

A.P.I.: (American Petroleum Institute) used to designate the type of tapered thread used on many tools.

AS4: air system — 4" (10 cm)

AS6: air system — 6" (15 cm)

Bar-cutter: very aggressive open or cutter-style reamer with large, carbide-coated cutters and straight paddles. Offers great mixing action; best in hardpans and chalky, dry-compacted soils. Not recommended for use in sticky clays, rock or rocky conditions.

Bell reamer w/ teeth: a packer-style reamer with replaceable rotary carbide teeth. Is a bell shape to push cuttings and fluid to the outer bore wall. Works in most soils; is best in small cobble, 3" (8 cm) and under.

Carrot-puller: is a tapered pulling eye with a "thread" that grips the inside of the product. Attaches to the swivel via a shackle.

Chevron II bit: features two chevron-shaped tips with carbide edges that provide better performance in soft shales, hardpan and caliche.

Clevis/Eye swivel: this swivel has a double eye plate or "yoke" that attaches to a reamer on one end and a single eye plate that attaches to product on the other.

Crossover adapter subs: used to crossover between two different thread styles or joint connection styles

Cutter/Mixer-type reamer: open-type reamers, including the Vermeer wing-cutter, bar-cutter, helical, super helical and helical plus.

Double clevis swivel: this swivel has a reamer on one end and a double eye plate or "yoke" that attaches to product on the other end.

Drill bit: attaches to the drill head; is the component that cuts through the ground. It is also responsible for steering the head and mixing drilling fluid during the pilot bore.

Drill head: the piece that attaches at the front of the drill string; houses the transmitter. The bit mounts on the head.

Drill stem maintenance kit: this kit has everything you need to clean up your stem for inspection. A triangular file is included for minor dressing of the pin end to repair small nicks or imperfections.

Drill stem: a length of tubular steel that is fed into the bore hole. Stems are built with threaded ends that allow multiple stems to be connected. Stems are added as drilling distance increases. The stem is also used to introduce drilling fluid to the bore hole through its hollow center. Vermeer uses one-piece forged drill stem for greater integrity. Vermeer offers FIRESTICK I and FIRESTICK II drill stem.

Drive chuck: one end of this component attaches to the output shaft of the rotation gearbox, the other end attaches to the drill stem.

Econo bit: is a tough and economical, heat-treated, cast steel bit with carbide hardfacing along its edges for long life in abrasive conditions. Not recommended for use in hardpans or rocky conditions.

End-load/end-load heads: end-load refers to a method of inserting or removing a transmitter. An end-load head is two or three pieces, and you must break either the front or rear section apart from the housing to access the transmitter. The Vermeer mini-head and end-load head fall into this category.

GLOSSARY

End-load head: The end-load head is designed for use with wireline and extended-life (four battery) transmitters. The head has three pieces that thread together: the front bit mount sub, the transmitter housing and the rear connection sub. The transmitter is accessed by unthreading the rear connection sub and inserting or removing it from the transmitter housing.

Expanding taper and sleeved taper-puller: product is slid over the jaws and then the jaws are expanded by twisting the pulling eye. This pushes the jaws outward and they “bite” into the product from the inside. A sleeved puller works the same way, but an outer sleeve protects the product and grips it from outside as well as the inside.

FIRESTICK II: the type of thread used on newer NAVIGATOR drill stem. First seen on the D33x44, it's an improved version of FIRESTICK I with an improved shoulder, locking threads and larger inside diameter and outside diameter at the upset.

FIRESTICK I: the type of thread used on original version NAVIGATOR drill stem. It's a tapered, double-shouldered, torque-up-type thread.

Fluted reamer: flutes help to “pump” slurry past the reamer; features your choice of shark or rotary teeth, with or without built-in swivel. Designed for use in sand, it can also be used in most soils. Not intended for use in solid rock.

Hardface bit: features tough, heat treated plate steel bit with carbide hardfacing along its edges. 1" (25 mm) thick for D16x20 – D40x40; 1.25" (32 mm) thick for D50x100 – D80x120; available with optional center pullback hole.

Helical plus reamer: is a helix of bars loaded with carbide shark teeth. Is an aggressive, low-torque, open/cutter-style reamer. Added length and horseshoe-shaped paddles create better slurry than other reamers. Works great in most soils, sand and clay. Not recommended for use in rock or rocky conditions.

Helical reamer: is a helix of bars loaded with carbide shark teeth. Is an aggressive, low-torque, open/cutter-style reamer. Works great in most soils, sand and clay. Not recommended for use in rock or rocky conditions.

Hex collar connection: the joint between the starter rod and tooling (drill head, reamer, etc.); is made up by threading the pieces together, then sliding a hex collar over the hex portion of the starter rod and the tool. A socket head set screw retains the collar. The threads are intended to handle tensile loads (pulling forces), the hex collar is intended to handle torsional loads (torque).

Hole-opener: a roller-cone-style, “split-bit” rock reamer that is designed to open up the pilot hole in rock formations. TCI roller-CONEs are utilized for medium to hard rock; mill teeth are available for soft rock and hardpans.

LPT/Hex or ITS/Hex: low-profile thread; used on Vermeer tool spuds with a hex collar-type of joint.

Mini-head: this head is designed specifically for compact class Vermeer HDDs (PL8000 – D10x15). Its extremely small size allows highly aggressive steering and requires the use of a mini-transmitter (which is loaded from the front end). Intended for use in service installations (curb-to-house, shallow, short installations of 2" (5 cm) OD or less product). Attaches to the drill stem.

Mud Motor: Pilot boring head utilizing a tricone bit that is powered by the fluid flow.

Multi-duct-puller: a bell-shaped tool with multiple attachment points. Is used to install multiple products in one operation.

Packer-type reamer: full-body-type reamers. Technically, all Vermeer reamers cut a larger hole than the OD of the body, although they pack more than they cut. Vermeer reamers that fit this category are the fluted, spiral, bell and wing/bell reamers. This class of reamer will likely withstand tougher conditions than a cutter-type class of reamer.

Pull grip: steel mesh, open at one end with a loop on the other. Also referred to as “Chinese fingers”— they are slid over the outside of the product and their grip tightens as they are pulled (the harder you pull, the tighter they get). The loop is attached to swivel using a shackle.

Pullback sonde housing: used to locate the reamer; can be positioned behind the reamer or in front of it.

Reamer: A tool that is used to open a hole large enough to install a product.

RockFire hammer: air-powered rock-drilling head is used with various bits for different types/hardness of rock formations. Available as the AS4 — a 4" (102 mm) tool for D24x33 – D40x40, or as the AS6 — a 6" (152 mm) tool for the D50x100 – D80x100.

Rod recycler: used when pre-reaming (i.e. the final reamer size to be used will be 14" [36 cm], so you would pull through a 10" [25 cm] reamer before pulling the 14" [36 cm]). Attaching the rod recycler behind the 10" (25 cm) reamer allows you to pull drill stem in so that you don't have to push the reamer back through the bore hole.

Roll pins: made from a high-grade, coiled, stainless, spring-steel; are used in the Splinelok I and Splinelok II joints. In the Splinelok I joint they are used to keep the two pieces from pulling apart, in the Splinelok II joint (and lid) they are used to lock the solid steel pins in position. Roll pins are also used to attach the various TriHawk Bits secure lids on same Drill Heads.

Rotary tooth: a carbide-tipped-CONE-shaped cutting tooth.

RS6/RS8: rotary system; a 6" (152 mm)/8" (203 mm) rotary tri-cone rock-drilling head. Powered by standard Vermeer NAVIGATOR drill stem. R56 available for D24x40 – D40x40. Cuts an approximate 7" (178 mm) hole. RS8 available for D50x100 - D80x120. Cuts an approx. 8.75" (222mm) hole.

Shackle: horseshoe-shaped with a pin or bolt through open end; is used to attach the product to the swivel. Also referred to as a clevis.

Shark bit: short, rounded bit with carbide shark teeth mounted along its front and sides, and carbide hardfacing along its edges. Is an aggressive bit with good abrasion resistance. Works best in hardpans and dry/compacted soils, and in some softer rock formations.

Shark tooth: a carbide-tipped, chevron shaped cutting tooth.

Side-load/side-load head: refers to a method of inserting or removing a transmitter. A side-load head has a lid or cover that is attached to the side of the housing. By removing this cover, the transmitter can be accessed. Vermeer heads in this category include the standard drill head, Splinelok dirt heads and TriHawk heads.

Single eye swivel: this swivel has threads on one end that attach it to the reamer; the other end has a pulling eye.

Solid steel pins: are made from a high-grade, heat-treated steel alloy; are used in the Splinelok II joint to keep the two pieces from pulling apart. Also used on Splinelok dirt heads and TriHawk heads to attach the lid to the housing. Solid steel pins have one or two shallow grooves cut around them. These grooves are where the roll pins engage to lock into position.

Spiral reamer: features a long, tapered body with spiral flighting and shark teeth. Is an excellent choice for use in cobble. Not intended for use in solid rock.

Splinelok I and II connection: the joint between the starter rod and tooling (drill head, reamer, etc.) is made without threads. Tooling has a male and a female side that mate together. Teeth are cut into both the male and female pieces to mate them up in order to transfer torque; the joint is locked together using multiple pins — either roll pins or a combination of solid steel pins and roll pins.

Spud: the joint end of a tool; can be threaded or Splinelok.

Standard dirt bit: a tough and economical heat-treated bit that works well in most non-abrasive, non-rocky, soft/loose soils. Available with optional center pullback hole.

GLOSSARY

Standard drill head: Vermeer standard drill heads are of the side-load design to allow quick and easy access to the transmitter. All Vermeer standard drill heads are matched with the capacity of the machine they are used with. Intended for use in conditions ranging from soft, loose soils to some shale (when equipped with the proper bit). Can be ordered with the hex collar or Splinelok connection for the PL8000 – D40x40; the head connects directly to the drill stem on D50x100 and larger machines.

Starter rod: allows the installation and removal of tooling without the use of breakout wrenches — by means of either a threaded connection with a hex collar, or by a Splinelok I or II system. The hex collar style joint requires the removal of one small bolt, sliding the collar and unthreading the joint by hand. The threadless Splinelok system requires the use of a hammer and punch to remove the pins, then the joint simply slides apart.

Sub saver: is attached between the drive chuck and drill stem on some machines; this is the high-wear link that helps the drive chuck last longer.

Super flute: is a high flow reamer with heat-treated casting for improved wear, increased flute volume, with rotary or shark teeth in various diameters, a swivel or through shaft, additional cutting and improved teeth performance, and a through shaft design for added strength and integrity. It's also rebuildable and has enhanced connection options.

Super helical reamer: a bar-cutter and helical reamer combined. Works great in most soils, sand and clay. Not recommended for use in rock or rocky conditions.

Swivel: attaches between drill string/tooling and product to keep the product from rotating. All Vermeer swivels are matched to each class of NAVIGATOR HDD.

Thread profile gauges: used to inspect thread wear; by placing gauge on thread, you can see if there are imperfections or uneven wear.

Transition adapter subs: used to crossover between two different thread styles or joint connection styles.

Tri Cone Bit: Three roller cones, with either Mill Teeth (machined steel) or TCI (tungsten carbide inserts) for drilling rock.

TriHawk head: is designed as a modular pilot-boring system. By having different types of bits that are easily exchanged and an A.P.I. Reg. (box) thread in the rear of the side-load housing, the TriHawk head can be used in many different types of conditions — even in some soft-medium types of rock (when equipped with the proper TriHawk bit). The lid is attached using a combination of solid steel pins and roll pins; the bits are attached with roll pins — no bolts mean no stripped threads or chance of cross-threading. Can be ordered with the hex collar or Splinelok connection for the PL8000 – D40x40; the head connects directly to the drill stem on D50x100 and larger machines

TriHawk I bit: is designed for good all-around performance in most soils, including dry/compacted soil, cobble, broken formations and soft rock. The TriHawk I bit has three replaceable carbide teeth that are available in different lengths. The longest teeth are the most aggressive and offer the deepest penetration — especially in softer rock. The angle of the teeth produces a smooth cutting action — transmitting less vibration through the drill stem. Offers boltless attachment to the housing via a square-drive Splinelok connection. Available for the D16x20 – D80x120.

TriHawk II bit: is designed for use in hardpans, caliche and some shale. Two long, widely spaced carbide teeth offer excellent penetration. Offers boltless attachment using a combination of T-slots and roll pins. Bit mounts to the housing via a square-drive Splinelok (D16x20 – D80x120 only) connection. Available for the PL8000 – D80x120.

TriHawk III bit: two large, carbide teeth provide aggressive cutting action and last longer than smaller teeth. The tooth angle, the fluid port placement and a large steering surface area allows this the bit to work well in a wide variety of conditions — from soft soils to soft/medium rock. Features carbide hardfacing for abrasion resistance; hardfacing can be easily re-applied to rebuild the bit economically and locally. Offers boltless attachment to the housing via a square-drive Splinelok connection. Available for the D16x20 – D80x120.

TriHawk IV bit: is designed for use in heavy, overburden cobble and fractured rock. Chisel carbides cut and crush the chips to provide annular space for the housing. Carbide hardfacing along its leading edge provides abrasion resistance and helps to prevent tooth washout. Offers boltless attachment to the housing via a square-drive Splinelok connection. Available for the D16x20 – D80x120.

TriHawk V bit: is specifically designed to provide controlled directional drilling in most soils, loose cobble, loose fill and hardpan. With a unique, cup shape, the leading edge of the bit tapers towards the bit's trailing edge — this is the key to its performance. Chisel carbides along the leading edge provide some penetration and allow the bit to drill through the hardpans; carbide hardfacing along the wear edges provide abrasion resistance and can also be easily re-applied to rebuild the bit economically and locally. Offers boltless attachment to the housing via a square-drive Splinelok connection. Available for the D16x20 – D80x120.

Universal Sonde Housing: Vermeer delivers unmatched ease and versatility on HDD jobsites, and meets virtually all HDD requirements with Universal Transmitter Housing. Its side-load design provides easy access to electronics, and the housing is wire-line compatible for long bores or areas with high interference. It features a unique sonde clocking design and a patent pending system for sonde pitch alignments. High fluid is ideal for use with mud motors.

Upset: the “bulge” at either end of the drill stem; is where the vise jaws grip when making up or breaking out joints.

Upset gauges: used to measure wear on drill stem. If you can slide the gauge over the upset of the drill stem, it means that you have worn .125" (3.2 mm) off of the OD of the stem and the joint strength will be compromised — it's time to replace it.

VCP bit: Vermeer Carbide Point — made from heat-treated 4140 plate steel, a pointed shape aids performance; features multiple carbide buttons along its wear edges for longer life. Works well in most soils and in some fractured formations.

VCT bit: Vermeer Carbide Tip — made from heat-treated 4140 plate steel; features multiple carbide buttons along its wear edges for longer life. Works well in most soils and in some fractured formations

VCTT bit: Vermeer Carbide Twin Tooth — the most aggressive plate bit available. Features twin large carbide teeth at the tip for penetration and hardfacing and carbide buttons along its edges. This bit can be used in most soils and in some softer rock formations.

Wing-cutter: aggressive, steep bars loaded with replaceable rotary carbide teeth make this a great low-torque reamer. 8" (203 mm) and larger wing-cutters have a support ring that tie the cutter bars together for added strength. Works great in most soils, sand and clay. Not recommended for use in rock or rocky conditions.

Wing/Bell reamer: wing-cutter bars followed by a bell that pushes the cuttings and fluid out toward the bore wall. Works great in most soils and sand. Not recommended for use in rock or rocky conditions.