

Hammer Pocket Manual

This Pocket Manual is a brief summary of proper hammer operation, inspection and maintenance. Read it first, and refer to the Hammer Manual for greater detail. Consult with Birmingham for any additional information needed.

Maintenance

Fuel – Diesel*

Use a good grade of filtered #2 diesel containing a Low Sulphur Diesel Fuel Conditioner (Kleen Flo or equivalent), to ensure adequate injector lubrication. Follow the manufacturer's recommended mix ratio.

DO NOT USE STARTING FLUIDS!

Lube Oil –Piston and Cylinder

Use any good multi-grade detergent oil (15W40). Use (5W30) oil for temperatures below -20° F. Before driving squeeze the oil primer bulb several times to prime the oil pump

NOTE: Observe the hammer piston for several minutes as it rises out of the upper cylinder - if the piston is shiny the oiling system is working properly. If the piston is not shiny, check the oil tank. Ensure that the tank vents & valves are open. Check to see Oil pump indicator is visibly triggering on each stroke. Squeeze the primer bulb three times and test again. Oil pump adjustment may be necessary to provide adequate lubrication. Remove keeper, turn adjuster nut counter-clockwise, and re-install keeper. Additionally, it may be necessary to rebuild the oil pump. See "Troubleshooting" in the hammer manual for more information.

Re-fueling and Re-oiling

Ensure that the tank vents are open. Keep all tanks full of fluid to prevent condensation from forming. If hammer is not equipped with ground re-fueling, remove the fuel and/or oil tank plug and fill the tank with the aid of a funnel.

If ground re-fueling is present, wipe the quick disconnects clean and using the quick-connect fittings supplied in the toolbox, attach the ground fueling and oiling lines. It is best to attach these lines before the hammer is operated and becomes hot. Pump fuel and/or oil into the fitting marked "DIESEL" or "OIL" located at the bottom of the hammer.

* **NOTE:** Biodegradable alternatives are available from Birmingham.

Lube Oil –Fuel Pump and Oil Pump

The pumps should be oiled through the lubrication fittings, using "Hammer Pump Oil" (ISO 680), as per the maintenance chart.

USE OIL, NOT GREASE FOR PUMPS!

Greasing

Only high temperature clay based greases can be used. Zep Flex Lube grease is approved for this application. Apply the grease through the grease fittings located on the lower cylinder. In the service chart it is referred to as greasing the "Impact Block".

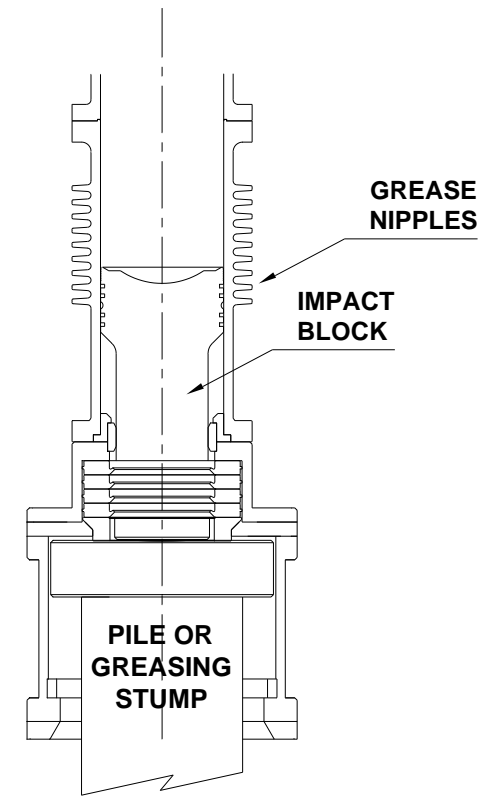
The hammer must be sitting on a pile or drive adapter to ensure the grease fittings are aligned to the correct greasing position. See pictorial.

To ensure the impact block is receiving grease, at least monthly remove the grease fittings and inspect the hammer cavities and fittings for plugging. Clean cavities and fittings and/or replace as necessary (see maintenance chart).

Notes:

Proper lubrication of the piston and impact block rings ensures maximum piston ring life and minimizes hammer bore wear. Piston ring wear can be measured by performing a Drop Time Test – see the special notes section of this manual.

If driving batter piles for an extended period, at the end of each shift, the piston must be rotated to prevent concentrated wear on the piston. This can be accomplished by inserting a lifting eye in the top of piston and rotating it or by using a piston turning tool available from Birmingham.



Hammer Throttle Control

- For first of day starts, as well as “re-strikes”, two dry drops are required (with no throttle and one injector removed). For cold starts and heavy pile batters, the piston should be lifted slowly with a slight pause above the exhaust port to allow impact block to settle on the pile.
- Fuel/oil tank vents and shut off valves must be open.
- Hammers should start around 350 PSI on the hydraulic hand pump. Lower pressures should be tried first. Higher pressures may be required in softer driving and/or starting 6505(HD) and B64 hammers (around 450 PSI).
- Maximum stroke should occur between 550-600 psi. The maximum rated stroke may not be obtainable in all driving conditions, or when the hammer heats up excessively. Fuel pump adjustment may be possible. Additionally, the throttle valve or fuel pump may need rebuilding.
- Use caution on pile “restrikes” – higher strokes may occur at lower throttle pressures. Attempt to start hammer at a lower setting.
- Release pressure on hand pump to shut off hammer.

Emergency Hammer Stop

In case the remote throttle control fails to stop hammer, lifting the hammer body approx 6” off the pile will stop the hammer.

Any occurrence of the catch cap being struck, requires the hammer to be stopped to inspect the catch cap stop edge/ring and piston catch ring, and for any necessary remedial action to be taken. The hammer must not be run with a damaged/missing piston catch ring or

chamfered/rolled/excessively sharp (cut hazard) catch cap stop edge/ring. *This is a hammer safety feature.*

Service Check List

- Check that all bolts are tight. Bolts are often line marked to facilitate visual inspection.
- Inspect the hammer for cracks, (esp. the fuel guards, guard mounts, trip slot area, tanks, gib mounts). Contact Birmingham. **Do not weld on hammer without prior consent.**
- Check that trip safety lever roll pins are in place and secure. See pin location in parts manual.
- Grease the hammer as per service chart.
- Maintain Oil & Fuel levels in tanks.
- Drain waste tank as needed and dispose of in accordance to laws.
- Observe the condition of the hammer cushion rings via the cushion housing sight holes when the hammer is not on a pile or lying horizontally, and replace when the cushion rings appear loose. See below.
- Observe the condition of the cushion materials (for drive cap helmet only) and replace when worn.
- Install weather and exhaust caps nightly and between piles during heavy rain.
- Close fuel and oil shut-off valves nightly.

Hammer abuse

Examples of abuse/neglect to the diesel pile hammer include but are not limited to:

- The piston impacting the catch cap. This is a violent impact between the pistons catch ring (on the piston) and the catch cap stop ring. This

stopping mechanism is an industry standard for diesel pile hammers and acts as a safety feature which must be inspected after each impact.

- Failing to keep the hammer sufficiently lubricated
- Continuing to run the hammer with an insufficient amount of pre-load in the hammer cushion stack.
- Failing to maintain hammer to pile alignment, which can result in the hammer riding the pile, effectively limiting the function of the cushion stack.
- Exceeding 20 blows per inch (20 blows per 2.5cm) pile penetration while driving over 40 BPM other than for pile capacity testing.
- Running the hammer below the rate of 38 blows per minute for over 20 minutes per pile on all hammer models except the 6505HD where a maximum of 40 blows per minute should not be exceeded over 20 minutes per pile.

Note: The hammer running rate is measured in blows per minute (BPM) and is a function of the physical stroke of the piston and is determined by the soil resistance at the job site.

Further hammer abuse information (cause and effect) can be found in the Hammer Operations Manual and on Birmingham’s website.

Hammer transportation

Ensure the piston and trip transportation pins (red) are re-installed before loading the hammer on the trailer. Hammers must be oriented with the drive housing facing forward (towards the trucks cabin).

Special Notes:

Braided Fuel lines – extra attention must be taken to ensure that braided fuel lines are not kinked, twisted, bent into a tight radius, or rubbing against anything, to prevent line damage. To control fuel line routing, a two-wrench tightening method must be used, whereby the fixed nut is held with one wrench to maintain line routing, while the fastening nut is tightened. Refer to Service Bulletin SB230402-1 for additional information.

Injector Clamp bolts – must be evenly torqued to 36 ft/lbs. (and not re-torqued when the bolts are hot) to prevent bolt breakage and/or injector malfunction. Refer to Service Bulletin SB250908-1 for additional information, and/or notes below the torque charts.

Piston Drop Time Test – A piston drop time test is used to check compression. The test requires measuring the number of seconds between piston disengagement and the piston coming to a complete rest. As the piston rings wear, the drop time will decrease. Routinely performing this test will give advance warning of piston rings that will be needing replacement, and replacement can be pre-planned. Generally speaking, piston ring replacement will be required when a drop time falls below 10 seconds. Upon removing the piston, inspect the bore surface finish for any excessive wear, pitting or damage and contact Birmingham for any advice on the course of action to take.

Cushion Stack Preload Inspection – For the protection of the hammer, sufficient cushion stack preload must be maintained. The pre-load deteriorates over time due to usage. To determine if the cushion stack still has sufficient pre-load, ensure the hammer is not resting on a pile (compressing the stack), and attempt to push a standard (flat) tip screwdriver into the stack, exerting approximately 50 pounds of force. If the screwdriver tip even begins to enter the stack, it's an indication the stack is in need of replacement. More details are in the Hammer Operations Manual.

HAMMER MAINTENANCE CHART

ITEM	FREQUENCY	ACTION
IMPACT BLOCK	20 MIN. **	LUBRICATE WITH ZEP FLEX LUBE , 10 SHOTS PER FITTING
FUEL & OIL PUMP	20 MIN. **	OIL WITH HAMMER PUMP OIL (ISO 680) 3-4 SHOTS PER FITTING
HAMMER GIBS	BEFORE DRIVING OR AS NEEDED	LUBRICATE WITH EP2 GREASE AS NEEDED
TRIP GIBS	BEFORE DRIVING OR AS NEEDED	LUBRICATE WITH EP2 GREASE AS NEEDED
WASTE TANK	DAILY OR AS NEEDED	DRAIN AND DISPOSE OF IN ACCORDANCE TO LAWS
REMOTE THROTTLE	WEEKLY OR AS NEEDED	FILL WITH DEXTRON II/III OR EQUAL
GREASE FITTINGS	MONTHLY	REMOVE AND INSPECT – CLEAN CAVITIES IN HAMMER AND FITTINGS AND/OR REPLACE.
PISTON DROP TIME	MONTHLY	PERFORM DROPTIME TEST TO GAGE PISTON RING WEAR
TRIP LINKAGE	MONTHLY OR AS NEEDED	LUBRICATE WITH EP2 GREASE AS NEEDED
IN-LINE FUEL FILTERS	MONTHLY OR AS NEEDED	REMOVE AND REPLACE
FUEL CARTRIDGE FILTER	MONTHLY OR AS NEEDED	REMOVE AND REPLACE
COMPRESSION RINGS	SEMI - ANNUALLY OR AS NEEDED	REMOVE AND REPLACE
CUSHION RINGS	QUARTERLY OR AS NEEDED	INSPECT PRE-LOAD TENSION - REPLACE AS NEEDED

Refer to the Hammer Manual in the toolbox for further information.

Torque Specifications - Socket Head Cap Screws

Imperial Coarse Thread

	With Nord Lock Washer	Loctite Only
SHCS Holo Krome 1960 Series A574	(ft lbs) w/ oiled threads	(ft lbs) with loctite
1/4"	13	10
5/16"	26	22
3/8"	45	38
7/16"	70	61
1/2"	109	93
9/16"	*148*	*130*
5/8"	216	179
3/4"	378	317
7/8"	607	511
1"	916	767
1 1/4"	1810	1533
1 1/2"	3140	2668

Metric Coarse Thread

	With Nord Lock Washer	Loctite Only
SHCS Holo Krome 1960 Series Grade 12.9	(ft lbs) w/ oiled threads	(ft lbs) with loctite
M8	28	25
M10	55	49
M12	94	80
M14	*150*	*129*
M16	229	200
M18	322	276
M20	450	390
M22	613	532
M24	776	674
M27	1131	989
M30	1542	1341
M33	2076	1826
M36	2680	2345
M39	3454	3038

*** Note:**

If torquing injector clamp bolts, use 36 ft. lbs. Alternate the tightening of these bolts using uniform torque so that the clamp pulls 'straight' on the injector body and does not introduce a 'bending' load – this can cause poor injector performance and excessive injector 'drip', and the possibility of injector or bolt failure.