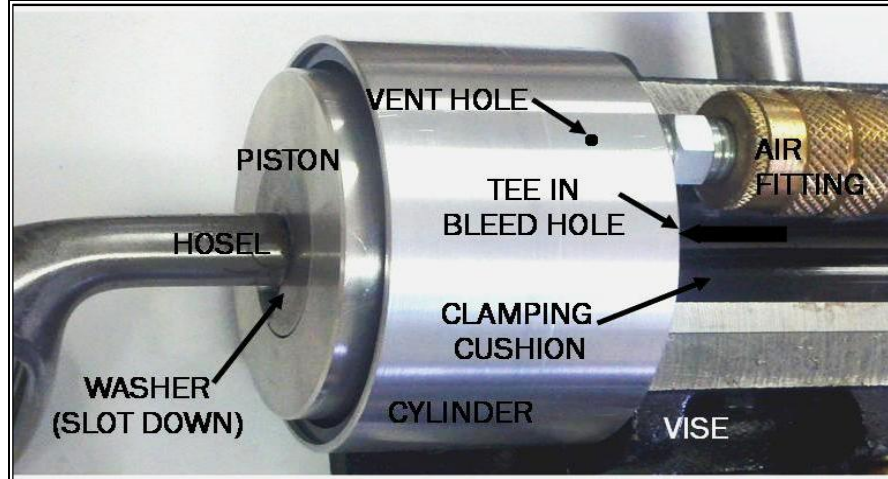


**OPERATION** This extractor's force "surrounds" the golf shaft, minimizing shaft bending and thus helping prevent shaft damage. Air pressure of 120 PSI provides 700 pounds of extraction force. The slotted washer works on shafts with .335 to .370 tip diameters; others are available. Required are a vise, safety glasses, gloves, heat sources, stopwatch, and an air source of **115 - 125 PSI**. Included is an industrial-shape air line coupling with 1/8-27 NPT male threads; for other shapes, search 6534KAC at [www.mcmaster.com](http://www.mcmaster.com). If you have a fitting with 1/4-28 NPT threads, you can use a reducer fitting.



**LIMITED WARRANTY**

Holtzman Engineering, Inc. makes no warranty of any kind except we will replace this product if found defective in material or workmanship for one year from date of purchase. Holtzman Engineering, Inc. will not be held liable for any injuries or damages incurred as a result of the use of this product nor damage to any parts this product may affect.

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**SHAFT CLAMPING** must prevent **excessive** sliding during extraction. The shaft and cushion must be completely free of oil, grease, or water. Heavier graphite shafts and steel shafts can normally be clamped with relatively high force, lighter graphite shafts with relatively less force. To test, apply extraction force to an unheated head and see how fast the shaft slides in the cushion; slow sliding is normal.

**PREPARE FOR EXTRACTION** Put on safety glasses. Although unlikely, sudden, high speed head release can occur, so plan on this by either **holding the club's head in a gloved hand when extracting or by placing a cushioned object such as a box of rags near the head**. Remove the ferrule (heat and a utility knife work well). Check that air pressure is 115 to 125 PSI (**125 PSI requires less heating**); force compressor operation if necessary. Push the piston fully into the cylinder and slide the extractor over the shaft's grip end. Place the clamping cushion on the shaft approximately 2" from the hosel and place the washer so its slot is tight against the shaft, facing down, and nesting in the piston. Position so the extractor is tight between the vise and hosel, then close the vise.

**HEATING** Rapid heating reduces shaft temperature at extraction. Most heat loss is to the head, so apply **more heat toward the hosel's head end**. The following table shows typical heating times vs. heat source and club type.

**HEATING SCHEDULE for 250° F SHAFTING EPOXY (higher temp epoxies require longer time) @ 125 PSI**

CLUB TYPE	HEAT SOURCE	HEAT TIME, seconds	DELAY to MAX TEMP**
LONG HOSELWOODS*	ELECTRIC 1200W	20-30	15 SECONDS
SHORT HOSEL WOODS*	ELECTRIC 1200W	15 ON/10 OFF/15 ON/10 OFF/15 ON	5 SECONDS
IRONS, WEDGES	PROPANE	15-20	15 SECONDS
SHAFT ADAPTERS***	PROPANE	5	MINIMAL

\*Long hosel woods have hosels longer than 1.25" and epoxy heating can occur primarily **through** the hosel. Short hosel woods have hosels shorter than 1.25" and some epoxy heating must occur **down** the hosel. The short hosel procedure minimizes paint temperature; the long hosel procedure minimizes shaft temperature.

\*\*There is a delay until the epoxy reaches its maximum temperature after the heat source is removed.

\*\*\*No need to hold shaft adapters. Just heat and tap (see below) until extraction occurs. We have available a split collar which can be used on shaft adapters with thin aluminum flanges to prevent flange bending.

**EXTRACTION FORCE** is applied by briefly "tapping" the bleed hole (back of cylinder, see photo) with a tee; tapping minimizing shaft sliding. If you have a free hand (you have placed a cushioned object at the head or if you have a helper), apply heat per the schedule, attach the air line during the delay time, then tap and heat until extraction occurs. If you do not have a free hand (you are holding the head in your hand), apply heat per the schedule, attach the air line during the delay time, then start tapping. If the head does not come off, the epoxy has not softened sufficiently. Apply a few more seconds of heat and repeat until extraction occurs. To promote smooth extraction, when the piston has moved 3/16", air escapes the **VENT** hole (side of cylinder, see pic) and force drops. **If extraction has not occurred and air is escaping the VENT hole, reset the extractor.** If extraction is partial, for steel shafts pull and twist on the head to finish removal; if graphite, reset the extractor and repeat.