

Introduction

This document is meant to highlight sections of safety standards published by the American National Standards Institute and the Occupational Safety and Health Administration. This document is not meant to replace those standards but only highlight certain areas.

When care is taken to insure that the right tool is operated properly; and safety and maintenance procedures are followed, accidents can be avoided. Read and follow all instructions and directions, comply with all rules governing the use of power

tools, personal protective equipment and equipment guards.

Remember – machines, attachments, and accessories must be used only for the purpose for which they were designed. Safety reasons and product liability prohibit any modifications to tools. Any attachments or accessories must be agreed to in advance with an authorized technical representative of the T.C. Service Co.

General Safety Requirements



Familiarize yourself with the “General Operators Instructions provided with each machine. Read and understand the most current versions of ANSI B7.1, ANSI B186.1 as well as other relevant standards.



The grinding equipment must be approved for the rated speed of the machine. The rated speed, marked on the machine, should not be exceeded. Be sure to learn the proper handling and storing of abrasive wheels and inserted tooling. **Remember SFPM = Wheel Diameter (in.) X RPM X .262**



Always wear eye and hearing protection, and when necessary, other personal protective equipment such as gloves, apron and helmet.



Check hose size and air pressure. The air pressure at the tool inlet shall not exceed 90 psi (6.1 BAR).

Check the free speed of the machine with a tachometer prior to placing into service, at regular intervals, and whenever the machine has been serviced. This check should be made with the grinding equipment detached.



Mounting grinding wheels and inserting tooling properly is crucial to safe operation and efficient working conditions. Check that the exhaust air is directed away to avoid dust or other airborne particles from the work piece onto the operator or other persons. If necessary, utilize an exhaust hose and arrange for dust collection.



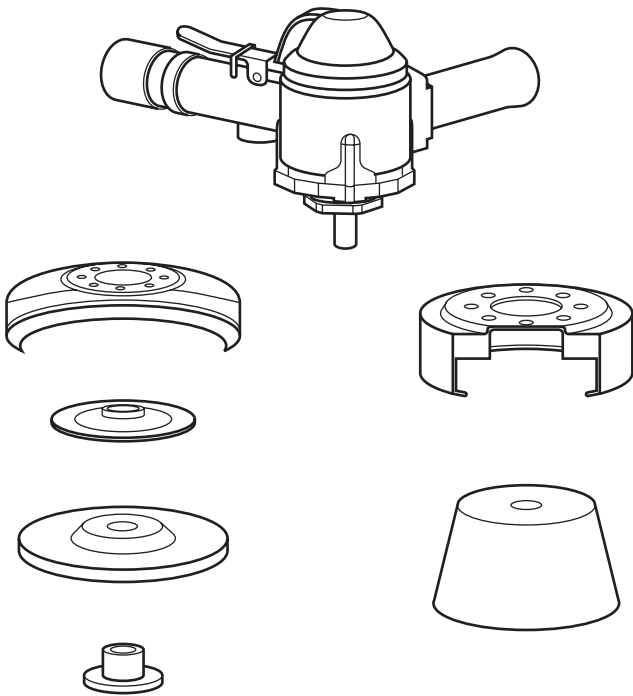
Remember – disconnect tool from air supply before doing any service. This prevents accidental start-up. Do not disassemble the governor. The governor is guaranteed for the life of the tool, if not abused.

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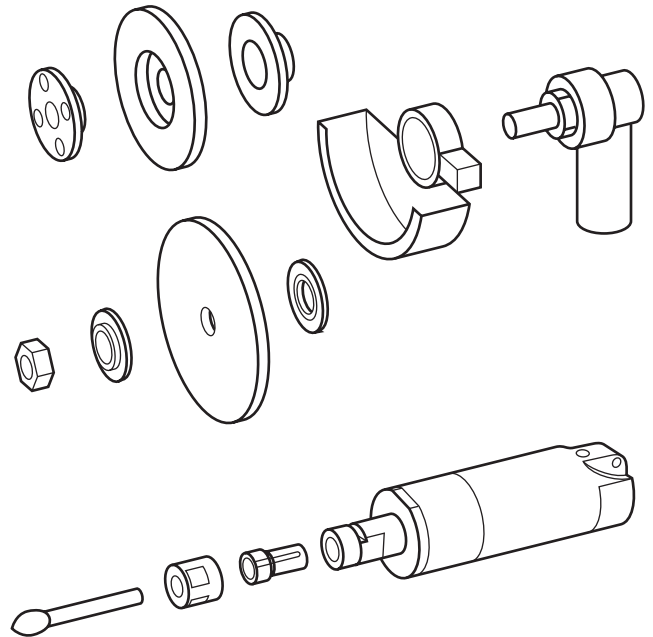
Mounting Instructions



Mounting Grinding Wheels and Guards

- Check operating speed marked on wheel – it must equal or exceed rated spindle speed.
- Inspect wheel for cracks or chips – if found, do not use.
- Do not fit a wheel that has been soaked in or exposed to any liquids.
- Wheel fit on spindle shall be free but not loose.
- Attach wheel with flanges conforming to international standard. Be sure all flanges are in good condition. Flanges should have a flat contact with the wheel and be without cracks or burrs.
- Do not use unauthorized bushings or adaptors to attach large hole abrasive wheels.
- Use blotters when provided with grinding wheel.
- Do not mismatch wheel and spindle thread.
- Spindle and spindle thread shall be without damage or wear.
- Do not bottom spindle thread ends in cup or plug wheels with threaded insert – use an authorized spacer.
- Tighten properly mounted wheel to prescribed torque.
- Remember – test run every new wheel in an area away from other workers (example - under workbench) for at least 30 seconds.

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Mounting Inserted Tooling

- Check operating speed marked on tooling, it must equal or exceed rated spindle speed.
- Inspect tooling for cracks or chips – if found, do not use.
- The fit of the inserted tool in collet should be free, but not loose.
- Tighten inserted tool with collet nut conforming to international standard and in good condition.
- Do not use unauthorized bushings or adaptors.
- Mount the inserted tool correctly and tighten to prescribed torque.
- Remember – test run every new tool insert for 30 seconds in an area away from other workers (example - under workbench).

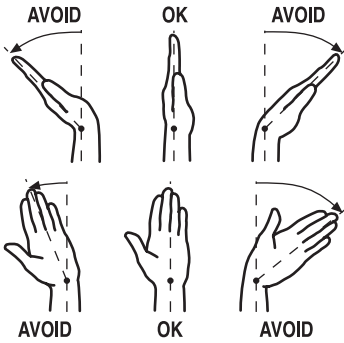
Notice – Inserted tools on heavy use percussive non-rotary power tools can be exposed to heavy strains and after long periods of use break due to fatigue. Unexpected tool movement or tool insert breakage may cause injury, particularly to the lower limbs. Operator should keep a good balanced position over work. Do not chisel or grind toward your body.

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Ergonomics

Work Healthy Problems can be avoided.



Some individuals may be susceptible to disorders of the hands and arms when performing tasks of highly repetitive motion and/or exposure to extended vibration. Carpal tunnel syndrome and tendonitis are two such disorders that may be caused or aggravated by continued repetitive exertion of the hands and arms.

The following suggestions will help reduce or moderate the effects of repetitive work motion and/or extended vibration exposure:

- Do not over-grip the machine. Use only the grip force necessary to maintain proper and safe control.
- Keep hands and body dry and warm. Blood flow is important – exercise hands and arms as often as necessary.
- Avoid hand work positions that require the wrist to be flexed, hyperextended or turned side-to-side.
- Do not support body-weight on the pneumatic tool during operation.
- Maintain a stress-free posture for the entire body. Select a proper work level for the proper tool.
- Keep machines well maintained and in good working order. Properly maintained tools are less likely to fail or produce unwanted vibrations. Maintenance includes the use of an air line filter-regulator-lubricator set as close to the tool as possible.

OIL TOOLS DAILY. Mobil DTE Light or equivalent is recommended. Pour 1/2 oz. of oil into air inlet and run tool to allow oil to be carried to tool interior.

Work gloves with vibration reducing liners, tool wraps, grips, and wrist supports may be utilized by machine operators to reduce or moderate wrist trauma. Applications vary and Manufacturers of these gloves, wraps and supports should be consulted.

Special Notices

Machine Overhauls – At least twice a year at heavy/daily operation and once a year at light duty, all machines should be dismantled and cleaned. Internal parts should be checked for wear or damage. Be particularly careful of the governor assembly. Careless treatment may prevent it from functioning. Always check the free speed of the machine following service!

Pneumatically driven power tools are not generally insulated from coming into contact with electrical sources. Be sure to avoid contact with wires or other possible current carrying sources.

Explosive atmospheres must not be ignited. To prevent injury and property loss from fire or explosion use other non-sparking process.

Airborne hazards – Working with material removal tools can generate dust which, depending on the material being worked on, could be harmful to the operator.

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Type 1 Wheel Grinders

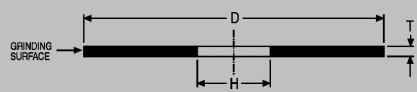


Illustration 18 – Type 1 straight wheel
Peripheral grinding wheel having a diameter, thickness and hole.

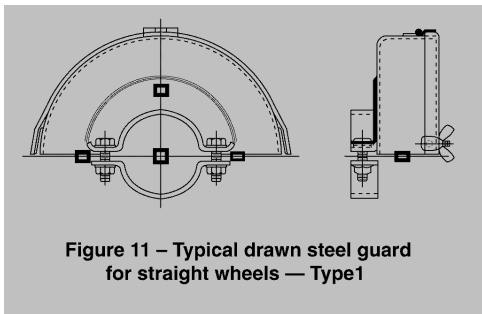
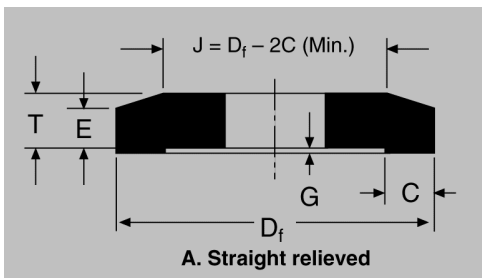


Figure 11 – Typical drawn steel guard for straight wheels — Type1

Guarding:

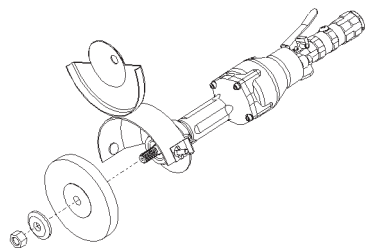
The guard must cover the top half of the wheel. This includes the outer face of the wheel.



Flanges:

Type 1 wheels shall be mounted between properly relieved flanges which have matching bearing surfaces. Such flanges shall be at least one-third the wheel diameter.

Wheel Size	2"	3"	4"	5"	6"	7"	8"	10"
Flange Size	11-16"	1"	1-3/8"	1-11/16"	2"	2-3/8"	2-11/16"	3-3/8"



Some Exceptions:

- Type 1 reinforced wheels not more than 3" in diameter and 1/4" in thickness, operating at peripheral speeds not exceeding 9,500 SFPM, provided that safety glasses and face shield protection are worn.

9500 SFPM Chart

Wheel Diameter	RPM
2"	18,144
2-1/2"	14,514
3"	12,096

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Type 1 Cut Off Wheel

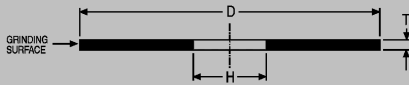
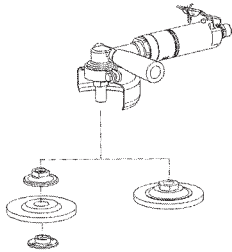


Illustration 18 – Type 1 straight wheel
Peripheral grinding wheel having a diameter, thickness and hole.

Definition:

Type 1 Cut-Off Wheels are defined as Type 1 wheels that conform to the following chart:

Wheel Size	Maximum Thickness
4" or less	1/8"
4" to 6"	3/16"
6" to 12"	1/4"
12"-23"	3/8"



Guarding:

The guard must cover the top half of the wheel. This includes the outer face of the wheel.

Exceptions:

If a guard is tested to the criteria specified in ANSI B7.1-2000 Section 4.2.4.1.1 and passes, then that guard is acceptable. All Top Cat® right angle grinders have been tested such that open faced guards are acceptable.

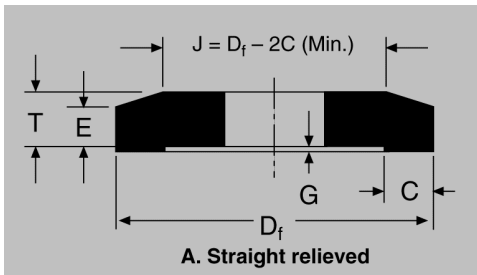
Flanges:

Type 1 cutting-off wheels shall be mounted between properly relieved flanges which have matching bearing surfaces. Such flanges shall be at least one-fourth the wheel diameter.

Exceptions:

- Machines specifically designed and used for masonry cutting, using only reinforced bonded abrasive cutting-off wheels and steel centered diamond cutting-off wheels, shall use flanges not less than 4" diameter for wheels 18" and 20" diameter.
- Machines specifically designed and used for concrete sawing, using only steel centered diamond abrasive cutting-off wheels 20" diameter and larger, shall use flanges not less than 1/6 the wheel diameter.
- On portable saws using reinforced bonded abrasive cutting-off wheels up to and including 8-1/4" diameter, the diameter of the flanges may be less than one-fourth of the wheel diameter, providing the flanges are in conformance with the following table.

Wheel Arbor Hole Size	Minimum Outside Diameter of Flange
5/8 or smaller	1-1/8"
Over 5/8" thru 3/4"	1-1/4"
Over 3/4 thru 1-1/4"	1-3/4"



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Type 6 and 11 Cup Wheels

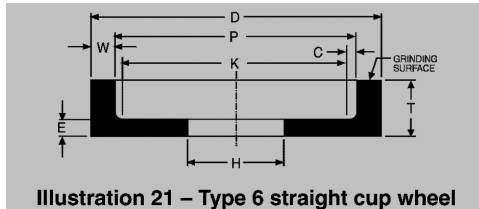


Illustration 21 – Type 6 straight cup wheel

Side grinding wheel having a diameter, thickness and hole with one side straight or flat and the opposite side recessed. This type, however, differs from Type 5 in that the grinding is performed on the wall of the abrasive created by the difference between the diameter of the recess and the outside diameter of the wheel. Therefore, the wall thickness "W" takes precedence over the diameter of the recess as an essential intermediate dimension to describe this shape type.

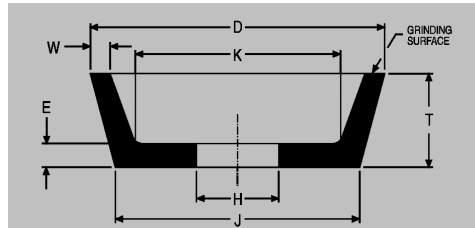


Illustration 23 – Type 11 flaring cup wheel

Side grinding wheel having a wall flared or tapered outward from the back. Wall thickness at the back is normally greater than at the grinding surface.

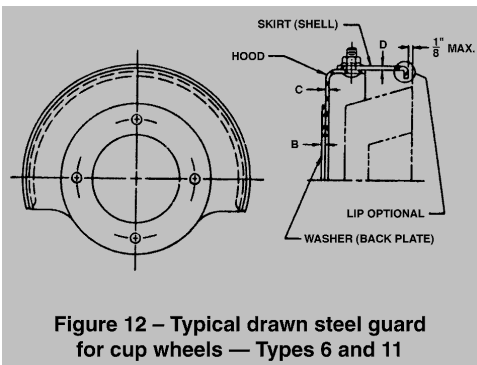


Figure 12 – Typical drawn steel guard for cup wheels — Types 6 and 11

Guarding:

A safety guard for vertical or angle grinders using Type 6 or Type 11 cup wheels shall cover the wheel's plane of rotation toward the operator for at least 180°; shall cover the side of the wheel toward the driving flange for at least 180°; and shall have a skirt which is adjustable to within 1/8" of the plane of the surface of the wheel.

Notes:

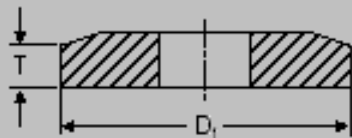
- "Cup Back Bushings" under no circumstances shall be considered a substitute for a guard, and wheels so manufactured shall not be used without a guard.
- So-Called "Revolving Cup Guards" shall not be used, and under no circumstances shall be considered a substitute for a guard.

Flanges:

These wheels shall be mounted against a straight unrelieved flange not be less than one-third the diameter of the wheel.

Notes:

Make sure that wheel tightens up against flange directly - not a nut!



NOTE: T is effective thickness. If there is no taper, then this is overall thickness

Figure 37 – Driving flange secured to spindle for use on portable wheels with threaded inserts

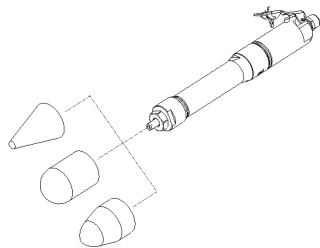
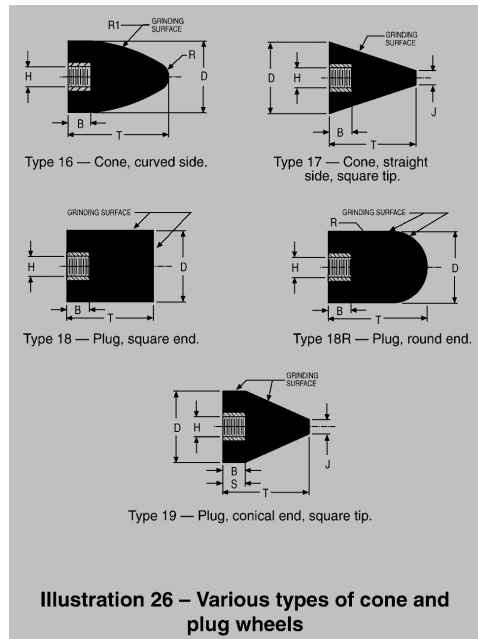
Wheel Diameter	4"	5"	6"
Flange Diameter	1-3/8"	1-3/4"	2"

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Type 16, 17, 18, 18R & 19 Plugs and Cones



Guarding:

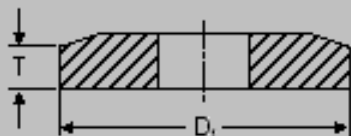
Types 16, 17, 18, 18R and 19 cones and plugs and threaded hole pot balls where the work offers protection or where the size does not exceed 3" in diameter by 5" long.

Flanges:

These wheels shall be mounted against a straight unrelieved flange not be less than one-third the diameter of the wheel.

Notes:

- Make sure that wheel tightens up against flange directly - not a nut!
- Make sure that wheel tightens up against flange directly - not the end of the spindle!



NOTE: T is effective thickness. If there is no taper, then this is overall thickness

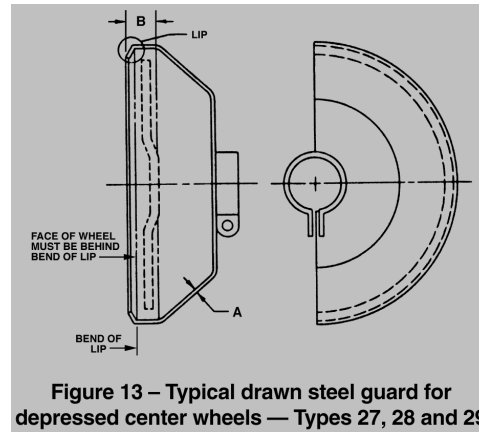
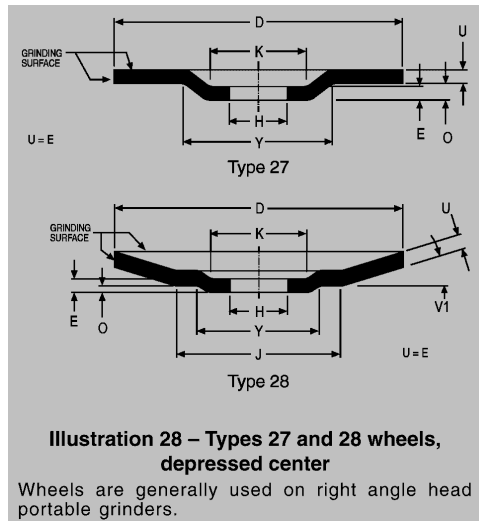
Figure 37 – Driving flange secured to spindle for use on portable wheels with threaded inserts

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Type 27, 28, and 29 Depressed Center Wheels



Guarding:

A safety guard for vertical or angle grinders using Types 27, 28 and 29 wheels shall cover the wheel's plane of rotation toward the operator for at least 180°; shall cover the side of the wheel toward the driving flange for at least 180°; and shall have a lip on the outer edge which curls inward to deflect wheel fragments and to provide necessary strength. The lip shall extend beyond the surface of the wheel throughout the 180° coverage

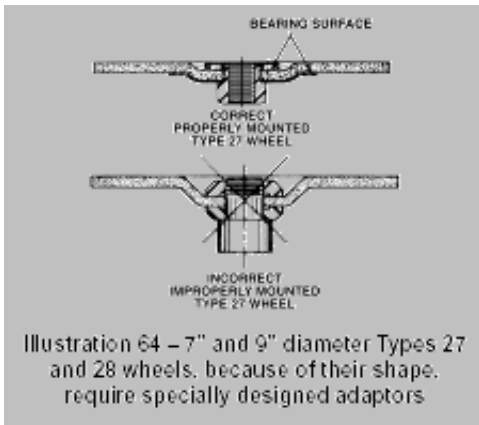


Illustration 64 - 7" and 9" diameter Types 27 and 28 wheels, because of their shape, require specially designed adaptors



Illustration 65 - Mounting condition shown must have flanges at least one third wheel diameter

Flanges: Larger than 5":

Type 27, 28 and 29 wheels larger than 5" require specially designed adaptors because of their shape and usage. The adaptor (back flange) shall extend beyond the central hub, or raised portion, and contact the wheel to counteract the side pressure on the wheel in use. The adaptor nut, which is less than the minimum onethird diameter of the wheel, fits in the depressed side of the wheel to prevent interference in side grinding. These specially designed adaptors shall be used to mount only Types 27, 28 and 29 reinforced organic bonded wheels.

5" or smaller:

Type 27 wheels 5" diameter and smaller with 3/8" arbor holes shall be mounted with special adaptors as described above (see illustration 64). Type 27 wheels with 5/8" or 7/8" diameter arbor holes shall be mounted with either special adaptors as described above or matched flanges (see illustration 65) provided the matched flanges have outside diameters of at least 1/3 the diameter of the wheel or the outside flange diameters equal to the K dimension

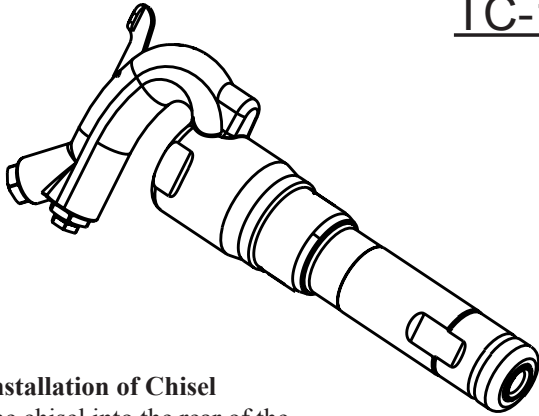
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Chisel Percussion Tools

TC-10, TC-20, TC-30 & TC-40 Series Chipping Hammers

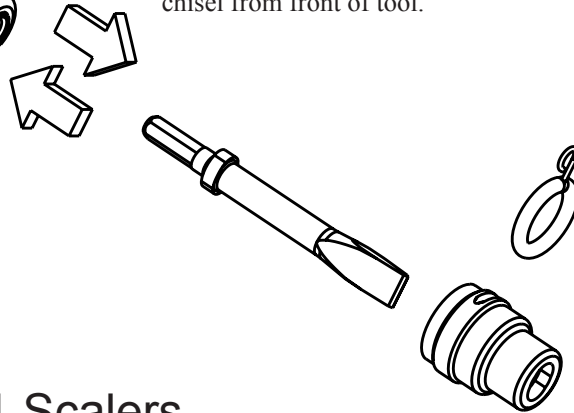


Installation of Chisel

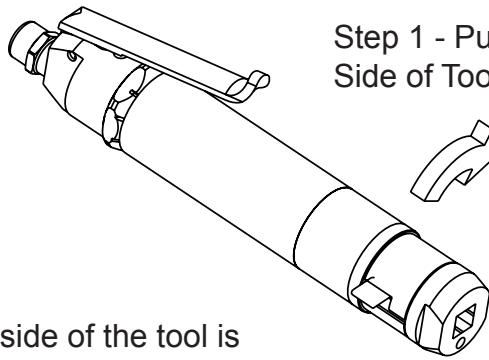
- 1 - Slide the chisel into the rear of the safety retainer (2427). Be sure the oval collar of the chisel falls into the oval notch in the retainer that does not go all the way through.
- 2 - Slide the chisel and safety retainer onto the front of the tool. The retaining spring slot on the safety retainer should align with the groove of the barrel.
3. Slide the retaining spring (2428) into the slot of the safety retainer.

Removal of Chisel

- 1 - Grasp the retaining spring (2428) and pull from groove.
- 2 - Slide out safety retainer (2427) and chisel from front of tool.



TC-1 Scalers

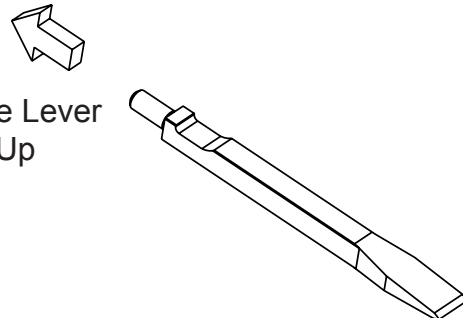


Step 1 - Pull lever on Side of Tool Up

The lever on the side of the tool is connected to the steel wedge that retains the chisel/needle driver. The wedge rests in the cut-out (notch) of the chisel when it is installed in the tool.

Step 2 - Slide In/Pull Out Chisel into/from Tool with Cut-out (Notch) Oriented Up

Step 3 - Release Lever on Side of Tool Up



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Chisel Percussion Safety in Operation

The safety procedures for operating air tools are everyone's responsibility. The following lists several aspects of air tool safety that should be considered during operation. Please be aware of these aspects and report any unsafe practice you see to a supervisor or safety officer immediately.

RETAINERS MUST BE USED AT ALL TIMES!!!

- 1) The inserted tool on heavy types of percussive, non-rotary power tools is exposed to heavy strains and can after long period of use break due to fatigue.
- 2) Unexpected tool movement or breakage of inserted tool may cause injuries to the lower limbs, in particular the feet.
- 3) Unsuitable postures may not allow counteracting of normal or unexpected movement of the power tool. (A working position shall be adopted which remains stable in the event of a break up of the inserted tool.)
- 4) Support the work piece properly.
- 5) Holding the inserted tool by the free hand can be a source of vibration damage.
- 6) If the tool jams, shut off the power and ease the chisel free. (Check the chisel for damage before continuing operation.)
- 7) Ensure that sparks from the process do not create a hazard to eyes or will ignite the environment.
- 8) Percussive tools shall not be used in potentially explosive atmospheres.
- 9) Pneumatically driven tools are not generally insulated from coming into contact with electric sources. Be sure to avoid contact with wires or other possible current carrying sources.
- 10) The operator must check that no bystanders are in the vicinity.
- 11) Disconnect the power supply before servicing and changing of inserted tooling.**
- 12) Release control device in case of interruption of energy supply.
- 13) Always keep the tool in a clean, dry place when not in use.
- 14) Do not hold tool near body when operating.
- 15) Keep firm grip on tool during operation.
- 16) Do not chisel toward your body.
- 17) If a quick disconnect hose fitting is used, insert a whip hose between coupling and the tool.**
- 18) Never carry a tool by the hose.
- 19) Never yank the hose to disconnect it from the air supply.
- 20) Keep hoses away from heat, oil, sharp edges and in good repair - inspect regularly.
- 21) Check to see that tool is securely fastened to air hose.
- 22) In air hoses larger than ½ inch, a safety excess flow valve must be installed at the source of the air supply to reduce pressure in case of hose failure.
- 23) Before operating the tool, see that a safety clip or retainer is installed and working to prevent attachments such as chisels, needles or other implement from being ejected from the tool when operated. Because these retaining devices receive substantial abuse and wear, they should be inspected regularly and replaced when damage or wear is noted.
- 24) Never leave a tool attached to supplied air unattended. Avoid accidental actuation.
- 25) Always disconnect the tool from the air supply or shut off and drain the air hose prior to changing chisels, needles or other implements.
- 26) Never point or direct a tool toward another worker or yourself.
- 27) When working in close proximity to other workers, suitable barriers may need to be erected around work areas to protect workers from possible tool ejections or flying pieces from the removal process itself.
- 28) Be sure to wear the properly fitted personal protective equipment required to guard against operator injury.

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