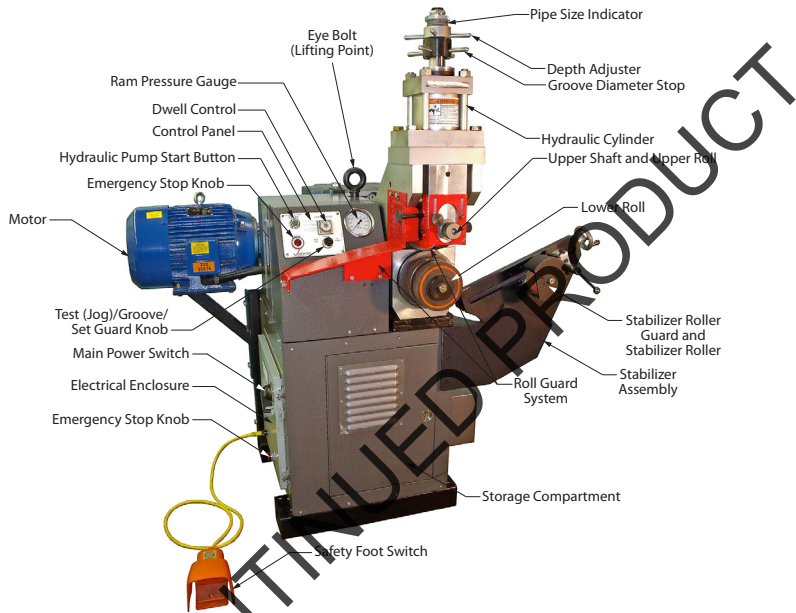
Qty.	Description
1	Stabilizer Assembly
1	Roll Set for 14 – 24-inch/355.6 – 610-mm Carbon Steel Pipe - AGS Specifications

NOTE: Support bases for grooving 26-inch/660-mm and larger pipe sizes must be ordered separately and will be shipped in separate containers from the tool components listed on this page.

TOOL NOMENCLATURE

NOTICE

- Drawings and/or pictures in this manual may be exaggerated for clarity.
- The tool, along with this operating and maintenance instructions manual, contains trademarks, copyrights, and/or patented features that are the exclusive property of Victaulic.



Located on Side of Tool Near Motor

WARNING

Failure to follow instructions and warnings could result in serious personal injury, property damage, and/or product damage.

Before operating or servicing any pipe preparation tools, read all instructions in the Operating and Maintenance Instructions manual and all labels on the tool.

Wear safety glasses, hardhat, foot protection, and hearing protection when working around tools.

If you need additional safety training literature, or if you have questions concerning the safe and proper operation of any Victaulic pipe preparation tools, contact Victaulic, P.O. Box 31, Easton, PA 18044-0031, Phone: (610) 291-0100, Fax: (610) 291-0101, or email: peckvic@victaulic.com

0007 Rev. D 001027-00-00

Located on Hydraulic Cylinder

WARNING

Grooving rolls can crush or cut fingers and hands.

- Always disconnect the tool from the power source before making any tool adjustments.
- Loading/unloading pipe will place your hands close to the rollers. Keep hands away from the grooving rolls and the roller on the pipe stabilizer during operation.

- Never reach inside the pipe ends or across the tool or pipe during operation.
- Always groove pipe in a **CLOCKWISE** direction.
- Never groove pipe that is shorter than the recommended lengths listed in the operating and maintenance manual.
- Never wear loose clothing, loose gloves, or anything that can become entangled in moving parts.

0007 Rev. C 001163-00-00

Located on Electrical Enclosure

DANGER

Contact with hazardous voltage inside this door may result in death or serious personal injury.

- ALWAYS disconnect the tool from the power source before performing maintenance or adjustments.
- Only qualified personnel should open this door.

0008 Rev. B 000940-00-00

Located Near Control Panel

DANGER

Contact with hazardous voltage inside this cover plate may result in death or serious personal injury.

- ALWAYS disconnect the tool from the power source before performing maintenance or adjustments.
- Only qualified personnel should open this cover plate.


0008 Rev. B 000542-00-00

IMPORTANT INFORMATION FOR TOOL SETUP

Support bases are required when using a VE872 Roll Grooving Tool to groove 26-inch/660-mm and larger pipe sizes. Each support base corresponds with a range of pipe sizes; these requirements must be followed to ensure pipe is grooved properly (refer to table below).

If the tool will be used for roll grooving 24-inch/610-mm and smaller pipe sizes, follow the “Tool Setup for Grooving 24-inch/610-mm and Smaller Pipe Sizes” section. For the 24-inch/610-mm and smaller pipe size range, support bases are not required, but the tool must be anchored to a sturdy, level concrete floor.

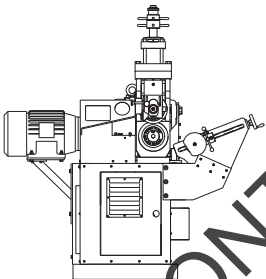
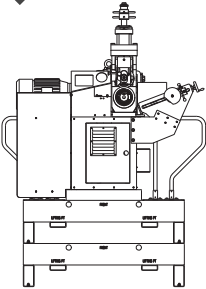
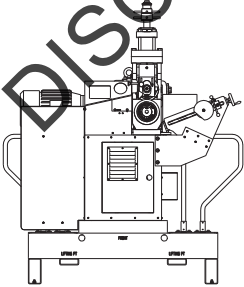
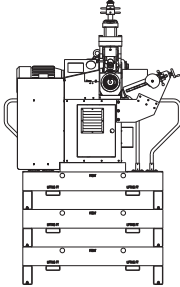
If the tool will be used for roll grooving 26-inch/660-mm and larger pipe sizes, follow the “Tool Setup for Grooving 26-inch/660-mm and Larger Pipe Sizes” section. **NOTE:** Each support base is 16 inches/406 mm in height and weighs approximately 180 pounds/82 kilograms.



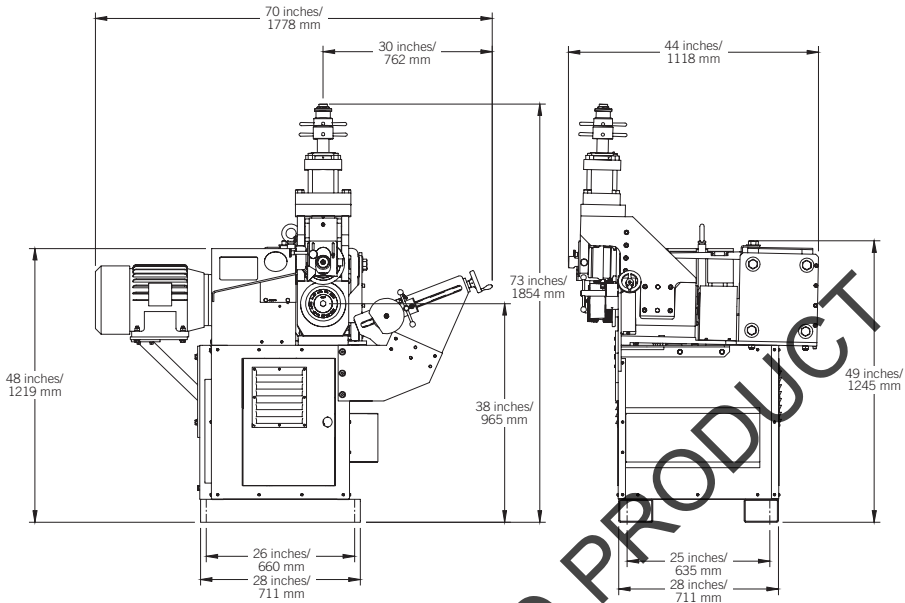
WARNING

- The tool or bottom support base **MUST** always be anchored to a sturdy, level concrete floor that is capable of handling the weight of the tool and accessories.
- Handrails must be installed and the electrical cord/safety foot switch cord must be routed through the support base(s) to prevent tripping hazards.

Failure to follow this instruction could result in serious personal injury and property damage.

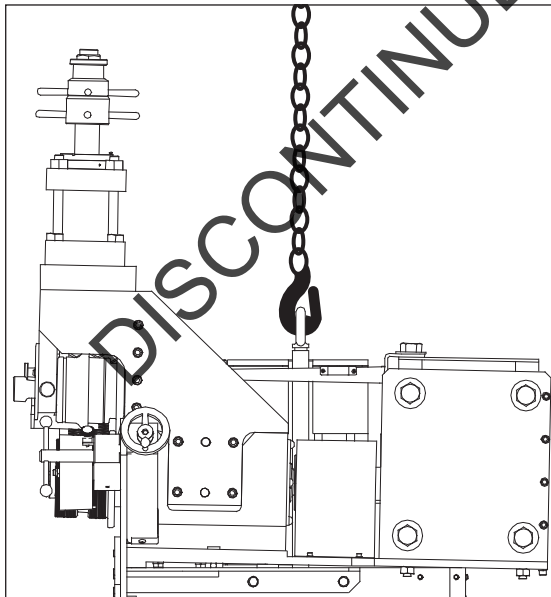
Configuration	Pipe Size Range	Configuration	Pipe Size Range
 Tool without support base(s)	24 – 48-inch/ 610 – 1219-mm Pipe Sizes	 Tool installed with two support bases	40 – 48-inch/ 1016 – 1219-mm Pipe Sizes
 Tool installed with one support base	26 – 38-inch/ 660 – 965-mm Pipe Sizes	 Tool installed with three support bases	50 – 72-inch/ 1270 – 1829-mm Pipe Sizes

TOOL DIMENSIONS AND WEIGHT – WITHOUT SUPPORT BASES



The VE872 Roll Grooving Tool, as shown above, weighs approximately 1900 pounds/865 kilograms.

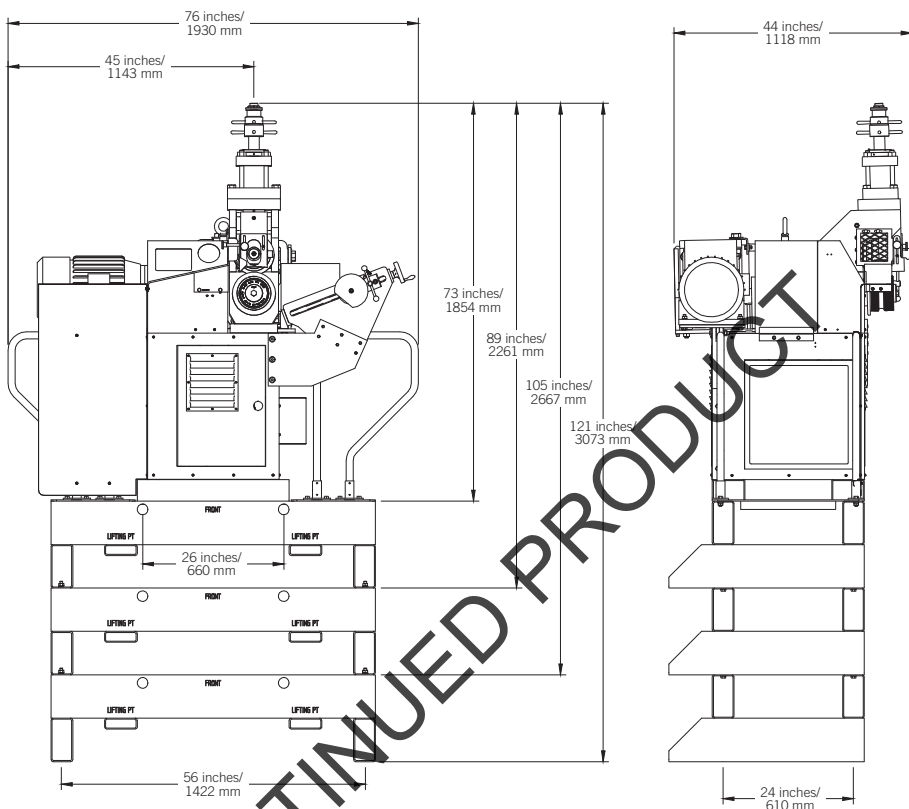
LIFTING REQUIREMENTS – WITHOUT SUPPORT BASES

**WARNING**

- An overhead crane must be used to lift/transport the tool to its intended location.
- An eye bolt is provided in the top-middle section of the tool, as shown in the drawing to the left.
- Minimum capacity rating of the overhead crane shall be 2000 pounds/910 kilograms.

Failure to follow this instruction could result in serious personal injury and property damage.

TOOL DIMENSIONS AND WEIGHTS – WITH SUPPORT BASES



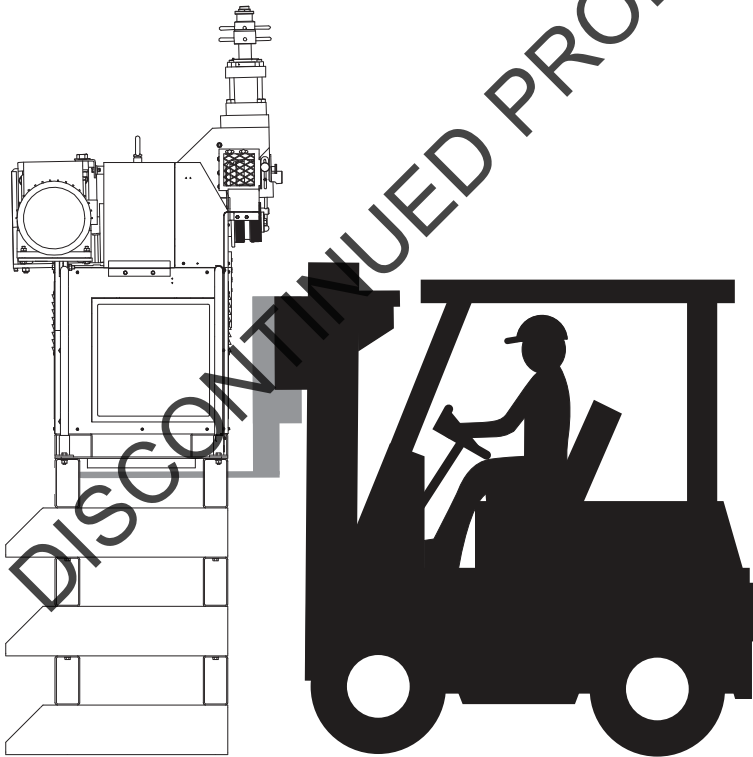
The VE872 Roll Grooving Tool by itself weighs approximately 1900 pounds/865 kilograms.

- The VE872 Roll Grooving Tool mounted on one support base weighs approximately 2080 pounds/945 kilograms.
- The VE872 Roll Grooving Tool mounted on two support bases weighs approximately 2260 pounds/1025 kilograms.
- The VE872 Roll Grooving Tool mounted on three support bases weighs approximately 2440 pounds/1110 kilograms.

LIFTING REQUIREMENTS – WITH SUPPORT BASES**⚠ WARNING**

- **DO NOT** attempt to use the eye bolt for lifting a VE872 Roll Grooving Tool that is installed on the support base(s).
- When attempting to relocate a VE872 Roll Grooving Tool that is installed on the support base(s), the wedge-type concrete floor anchors must be removed, and a forklift must be used to transport the tool assembly.
- The forks of the forklift must engage only with the “LIFTING POINT” locations of the top support base, as shown in the drawing below.
- Wedge-type concrete floor anchors must be used to anchor the tool/support base assembly to the floor at the new location. Refer to the “Tool Setup for Grooving 26-inch/660-mm and Larger Pipe Sizes” section.

Failure to follow these instructions could result in serious personal injury and property damage.



TOOL SETUP FOR GROOVING 24-INCH/610-MM AND SMALLER PIPE SIZES



WARNING

- **DO NOT** turn on the main power supply to the tool until instructed otherwise.
- The tool **MUST** be leveled and anchored securely on a concrete floor or base.

Failure to follow these instructions could result in serious personal injury.

1. Remove all components from the packaging, and make sure all necessary items are included. Refer to the “Receiving the Tool” section.

2. Select a location for the tool and pipe stand by taking into consideration the following factors:

2a. The required power supply (refer to the “Power Requirements” section)

2b. Ambient temperature requirements of 20° F to 104° F/21°C to 26° C

2c. A level concrete floor or base for the tool and pipe stand

2d. Adequate space to handle pipe lengths

2e. Adequate clearance around the tool and stabilizer assembly for adjustment and maintenance (refer to drawings on page 7)

NOTE: An overhead crane must be used to lift/transport the tool to its intended location. An eye bolt is provided in the top-middle section of the tool. Make sure the minimum capacity rating of the overhead crane is 2000 pounds/910 kilograms. Refer to the “Tool Dimensions and Weight – Without Support Bases” section for additional information.



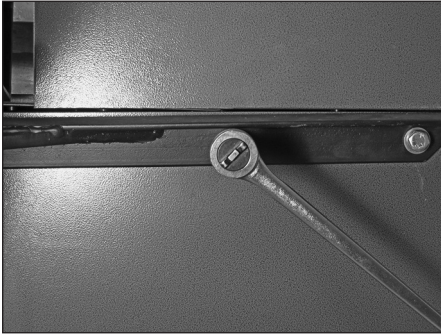
3. The VE872 Roll Grooving Tool is designed for use in a permanent location and must be located on a level concrete floor or base. After an appropriate location is chosen, the tool must be leveled front-to-back and side-to-side and anchored securely. A non-level tool can severely affect grooving operation. When checking tool level, place the level directly on the tool surfaces, as shown above.



WARNING

- **During tool setup, two people are needed to safely handle the stabilizer assembly due to its weight.**
- **An alternative is to use a hoist to lift the stabilizer assembly into position.**

Failure to follow these instructions could result in serious personal injury.



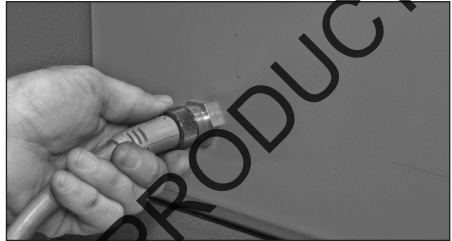
4. Remove the stabilizer bolts and lock washers from the front and right side of the tool. Position the stabilizer assembly onto the front, right corner of the tool so that the mounting holes in the stabilizer assembly align with the mounting holes in the tool. Using the stabilizer bolts and lock washers, removed previously from the tool, fasten the stabilizer assembly to the tool. **NOTE:** The tool frame is designed so that no nuts are required on the ends of the bolts. Tighten all stabilizer bolts completely until the lock washers are compressed.

NOTICE

- **VE872 tools are equipped with a detachable safety-foot-switch cord. The safety foot switch can be removed easily for storage in the cabinet when the tool is not in use.**



5. Install the safety foot switch by aligning the pins/tab of the male adapter plug with the receptacle.



6. Tighten the locking ring on the plug.
7. Proceed to the "Power Requirements" section.

TOOL SETUP FOR GROOVING 26-INCH/660-MM AND LARGER PIPE SIZES

WARNING

- **DO NOT** turn on the main power supply to the tool until instructed otherwise.
- The bottom support base **MUST** always be anchored to a sturdy, level concrete floor that is capable of handling the weight of the tool and accessories.

Failure to follow these instructions could result in serious personal injury.

1. Remove all components from the packaging, and make sure all necessary items are included. Refer to the “Receiving the Tool” section.

2. The VE872 Roll Grooving Tool with support base(s) is designed for use in a permanent location and must be located on a level concrete floor. After an appropriate location is chosen, the bottom support base must be level and securely anchored. A non-level tool can severely affect grooving operation.

3. Select a location for the tool/support base(s) and pipe stand by taking into consideration the following factors:

3a. The required power supply (refer to the “Power Requirements” section)

3b. Ambient temperature requirements of 20° F to 104° F/21° C to 26° C

3c. A level concrete floor for the tool/support base(s) and pipe stand

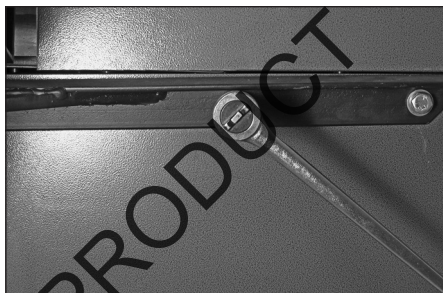
3d. Adequate space to handle pipe lengths

3e. Adequate clearance around the tool/support base(s) for adjustment and maintenance (refer to drawings on page 8)

WARNING

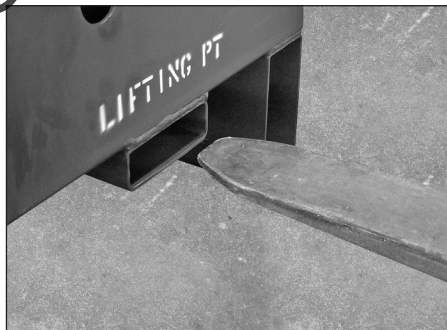
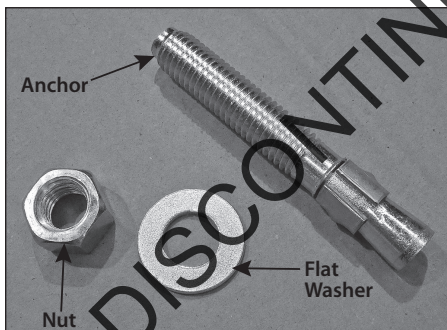
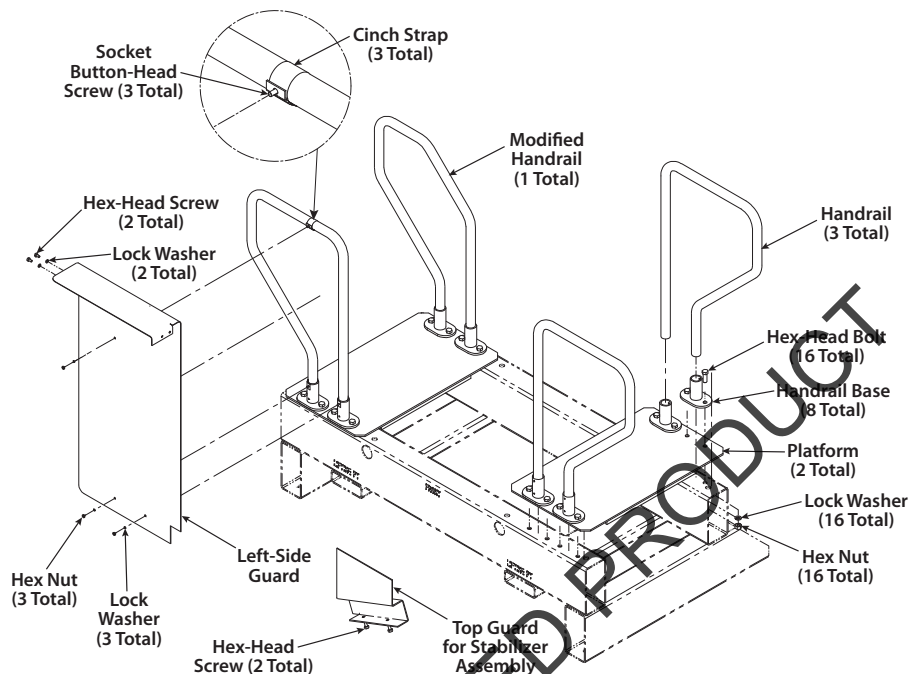
- During tool setup, two people are needed to safely handle the stabilizer assembly due to its weight.
- An alternative is to use a hoist to lift the stabilizer assembly into position.

Failure to follow these instructions could result in serious personal injury.



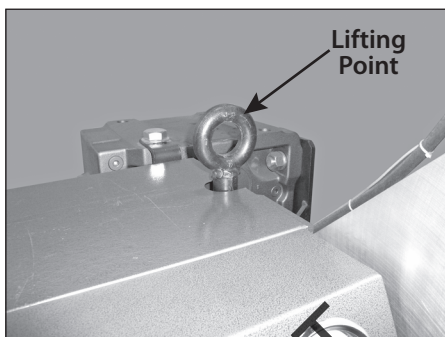
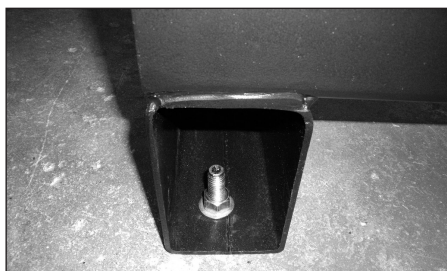
4. Remove the stabilizer bolts and lock washers from the front and right side of the tool. Position the stabilizer assembly onto the front, right corner of the tool so that the mounting holes in the stabilizer assembly align with the mounting holes in the tool. Using the stabilizer bolts and lock washers, removed previously from the tool, fasten the stabilizer assembly to the tool.

NOTE: The tool frame is designed so that no nuts are required on the ends of the bolts. Tighten all stabilizer bolts completely until the lock washers are compressed.



5. Wedge-type concrete floor anchors ($\frac{3}{8}$ x $\frac{1}{4}$ -inch minimum size, dependent upon floor structure) must be used to secure the bottom platform to the floor. Make sure the floor anchors are installed into the concrete floor in accordance with the manufacturer's instructions.

6. Using a forklift, raise the bottom support base over the area where the floor anchors are installed. **NOTE:** The forks must be engaged with the "LIFTING POINT" locations. Align the four holes in the support base with the four floor anchors. Slowly lower the support base over the floor anchors.



7. Install a flat washer and nut onto each of the floor anchors, as shown above. Tighten the nut completely.

8. At this time, an additional support base can be installed. Following the same lifting method as in step 6, raise the second support base over the bottom support base. Align the four holes in the second support base with the four holes in the bottom support base. Slowly lower the second support base onto the bottom support base.

9. Locate the 1/2-inch x 1 1/2-inch bolt, two flat washers, lock washer, and nut (supplied with the support base kit). This hardware is required to anchor the support bases to each other.

10. Insert a bolt with flat washer through the holes in the second support base and bottom support base. Apply a flat washer, lock washer, and nut to the end of the bolt. Tighten the nut completely until the lock washer is compressed. Repeat this step for the other three hole locations.

11. If the third support base is required, follow steps 8 - 10.

12. When the correct amount of support bases are installed and secured to each other, the tool must be lifted into position and placed onto the support base(s). An eye bolt is provided in the top-middle section of the tool. Make sure the minimum capacity rating of the overhead crane is 2000 pounds/910 kilograms. Refer to the "Tool Dimensions and Weight - Without Support Bases" section for additional information.

13. As the tool is being lowered onto the support base(s), make sure the power cord is guided out of the way and the safety foot switch cord is disconnected to prevent damage. The holes in the base of the tool must align with the innermost holes in the support base.

14. Locate the 1/2-inch x 1 1/2-inch bolt, two flat washers, lock washer, and nut (supplied with the support base kit). This hardware is required to anchor the tool and support base to each other.

15. Insert a bolt with a flat washer up through the hole in the support base and into the hole in the base of the tool. Apply a flat washer, lock washer, and nut to the end of the bolt. Tighten the nut completely until the lock washer is compressed. Repeat this step for the other three hole locations in the support base and tool base.

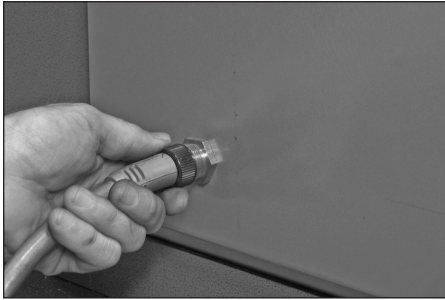
NOTICE

- **VE872 tools are equipped with a detachable safety-foot-switch cord. The safety foot switch can be removed easily for storage in the cabinet when the tool is not in use.**

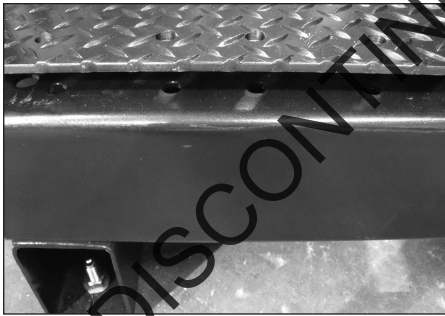
⚠ WARNING

- Handrails must be installed and the electrical cord/safety foot switch cord must be routed through the support base(s) to prevent tripping hazards.

Failure to follow this instruction could result in serious personal injury.

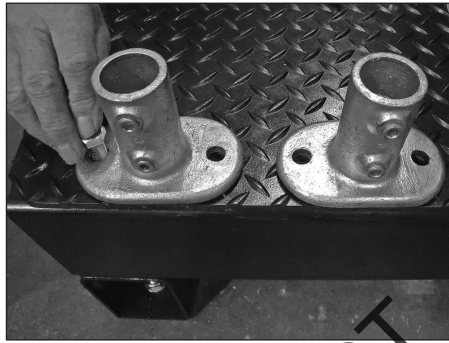


16. Route the safety foot switch cord up through the support base(s). Plug the safety foot switch cord into the receptacle on the side of the tool by aligning the pins/tab of the male adapter plug with the receptacle. Tighten the locking ring on the plug.



17. Install the platform onto the support base. Align the holes in the platform with the holes in the support base, as shown above. Repeat this step for the other side of the tool.

18. Locate the ½-inch x 1 ½-inch hex-head bolt, lock washer, and hex nut (supplied with the support base kit). This hardware is required for installation of the handrail bases.



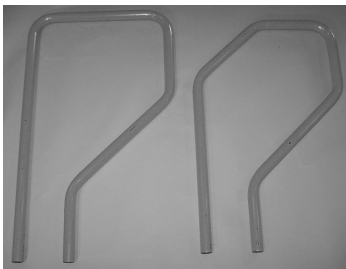
19. Install a handrail base onto the platform at the eight locations on the platform/tool support. Make sure the holes in the handrail bases align with the holes in the platform/support base and that the set screws on the handrail bases face away from the platform, as shown above.

19a. Install a hex-head bolt through the two holes in each handrail base and into the platform/tool support. Apply a lock washer and hex nut onto the end of each hex-head bolt.

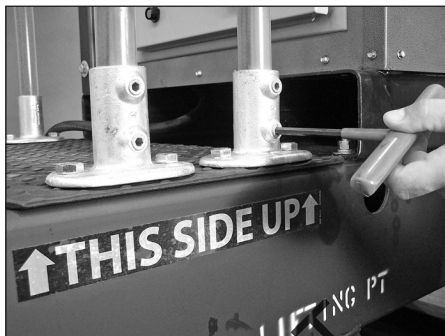


19b. Tighten the hex nut completely until the lock washer is compressed. Repeat this step for each handrail base location.

NOTICE



- The handrail, shown on the right side in the above picture, is modified to accommodate room for the motor.



19d. Tighten the two set screws on each handrail base to retain the handrails.

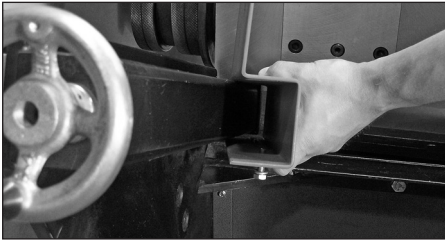


19c. Insert a handrail into each handrail base.
NOTE: The modified handrail must be installed at the motor, as shown above.



20. Install the left-side guard to the existing roll guard with the hex-head screws and lock washers provided.

20a. Secure the left-side guard to the handrail using the three cinch strap/socket button-head screw assemblies, lock washers, and hex nuts. Refer to the locations noted in the drawing on page 10.



21. Install the top guard for the stabilizer assembly, as shown above. Tighten the two hex-head screws to retain the top guard to the back of the stabilizer assembly.

22. Proceed to the "Power Requirements" section.



NOTE: Always use the handrails for support when climbing the support base(s).

NOTE: When attempting to relocate a tool that is installed on support base(s), refer to the "Tool Dimensions and Weights - With Support Bases" and "Lifting Requirements - With Support Bases" sections for additional information.

POWER REQUIREMENTS



DANGER



- **ONLY QUALIFIED ELECTRICIANS SHOULD CONNECT INCOMING POWER TO THE TOOL.**

- To reduce the risk of electric shock, check the electrical source for proper grounding.
- Always turn off the main power supply to the tool before making any tool adjustments or before performing any maintenance.
- **DO NOT** alter the plug in any way.

Failure to follow these instructions could result in death or serious personal injury.

The VE872 is designed to operate on a 220/440-volt, 3-phase, 60-Hz power supply. The tools are shipped with the wiring set for 220-volt operation, unless specified otherwise on the order. To re-wire the VE872 for 440-volt, 60-Hz service, the following conversions must be made. Refer to the electrical schematic in the RP-VE872 Repair Parts List and the information contained on the nameplate on the tool's drive motor and hydraulic pump motor.

Conversions to 440-volt, 60-Hz Service Include:

1. Motor Connections
2. Fuse Changes
3. Thermal Overload Unit Changes
4. Transformer Connections


The circuit protection required for 220-volt operation is 45 amps. For 440-volt operation, 25-amp circuit protection is required. All VE872 components are grounded to the frame of the tool. Make sure the frame is properly grounded.

For other voltages and frequencies, contact Victaulic. **NOTE:** Operation with certain voltages (i.e. 380/400 volt, 3-phase, 50/60 Hz service) requires different motors and other electrical parts. Contact Victaulic for information regarding operation of a tool with an alternate voltage.

POWER HOOKUP AND VERIFICATION OF PIPE ROTATION DIRECTION

Each VE872 Roll Grooving Tool is provided with a label inside the main electrical enclosure, which identifies voltage ratings, etc. for the tool (refer to example below). Reference must be made to this label to ensure proper tool setup.

MODEL



victaulic

FORM 1000

SERIAL NUMBER

DRIVE MOTOR

VOLTS
208/230
440/460
380/400

PHASE

1
3

HERTZ

50
60
50/60

FULL-LOAD CURRENT

	AMPS AT 230 VOLTS	AMPS AT 460 VOLTS	AMPS AT 380 VOLTS

HYDRAULIC MOTOR

VOLTS	PHASE	HERTZ	FULL-LOAD CURRENT
208/230	1	50	AMPS AT 230 VOLTS
440/460	3	60	AMPS AT 460 VOLTS
380/400		50/60	AMPS AT 380 VOLTS

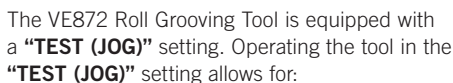
• GEAR OIL – AGMA 7

• HYDRAULIC OIL – HIGH-PRESSURE, ANTI-WEAR ISO GRADE 32

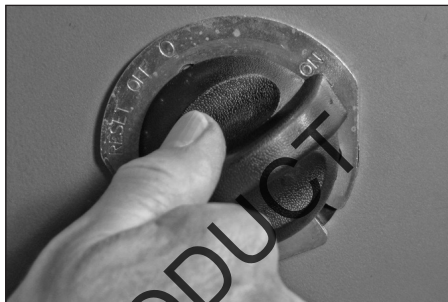
• BEARING – ANTI-WEAR, EXTREME PRESSURE, N-G GRADE #2

Electrical Assembly
Directional Division

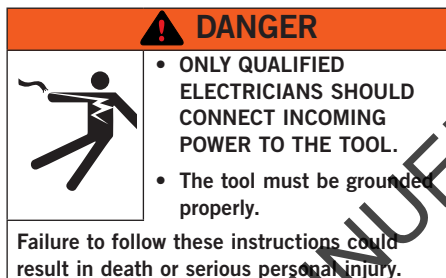
FORM 1000



- Determining rotation of the tool's lower roll
- Confirming that the pipe to be grooved is tracking properly on the lower roll



4. Turn the main power switch on the side of the tool to the “ON” position.



The VE872 Roll Grooving Tool is supplied with a 3/4-inch nominal conduit opening for wiring incoming power. The conduit opening is located at the back of the tool near the main electrical enclosure.

Incoming electrical connections must be made inside the main electrical enclosure. The incoming three-phase power must be connected at the top of the main circuit breaker at the upper-right side within the main electrical enclosure.

1. Make the ground connection inside the main electrical enclosure.
2. Make 3-phase electrical connections to the circuit breaker of the tool.
3. After the power is connected properly, the tool must be checked for proper rotational direction.



5. Pull the emergency **“STOP”** knob on the control panel and the electrical enclosure to the out position.



6. Place the selector switch on the control panel to the “TEST (JOG)” mode and momentarily depress the “HYDRAULIC PUMP START” button to energize the lower roll. Observe lower roll rotational direction. Release the “HYDRAULIC PUMP START” button to de-energize the lower roll. **NOTE:** The safety foot switch does not need to be depressed while the tool is in the “TEST (JOG)” mode.

7. Proper rotation of the lower roll is **CLOCKWISE** when viewed from the front of the tool. If rotation is clockwise, power hookup is complete.

WARNING

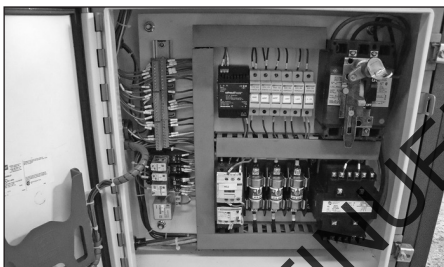
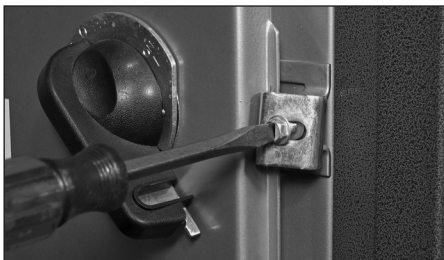
- Always turn off the main power supply to the tool before making any tool adjustments.

Failure to follow this instruction could result in serious personal injury.

8. If rotation of the lower roll is counter-clockwise, turn the main power switch on the side of the tool to the “OFF” position and proceed with the following steps.



9. Turn off the main power supply to the tool (main circuit breaker panel, knife switch, etc.). Lock the switch in the “OFF” position to prevent accidental engagement. **NOTE:** Victaulic does not supply this lockout mechanism.



10. Open the main enclosure by loosening the screw on the two brackets of the main enclosure. Push in the lever at the bottom of the handle while turning clockwise to open the main enclosure.

11. Reverse any of the two incoming lines at the top of the main circuit breaker (located at the upper-right side within the enclosure).

12. Close the main enclosure and re-tighten the screw on the two brackets.

13. Turn on the main power supply to the tool (main circuit breaker panel, knife switch, etc.).

14. Follow steps 4 - 7 to check the rotational direction of the lower roll. If rotational direction is not clockwise, contact Victaulic. If rotational direction is clockwise, the power hookup procedure is complete.

PREPARING PIPE FOR GROOVING

CAUTION

- For maximum grooving roll life, remove foreign material and loose rust from the interior and exterior surfaces of the pipe ends. Rust is an abrasive material that will wear the surface of grooving rolls.

Foreign material may interfere with or damage grooving rolls, resulting in distorted grooves and grooves that are out of Victaulic specifications.

For proper tool operation and production of grooves that are within Victaulic specifications, the following pipe preparation steps must be followed.

Victaulic recommends square-cut pipe for use with grooved-end pipe products. Square-cut pipe **MUST** be used with Victaulic FlushSeal® and EndSeal® gaskets. For 12-inch/323.9-mm and smaller pipe sizes, beveled-end pipe may be used with Victaulic standard and Vic-Flange gaskets, provided that the wall thickness is standard wall (ANSI B36.10) or less and that the bevel meets ANSI B16.25 (37½°) or ASTM A-53 (30°). **NOTE:** Roll grooving beveled-end pipe may result in unacceptable pipe flare. Beveled carbon steel pipe in 14 - 72-inch/355.6 - 1829-mm sizes is acceptable with Victaulic Advanced Grooving System (AGS) standard or FlushSeal gaskets, including AGS Vic-Flanges.

1. For 12-inch/323.9-mm and smaller pipe sizes, raised internal and external weld beads and seams must be ground flush with the pipe surface 2 inches/50 mm back from the pipe ends.

1a. For 14 - 38-inch/355.6 - 965-mm pipe sizes, raised internal and external weld beads and seams must be ground flush with the pipe surface 4 inches/100 mm back from the pipe ends.

1b. For 40 - 72-inch/1016 - 1829-mm pipe sizes, raised internal and external weld beads and seams must be ground flush with the pipe surface 4½ inches/115 mm back from the pipe ends.

2. The inside diameter of the pipe end must be cleaned to remove coarse scale, dirt, and other foreign material that might interfere with or damage grooving rolls. The front edge of the pipe end shall be uniform with no concave/convex surface features that will cause improper grooving roll tracking and result in difficulties during coupling assembly.

PIPE LENGTH REQUIREMENTS

VE872 tools are capable of grooving short pipe lengths without the use of a pipe stand. Table 1 identifies the minimum pipe lengths that can be grooved safely by using Victaulic Grooving Tools. In addition, this table identifies the maximum pipe lengths that can be grooved without the use of a pipe stand. Refer to the “Grooving Short Pipe Lengths” section for instructions on how to groove short pipe lengths. **NOTE:** Grooved pipe nipples, shorter than those listed in Table 1, are available from Victaulic.

Pipe lengths, longer than those listed in Table 1 (and up to 20 feet/6 meters), must be supported with a pipe stand. Pipe lengths, from 20 feet/6 meters up to double-random lengths (approximately 40 feet/12 meters), must be supported with two pipe stands. Refer to the “Long Pipe Lengths” section for instructions on how to groove long pipe lengths.

If pipe is required that is shorter than the minimum length listed in Table 1, shorten the next-to-last piece so that the last piece is as long (or longer) than the minimum length specified.

EXAMPLE: A 20-foot, 4-inch/6.2-m length of 10-inch diameter carbon steel pipe is required to finish a section, and only 20-foot/6.1-m lengths are available. Instead of roll grooving a 20-foot/6.1-m length of carbon steel pipe and a 4-inch/102-mm length of carbon steel pipe, follow these steps:

1. Refer to Table 1, and note that for 10-inch diameter carbon steel pipe, the minimum length that should be roll grooved is 10 inches/255 mm.
2. Roll groove a 19-foot, 6-inch/5.9-m length of pipe and a 10-inch/255-mm length of pipe. Refer to the “Long Pipe Lengths” section.

TABLE 1- PIPE LENGTHS SUITABLE FOR GROOVING

Carbon Steel Pipe Size		Length – inches/mm	
Nominal Pipe Size inches or mm	Actual Pipe Outside Diameter inches/mm	Minimum	Maximum
203.2 mm	8.000 203.2	10 255	24 610
216.3 mm	8.516 216.3	10 255	24 610
8	8.625 219.1	10 255	24 610
254.0 mm	10.000 254.0	10 255	20 510
267.4 mm	10.528 267.4	10 255	20 510
10	10.750 273.0	10 255	20 510
304.8 mm	12.000 304.8	12 305	18 460
318.5 mm	12.539 318.5	12 305	18 460
12	12.750 323.9	12 305	18 460
14 OD	14.000 355.6	12 305	16 410
377 mm	14.843 377	12 305	16 410
15 OD	15.000 381	12 305	16 410
16 OD	16.000 406.4	12 305	16 410
426 mm	16.772 426	12 305	16 410
18 OD	18.000 457	NOTE: Always use a pipe stand when roll grooving pipe in these sizes. DO NOT roll groove pipe lengths shorter than 18 inches/ 460 mm in these sizes.	
480 mm	18.89 480		
20 OD	20.000 508		
530 mm	20.866 530		
22 OD	22.000 559		
24 OD	24.000 610		
650 mm	25.591 650		
26 OD	26.000 660		
28 OD	28.000 711		

Carbon Steel Pipe Size		Length – inches/mm	
Nominal Pipe Size inches or mm	Actual Pipe Outside Diameter inches/mm	Minimum	Maximum
30 OD	30.000 762	NOTE: Always use a pipe stand when roll grooving pipe in these sizes. DO NOT roll groove pipe lengths shorter than 18 inches/ 460 mm in these sizes.	
32 OD	32.000 813		
36 OD	36.000 914		
38 OD	38.000 965		
40 OD	40.000 1016		
42 OD	42.000 1067		
44 OD	44.000 1118		
46 OD	46.000 1168		
48 OD	48.000 1219		
50 OD	52.000 1321		
54 OD	54.000 1372		
56 OD	56.000 1422		
60 OD	60.000 1524		
72 OD	72.000 1829		

CHECKING AND ADJUSTING THE TOOL PRIOR TO GROOVING

Every Victaulic roll grooving tool is checked, adjusted, and tested at the factory prior to shipment. However, before attempting to operate the tool, the following checks and adjustments should be made to ensure proper tool operation.

WARNING

- Always turn off the main power supply to the tool before making any tool adjustments.

Failure to follow this instruction could result in serious personal injury.

GROOVING ROLLS

Make sure the proper roll set is installed on the tool for the pipe size and material that will be grooved. Roll sets are marked with the pipe size, part number, and they are color coded for the pipe material. Refer to the applicable “Tool Rating and Roll Selection” section. If the proper rolls are not installed on the tool, refer to the “Roll Changing” section.

CAUTION

- Make sure the lower-roll retaining bolt is tight and that the upper shaft is locked in position.

A loose lower-roll retaining bolt or upper shaft could cause damage to the tool and rolls.

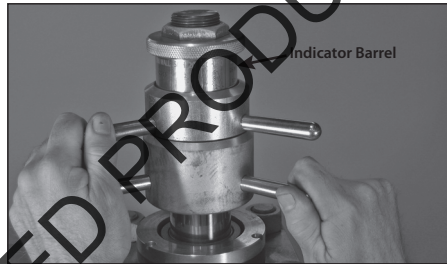
ADJUSTING THE ROLL GUARDS

CAUTION

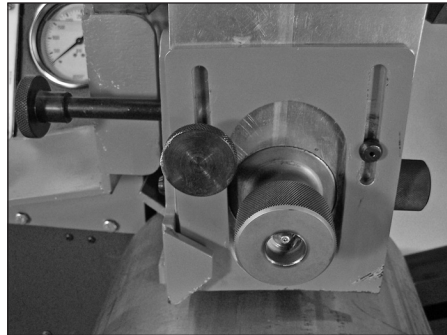
- The “Adjusting the Roll Guards” section must be completed with every roll change.

Failure to adjust the roll guards properly could result in personal injury.

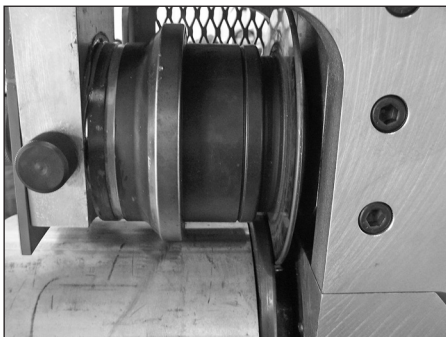
The VE872 tool features a “SET GUARD” control switch setting. With the correct pipe size and schedule inserted in the tool, the “SET GUARD” setting allows the operator to complete the necessary guard adjustments.



1. Retract the depth adjusters to allow for full travel of the hydraulic cylinder.



2. Loosen the knob on the front of the roll guards to raise the plate to its highest position. Tighten the knob.



2a. Insert a length of pipe that is the correct size and schedule over the lower roll. Make sure the pipe end contacts the lower-roll backstop flange. The pipe must rest directly on top of the roll and must not be skewed to one side or the other.



3. Place the selector switch on the control panel to the **"SET GUARD"** mode. Depress the safety foot switch to place the tool's hydraulic system under pressure. Movement of the tool's ram/slide/upper roll will occur. The hydraulic pump will shut off automatically when the upper roll contacts the pipe and an increase in hydraulic system pressure (as little as 75 - 100-psi pressure) occurs. Release the safety foot switch. The ram assembly will remain down. If hydraulic pressure is not established, the ram will return to the neutral position as the safety foot switch is released.



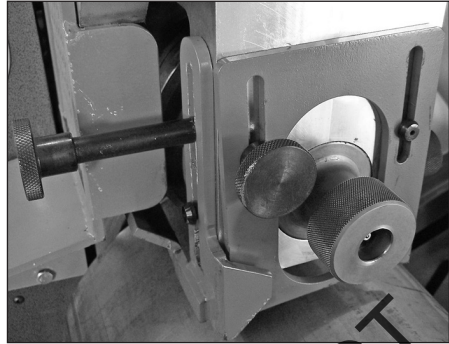
4. Prior to making tool guard adjustments, push down (in) on the emergency **"STOP"** knob on the control panel. The upper roll will continue to remain seated against the pipe.

WARNING

- The roll guards must be spaced properly by using the appropriate guard setting pad.

Failure to follow this instruction could result in serious personal injury.

5. Two guard setting pads are included with the tool. For 12-inch/323.9-mm and smaller pipe sizes, use the 1/4-inch/6.4-mm thick guard setting pad. For 14-inch/355.6-mm and larger pipe being grooved with AGS roll sets, use the 3/8-inch/9.5-mm thick guard setting pad containing a **"FOR AGS ONLY"** label.

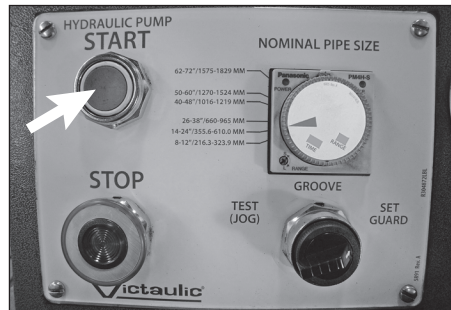


8. Remove the guard setting pad from the pipe. Store the guard setting pad in a safe location.



6. Hold the correct guard setting pad firmly against the pipe and push it under the roll guards. Loosen the knob on the front of the roll guards to drop the plate onto the guard setting pad. Tighten the knob.

9. When tool guard adjustments are complete, pull the emergency **"STOP"** knob on the control panel to the out position.



7. Loosen the knob on the left side of the roll guard to drop the side sliding guard onto the guard setting pad. Tighten the knob.

10. Depress and release the **"HYDRAULIC PUMP START"** button. The tool's hydraulic pump motor will energize and the tool's ram shaft will retract to the neutral position.

11. The guard setting procedure is complete.

PIPE STABILIZER ADJUSTMENT

⚠ WARNING

- Always turn off the main power supply to the tool before making any tool adjustments.
- DO NOT reach over pipe while making adjustments.
- DO NOT make adjustments while the tool/pipe is in operation/motion.

Failure to follow these instructions could result in serious personal injury.

The pipe stabilizer for the VE872 is designed to prevent pipe sway of short and long pipe lengths. When the stabilizer is adjusted for a selected pipe size and wall thickness, it does not require further adjustment unless pipe of a different size and wall thickness will be grooved. Pipe of the same size and wall thickness can be moved in and out of the tool without retracting the stabilizer.



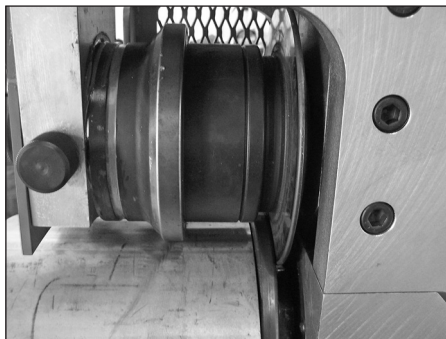
1. Make sure the proper roll set is installed on the tool for the pipe size and material to be grooved. Rolls are marked with the pipe size, part number, and they are color-coded according to the pipe material. Refer to the applicable "Tool Rating and Roll Selection" section.



2. Loosen the stabilizer locking handle.



2a. Using the stabilizer handwheel, retract the stabilizer roller to clear the pipe when it is inserted onto the lower roll.

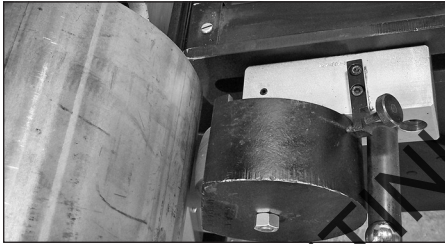


3. Insert a length of pipe that is the correct size and schedule over the lower roll. Make sure the pipe end contacts the lower-roll backstop flange. The pipe must rest directly on top of the roll and must not be skewed to one side or the other.

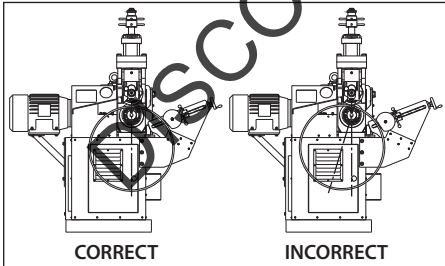
CAUTION

- **DO NOT** adjust the stabilizer roller to push the pipe to the left and off center from the rolls. Increased pipe-end flare and shortened roll life will result if the pipe is pushed to the left and off center.
- **DO NOT** reach across the pipe to make pipe stabilizer adjustments.
- **DO NOT** adjust the pipe stabilizer while the pipe is in motion.
- **Assembly of couplings on pipe that exceeds the maximum allowable flare dimension may prevent proper pad-to-pad assembly of coupling housings and gasket distortion/damage.**

Failure to prepare pipe in accordance with all instructions may cause joint failure, resulting in personal injury and/or property damage.



4. Using the stabilizer handwheel, adjust the stabilizer roller toward the pipe.



NOTE: DO NOT adjust the stabilizer roller too far inward, since it will skew the pipe to the left and off center, resulting in excessive pipe-end flare. Refer to the drawing above for proper positioning.



5. Loosen the roller guard's set knob to position the roller guard so that the opening faces the pipe directly. Make sure the guard does not rub the pipe. Tighten the roller guard's set knob.



6. Tighten the stabilizer locking handle.

7. Complete all adjustments and groove the pipe. Refer to the "Grooving Operation" section. Observe the stabilizer roller while grooving. It should remain in contact with the pipe, and the pipe should rotate smoothly without swaying from side to side. If the pipe is not rotating smoothly or is swaying from side to side, discontinue grooving and adjust the stabilizer roller. Continue the grooving operation and make further adjustments, as necessary.

RAM SPEED ADJUSTMENT

The ram speed adjustment is factory set for roll grooving carbon steel pipe. When grooving a pipe material other than carbon steel pipe, the ram speed may need to be re-adjusted.

1. Locate the key, which is inserted into the ram speed control valve at the factory.



2. Turn the key to unlock the ram speed control valve.
3. With the key inserted into the ram speed control valve, rotate the knob until it “locks in.” Adjust the ram speed control valve to the proper setting, as indicated in the table below.

Pipe Material	Ram Speed Control Valve Setting
Carbon Steel	2.5

Scale: 1.0 = Slow, 10.0 = Fast

4. After the ram speed is set, unlock the ram speed control valve and remove the key. Store the key in a safe location on the tool.

NOTICE

- The ram speed affects only the rate at which the upper roll forms the groove. It does not affect the rate at which the upper roll advances to contact the pipe, nor does it affect the rate at which the roll retracts from the pipe at the completion of a groove.
- Ram speed during the formation of a groove can have a significant effect on pipe flare. The settings listed in the table on this page will produce grooves within Victaulic specifications in most situations. However, if excessive flare results at these settings, reduce the setting to correct the condition. For example, adjust the ram-speed control valve to 1.5 or 2.0 for carbon steel pipe when flare is excessive at the 2.5 setting.

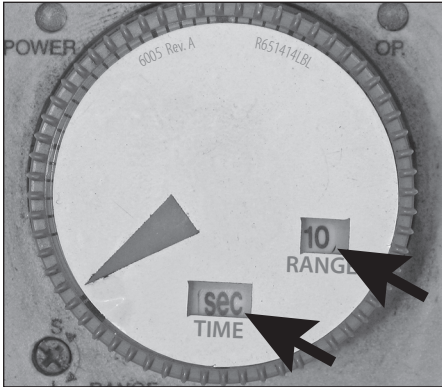
DWELL CONTROL ADJUSTMENT

The dwell control adjustment controls the length of time the tool continues to rotate the pipe after the groove diameter stop contacts the top of the hydraulic cylinder. The dwell control timer is adjustable for time range and pipe size settings.

When adjusted to the proper pipe size, the pipe will rotate a minimum of one revolution after the groove diameter stop contacts the hydraulic cylinder. This ensures that the groove in the pipe will be of uniform depth around the entire pipe circumference.

TIME RANGE ADJUSTMENT

The time range setting will set the operating parameters of the timer.

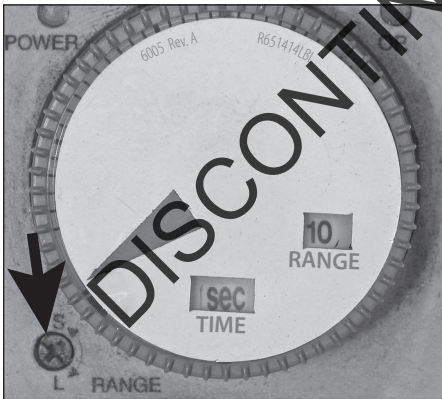


1. To adjust the time range setting, rotate the timer dial counterclockwise completely until the range settings are visible on the dial.

CAUTION

- Use only a #0 Phillips-head screwdriver to adjust the range screw.

Failure to follow this instruction may damage the screw head.



2. If necessary, rotate the time range screw, located in the lower left-hand corner of the timer, to the desired range shown on the dial face. **NOTE:** VE872 tools are factory set in the “SEC-10” position. Use only a #0 Phillips

head screwdriver to adjust the range screw. Use of any tools other than a #0 Phillips-head screwdriver may damage the screw head.

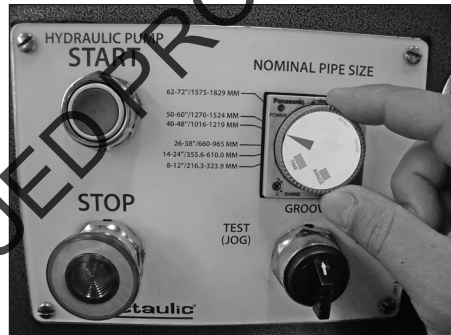
- For 8 – 38-inch/219.1 – 965-mm pipe sizes, set the timer range to “SEC-10”
- For 40 – 72-inch/1016 – 1829-mm pipe sizes, set the timer range to “SEC-50”

CAUTION

- The timing range must be set properly for the pipe size being grooved.

Failure to follow this instruction could cause excessive or insufficient dwell, resulting in improper groove diameters and grooves that are not uniform in depth.

PIPE SIZE ADJUSTMENT



1. Rotate the timer dial to the appropriate pipe size.
 - For 8 – 38-inch/219.1 – 965-mm pipe sizes, make sure the timer range is set to “SEC-10.”
 - For 40 – 72-inch/1016 – 1829-mm pipe sizes, make sure the timer range is set to “SEC-50.”

GROOVE DIAMETER STOP ADJUSTMENTS

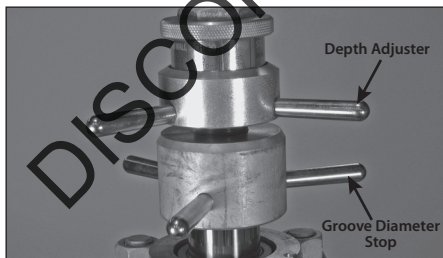
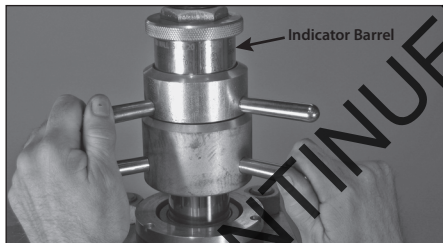
The groove diameter stop must be adjusted for each pipe size or change in wall thickness. The groove diameter, which is identified as the “C” dimension, is listed under the “Roll Groove Specifications” section. In addition, a label affixed to the tool lists the “C” dimensions.

NOTICE

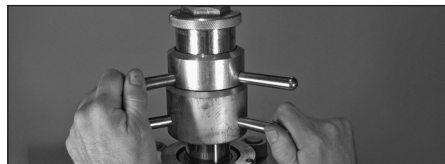
- To perform the following adjustments, use several short, scrap sections of pipe that are the proper material, diameter, and thickness to be grooved. Make sure the scrap sections meet the length requirements listed in Table 1.

To achieve the proper diameter:

1. Determine the diameter and thickness of the pipe to be grooved.
2. Locate the proper diameter and thickness on the pipe size indicator label of the depth stop. The pipe size indicator barrel can be rotated for ease of viewing.



3. Unlock the groove diameter stop (clockwise) from the depth adjuster. Align the top edge of the depth adjuster with the lowest line position of the proper size and schedule markings on the indicator barrel. Hold the depth adjuster to prevent it from turning.

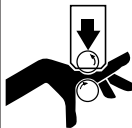


4. Turn the groove diameter stop counter-clockwise to lock the depth adjuster in position.

NOTICE

- Rotating the depth adjusters while locked will cause premature thread wear of the depth adjusters and cylinder ram.
- The markings provide an approximate groove diameter adjustment and are not exact groove diameter settings. Variations in pipe OD and wall thickness make it impossible to calibrate the groove diameter stop exactly.
- Set the initial adjustment shallow (at bottom edge of mark), groove a sample piece of pipe, then make the final adjustment.

WARNING



Grooving rolls can crush or cut fingers and hands.

- Always turn off the main power supply to the tool before making any tool adjustments.
- Loading/unloading pipe will place your hands close to the rollers. Keep hands away from the grooving rolls and the roller on the pipe stabilizer during operation.
- Never reach inside the pipe ends or across the tool or pipe during operation.
- Always groove pipe in a **CLOCKWISE** direction.
- Never groove pipe that is shorter than the recommended lengths listed in this manual.
- Never wear loose clothing, loose gloves, or anything that can become entangled in moving parts.

5. Prepare a trial groove. Refer to the “Grooving Operation” section.

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REV_C

NOTICE

- Occasionally during grooving, the groove diameter stop may move up and down slightly, making contact and then breaking contact with the hydraulic cylinder. This is normal for pipe that has a noticeable weld seam or hard spot.



6. After a trial groove is prepared and the pipe is removed from the tool, check the groove diameter ("C" dimension) carefully. Refer to the "Roll Groove Specifications" section. A standard pipe tape, supplied with the tool, is the best method for checking the "C" dimension. In addition, a vernier caliper or narrow-land micrometer can be used to check this dimension at two locations (90° apart) within the groove. The average reading must be within the required groove diameter specification.

CAUTION

- The "C" dimension (groove diameter) must conform to Victaulic specifications to ensure proper joint performance.

Failure to follow this instruction could cause joint failure, resulting in personal injury and/or property damage.

7. If the groove diameter ("C" dimension) is not within Victaulic specifications, the diameter stop must be adjusted.

7a. Unlock the depth adjusters.

7b. To adjust for a smaller groove diameter (deeper groove), loosen the groove diameter stop and turn the depth adjuster counter-clockwise (when viewed from above the tool). Turn the groove diameter stop counter-clockwise to lock the depth adjuster in this position.

7c. To adjust for a larger groove diameter (shallower groove), loosen the groove diameter stop and turn the depth adjuster clockwise (when viewed from above the tool). Turn the groove diameter stop counter-clockwise to lock the depth adjuster in this position.

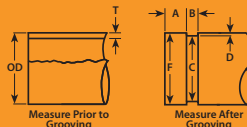
NOTE: A quarter turn either way will change the groove diameter by 0.042 inch/1.1 mm or 0.167 inch/4.2 mm per full turn.

8. Prepare another trial groove and check the groove diameter ("C" dimension), as described in previous steps. Repeat these steps, as necessary, until the groove diameter is within specification.

NOTICE

- Rotating the depth adjusters while locked will cause premature thread wear of the depth adjusters and cylinder ram.
- The design of the roll sets will provide the correct "A" and "B" dimensions. If the "A" and "B" dimensions are out of specification, ensure that the pipe is seated properly while grooving. In addition, ensure that the matching roll set is installed on the tool.
- A label is affixed to the tool, which outlines additional dimensional checks:

Pipe and groove features, noted below, must be measured to verify they are within current Victaulic specifications. Victaulic submittal publications can be downloaded at www.victaulic.com.



OD= Average Pipe Outside Diameter
T = Pipe Wall Thickness
A = Distance from Pipe End to Groove
B = Groove Width at Base of Groove
C = Average Diameter at Base of Groove
D = Groove Depth
F = Pipe-End Flare

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GROOVING SHORT PIPE LENGTHS

DANGER



- To reduce the risk of electric shock, check the tool for proper grounding and follow all instructions.
- Before operating the tool, review the “Operator Safety Instructions” section of this manual.

Failure to follow these instructions could result in death or serious personal injury.

CAUTION

- This tool must be used **ONLY** for roll grooving pipe designated in the applicable “Tool Rating and Roll Selection” section of this manual.

Failure to follow this instruction could overload the tool, resulting in reduced tool life and/or damage to the tool.

1. Before grooving, make sure all instructions in the previous sections of this manual have been followed.

2. Turn on the main power supply to the tool (main circuit breaker, panel, knife switch, etc.).



3. Turn the main power switch on the side of the tool to the “ON” position.



4. Make sure the selector switch on the control panel is set to the “GROOVE” position.

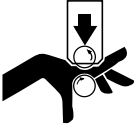


4a. Pull the emergency “STOP” knob on the control panel to the out position, and make sure the emergency “STOP” knob on the electrical enclosure is pulled to the out position.



5. Push the “HYDRAULIC PUMP START” button.

WARNING



Grooving rolls can crush or cut fingers and hands.

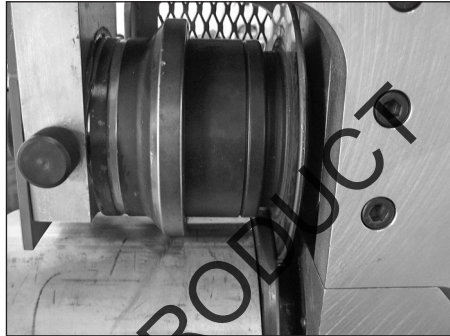
- Always turn off the main power supply to the tool before making any tool adjustments.

- Loading/unloading pipe will place your hands close to the rollers. Keep hands away from the grooving rolls and the roller on the pipe stabilizer during operation.
- Never reach inside the pipe ends or across the tool or pipe during operation.
- Always groove pipe in a CLOCKWISE direction.
- Never groove pipe that is shorter than the recommended lengths listed in this manual.
- Never wear loose clothing, loose gloves, or anything that can become entangled in moving parts.

CAUTION

- Pipe must be supported manually before and after the grooving cycle.

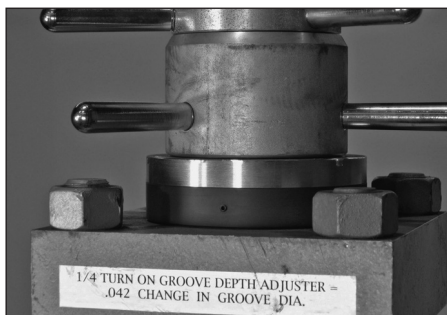
Failure to follow this instruction could result in personal injury.



6. Insert a length of pipe that is the correct size, material, and thickness onto the lower roll. Make sure the pipe end contacts the lower-roll backstop flange completely. While manually supporting the pipe, depress and hold down the safety foot switch. The upper roll will advance and contact the pipe. Remove hands from the pipe.

NOTICE

- Occasionally during grooving, the groove diameter stop may move up and down slightly, making contact and then breaking contact with the hydraulic cylinder. This is normal for pipe that has a noticeable weld seam or hard spot.



7. As grooving continues, the groove diameter stop will move down and contact the hydraulic cylinder. This contact activates the dwell timer, which allows the pipe to rotate one to three more revolutions to ensure groove completion (refer to the “Dwell Control Adjustment” section).

7a. The upper roll will retract automatically and will release the pipe.

7b. Release the safety foot switch, and withdraw foot from the switch.

8. Inspect the groove/pipe end to ensure they are within Victaulic specifications.

9. If roll grooving will not be performed for an extended time period, turn off the hydraulic system by pushing down (in) either the emergency “STOP” knob on the control panel or the electrical enclosure.

NOTICE

- The groove diameter must be within specification for the diameter and wall thickness of pipe. The groove diameter should be checked and adjusted, as necessary, to ensure grooves remain within specification.

GROOVING LONG PIPE LENGTHS

DANGER



- To reduce the risk of electric shock, check the tool for proper grounding and follow all instructions.
- Before operating the tool, review the “Operator Safety Instructions” section of this manual.

Failure to follow these instructions could result in death or serious personal injury.

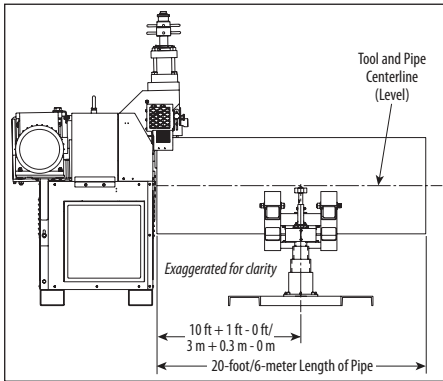
CAUTION

- For long pipe lengths, make sure the pipe stand is positioned properly to minimize pipe end flare.
- DO NOT install couplings on pipe that exceeds the maximum allowable flare.
- This tool must be used ONLY for roll grooving pipe designated in the applicable “Tool Rating and Roll Selection” section of this manual.
- Always refer to the applicable “Roll Groove Specifications” table for details.

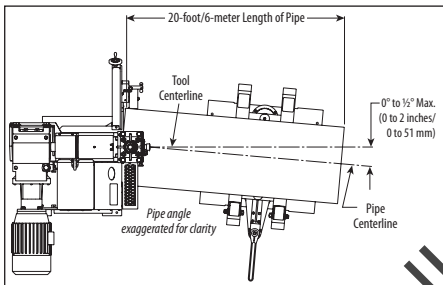
Failure to follow these instructions could cause product failure, resulting in property damage.

When roll grooving pipe that exceeds the maximum length shown in Table 1, a roller-type pipe stand must be used. The roller-type pipe stand must be capable of handling the weight of the pipe, while allowing the pipe to rotate freely.

1. Make sure the tool is level. Refer to the “Tool Setup” section for leveling requirements.



2. Place the pipe stand at a distance slightly beyond half the pipe length from the tool. Refer to the drawing above.



3. Position the pipe stand approximately 0 - 1/2 a degree to the left for the tracking angle. Refer to the drawing above. **NOTE:** When pipe flare is excessive, right-to-left tracking must be kept to a minimum. It may be necessary to use less than 1/2 a degree for the tracking angle.

4. If the tool is properly set up in a level position, but the back end of the pipe is higher than the end being grooved, the pipe may not track. In addition, excessive flare may occur on the pipe end. Refer to the "Tool Setup" section and the drawings above for tool setup and pipe positioning requirements.

5. Before grooving, make sure all instructions in the previous sections of this manual have been followed.

6. Turn on the main power supply to the tool (main circuit breaker panel, knife switch, etc.).



7. Turn the main power switch on the side of the tool to the "ON" position.



8. Pull the emergency "STOP" knob on the control panel and the electrical enclosure to the out position.

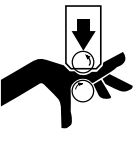


9. Make sure the selector switch on the control panel is set to the **"GROOVE"** position.



9a. Push the **"HYDRAULIC PUMP START"** button.

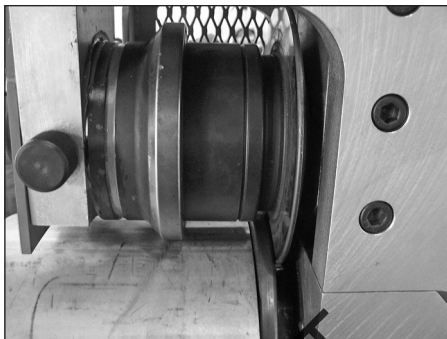
⚠ WARNING



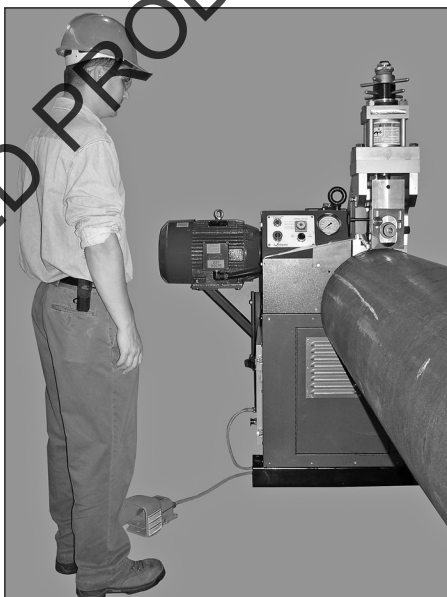
Grooving rolls can crush or cut fingers and hands.

- Always turn off the main power supply to the tool before making any tool adjustments.

- Loading/unloading pipe will place your hands close to the rollers. Keep hands away from the grooving rolls and the roller on the pipe stabilizer during operation.
- Never reach inside the pipe ends or across the tool or pipe during operation.
- Always groove pipe in a **CLOCKWISE** direction.
- Never groove pipe that is shorter than the recommended lengths listed in this manual.
- Never wear loose clothing, loose gloves, or anything that can become entangled in moving parts.



10. Insert a length of pipe that is the correct size, material, and thickness onto the lower roll. Make sure the pipe end contacts the lower-roll backstop flange completely. Remove hands from the pipe.



11. The operator should be positioned, as shown above.



12. To start the grooving operation, depress and hold down the safety foot switch. This will advance the upper roll into contact with the pipe. The lower roll will start rotating, and the groove will begin to form.

13. During the grooving operation, visually check the tracking of the pipe as it rotates. Make sure the pipe remains against the lower roll backstop flange. If the pipe does not stay in contact with the lower-roll backstop flange, stop the tool by releasing the safety foot switch, and withdraw foot from the switch. Make sure pipe is positioned properly (refer to the "Long Pipe Lengths" section). Repeat steps 10 - 12.



14. As grooving continues, the groove diameter stop will move down and contact the hydraulic cylinder. This contact activates the dwell timer, which allows the pipe to rotate one to three more revolutions to ensure groove completion

(refer to the "Dwell Control Adjustment" section). The tool will automatically release the pipe a few seconds later. Release the safety foot switch, and withdraw foot from switch.

15. Inspect the groove/pipe end to ensure they are within Victaulic specifications.

NOTICE

- Occasionally during grooving, the groove diameter stop may move up and down slightly, making contact and then breaking contact with the hydraulic cylinder. This is normal for pipe that has a noticeable weld seam or hard spot.
- Make sure short pipe lengths are properly supported.

16. If roll grooving will not be performed for an extended time period, turn off the hydraulic system by pushing down (in) either the emergency "STOP" knob on the control panel or the electrical enclosure.

NOTICE

- If the pipe remains lodged on the lower roll:
Jogging the lower roll will free the pipe. **DO NOT** attempt to pull the pipe out of the rolls while "jogging" the lower roll. Pull the emergency "STOP" knob on the control panel and the electrical enclosure to the out position, depress the "Hydraulic Pump Start" button, then push down (in) on the emergency "STOP" knob on the control panel and the electrical enclosure to "jog" the lower roll.
- The groove diameter must be within specification for the diameter and wall thickness of pipe. The groove diameter should be checked and adjusted, as necessary, to ensure grooves remain within specification.

ROLL CHANGING

VE872 roll grooving tools are designed with rolls to accommodate several pipe sizes and materials, which eliminates the need for frequent roll changes.

When a different pipe size or material is required for grooving, the upper and lower rolls must be changed. For proper roll selection, refer to the "Tool Rating and Roll Selection" section.

NOTICE

- **Upper and lower rolls are matched components and must not be intermixed.**

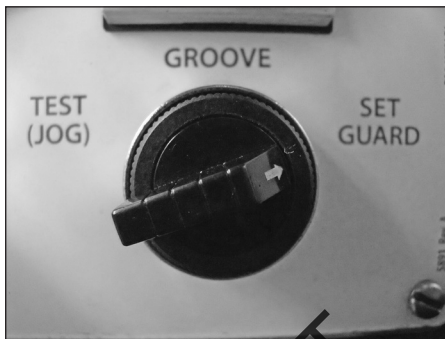
1. Turn on the main power supply to the tool (main circuit breaker panel, knife switch, etc.).



2. Turn the main power switch on the side of the tool to the "ON" position.



3. Pull the emergency "STOP" knob on the control panel and the electrical enclosure to the out position.



4. Place the selector switch on the control panel to the "SET GUARD" mode.



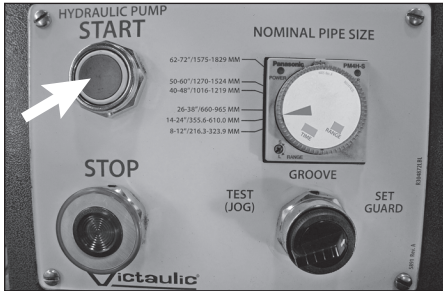
5. Push the "HYDRAULIC PUMP START" button.



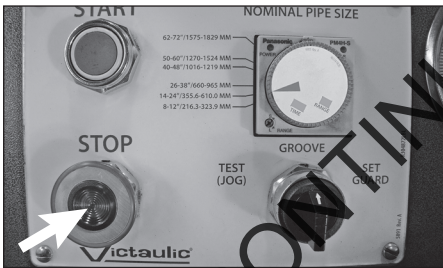
6. Depress the safety foot switch. When the groove diameter stop contacts the hydraulic cylinder, the hydraulic pump will shut off. Release the safety foot switch, and withdraw foot from switch.



7. Remove the slide spacer by snapping it out of the tool head, as shown above.



8. Push the **"HYDRAULIC PUMP START"** button to retract (raise) the slide.

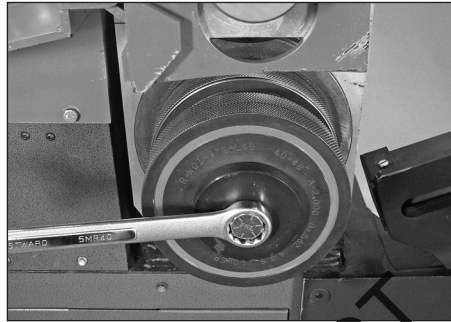


9. After the slide is retracted (raised) completely, push down (in) on the emergency **"STOP"** knob on the control panel.



10. Turn the main power switch on the side of the tool to the **"OFF"** position.

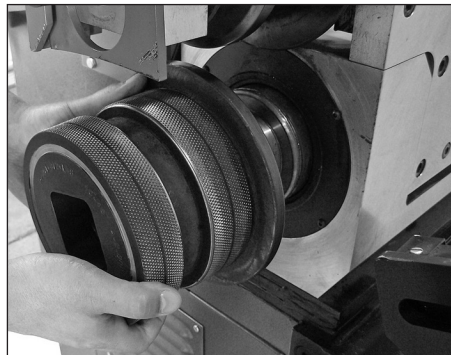
LOWER ROLL REMOVAL



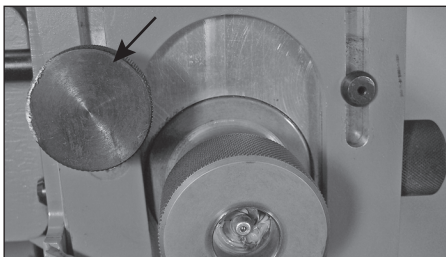
1. Using an appropriate wrench, loosen the lower-roll retaining bolt.



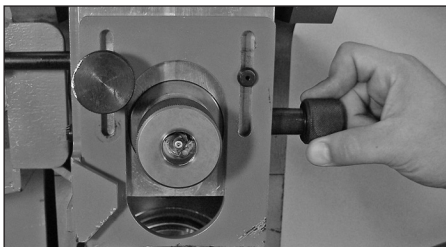
2. Remove the lower-roll retaining bolt and the lower-roll washer.



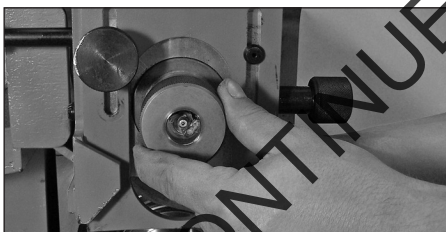
3. Remove the lower roll by pulling it off the main shaft. Store the lower roll inside the tool cabinet. If the lower roll cannot be removed by hand, use a conventional gear puller.

UPPER ROLL REMOVAL

1. Adjust the front roll guard, if necessary, to uncover the upper shaft completely.



2. Pull the upper shaft locking pin out of the slide until it stops.



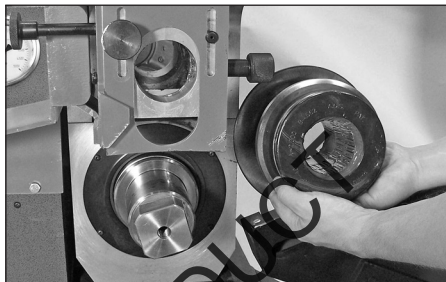
3. While supporting the upper roll, remove the upper shaft from the upper roll/slide by pulling it straight out.



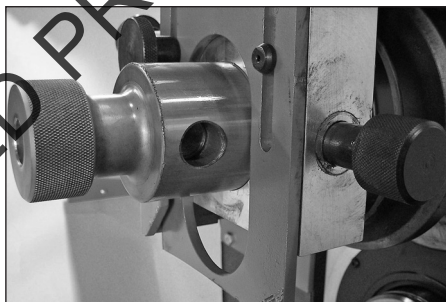
3a. Remove the upper roll. Store the upper roll inside the tool cabinet.

UPPER ROLL INSTALLATION

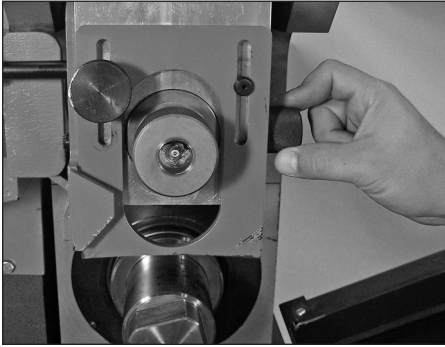
1. Prior to installation, clean the upper shaft and the upper roll to remove any dirt and scale. Inspect the bearing in the upper roll for proper lubrication and condition. If damage is present, replace any affected components.



2. Install the proper upper roll behind the slide, as shown above. Make sure the markings on the upper roll are facing forward.



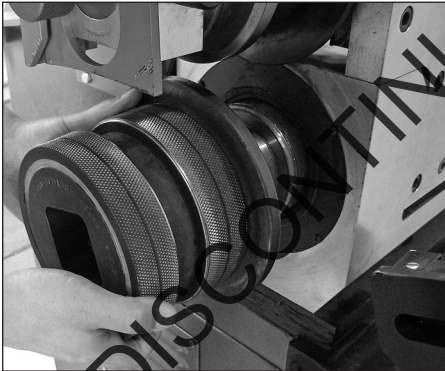
3. While supporting the upper roll, insert the upper shaft into the slide and upper roll. Align the hole in the upper shaft with the locking pin on the side of the slide.



Push the upper shaft locking pin into the slide/upper shaft until it stops. **NOTE:** Hole orientation lines are marked on the front of the upper shaft.

LOWER ROLL INSTALLATION

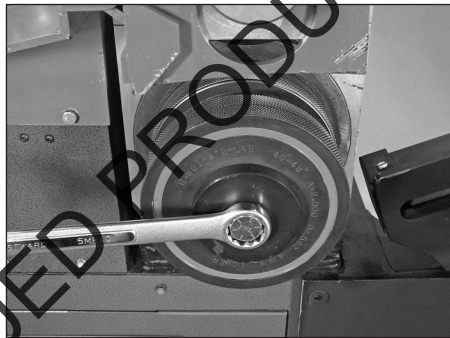
1. Prior to installation, clean the main shaft and the lower roll to remove any dirt and scale.
2. To aid in removing the lower roll at a later time, a dry graphite spray or anti-seize lubricant can be applied to the main shaft before the lower roll is installed.



3. Align the square end of the main shaft with the square hole in the lower roll. Push the lower roll completely onto the main shaft. Make sure the markings on the lower roll are facing out.



4. Install the lower-roll washer and lower roll retaining bolt.



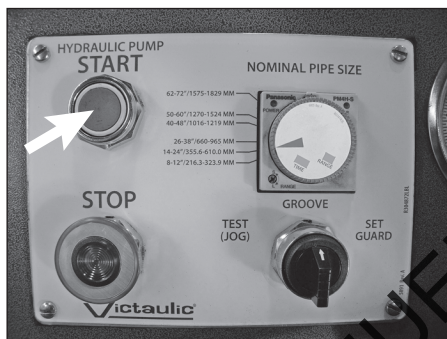
5. Tighten the lower-roll retaining bolt completely to secure the lower roll onto the main shaft.



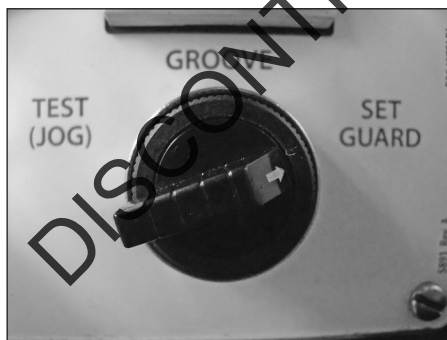
6. Turn the main power switch on the side of the tool to the "ON" position.



7. Pull the emergency **“STOP”** knob on the control panel to the out position.



8. Push the **“HYDRAULIC PUMP START”** button.

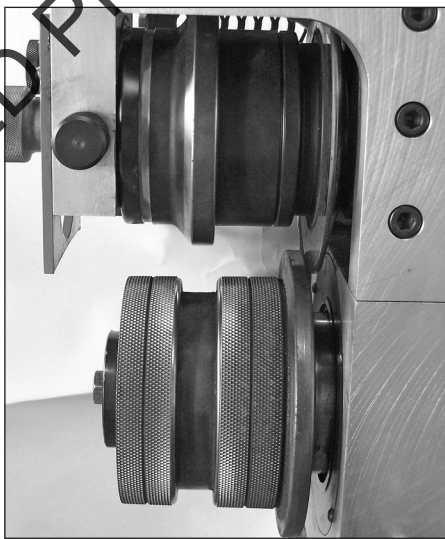


8a. Place the selector switch on the control panel to the **“SET GUARD”** mode. Depress and hold the safety foot switch. The upper roll and slide will start to move downward.

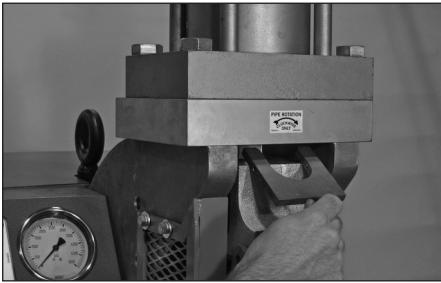
CAUTION

- The upper roll is free floating. Ensure the upper roll is positioned toward the back of the upper shaft.

Failure to follow this instruction could result in damage to the flange of the upper and lower rolls.



9. After the upper roll/slide has advanced approximately 1 inch/25 mm and the rolls are aligned and engaged, push down (in) on the emergency **“STOP”** knob on the control panel.



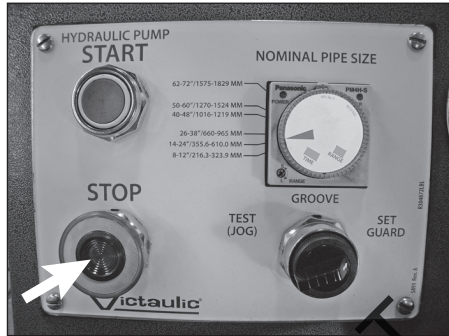
10. Snap the slide spacer into the tool, as shown above.



11. Pull the emergency **"STOP"** knob on the control panel to the out position.



12. Push the **"HYDRAULIC PUMP START"** button to fully retract (raise) the slide.



13. After the slide has retracted (raised) completely, push down (in) on the emergency **"STOP"** knob on the control panel.



14. Grease the upper shaft bearings by applying grease through the lubrication fitting on the front of the upper shaft. Refer to the applicable "Recommended Lubricants" table for the proper grease.

15. Roll set installation is now complete. Before grooving, make sure all instructions in the previous sections of this manual have been followed (i.e. adjusting the roll guards, adjusting the groove diameter stop, etc.).

MAINTENANCE



DANGER



- Always turn off the main power supply to the tool before making any tool adjustments or before performing any maintenance.

Failure to follow this instruction could result in death or serious personal injury.

This section provides information about keeping tools in proper operating condition and guidance for making repairs when it becomes necessary. Preventive maintenance during operation will pay for itself in repair and operating savings.

Replacement parts must be ordered from Victaulic to ensure proper and safe operation of the tool.

LUBRICATION

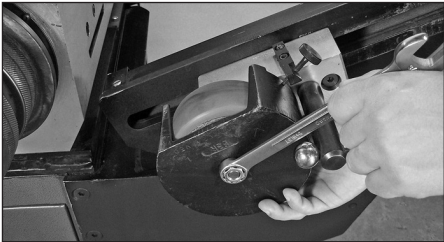
1. After every 8 hours of operation, lubricate the tool. Always lubricate the upper roll bearings when rolls are changed.



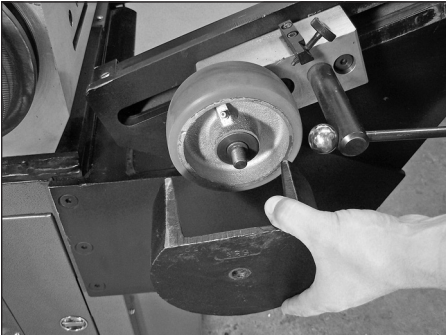
2. Grease the upper shaft bearings every time roll changes are made and after every 8 hours of operation. A grease fitting is provided on the front of the upper shaft. Refer to the applicable "Recommended Lubricants" table for the proper grease.



3. Grease the slide gibs and main shaft bearings through the grease fittings located on the back of the slide.



4b. Replace the stabilizer roller guard and stabilizer-roller-guard wing nut.



4. Remove the stabilizer-roller-guard nut and stabilizer roller guard.

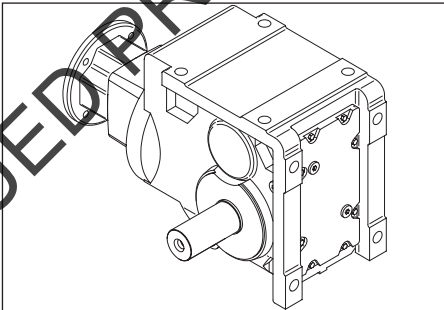


4a. Grease the stabilizer roller.

CHECKING AND FILLING GEAR REDUCER OIL

The gear reducer oil level must be checked semi-annually or every 3,000 hours of operation. If leakage is present, repairs must be made to correct the leak.

- 1. Remove the oil level plug from the gear reducer (refer to drawing below). The oil level should be even with the bottom of the hole.



	Breather Valve
	Oil Level Plug
	Oil Drain Plug

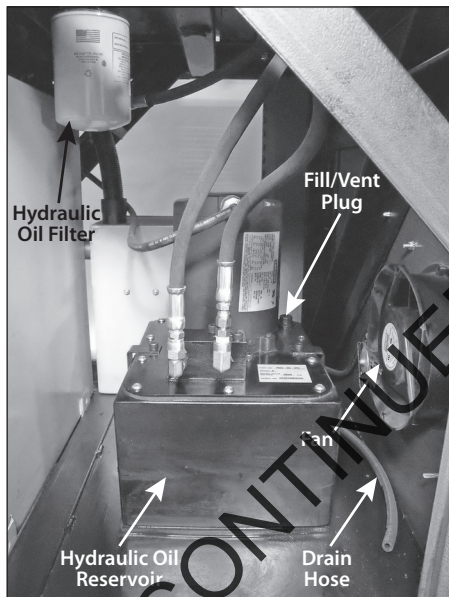
- 2. To add oil, remove the plug from the top of the gear reducer and fill to the proper level (refer to drawing above). Refer to the card attached to the gear reducer for the proper lubricant.
- 3. Re-install the plug(s).

CHECKING AND FILLING HYDRAULIC OIL

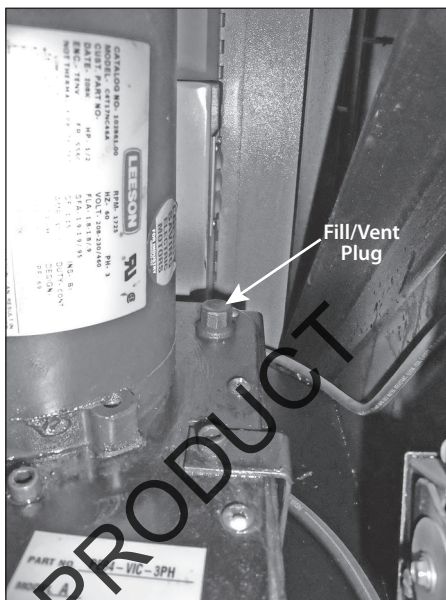
1. Check the hydraulic oil level on a monthly basis. The level should be 1 – 2 inches/25 – 50 mm below the top of the tank. DO NOT overfill the tank, since the oil may overflow due to thermal expansion. Refer to the applicable “Recommended Lubricants” table for the proper hydraulic oil.

REPLACING HYDRAULIC OIL AND FILTER

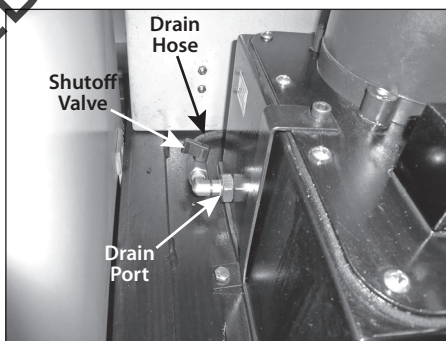
Replace the hydraulic oil and hydraulic oil filter annually or every 2000 hours of operation, whichever comes first.



1. Open the storage compartment on the front of the tool cabinet to gain access to the hydraulic oil reservoir and hydraulic oil filter, as shown above.



2. Remove the fill/vent plug from the top of the hydraulic oil reservoir.



3. Place the end of the drain hose into a container large enough to hold 2 gallons/8 liters of oil.

3a. Open the shutoff valve on the side of the hydraulic oil reservoir to drain the hydraulic oil.

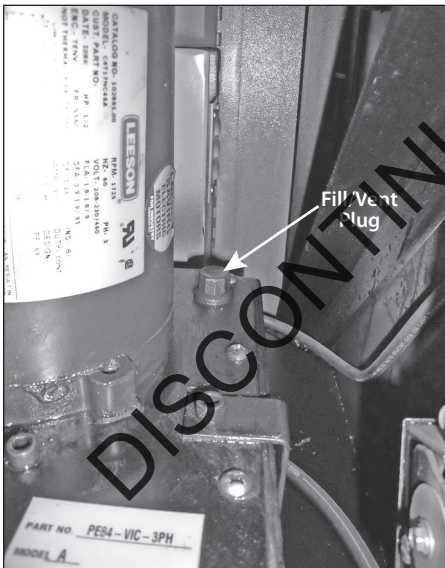
3b. When all hydraulic oil is drained from the hydraulic oil reservoir, close the shutoff valve.



4. Place a tray under the hydraulic oil filter. Remove the hydraulic oil filter.

4a. Lubricate the new hydraulic oil filter gasket (shown above) with new hydraulic oil. Fill the filter with new hydraulic oil. Install the new filter hand-tight.

5. Fill the hydraulic oil reservoir through the fill/vent plug with new hydraulic oil. The level should be 1 – 2 inches/25 – 50 mm below the top of the tank. Refer to the applicable "Recommended Lubricants" table.



6. Re-install the fill/vent plug into the top of the hydraulic oil reservoir.

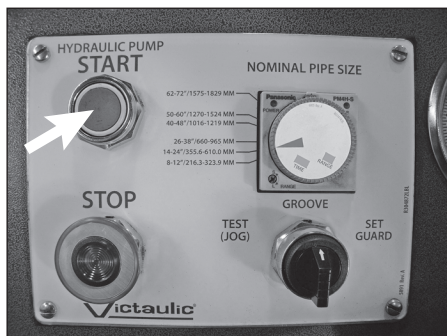
7. Turn on the main power supply to the tool (main circuit breaker panel, knife switch, etc.).



8. Turn the main power switch on the side of the tool to the "ON" position.



9. Pull the emergency "STOP" knob on the control panel and the electrical enclosure to the out position.



10. Push the **"HYDRAULIC PUMP START"** button. Allow the hydraulic pump to run for 3–5 minutes.

10a. Inspect the hydraulic system for leaks.

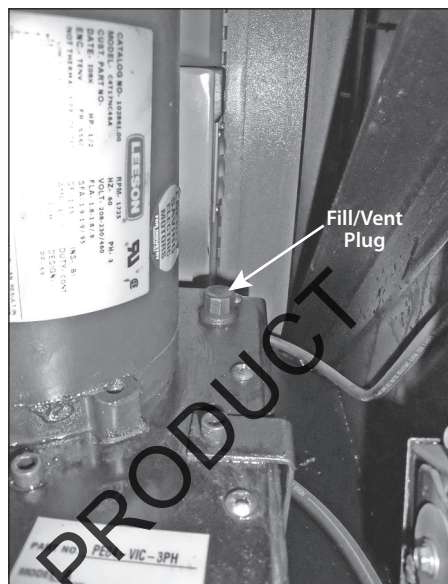


11. Turn off the hydraulic system by pushing down (in) on the emergency **"STOP"** knob on the control panel.

12. Check the hydraulic oil level. Add oil, as necessary.

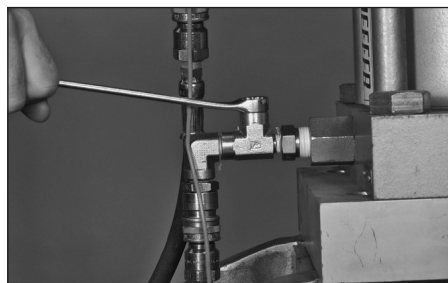
13. Follow the "Air Bleeding" section.

AIR BLEEDING

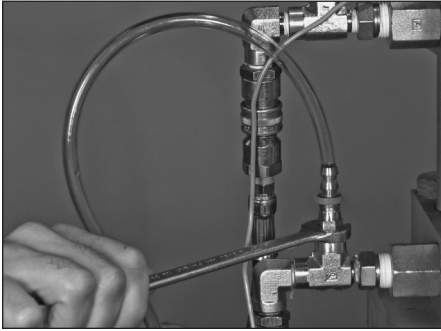


1. Remove the fill/vent plug from the hydraulic tank.

1a. Add new hydraulic oil to the hydraulic oil reservoir through the fill/vent plug, if necessary. The level should be 1 – 2 inches/25 – 50 mm below the top of the tank. Refer to the applicable "Recommended Lubricants" table.



2. Remove the plug from the tee at the bottom of the hydraulic cylinder port.



3. Install the bleeder tube into the tee, as shown above. Insert the other end of the bleeder tube into the fill/vent hole in the hydraulic tank.

NOTE: The bleeder tube consists of a 1/4-inch NPT barb hose fitting and 4 feet/1.2 m of 1/4-inch ID clear vinyl hose (supplied with the tool).

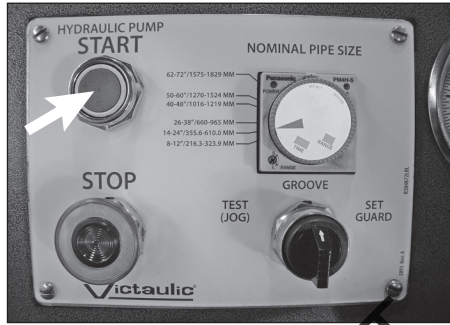
4. Turn on the main power supply to the tool (main circuit breaker panel, knife switch, etc.).



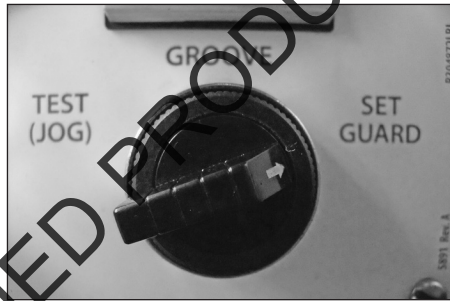
5. Turn the main power switch on the side of the tool to the **"ON"** position.



6. Pull the emergency **"STOP"** knob on the control panel to the out position.



7. Push the **"HYDRAULIC PUMP START"** button. Hydraulic oil will start flowing from the tee through the bleeder tube and into the tank.



a. Place the selector switch on the control panel to the **"SET GUARD"** mode.

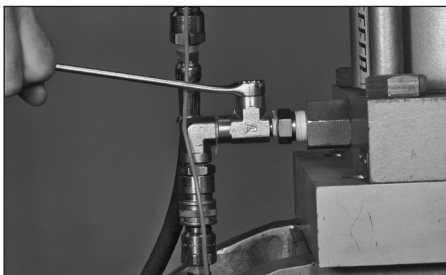
8. Depress the safety foot switch, hold it down for 5 seconds, and release it for 5 seconds. Repeat this step until no air bubbles can be seen through the clear vinyl tube.



9. Push down (in) on the emergency **"STOP"** knob on the control panel.

NOTICE

- To prevent oil from flowing out of the tee while removing the bleeder tube and installing the plug: Block the groove diameter stop from moving down by inserting a piece of wood between the groove diameter stop and the top of the hydraulic cylinder.



10. Remove the bleeder tube, and install the plug into the tee. **DO NOT ALLOW AIR TO GET BACK INTO THE TEE WHEN INSTALLING THE PLUG (REFER TO NOTICE BELOW).**

NOTICE

- To prevent air from entering the tee while the bleeder tube is removed and the plug is installed: Hold the 4-way valve in the “shifted” position by pressing in on the rubber boot on the end of the valve. Keep the rubber boot depressed until the plug is installed and tightened.

11. Repeat steps 4 – 11 for bleeding air from the tee at the top of the hydraulic cylinder port.
 12. Bring the hydraulic oil level up to 1 – 2 inches/25 – 50 mm from the top of the tank. Refer to the applicable “Recommended Lubricants” table for the proper hydraulic oil.

RECOMMENDED LUBRICANTS

BEARING AND SLIDE GREASE – NLGI #2 SUMMER GRADE GRAPHITE MOLY BASE (General Purpose EP Lithium Base Grease)

Manufacturer	Product
BP Amoco	Energrease LC-EP2
Gulf Oil Corp.	Gulfcrown Grease EP#2
Lubriplate	No. 630-2
Mobil Oil Corp.	Mobilux EP2
Pennzoil Products Co.	Pennlith EP 712 Lube
Shell Oil Co.	Alvania EP2
Sun Refining	Sun-Prestige 742 EP
Texaco Inc.	Multifak EP2

GEAR OIL

Refer to the tag located on the gear reducer

HYDRAULIC OIL

(High Pressure, Anti-Wear/Anti-Foam Hydraulic Oil ISO Grade 32)

Manufacturer	Product
BP Amoco	Energol HLP-HM32
Gulf Oil Corp.	Harmony 32 AW
Kendall Refining Co.	Kenol R&O AW-32
Lubriplate	HO-o
Mobil Oil Corp.	Mobil DTE 24
Pennzoil Products Co.	Pennzbell AW32
Shell Oil Co.	Tellus 32
Sun Refining	Surviv 832
Texaco Inc.	Rando

PARTS ORDERING INFORMATION

When ordering parts, the following information is required for Victaulic to process the order and send the correct part(s). Request the RP-VE872 Repair Parts List for detailed parts listings.

- Tool Model Number – VE872
- Tool Series Number – The serial number can be found on the side of the tool on the nameplate
- Quantity, Part Number, and Description
- Where to Send the Part(s) – Company name and address
- To Whose Attention to Send the Part(s)
- Purchase Order Number
- Billing Address

Parts can be ordered by calling 1-800-PICK VIC.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
Pipe will not stay in grooving rolls.	Incorrect pipe positioning of long pipe length.	Refer to the "Long Pipe Lengths" section.
	Lower roll and pipe are not rotating clockwise.	Refer to the "Power Hookup and Verification of Pipe Rotation Direction" section.
Pipe stops rotating during the grooving operation.	Rust or dirt buildup is present on the lower roll.	Remove rust or dirt accumulation from the lower roll with a stiff wire brush.
	Rust or dirt is excessively heavy inside the pipe end.	Remove heavy rust and dirt from inside the pipe end.
	Worn grooving rolls.	Inspect the lower roll for worn knurls. Replace the lower roll if excessive wear is present.
	The circuit breaker has tripped or a fuse has blown out on the electrical circuit that supplies the tool.	Reset the breaker, or replace the fuse.
While grooving, loud squeaks echo through the pipe.	Incorrect pipe support positioning of a long pipe length. Pipe is "over-tracking."	Move the pipe support to the right. Refer to the "Long Pipe Lengths" section.
	Pipe is not cut square.	Cut the pipe end squarely.
	Pipe is rubbing excessively on the lower-roll backstop flange.	Remove the pipe from the tool, and apply a light coating of bandsaw blade wax to the face of the pipe end.
	Ram speed is set too low.	Refer to the "Ram Speed Adjustment" section.
	Tool bearings are not lubricated.	Refer to the "Maintenance" and "Lubrication" sections.
During grooving, loud thumps or bangs occur approximately once every revolution of the pipe.	Pipe has a pronounced weld seam.	For 12-inch/323.9-mm and smaller pipe sizes, raised internal and external weld beads and seams must be ground flush with the pipe surface 2 inches/50 mm back from the pipe ends. For 14 - 38-inch/355.6 - 965-mm pipe sizes, raised internal and external weld beads and seams must be ground flush with the pipe surface 4 inches/100 mm back from the pipe ends. For 40 - 72-inch/1016 - 1829-mm pipe sizes, raised internal and external weld beads and seams must be ground flush with the pipe surface 4 1/2 inches/115 mm back from the pipe ends.
Pipe flare is excessive.	Pipe support is adjusted too high for long pipe.	Refer to the "Long Pipe Lengths" section.
	Tool is tilted forward (out of level) while grooving long pipe.	Refer to the applicable "Tool Setup" section.
	Incorrect pipe support positioning of long pipe. Pipe is "over-tracking."	Move the pipe support to the right. Refer to the "Long Pipe Lengths" section.
	Pipe stabilizer is adjusted too far inward.	Back off the pipe stabilizer to the furthest point where it still stabilizes the pipe effectively.
	Ram speed is not set correctly.	Refer to the "Ram Speed Adjustment" section.
Larger diameter pipe sways or vibrates from side to side.	Incorrect pipe stabilizer adjustment.	Move the pipe stabilizer in or out until the pipe rotates smoothly.

TROUBLESHOOTING (CONTINUED)

PROBLEM	POSSIBLE CAUSE	SOLUTION
Tool will not groove the pipe.	Air is present in the hydraulic system.	Refer to the "Air Bleeding" section.
	Pipe is beyond the wall thickness or pipe yield strength capacity of the tool.	Refer to the applicable "Tool Rating and Roll Selection" section.
Pipe groove diameters do not meet Victaulic specifications.	Groove diameter stop is not adjusted properly.	Refer to the "Groove Diameter Stop Adjustments" section.
	Pipe is beyond the wall thickness or pipe yield strength capacity of the tool.	Refer to the applicable "Tool Rating and Roll Selection" section.
	Incorrect upper roll, lower roll, or both installed on the tool	Install the correct rolls. Refer to the applicable "Tool Rating and Roll Selection" section.
The "A" Gasket Seat or "B" Groove Width dimensions do not meet Victaulic specifications.	Upper roll bearing is not lubricated adequately.	Refer to the "Maintenance" section.
	Incorrect upper roll, lower roll, or both installed on the tool	Install the correct rolls. Refer to the applicable "Tool Rating and Roll Selection" section.
	Pipe not inserted fully onto the lower roll, or pipe is not tracking properly.	Make sure pipe is against the lower-roll backstop flange. Refer to the "Long Pipe Lengths" section for proper pipe stand positioning.

TOOL RATING AND ROLL SELECTION

ORIGINAL GROOVE SYSTEM (OGS) FOR CARBON STEEL PIPE - COLOR CODED BLACK

Pipe Size		Dimensions Inches/millimeters		Original Groove System Type
Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Carbon Steel Pipe Wall Thickness		Roll Part Numbers
		Minimum	Maximum	
8	8.625	0.109	0.375	Lower Roll R9Q1872L12 Upper Roll R9Q1872A12 Roll Set R9Q1872012
	219.1	2.8	9.5	
10	10.750	0.134	0.375	
	273.0	3.4	9.5	
12	12.750	0.156	0.375	Lower Roll # R9Q1872L38 Upper Roll R9Q1872U38 Roll Set R9Q1872038
	324.9	4.0	9.5	
26 OD	26.000	0.250	0.375	
	660	6.4	9.5	
28 OD	28.000	0.250	0.375	Lower Roll # R9Q1872L48 Upper Roll R9Q1872U48 Roll Set R9Q1872048
	711	6.4	9.5	
30 OD	30.000	0.250	0.375	
	762	6.4	9.5	
32 OD	32.000	0.250	0.375	Lower Roll # R9Q1872L58 Upper Roll R9Q1872U58 Roll Set R9Q1872058
	813	6.4	9.5	
36 OD	36.000	0.250	0.375	
	914	6.4	9.5	
38 OD	38.000	0.250	0.375	Lower Roll # R9Q1872L68 Upper Roll R9Q1872U68 Roll Set R9Q1872068
	965	6.4	9.5	
40 OD	40.000	0.250	0.375	
	1016	6.4	9.5	
42 OD	42.000	0.250	0.375	Lower Roll # R9Q1872L78 Upper Roll R9Q1872U78 Roll Set R9Q1872078
	1067	6.4	9.5	
44 OD	44.000	0.250	0.375	
	1118	6.4	9.5	
46 OD	46.000	0.250	0.375	Lower Roll # R9Q1872L88 Upper Roll R9Q1872U88 Roll Set R9Q1872088
	1168	6.4	9.5	
48 OD	48.000	0.250	0.375	
	1219	6.4	9.5	

The wall thicknesses listed are nominal minimum and maximum.

In addition, the following pipe sizes may be roll grooved: 203.2 mm; 216.3 mm; 254.0 mm; 267.4 mm; 304.8 mm; and 318.5 mm. Contact Victaulic for details.

Special order - not a stocked item

RW ROLLS FOR GROOVING LIGHT-WALL, STANDARD-WEIGHT, AND EXTRA-STRONG (XS) CARBON STEEL PIPE TO ADVANCED GROOVE SYSTEM (AGS) SPECIFICATIONS - COLOR CODED BLACK WITH YELLOW BAND

Pipe Size		Dimensions inches/millimeters		RW
Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Carbon Steel Pipe Wall Thickness		Roll Part Numbers for Carbon Steel Pipe
		Minimum	Maximum	
14 OD	14.000 355.6	0.220 5.6	0.500 12.7	Lower Roll RWQ1872L24 Upper Roll RWQ1872A24 Roll Set RWQ1872024
16 OD	16.000 406.4	0.220 5.6	0.500 12.7	
18 OD	18.000 457	0.220 5.6	0.500 12.7	
20 OD	20.000 508	0.220 5.6	0.500 12.7	
22 OD	22.000 559	0.220 5.6	0.500 12.7	
24 OD	24.000 610	0.220 5.6	0.500 12.7	
26 OD	26.000 660	0.220 5.6	0.500 12.7	Lower Roll RWQ1872L38 Upper Roll RWQ1872A38 Roll Set RWQ1872038
28 OD	28.000 711	0.220 5.6	0.500 12.7	
30 OD	30.000 762	0.220 5.6	0.500 12.7	
32 OD	32.000 813	0.220 5.6	0.500 12.7	
34 OD	34.000 864	0.220 5.6	0.500 12.7	
36 OD	36.000 914	0.220 5.6	0.500 12.7	
38 OD	38.000 965	0.220 5.6	0.500 12.7	Lower Roll RWQ1872L48 Upper Roll RWQ1872A48 Roll Set RWQ1872048
40 OD	40.000 1016	0.220 5.6	0.500 12.7	
42 OD	42.000 1067	0.220 5.6	0.500 12.7	
44 OD	44.000 1118	0.220 5.6	0.500 12.7	
46 OD	46.000 1168	0.220 5.6	0.500 12.7	
48 OD	48.000 1219	0.220 5.6	0.500 12.7	

Table and notes continue on the following page

RW ROLLS FOR GROOVING LIGHT-WALL, STANDARD-WEIGHT, AND EXTRA-STRONG (XS)
CARBON STEEL PIPE TO ADVANCED GROOVE SYSTEM (AGS) SPECIFICATIONS -
COLOR CODED BLACK WITH YELLOW BAND (CONTINUED)

Pipe Size		Dimensions inches/millimeters		RW
Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Carbon Steel Pipe Wall Thickness		Roll Part Numbers for Carbon Steel Pipe
		Minimum	Maximum	
50 OD	50.000 1270	0.220 5.6	0.500 12.7	Lower Roll RWQ1872L72 Upper Roll RWQ1872A72 Roll Set RWQ1872072
54 OD	54.000 1372	0.220 5.6	0.500 12.7	
56 OD	56.000 1422	0.220 5.6	0.500 12.7	
60 OD	60.000 1524	0.220 5.6	0.500 12.7	
62 OD	62.000 1575	0.220 5.6	0.500 12.7	
72 OD	72.000 1829	0.220 5.6	0.500 12.7	

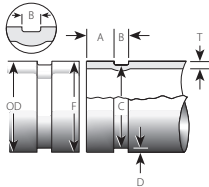
The wall thicknesses listed are nominal minimum and maximum

EXPLANATION OF CRITICAL ROLL GROOVE DIMENSIONS FOR ORIGINAL GROOVE SYSTEM (OGS) PRODUCTS

⚠ WARNING

- Pipe dimensions and groove dimensions must be within the tolerances specified in the tables on the following pages to ensure proper joint performance.

Failure to follow these specifications could cause joint failure, resulting in serious personal injury and/or property damage.



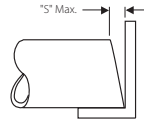
Standard Roll Groove

Illustration is exaggerated for clarity

Pipe Outside Diameter – Nominal NPS Pipe Size (ANSI B36.10) and Basic Metric Pipe Size (ISO 4200) – The average pipe outside diameter must not vary from the specifications listed in the tables on the following pages. Maximum allowable pipe ovality shall comply with the requirements of ASTM A-999 and API 5L. Greater variations between the major and minor diameters will result in difficult coupling assembly.

For NPS pipe, the maximum allowable tolerance from square-cut pipe ends is:

1/16 inch/1.6 mm for 8 – 24-inch/219.1 – 610-mm sizes and 3/32 inch/2.4 mm for 26-inch/660-mm and larger sizes. This is measured from the true square line.



Any internal and external weld beads or seams must be ground flush to the pipe surface. The inside diameter of the pipe end must be cleaned to remove coarse scale, dirt, and other foreign material that might interfere with or damage grooving rolls. The front edge of the pipe end shall be uniform with no concave/convex surface features that will cause improper grooving roll tracking and result in difficulties during coupling assembly.

“A” Dimension – The “A” dimension, or the distance from the pipe end to the groove, identifies the gasket seating area. This area must be free from indentations, projections (including weld seams), and roll marks from the pipe end to the groove to ensure a leak-tight seal. All foreign material, such as loose paint, scale, oil, grease, chips, rust, and dirt must be removed.

“B” Dimension – The “B” dimension, or groove width, controls expansion, contraction, and angular deflection of flexible couplings by the distance it is located from the pipe and its width in relation to the coupling housings’ “key” width. The bottom of the groove must be free of all foreign material, such as dirt, chips, rust, and scale that may interfere with proper coupling assembly.

“C” Dimension – The “C” dimension is the average diameter at the base of the groove. This dimension must be within the diameter’s tolerance and concentric with the OD for proper coupling fit. The groove must be of uniform depth for the entire pipe circumference.

EXPLANATION OF CRITICAL ROLL GROOVE DIMENSIONS
FOR ORIGINAL GROOVE SYSTEM (OGS) PRODUCTS (CONTINUED)

“D” Dimension – The “D” dimension is the normal depth of the groove and is a reference for a “trial groove” only. Variations in pipe OD affect this dimension and must be altered, if necessary, to keep the “C” dimension within tolerance. The groove diameter must conform to the “C” dimension described above.

“F” Dimension – Maximum allowable pipe-end flare diameter is measured at the extreme pipe-end diameter. **NOTE:** This applies to average (pi tape) and single-point readings.

“T” Dimension – The “T” dimension is the lightest grade (minimum nominal wall thickness) of pipe that is suitable for cut or roll grooving. Pipe that is less than the minimum nominal wall thickness for cut grooving may be suitable for roll grooving or adapted for Victaulic couplings by using Vic-Ring® Adapters. Vic-Ring Adapters can be used in the following situations (contact Victaulic for details):

- When pipe is less than the minimum nominal wall thickness suitable for roll grooving
- When pipe outside diameter is too large to roll or cut groove
- When pipe is used in abrasive services

NOTICE
<ul style="list-style-type: none">• Coatings that are applied to the interior surfaces of Victaulic grooved and plain-end pipe couplings must not exceed 0.010 inch/0.25 mm. This includes the bolt pad mating surfaces.• In addition, the coating thickness applied to the gasket-sealing surface and within the groove on the pipe exterior must not exceed 0.010 inch/0.25 mm.

Original Groove System (OGS) Roll Grooving Specifications for Carbon Steel Pipe

Size		Dimensions – inches/millimeters											Max. Allow. Flare Dia.
		Pipe Outside Diameter		Gasket Seat “A”		Groove Width “B”			Groove Diameter “C”		Groove Depth “D” (ref.)	Min. Allow. Wall Thick. “T”	
Nominal Size inches or mm	Actual Pipe Outside Diameter inches/mm	Max.	Min.	Basic	Max.	Min.	Basic	Max.	Min.	Max.			
203.2mm	8.000 203.2	8.063 204.8	7.937 202.4	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	7.791 198.5	0.092 2.4	0.109 2.8	8.17 207.5
216.3mm	8.515 216.3	8.578 217.9	8.438 215.6	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	8.331 211.6	0.092 2.4	0.109 2.8	8.69 220.7
8	8.625 219.1	8.688 220.7	8.547 218.3	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	8.441 214.4	0.092 2.4	0.109 2.8	8.80 223.5
254.0mm	10.000 254.0	10.063 255.6	9.937 253.2	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	9.785 248.5	0.094 2.4	0.134 3.4	10.17 258.3
267.4mm	10.528 267.4	10.591 269.0	10.457 266.6	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	10.340 262.6	0.094 2.4	0.134 3.4	10.70 271.8
10	10.750 273.0	10.813 274.7	10.687 272.3	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	10.562 268.3	0.094 2.4	0.134 3.4	10.92 277.4
304.8mm	12.000 304.8	12.063 306.4	11.937 304.0	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	11.751 299.2	0.109 2.8	0.156 4.0	12.17 309.1
318.5mm	12.539 318.5	12.602 320.1	12.463 317.7	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	12.321 313.0	0.109 2.8	0.156 4.0	12.71 322.8
12	12.750 323.9	12.813 325.5	12.687 323.1	0.750 19.1	0.781 19.8	0.719 18.3	0.469 11.9	0.500 12.7	0.438 11.1	12.531 317.5	0.109 2.8	0.156 4.0	12.92 328.2
26 OD	26.000 660	26.093 662.8	25.969 659.6	1.750 44.5	1.781 45.2	1.687 42.8	0.625 15.9	0.656 16.7	0.594 15.1	25.000 647.7	0.250 6.4	0.250 6.4	26.20 665.5
28 OD	28.000 711	28.093 713.6	27.969 710.4	1.750 44.5	1.781 45.2	1.687 42.8	0.625 15.9	0.656 16.7	0.594 15.1	27.500 698.5	0.250 6.4	0.250 6.4	28.20 716.3
30 OD	30.000 762	30.093 764.4	29.969 761.2	1.750 44.5	1.781 45.2	1.687 42.8	0.625 15.9	0.656 16.7	0.594 15.1	29.500 749.3	0.250 6.4	0.250 6.4	30.20 767.1
32 OD	32.000 813	32.093 815.2	31.969 812.0	1.750 44.5	1.781 45.2	1.687 42.8	0.625 15.9	0.656 16.7	0.594 15.1	31.500 798.5	0.250 6.4	0.250 6.4	32.20 817.9
36 OD	36.000 914	36.093 916.8	35.969 913.6	1.750 44.5	1.781 45.2	1.687 42.8	0.625 15.9	0.656 16.7	0.594 15.1	35.500 900.1	0.250 6.4	0.250 6.4	36.20 919.5
42 OD	42.000 1067	42.093 1069.2	41.969 1066.0	2.000 50.8	2.031 51.6	1.937 49.2	0.625 15.9	0.656 16.7	0.594 15.1	41.500 1054.5	0.250 6.4	0.250 6.4	42.20 1071.9
48 OD	48.000 1219	48.093 1221.6	47.969 1218.4	2.000 50.8	2.031 51.6	1.937 49.2	0.625 15.9	0.656 16.7	0.594 15.1	47.500 1206.5	0.250 6.4	0.250 6.4	48.20 1224.3

EXPLANATION OF CRITICAL ADVANCED GROOVE SYSTEM (AGS) ROLL GROOVE DIMENSIONS

WARNING

- Pipe dimensions and groove dimensions must be within the tolerances specified in the tables on the following pages to ensure proper joint performance.

Failure to follow these specifications could cause joint failure, resulting in serious personal injury and/or property damage.

NOTICE

- Grooving pipe to Advanced Groove System (AGS) specifications enlarges the pipe length by approximately $\frac{1}{8}$ inch (0.125 inch/3.2 mm) for each groove. For a pipe length with an AGS groove at each end, the length will grow approximately $\frac{1}{4}$ inch (0.250 inch/6.4 mm) total. Therefore, the cut length should be adjusted to accommodate this growth. **EXAMPLE:** If you need a 24-inch/610-mm length of pipe that will contain an AGS groove at each end, cut the pipe to a length of 23 $\frac{3}{4}$ inches/603 mm to allow for this growth.
- It is critical to measure the Groove Diameter “C” dimension, along with the Gasket Seat “A” dimension and the Flare Diameter “F” dimension. These measurements must be within the specifications listed in the following tables for proper joint performance.
- Coatings that are applied to the interior surfaces of Victaulic grooved and plain-end pipe couplings must not exceed 0.010 inch/0.25 mm. This includes the bolt pad mating surfaces.
- In addition, the coating thickness applied to the gasket-sealing surface and within the groove on the pipe exterior must not exceed 0.010 inch/0.25 mm.

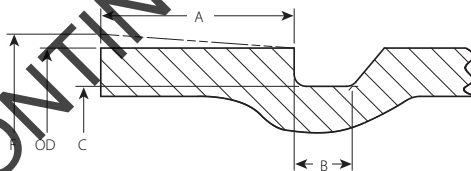


Illustration is exaggerated for clarity

Pipe Outside Diameter – Nominal NPS Pipe Size (ANSI B36.10) and Basic Metric Pipe Size

(ISO 4200) – The average pipe outside diameter must not vary from the specifications listed in the tables on the following pages (API 5L end tolerance). Maximum allowable pipe ovality shall comply with the requirements of ASTM A-999 and API 5L. Greater variations between the major and minor diameters will result in difficult coupling assembly.

The maximum allowable tolerance from square-cut pipe ends is $\frac{1}{8}$ inch/3.2 mm for all sizes grooved to AGS dimensions. This is measured from the true square line. Any internal and external weld beads or seams must be ground flush to the pipe surface. The inside diameter of the pipe end must be cleaned to remove coarse scale, dirt, and other foreign material that might interfere with or damage grooving rolls. The front edge of the pipe end shall be uniform with no concave/convex surface features that will cause improper grooving roll tracking and result in difficulties during coupling assembly.

EXPLANATION OF CRITICAL ADVANCED GROOVE SYSTEM (AGS) ROLL GROOVE DIMENSIONS (CONTINUED)

“A” Dimension – The “A” dimension, or the distance from the pipe end to the groove, identifies the gasket seating area. This area must be free from indentations, projections (including weld seams), and roll marks from the pipe end to the groove to ensure a leak-tight seal. All foreign material, such as loose paint, scale, oil, grease, chips, rust, and dirt must be removed.

“B” Dimension – The “B” dimension, or groove width, controls expansion, contraction, and angular deflection of flexible couplings by the distance it is located from the pipe and its width in relation to the coupling housings’ “key” width. The bottom of the groove must be free of all foreign material, such as dirt, chips, rust, and scale that may interfere with proper coupling assembly. The corners at the bottom of the groove must be radiused R.094/R 2.39. The Groove Width “B” dimension will be achieved with properly maintained Victaulic tools that are equipped with Victaulic AGS (RW or RWQ) roll sets for carbon steel pipe.

“C” Dimension – The “C” dimension is the average diameter at the base of the groove. This dimension must be within the diameter’s tolerance and concentric with the OD for proper coupling fit. The groove must be of uniform depth for the entire pipe circumference. Victaulic RW or RWQ roll sets must be used for carbon steel pipe.

“D” Dimension – The “D” dimension is the normal depth of the groove and is a reference for a “trial groove” only. Variations in pipe OD affect this dimension and it must be altered, if necessary, to keep the “C” dimension within tolerance. The groove diameter must conform to the “C” dimension described above.

“F” Dimension – Maximum allowable pipe-end flare diameter is measured at the extreme pipe-end diameter. **NOTE:** This applies to average (pi tape) and single-point readings.

Minimum Nominal Wall Thickness – The minimum nominal wall thickness is the lightest grade of pipe that is suitable for cut or roll grooving. Pipe that is less than the minimum nominal wall thickness for cut grooving may be suitable for roll grooving or adapted for Victaulic AGS couplings by using AGS Vic-Ring® Adapters. AGS Vic-Ring Adapters can be used in the following situations (contact Victaulic for details):

- When pipe is less than the minimum nominal wall thickness suitable for roll grooving
- When pipe outside diameter is too large to roll or cut groove
- When pipe is used in abrasive services

**For light-wall carbon steel pipe being grooved to AGS specifications
(in accordance with EN 10217 or ASTM A-53):**

14-inch/355.6-mm minimum nominal wall thickness is 0.220 inch/5.6 mm
16 – 24-inch/406.4 – 610-mm minimum nominal wall thickness is 0.250 inch/6.3 mm

**For standard-wall carbon steel pipe being grooved to AGS specifications
(in accordance with EN 10217 or ASTM A-53):**

14-inch/355.6-mm minimum nominal wall thickness is 0.315 inch/8.0 mm
16-inch/406.4-mm minimum nominal wall thickness is 0.346 inch/8.8 mm
18 – 36-inch/457 – 914-mm minimum nominal wall thickness is 0.375 inch/9.5 mm

**For extra-strong carbon steel pipe being grooved to AGS specifications
(in accordance with ASTM A-53):**

38 – 72-inch/965 – 1829-mm minimum nominal wall thickness is 0.500 inch/12.7 mm

NOTE: For 14 – 72-inch/355.6 – 1829-mm carbon steel pipe being grooved to AGS specifications the maximum ratings are limited to pipe that does not exceed the yield strength of API-5L Grade “B”, ASTM Grade “B”, 150 Brinell Hardness Number (BHN) maximum.

Advanced Groove System (AGS) Roll Grooving Specifications for Carbon Steel Pipe

Nominal NPS/Basic Metric Pipe Size	Actual Pipe Outside Diameter inches/mm		Minimum Nominal Wall Thickness inches/mm				Dimensions inches/mm								Maximum Allowable Flare Diameter +1"
	Carbon Steel		Strong Carbon Steel	Light-Wall Carbon Steel	Gasket Seat "A"		Groove Width "B"			Groove Diameter "C"					
	Max.	Min.			Basic	Max.	Min.	Max.	Min.	Max.	Min.				
14 355.6	14.094 358.0	13.969 354.8	—	0.220 5.6	1.500 38.1	1.531 38.9	1.437 36.5	0.455 11.6	0.450 11.4	13.500 342.9	13.455 341.8				
16 406.4	16.094 408.8	15.969 405.6	—	0.220 5.6	1.500 38.1	1.531 38.9	1.437 36.5	0.455 11.6	0.450 11.4	15.500 393.7	15.455 392.6				
18 457	18.094 459.6	17.969 456.4	—	0.250 6.4	1.500 38.1	1.531 38.9	1.437 36.5	0.455 11.6	0.450 11.4	17.500 444.5	17.455 443.4				
20 508	20.094 510.4	19.969 507.2	—	0.250 6.4	1.500 38.1	1.531 38.9	1.437 36.5	0.455 11.6	0.450 11.4	19.500 495.3	19.455 494.2				
22 559	22.094 561.2	21.969 558.0	—	0.250 6.4	1.500 38.1	1.531 38.9	1.437 36.5	0.455 11.6	0.450 11.4	21.500 546.1	21.455 545.0				
24 610	24.094 612.0	23.969 608.8	—	0.250 6.4	1.500 38.1	1.531 38.9	1.437 36.5	0.455 11.6	0.450 11.4	23.500 596.9	23.455 595.8				
26 660	26.063 662.0	25.937 658.8	—	0.375 9.5	1.750 44.5	1.781 45.2	1.687 42.8	0.535 13.6	0.530 13.5	25.430 645.9	25.370 644.4				
28 711	28.063 712.8	27.937 709.6	—	0.375 9.5	1.750 44.5	1.781 45.2	1.687 42.8	0.535 13.6	0.530 13.5	27.430 696.7	27.370 695.2				
30 762	30.063 763.6	29.937 760.4	—	0.375 9.5	1.750 44.5	1.781 45.2	1.687 42.8	0.535 13.6	0.530 13.5	29.430 747.5	29.370 746.0				
32 813	32.063 814.4	31.937 811.2	—	0.375 9.5	1.750 44.5	1.781 45.2	1.687 42.8	0.535 13.6	0.530 13.5	31.430 798.3	31.370 796.8				
34 864	34.063 865.2	33.937 862.0	—	0.375 9.5	1.750 44.5	1.781 45.2	1.687 42.8	0.535 13.6	0.530 13.5	33.430 849.1	33.370 847.6				
36 914	36.063 916.0	35.937 912.8	—	0.375 9.5	1.750 44.5	1.781 45.2	1.687 42.8	0.535 13.6	0.530 13.5	35.430 899.9	35.370 898.4				
38 965	38.063 966.8	37.937 963.6	0.500 12.7	—	1.750 44.5	1.781 45.2	1.687 42.8	0.535 13.6	0.530 13.5	37.430 950.7	37.370 949.2				

Table continues on the following page.

Advanced Groove System (AGS) Roll Grooving Specifications for Carbon Steel Pipe (Continued)

Nominal NPS/Basic Metric Pipe Size	Actual Pipe Outside Diameter inches/mm		Minimum Nominal Wall Thickness inches/mm				Dimensions inches/mm							
	Carbon Steel		Extra- Strong Carbon Steel	Std.- Wall Steel	Light-Wall Carbon Steel	Gasket Seat "A"			Groove Width "B"			Groove Diameter "C"		Maximum Allowable Flare Diameter "F"
	Max.	Min.				Basic	Max.	Min.	Basic	Max.	Min.	Max.	Min.	
40	40.063	39.937	0.500	—	—	2.000	2.031	1.937	0.562	0.567	0.557	39.375	39.315	40.30
1016	1017.6	1014.4	12.7	—	—	50.8	51.6	49.2	14.3	14.4	14.1	1000.1	998.6	1023.6
42	42.063	41.937	0.500	—	—	2.000	2.031	1.937	0.562	0.567	0.557	41.375	41.315	42.30
1067	1068.4	1065.2	12.7	—	—	50.8	51.6	49.2	14.3	14.4	14.1	1050.9	1049.4	1074.4
44	44.063	43.937	0.500	—	—	2.000	2.031	1.937	0.562	0.567	0.557	43.375	43.315	44.30
1118	1119.2	1116.0	12.7	—	—	50.8	51.6	49.2	14.3	14.4	14.1	1101.7	1100.2	1125.2
46	46.063	45.937	0.500	—	—	2.000	2.031	1.937	0.562	0.567	0.557	45.375	45.315	46.30
1168	1170.0	1166.8	12.7	—	—	50.8	51.6	49.2	14.3	14.4	14.1	1152.5	1151.0	1176.0
48	48.063	47.937	0.500	—	—	2.000	2.031	1.937	0.562	0.567	0.557	47.375	47.315	48.30
1219	1220.8	1217.6	12.7	—	—	50.8	51.6	49.2	14.3	14.4	14.1	1203.3	1201.8	1226.8
50	50.063	49.937	0.500	—	—	2.000	2.031	1.937	0.562	0.567	0.557	49.375	49.315	50.30
1270	1271.6	1268.4	12.7	—	—	50.8	51.6	49.2	14.3	14.4	14.1	1254.1	1252.6	1277.6
54	54.063	53.937	0.500	—	—	2.500	2.531	2.437	0.562	0.567	0.557	53.430	53.370	54.30
1372	1373.2	1370.0	12.7	—	—	63.5	64.3	61.9	14.3	14.4	14.1	1357.1	1355.6	1379.2
56	56.063	55.937	0.500	—	—	2.500	2.531	2.437	0.562	0.567	0.557	55.430	55.370	56.30
1422	1424.0	1420.8	12.7	—	—	63.5	64.3	61.9	14.3	14.4	14.1	1407.9	1406.4	1430.0
60	60.063	59.937	0.500	—	—	2.500	2.531	2.437	0.562	0.567	0.557	59.430	59.370	60.30
1524	1525.6	1522.4	12.7	—	—	63.5	64.3	61.9	14.3	14.4	14.1	1509.5	1508.0	1531.6
62	62.063	61.937	0.500	—	—	2.500	2.531	2.437	0.562	0.567	0.557	61.430	61.370	62.30
1575	1576.4	1573.2	12.7	—	—	63.5	64.3	61.9	14.3	14.4	14.1	1560.3	1558.8	1582.4
72	72.063	71.937	0.500	—	—	2.500	2.531	2.437	0.562	0.567	0.557	71.430	71.370	72.30
1829	1830.4	1827.2	12.7	—	—	63.5	64.3	61.9	14.3	14.4	14.1	1814.3	1812.8	1836.4

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