

Down the Hole Hammer

VKP 95-1



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Preface

This operation and maintenance manual provides the drawings, parts lists and suggested procedures necessary for the operations, care and maintenance of the VKP 95-1. It is extremely important that all the suggested safety precautions, as well as user's safety rules, be followed. PERMON is not responsible for damage to equipment or personnel injury due to misuse of the equipment or disregard for safety procedures.

Principles of Operation

The VKP series of downhole hammer drills are designed for efficient operation with minimum air requirements in a wide range of air pressures. These hammers are recommended for blasthole drilling in quarries and open pit mines as well as water well and construction drilling applications. The downhole drilling method has proven to be economically effective in a wide range of rock types ranging from unconsolidated limestones to the hardest granite and quartz formations. Since the hammer force is applied directly to the drill bit, power transmission losses as are common in conventional top hole hammers are prevented.

These hammers can be used on any rig having an adequate rotational mechanism and an appropriate compressed air supply.

Specifications

Hammer Type	Connection Thread	Shipping Weight		Outside Diameter		Length without Bit		Bit Size Range	
		kg	lbs.	mm	in.	mm	in.	mm	in.
VKP 95-1	API 2 3/8" Reg. Box	22,5	49.5	81,0	3.19	790	31.10	92-105	3 5/8-4 1/8

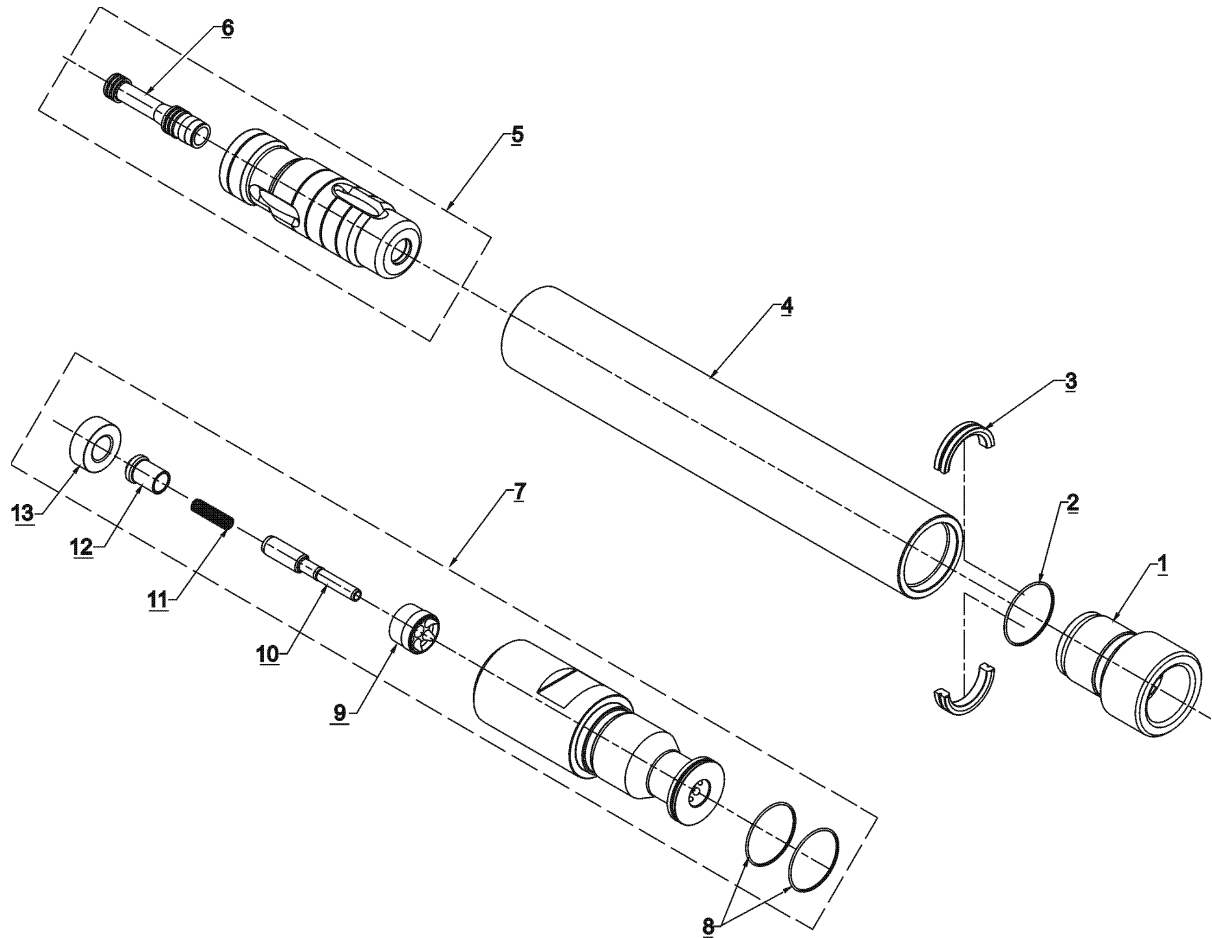
Air Consumption

6 Bar 90 PSI	9 Bar 130 PSI	12 Bar 175 PSI	15 Bar 220 PSI	18 Bar 260 PSI	21 Bar 305 PSI	24 Bar 350 PSI
3,3 m ³ /min 117 SCFM	5,2 m ³ /min 184 SCFM	7,1 m ³ /min 251 SCFM	9,2 m ³ /min 325 SCFM	11,6 m ³ /min 410 SCFM	13,7 m ³ /min 484 SCFM	16,2 m ³ /min 572 SCFM

Impact Rate

6 Bar 90 PSI	9 Bar 130 PSI	12 Bar 175 PSI	15 Bar 220 PSI	18 Bar 260 PSI	21 Bar 305 PSI	24 Bar 350 PSI
1490/min	1830/min	2100/min	2320/min	2530/min	2620/min	2710/min

Parts List



REF.	PART NO.	PART NAME
	9550210	HAMMER COMPLETE
1	2148180	CHUCK VKP 95-1
1	2148200	CHUCK IR3,5 (OPTIONAL)
2	273109	O-RING 55X2
3	2361120	SPLIT RING VKP 95-1
3	2361510	SPLIT RING IR3,5 (OPTIONAL)
4	4342580	CYLINDER
5	5009200	PISTON COMPL.
6	722090	PISTON VALVE
7	5100060	BACKHEAD ASSEMBLY
8	273068	O-RING 55X3
9	2023350	PLUG
10	4325190	VALVE PIPE
11	4501380	SPRING
12	8140010	VALVE
13	273408	CHECK VALVE SEAT
-	414279	PLUG API 2 3/8"

Safety Precautions

The following safety precautions apply to all drilling equipment supplied by PERMON s.r.o. including the VKP 95-1 and the bits discussed in this manual.

Personnel must become completely familiar with the proper procedures and safety precautions before operating and maintaining the hammers and bits.

Failure to comply with safety precautions can result in serious or fatal injury to personnel, and improper operation and maintenance can cause equipment damage or excessive wear on the hammer and bit.

- Wear proper clothing. A hard hat, work gloves, safety shoes, eye and ear protection are required. Don't wear loose clothing that can get caught in the equipment.
- Wear goggles. Safety glasses are required. Loose chips, rock and dust are blown into the air during drilling. Also, wear safety glasses when sharpening bits.
- Protect lungs. Wear a respirator to keep from breathing or ingesting dust, especially if drilling without water or foam injection.
- Do not drop the hammer or bit. This equipment is very heavy. Handle it with care. In addition, auxiliary lifting equipment is suggested.
- Know the drilling formation. Exhaust air and hydrocarbons can form an explosive mixture under certain drilling conditions. If the drilling formation is known, proper precautions can be taken to avoid potential danger.
- Respect the equipment. Do not operate the hammer at excessive pressures or speeds. Follow the instructions in this manual and use the suggested procedures for operation and maintenance.
- The bit can drop out of the chuck by as much as 1" (25 mm). Caution is recommended when handling the hammer in order to prevent body parts, such as hands and fingers, from being pinched between the chuck and bit.

Preparation for Drilling and Drilling

Each hammer is assembled and tested before shipment. The hammer is shipped with all joints hand-tight.

It is suggested that all personnel operating, handling or maintaining the hammer become completely familiar with the hammer and bits, and the instructions in this manual.

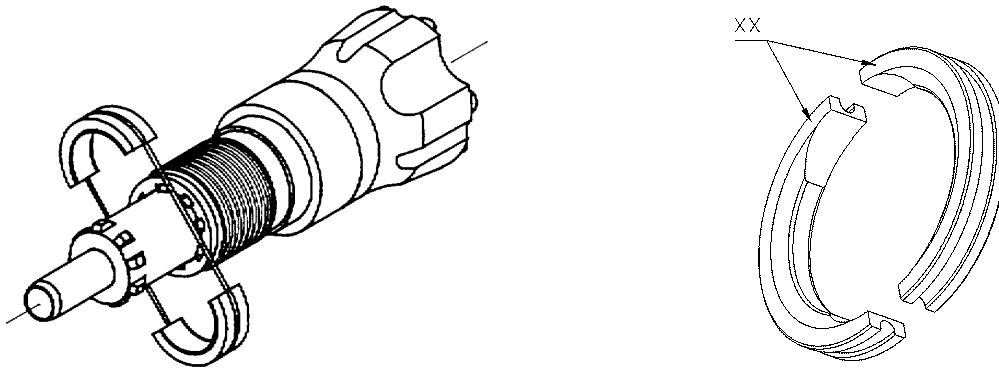
When handling the hammer and drill pipe, always keep the inside pipe and threads covered to prevent dirt, rust, scale or other objects from entering the hammer or the drill pipe.

Always use the proper wrenches, tools and procedures when handling the hammer or changing the bit.

All thread connections must be coated with thread compound (copper, metallic zinc or graphite) before the hammer is assembled and operated. Do not allow thread compound, dirt or wire brush to fall into hammer.

Important: Do not use bent joints of pipe. This cause uneven hammer wear and premature bit failures. If the joint does not shoulder easily, check the threads.

Lubricate the bit splines. Place chuck over bit followed by O-ring and split ring. Check that both parts of the split ring are positioned number to number and that the serial numbers are the same.



Screw the chuck/bit assembly into the cylinder hand-tight before using power make-up.

Tighten the hammer securely to the drill pipe by applying a wrench to the flats of the hammer's backhead and rotate slowly using the rig's rotational action.

Insure the lubricator is working properly and has fully coated the drill pipe ID.

Lower the hammer slowly until the bit contacts the rock and the piston starts operating.

Important: Wear gloves at all times when guiding the hammer into the hole to protect hands. Follow all safety precautions.

When drilling a new hole, add just enough hold-down pressure to start breaking rock. When drilling through loose surface material, avoid running the hammer at high air pressures as this will tend to blow the hole apart.

After a few feet of drilling, increase the total weight on the bit until the hammer runs smoothly. The air pressure will rise slowly, then stabilise.

Caution: Always apply the air and start rotation before putting weight on the bit to avoid damaging the bit.

Additional weight on the bit will not appreciably increase the penetration rate, but will lead to greater carbide and hammer wear.

Lubrication

Correct lubrication during drilling operations is extremely important. Inadequate lubrication is a major cause of hammer wear and failure. Use rock drill oil only.

When new VKP 95-1 DTH hammer or drill pipe are put into use, it is recommended that 1/4 a quart (0.25 ltrs) of oil be pured into the new hammer or each pipe to give them a good coating of oil and to prevent the hammer from running dry at any time.

The recommended amount of rock drill oil for reliable operation 0.08 quarts per hour per 100 CFM (0,15 litres per hour per m³/min).

Check oil levels each shift. Monitor oil delivery to hammer by looking at oil dripping from bit after each hole is drilled.

Hammer will not be damaged by too much oil. It can be damaged by not enough oil.

Recommended environmentally friendly rock drill oils for lubrication:

SETUZA PRIMOL EKO

ÖMV BIOHYD M 32

TOTAL HYDROBIO 46

BP BIOHYD SE46

Weight on Bit

For efficient drilling it is important that the bit carbides are in contact with the rock at the time of impact. The weight on bit must be sufficient to overcome the vibration of the hammer and hold the bit against the rock. Figure 1 shows the required weight on bits.

Important: The weight on bit must be maintained throughout the drilling operation. As the hole gets deeper and drill pipe is added, the hold-down pressure must be reduced to compensate the added weight of the pipe.

Figure 1. Minimum Total Weight on Bit

6 Bar 90 PSI	9 Bar 130 PSI	12 Bar 175 PSI	15 Bar 220 PSI	18 Bar 260 PSI	21 Bar 305 PSI	24 Bar 350 PSI
170 kg 374 Lb.	250 kg 550 Lb.	330 kg 726 Lb.	410 kg 902 Lb.	490 kg 1078 Lb.	570 kg 1254 Lb.	650 kg 1430 Lb.

Rotation Speed

Proper rotation speed is important for long bit life and good penetration. The recommended speed ranges from 10 to 70 RPM, with the slower rotation used in hard, abrasive formations and the faster rotation in soft, non-abrasive formations.

Do not use high rotary speed. Using too high of a rotary speed leads to scuffing or breakage of the carbide inserts on the drill bit. Adjust the rotation to obtain the best drilling rate and to minimise the wear on the bit.

Suggested Operating Procedures

Maintain good hold-down pressure on the hammer and insure that the hole is being cleaned.

In certain formations, the hammer will hit a soft band of material and drill quickly. Often, the drill's feed system is not able to cope with a sudden change because it allows the oscillating piston to strike the bit when it is not in contact with the rock. This magnifies stress to the bit. To avoid damaging the bit, drop the operating pressure and let the hammer tap its way through the soft material.

If there is a drop-off in the size and volume of cuttings or an air pressure build-up while the hammer is operating at a normal rate, raise the hammer without turning off the rotation and work the hammer up and down to assure that the hammer and pipe are free and the hole is clean before continuing to drill.

Cracks in the formation may cause the hammer to bind in the hole. Raise the hammer, clear the hole with air and work the hammer up and down to assure that the hammer and pipe are free before continuing to drill. Rotate slowly and feed the hammer down the hole slowly to resume drilling.

If the top of the hole craters, and cuttings and debris fall into the hole from the surface, install a short length of casing in the hole. Allow the casing to extend 6 to 8 inches (15 to 20 cm) above the surface and pack rags, clay or dirt around the outside of the casing.

When the rotation stops, the hammer will continue to hammer unless the hammer is raised off the bottom. If the hammer is not raised off the bottom, the bit carbides will become buried in the formation. Severe damage to the bit can occur if rotation is resumed without first raising the hammer and bit.

Very rough rotation can be caused by a dull bit or certain rock formations.

When drilling deep holes, thoroughly flush the hole at the end of the drill pipe before adding another joint. Lift the hammer for about 4"-6" (10-15 cm) and apply full air pressure. If the hammer strikes continue pulling back out of the hole. Failure to flush the pipe can allow cuttings to fall back to the bottom of the hole and sometimes into the hammer.

Keep the drill bit carbides always sharp to keep the maximum penetration rate, avoid bit breakage and reduce hammer overload.

Important: Do not reverse rotate the drill pipe due to the danger of unscrewing either the drill bit or pipe connections.

Disassembly

Caution: Never apply heat of any type or weld breakout tabs on any part of the hammer. Never strike or impact the cylinder or thread connections or damage could occur. Always use tongs with jaws that place a uniform load on the outside diameter of the hammer. Never grip with pipe wrenches that can deform and damage the hammer

Clamp the hammer in tongs with cylindrical jaws (refer Figure 2 for correct placement of cylindrical tongs or clamps). Placement of tongs on any other area of the cylinder except where indicated can cause severe damage to the cylinder. Make sure the tongs are held perpendicular to the piston case when loosening the chuck or backhead, otherwise the tongs can dig into, and damage the piston case. Place the bit breaker on the bit and unscrew the chuck with the bit and using wrench 65 mm the backhead assembly.

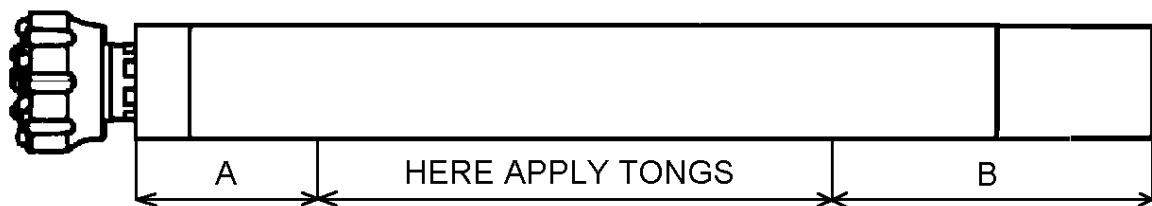


Figure 2. Dimensions for Tong placement

A	185 mm / 7.3 inch	B	315 mm / 12.4 inch
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Remove the piston from the top of the cylinder. Be careful, do not damage the plastic piston valve.

Disassemble the backhead assembly. Remove the rubber check valve seat, check valve and spring.

Assembly

Important: Before assembling the hammer, insure all components are inspected and restored to the best possible condition or replaced, if needed.

Insure all components are thoroughly cleaned to remove any residual emery dust, steel flings or corrosion. Thread lubricant **MUST** be used on all threaded connections and bit shank and splines. Coat all new or reworked components with rock drill oil. When the hammer is put back into service, this coating protects parts, until the line oil starts injecting the proper amount of oil into the air stream. All threaded joints must be properly tightened before returning the hammer into service. With the hammer assembled and immediately before returning to service, pour - for some rock drill oil into the hammer. Fill the level of the backhead, then release the check valve allowing the oil to flood the hammer.

Storage

Disassemble the hammer completely.

Thoroughly clean and repair all components.

Reassemble the hammer immediately, keeping the joints loose.

Coat the entire hammer, OD and ID, with a light film of rock drill oil. Coat all threads with thread lubricant.

Install thread protectors.

Seal each end of the hammer to keep dirt and dust out of the hammer.

Always store the hammer in a suitable protective container in a dry location.

Grease the bit shank.

Place a protective cover on top of the bit to prevent foot valve breakage.

Always store the bit in a suitable protective container in a dry location.

PERMON s.r.o.
Roztoky 217
27023 Krivoklat
Czech Republic

Tel.: +420 313 558 145
Fax: +420 313 558 313
Email: export@permon.cz
www.permon.cz