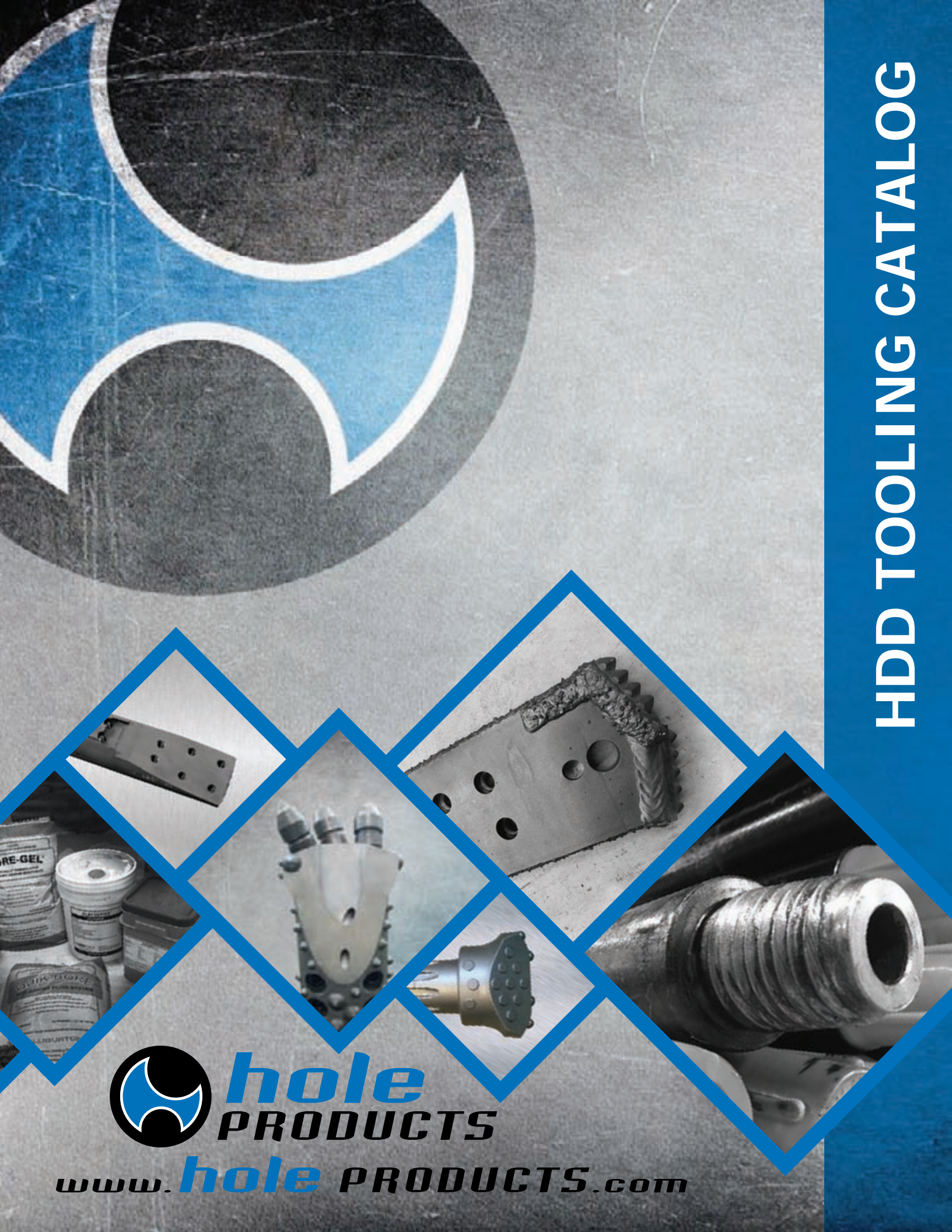


HDD TOOLING CATALOG



**hole**  
PRODUCTS

[www.holeproducts.com](http://www.holeproducts.com)



## OUR LOCATIONS

### Arizona

Toll free (844) 836-6225  
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Fax (480) 626-2822

### California

Toll free (844) 573-0854  
Phone (909) 939-2581  
Fax (909) 891-0434

### Florida

Toll free (877) 544-4211  
Phone (407) 792-2670  
Fax (407) 286-2956

### Georgia

Toll free (888) 448-4430  
Phone (770) 279-8755  
Fax (770) 279-8499

### Minnesota

Phone (320) 616-0701  
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### Missouri

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Phone (314) 282-2740  
Fax (314) 770-0687

### New Jersey

Toll free (888) 379-0371  
Phone (862) 254-8000  
Fax (862) 210-6000

### Wisconsin

Toll free (888) 465-3704  
Phone (715) 842-0000  
Fax (715) 842-5999

## INDUSTRIES & MARKETS

### DIRECT PUSH - PROBE

A full line of Geoprobe® compatible direct push tooling and accessories innovatively designed and manufactured to provide consistency, durability, and longevity. Large inventory, multiple stocking locations, local delivery, and global logistical solutions.

### ENVIRONMENTAL & GEOTECHNICAL

Auger tools, rods and subs, bits, sampling equipment, well completion products, and more. One call for all of your environmental and geotechnical product needs.

### GEOTHERMAL

Our IGSHPA certified staff can provide quality products and solutions for both geothermal installations and geothermal drilling.

### HDD

A full line of Ditch Witch® and Vermeer® compatible HDD drilling tools and accessories, backed by second to none service and support.

### MINERAL EXPLORATION

Quality, innovative tooling, and accessories to support all methods of exploratory drilling. Large on-hand inventory and worldwide shipping capabilities.

### ROTARY

A vast inventory of tooling and accessories to service air, mud, and reverse circulation rotary drilling operations.

### SONIC

World class tooling, designed and manufactured specifically to withstand the rigors unique to sonic drilling. On-site solutions you just can't find anywhere else.





# HORIZONTAL DIRECTIONAL DRILLING TABLE OF CONTENTS

<b>HORIZONTAL DIRECTIONAL DRILLING OVERVIEW</b> .....	<b>4</b>
<b>DITCHWITCH® HDD TOOLS</b> .....	<b>5</b>
• Transmitter Housings & Covers .....	6
• Tail Pieces .....	7
• Replacement Bolts .....	7
• Water Nozzles .....	7
• Drive Collars .....	8
• Drive Chucks .....	8
• Transition Rods .....	9
• Cross Over Subs .....	9
• Drill Rods .....	10
• Power Pipe Drill Pipe .....	10
• Rod Wipers .....	11
• Breakout Jaws .....	12
• Paddle Bits .....	14-18
• Paddle Bit Bolts & Hex L-Keys .....	18
<b>VERMEER® HDD TOOLS</b> .....	<b>19</b>
• Transmitter Housings & Covers .....	20
• Tail Pieces .....	21
• Replacement Bolts .....	21
• Water Nozzles .....	21
• Drive Collars .....	22
• Drive Chucks .....	23
• Starter Rods .....	24
• Saver Subs .....	25
• Cross Over Subs .....	25
• Drill Rods .....	26
• Rod Wipers .....	27
• Breakout Jaws .....	28
• Paddle Bits .....	30-34
• Paddle Bit Bolts and Hex L-Keys .....	34
<b>BACKREAMERS</b> .....	<b>36</b>
• Reamer Replacement Parts .....	37
<b>TRICONE BITS</b> .....	<b>38-39</b>
<b>PULLING EQUIPMENT</b> .....	<b>40</b>
• Directional Drilling Swivels .....	40
• Clevis By Clevis Pullback Swivels .....	41
• Bolt-On Pullback Swivels .....	41
• Innerduct Pulling Eyes .....	42-43
• Pulling Eyes .....	44
• Shackles .....	44
• Pulling Slings .....	45
• Pulling Grips .....	45

# HORIZONTAL DIRECTIONAL DRILLING TABLE OF CONTENTS

<b>MINCON® HDD DRILLING SYSTEMS .....</b>	<b>46-49</b>
<b>RAILHEAD® UNDERGROUND PRODUCTS .....</b>	<b>50</b>
• Incredibit® Rock Bits & Sonde Housings .....	51
• Endurance™ Sonde Housings .....	52
• Endurance™ Paddle Bits.....	53
• Direct Bore Housings & Bits.....	54
• EXTReam™ Reamers & IncrediPull Pullers .....	55
<b>GRUNDOMAT® PIERCING TOOL .....</b>	<b>56-57</b>
<b>DRILLING FLUIDS, ADDITIVES, GROUTS &amp; EQUIPMENT .....</b>	<b>58</b>
• Baroid® Drilling Fluids .....	59
• Cetco® Drilling Fluids .....	60
• Additional Drilling Fluids.....	60
• Baroid® Additives.....	61-62
• Cetco® Additives.....	63
• Thread Compounds .....	64
• Dope Brushes.....	64
• Mud Scale/Balance .....	65
• Marsh Funnel and Measuring Cup .....	65
• Sand Content Test Kit .....	66
• Test Strip Indicators.....	66
• Mini-Mud Desander.....	67
• Pumps & Spares.....	68
• Mud Cleaning Systems .....	68
<b>ACCESSORIES.....</b>	<b>69</b>
• Alturnamats® .....	69
• Tracer Wire .....	70
• Soil Probes.....	70
<b>HDD THREAD REFERENCE GUIDE .....</b>	<b>72-75</b>

## HORIZONTAL DIRECTIONAL DRILLING

Horizontal directional drilling, commonly referred to as HDD, is a steerable, trenchless drilling method most commonly used for installation of underground utilities. HDD makes drilling under roads, lakes, or difficult terrain possible and reduces the impact on the environment and infrastructure.

To service the horizontal and directional drilling market, we provide a full line of Ditch Witch®, Vermeer®, and TT Technologies compatible HDD drilling tools and accessories, backed by second to none service and support.

Our comprehensive line of HDD tooling includes transmitter housings, tail pieces, drive chucks, cross over subs, saver subs, drill rods, bits and blades, reamers, hard rock systems, quick disconnects, rods, swivels, pipe and cable pullers, tracer wire, drilling fluids and much more.

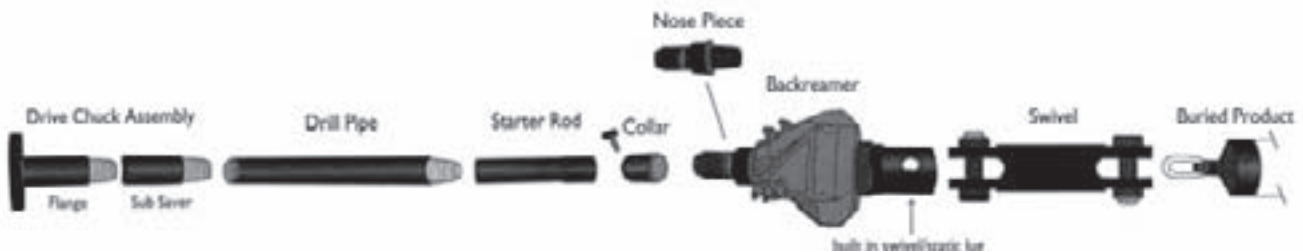
In addition, we offer a full line of pneumatic piercing tools for pit launching applications.

Products listed in the catalog are representative of the most common industry sizes and styles. Please contact your Hole Products representative for additional product details and ordering assistance.

### HDD Pilot Bore Drill String Diagram



### HDD Backreaming Drill String Diagram



*The above diagrams are designed as a reference guide only. Drill string configurations may vary depending on the drill manufacturer. Contact your local Hole Products representative for specific details on drill string components and assemblies.*



**DITCHWITCH® COMPATIBLE HDD TOOLS**  
PAGES 6 - 18

# DITCH WITCH® SIDE-LOAD, BOLT-ON TRANSMITTER HOUSINGS

## FOR DITCH WITCH® SUBSITE® BEACONS

Side-Load bolt-on transmitter housings are available for use on all Ditch Witch® drill rig models.

The side load feature provides quick and easy field installation and removal of transmitter sonde and batteries. All sizes feature:

- Replaceable tailpieces to increase the longevity of the housing.
- Heat treated replaceable nozzles for maximum durability and steering.
- Compatible with all styles of OEM type bolt-on pilot bits (paddle bits).

Please contact your Hole products representative for additional details.

DITCH WITCH® COMPATIBLE TRANSMITTER HOUSING FOR 86B				
PART #	DRILL RIG MODEL	HOLE PATTERN	O.D.	CONNECTION
2815076	JT920, JT920L, JT921, JT922, JT1220, JT1720, JT1720 MACH 1, JT2020	6 HOLE	2.750"	2" IF BOX
2815040	JT2720, JT2720 MACH 1, JT3020, JT4020, JT4020 MACH 1	6 HOLE	3.250"	2 3/8" API REG BOX
2815080	JT2020, JT2720	5 HOLE	3.25"	2 3/8" API REG BOX
2815141	JT4020 MACH 1, JT7020 MACH 1, JT8020 MACH 1	6 HOLE	4.25"	2 7/8" API IF BOX



## REPLACEMENT COVERS

DITCH WITCH® COMPATIBLE REPLACEMENT COVERS		
PART #	DESCRIPTION	FITS PART #
2815087	JT920, JT920L, JT921, JT922, JT1220, JT1720, JT1720 MACH 1, JT2020	2815076
2815089	JT2720, JT2720 MACH 1, JT3020, JT4020, JT4020 MACH 1	2815040
2815088	JT2020, JT2720	2815080



## TAIL PIECES FOR DITCH WITCH® HOUSINGS

Tail pieces or housing adapters are expendable subs designed to extend the life of the transmitter housing and allow for the use of multiple threads on a single housing. All tailpieces are manufactured from heat treated chrome-moly steel for maximum durability.

DITCH WITCH® COMPATIBLE TAIL PIECES			
PART #	DRILL RIG MODEL	CONNECTION	NET WT.
2815085	JT920, JT920L, JT921, JT922	EZ-2 BOX x 2" IF PIN	9.0 lbs.
2815090	JT1220 MACH 1	EZ-2 BOX x 2" IF PIN	10.0 lbs.
2815095	JT1720, JT1720 MACH 1, JT2020 MACH 1	EZ-2 BOX x 2" IF PIN	15.0 lbs.
2815096	JT2720	EZ-2 BOX x 2 3/8" API REG PIN	15.0 lbs.
2815105	JT2720 MACH 1	EZ-2 BOX x 2 3/8" API REG PIN	15.0 lbs.
2815110	JT3020 MACH 1	EZ-3 BOX x 2 3/8" API REG PIN	14.0 lbs.
2815115	JT4020 MACH 1	EZ-2 BOX x 2 3/8" API REG PIN	15.0 lbs.
2815097	JT9290, JT920L, JT921, JT922	1.41" - 6" PIN x 2" IF PIN	9.0 lbs.



## DITCH WITCH® HOUSING ACCESSORIES REPLACEMENT BOLTS

DITCH WITCH® COMPATIBLE REPLACEMENT BOLTS			
PART #	DESCRIPTION	BOLT SIZE	# REQUIRED
2810337	HOUSING COVER BOLT (LARGE)	1/2" - 13 x 3/4"	3
2810339	HOUSING COVER BOLT (SMALL)	3/8" - 16 x 3/4"	1



## WATER NOZZLES

DITCH WITCH® COMPATIBLE WATER NOZZLES		
PART #	DESCRIPTION	NOZZLE SIZE
2810050	SONDE HOUSING NOZZLE	1/8 "
2810051	SONDE HOUSING NOZZLE	3/16"



## DITCH WITCH® DRIVE COLLARS

Drive collars are designed to fit over the flats on starter rods, limiting over torquing of the threads.

DITCH WITCH® COMPATIBLE DRIVE COLLARS			
PART #	SIZE	DRILL RIG MODEL	DESCRIPTION
2810281	1.56"	JT520	OCTAGON COLLAR FOR EZ-2
2810282	2.00"	JT920, JT920L, JT921, JT922	OCTAGON COLLAR FOR EZ-2
2810284	2.25"	JT1220 MACH 1	OCTAGON COLLAR FOR EZ-2
2810283	2.50"	JT1720 MACH 1, JT2020 MACH 1, JT2720	OCTAGON COLLAR FOR EZ-2
2810286	2.75"	JT2720 MACH 1	OCTAGON COLLAR FOR EZ-2
2810287	2.75"	JT2720 AT, JT3020 AT, JT3020 MACH 1	OCTAGON COLLAR FOR EZ-3
2810288	3.00"	JT4020 MACH 1, JT2720 AT, JT3020 AT	OCTAGON COLLAR FOR EZ-2

DITCH WITCH® COMPATIBLE HARDFACED DRIVE COLLARS			
PART #	SIZE	DRILL RIG MODEL	DESCRIPTION
2810289	1.56"	JT520	HARDFACED OCTAGON COLLAR FOR EZ-2
2810174	2.00"	JT920, JT920L, JT921, JT922	HARDFACED OCTAGON COLLAR FOR EZ-2
2810291	2.25"	JT1220 MACH 1	HARDFACED OCTAGON COLLAR FOR EZ-3
2810292	2.50"	JT1720 MACH 1, JT2020 MACH 1, JT2720	HARDFACED OCTAGON COLLAR FOR EZ-2
2810293	2.75"	JT2720 MACH 1	HARDFACED OCTAGON COLLAR FOR EZ-2
2810294	2.75"	JT2720 AT, JT3020 AT, JT3020 MACH 1	HARDFACED OCTAGON COLLAR FOR EZ-3
2810297	3.00"	JT4020 MACH 1, JT2720 AT, JT3020 AT	HARDFACED OCTAGON COLLAR FOR EZ-2



## DITCH WITCH® DRIVE CHUCKS

Drive chucks are machined from a solid billet of heat treated chrome-moly steel for maximum strength and performance.

DITCH WITCH® COMPATIBLE DRIVE CHUCKS	
PART #	DRILL RIG MODEL
2812042	JT1220 MACH 1
2812043	JT2020 MACH 1
2812044	JT2720
2812045	JT1720, JT1720 MACH 1
2812046	JT920, JT920L



## DITCH WITCH® TRANSITION RODS

Ditch Witch® type transition rods are manufactured from heat treated 4140 chrome-moly steel for strength and durability. These rods are designed specifically for use under the stresses of horizontal directional drilling projects.

DITCH WITCH® COMPATIBLE TRANSITION RODS			
PART #	DRILL RIG MODEL	CONNECTION	NET WT.
2810394	JT520	JT520 COMPATIBLE PIN	10.0 lbs.
2810320	JT920	JT920 COMPATIBLE PIN x EZ-2 TRAN. ROD	12.0 lbs.
2810315	JT1220 MACH 1	JT1220 MACH 1 COMPATIBLE PIN x EZ-3 TRAN. ROD	24.0 lbs.
2810310	JT1720	JT1720 COMPATIBLE PIN x EZ-2 TRAN. ROD	30.0 lbs.
2810325	JT2020 MACH 1	JT2020 MACH 1 COMPATIBLE PIN x EZ-2 TRAN. ROD	32.0 lbs.
2810305	JT2720	JT2720 COMPATIBLE PIN x EZ-2 TRAN. ROD	36.0 lbs.
2810393	JT2720 MACH 1	JT2720 MACH 1 COMPATIBLE PIN x EZ-2 TRAN. ROD	37.0 lbs.
2810392	JT3020 MACH 1	JT3020 MACH 1 COMPATIBLE PIN x EZ-2 TRAN. ROD	43.0 lbs.
2810335	JT4020 MACH 1	JT4020 MACH 1 COMPATIBLE PIN x EZ-2 TRAN. ROD	61.0 lbs.



## DITCH WITCH® CROSS OVER SUBS

All subs are machined to exacting standards and composed of high strength alloy steel. Additional cross over subs are available on request.

DITCH WITCH® COMPATIBLE CROSS OVER SUBS			
PART #	DRILL RIG MODEL	CONNECTION	NET WT.
2815101	JT920, JT920L, JT921, JT922	EZ-2 BOX x 2.375" API REG PIN	13.0 lbs.
2815102	JT1220 MACH 1	EZ-3 BOX x 2.375" API REG PIN	14.0 lbs.
2815100	JT1720, JT1720 MACH 1, JT2020 MACH 1, JT2720	EZ-2 BOX x 2.375" API REG PIN	15.0 lbs.
2815103	JT1720, JT1720 MACH 1, JT2020 MACH 1, JT2720	EZ-3 BOX x 2.375" API REG PIN	15.0 lbs.
2815104	JT3020 MACH 1	EZ-3 BOX x 2.375" API REG PIN	14.0 lbs.
2815106	JT3020 MACH 1	EZ-3 BOX x 2.875" API REG PIN	15.0 lbs.
2815107	JT4020 MACH 1	EZ-2 BOX x 2.375" API REG PIN	15.0 lbs.
2815108	JT4020 MACH 1	EZ-2 BOX x 2.875" API REG PIN	17.0 lbs.

## DITCH WITCH® DRILL RODS

Hole Products offers a complete line of HDD drill rod for use with all Ditch Witch® rig models. Rods are manufactured using premium quality materials and the most advanced manufacturing techniques, thus providing maximum strength and durability.

DITCH WITCH® COMPATIBLE DRILL RODS									
PART #	RIG MODEL	TUBE O.D. (in)	TOOL JOINT (O.D.) (in)	LGTH.	CONNECT TYPE	MAX TORQUE (ft./lbs.)	BEND RADIUS	RACK	NET WT.
2812118*	JT520 Coarse Thread	1.125"	1.875"	4.9'	DW 1.10-5	500	7.00%	30	16 lbs.
2812119*	JT9/JT922 Coarse Thread	1.580"	2.130"	6.0'	DW 1.30-5	1,100	6.00%	50	29 lbs.
2812120	JT1720 JT1720 MACH 1	2.125"	2.500"	10.0'	DW 1.69-6	1,800	7.40%	44	57 lbs.
2812004	JT2020 MACH 1	2.375"	2.625"	10.0'	DW 1.94-4	2,200	7.40%	40	77 lbs.
2812099	JT25/JT30	2.375"	2.750"	9.8'	DW 2.11-4	4,000	8.00%	25/50	77 lbs.
2812001	JT2720	2.375"	2.750"	9.8'	DW 1.94-4	3,200	6.90%	25/50	79 lbs.
2812051	JT1720 MACH 1 3020 MACH 1	2.375"	3.000"	9.8'	DW 2.11-4	4,000	6.50%	24/48	89 lbs.
2812100	JT4020	2.875"	3.250"	14.75'	DW 2.40-4	5,000	9.90%	16/32	172 lbs.
2812101	JT4020 MACH 1	2.875"	3.500"	14.75'	DW 2.59-4	5,000	8.00%	16/32	182 lbs.
2812102*	JT7020 8020 JT100	3.625"	4.000"	14.75'	DW 3.27-4	10,000	7.20%	12	220 lbs.

\*Inertia Welded

## DITCH WITCH® POWER PIPE DRILL RODS

DITCH WITCH® COMPATIBLE FORGED DRILL RODS - POWER PIPE®									
PART #	RIG MODEL	TUBE O.D. (in)	TOOL JOINT (O.D.) (in)	LGTH.	CONNECT TYPE	MAX TORQUE (ft./lbs.)	BEND RADIUS	RACK	NET WT.
2812055	JT922	1.660"	1.875"	6'	#200 FST 1	1,500	6.20%	60	26 lbs.
2812058	JT1220	1.900"	2.125"	10'	#250 FST1	2,000	10.20%	45	52 lbs.
2812059	JT1220	2.063"	2.250"	10'	#400 FST 1	2,600	9.80%	45	57 lbs.
2812059	JT2020	2.063"	2.250"	10'	#400 FST 1	2,600	9.80%	45	57 lbs.
2812061	JT2020	2.375"	2.625"	10'	#600 FST 1	4,000	9.30%	40	77 lbs.
2812061	JT25	2.375"	2.625"	10'	#600 FST 1	4,000	9.30%	25/55	77 lbs.
2812061	JT30	2.375"	2.625"	10'	#600 FST 1	4,000	9.30%	24/48	77 lbs.
2812062	JT60	2.875"	3.250"	15'	#900 FST 1	9,000	8.70%	16/28	175 lbs.
2812056	JT100	3.500"	3.265"	15'	#800 FST 1	10,000	7.50%	12	220 lbs.

## DITCH WITCH® ROD WIPERS

Rods are drawn through the wipers allowing them to act as a squeegee while removing tooling from the hole. Hole Products provides high quality rod and casing wipers to remove soil, mud, and water from drill rods.

Rod wipers are available in multiple sizes, with or without steel, and split or dual. Please contact your Hole Products representative for additional details.

DITCH WITCH® COMPATIBLE ROD WIPER - FLAT PROFILE					
PART #	DRILL RIG MODEL	ROD SIZE	O.D.	I.D.	THICKNESS
3150035	JT920, JT920L, JT921, JT922, JT1210	1.660" #200 FST 1	9"	1 1/2"	3/4"
3150050	JT1220, JT1720	1.900" #250 FST 1	9"	1 3/4"	3/4"
3150134	JT1720, JT1720 MACH 1, JT2020	2.063" #400 FST 1	9"	1 7/8"	3/4"
3150040	JT2720	2.375" #600 FST 1	9"	2"	3/4"

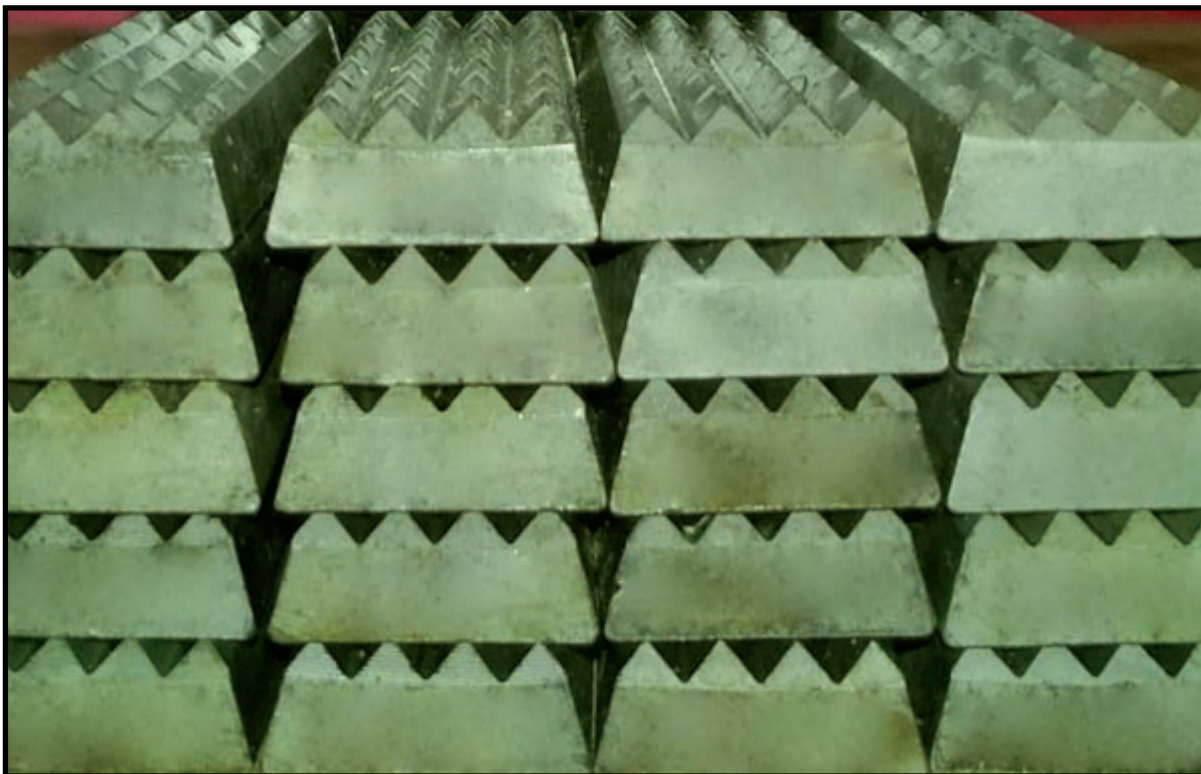


## DITCH WITCH® BREAKOUT JAWS

Breakout jaws fit into the wrenches of HDD rigs to make and break rod and casing joints.

Hole Products' jaws are machine faced from special grade tool steel and heat treated to the optimal level, making them extremely hard but not brittle. In field tests our jaws consistently outperform others in both gripping ability and jaw life.

DITCH WITCH® COMPATIBLE BREAKOUT JAWS			
PART #	DRILL RIG	DRILL ROD	JAW TYPE
2814878	JT922	1.660" #200 FST 1	INSERT
2814879	JT2020	2.063" #400 FST 1	INSERT
2814880	JT2720 MACH 1, JT3020, JT4020 MACH 1	2.375" #600 FST 1	INSERT
2814881	JT8020, JT100	3.500" #800 FST 1	INSERT





## DITCH WITCH® COMPATIBLE PADDLE BITS



Hole Products offers a wide range of HDD paddle bits for use on all Ditch Witch® drill rigs. Bits are available in a wide range of styles and sizes for use in a variety of formations.

All bits are manufactured using premium materials and many are hardfaced using a tungsten carbide embedding process, thus ensuring maximum wear life.

Please contact your Hole Products representative for specific recommendations regarding soil conditions and bit selection.

### SOIL TYPE DEFINITIONS\*:

**SANDY:** Loose sand or any soil that is predominately comprised of sand

**LIGHT:** Clay, silt, soft to medium soils that contain moisture

**MEDIUM:** Consolidated clays, semi-compacted soils

**HARD:** Compacted soils

**ROCKY:** Chunk rock, gravel, any non-consistent type of rock

**SOFT ROCK:** Slate, soft limestone, sandstone, and shales

**MEDIUM ROCK:** Limestone, sandstone, dolomite, shales

**HARD ROCK:** Hard limestone, granite, schist, trap rock, and quartzite

*\*Soil conditions often vary throughout a pilot bore which may affect the actual performance of the bit.*



## ECONOMY CHISEL BIT

For Normal Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810311	5 HOLE	12 MM	3.5"	3/4"	6.0 lbs.
2810312	5 HOLE	12 MM	4.0"	3/4"	7.0 lbs.
2810313	5 HOLE	12 MM	4.5"	3/4"	8.0 lbs.
2810314	5 HOLE	12 MM	5.0"	3/4"	9.5 lbs.
2810316	6 HOLE	16 MM	4.0"	3/4"	7.5 lbs.
2810317	6 HOLE	16 MM	4.5"	3/4"	8.5 lbs.
2810318	6 HOLE	16 MM	5.0"	3/4"	9.5 lbs.
2810391	6 HOLE	16 MM	6.0"	3/4"	10.5 lbs.



## HARDFACED CHISEL BIT\*

For Sand & Sandy Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810515	5 HOLE	12 MM	3.5"	3/4"	7.0 lbs.
2810040	5 HOLE	12 MM	4.0"	3/4"	8.0 lbs.
2810520	5 HOLE	12 MM	4.5"	3/4"	9.0 lbs.
2810525	5 HOLE	12 MM	5.0"	3/4"	10.0 lbs.
2810530	6 HOLE	16 MM	4.0"	3/4"	9.0 lbs.
2810535	6 HOLE	16 MM	4.5"	3/4"	10.0 lbs.
2810540	6 HOLE	16 MM	5.0"	3/4"	11.0 lbs.
2810541	6 HOLE	16 MM	6.0"	3/4"	13.0 lbs.
2810545	6 HOLE	20 MM	5.0"	1.0"	12.0 lbs.
2810550	6 HOLE	20 MM	6.0"	1.0"	12.5 lbs.



\*Includes tungsten carbide embedded hard facing.

## BUTTON CHISEL BIT

For Hard, Rocky Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810329	5 HOLE	12 MM	3.5"	3/4"	6.0 lbs.
2810331	5 HOLE	12 MM	4.0"	3/4"	7.0 lbs.
2810332	5 HOLE	12 MM	4.5"	3/4"	8.0 lbs.
2810334	5 HOLE	12 MM	5.0"	3/4"	9.0 lbs.
2810348	6 HOLE	16 MM	4.0"	3/4"	9.0 lbs.
2810349	6 HOLE	16 MM	4.5"	3/4"	10.0 lbs.
2810351	6 HOLE	16 MM	5.0"	3/4"	11.0 lbs.



## RADIUS BUTTON BIT

For Rocky & Abrasive Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810340	5 HOLE	12 MM	3.5"	3/4"	6.0 lbs.
2810345	5 HOLE	12 MM	4.0"	3/4"	7.0 lbs.
2810350	5 HOLE	12 MM	4.5"	3/4"	7.5 lbs.
2815021	5 HOLE	12 MM	5.0"	3/4"	8.5 lbs.
2810355	6 HOLE	16 MM	4.0"	3/4"	8.0 lbs.
2815025	6 HOLE	16 MM	4.5"	3/4"	9.0 lbs.
2810240	6 HOLE	16 MM	5.0"	3/4"	9.5 lbs.
2810365	6 HOLE	16 MM	5.0"	1.0"	12.5 lbs.
2810363	6 HOLE	16 MM	6.0"	3/4"	9.5 lbs.
2810366	6 HOLE	20 MM	5.0"	1.0"	8.5 lbs.
2810367	6 HOLE	20 MM	6.0"	1.0"	13.5 lbs.



## BUTTON TAPER BIT

For Hard, Rocky Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810385	5 HOLE	12 MM	3.5"	3/4"	7.0 lbs.
2810390	5 HOLE	12 MM	4.0"	3/4"	8.0 lbs.
2810395	5 HOLE	12 MM	4.5"	3/4"	9.0 lbs.
2810400	5 HOLE	12 MM	5.0"	3/4"	10.0 lbs.
2810405	6 HOLE	16 MM	4.0"	3/4"	9.0 lbs.
2810410	6 HOLE	16 MM	4.5"	3/4"	7.0 lbs.
2810415	6 HOLE	16 MM	5.0"	3/4"	8.0 lbs.
2810416	6 HOLE	16 MM	6.0"	3/4"	9.0 lbs.



## HARDFACED STEEP TAPER BIT\*

For Sand, Wet Clay with Cobble					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810352	5 HOLE	12 MM	3.5"	3/4"	6.0 lbs.
2810196	5 HOLE	12 MM	4.0"	3/4"	6.5 lbs.
2810353	5 HOLE	12 MM	4.5"	3/4"	7.0 lbs.
2810354	5 HOLE	12 MM	5.0"	3/4"	7.5 lbs.
2810356	6 HOLE	16 MM	4.0"	3/4"	7.0 lbs.
2810357	6 HOLE	16 MM	4.5"	3/4"	7.5 lbs.
2812018	6 HOLE	16 MM	5.0"	3/4"	8.0 lbs.
2810358	6 HOLE	16 MM	6.0"	3/4"	9.0 lbs.
2810359	6 HOLE	20 MM	5.0"	1.0"	10.0 lbs.
2810361	6 HOLE	20 MM	6.0"	1.0"	11.0 lbs.
2810362	6 HOLE	20 MM	8.0"	1.0"	11.0 lbs.



\*Includes tungsten carbide embedded hard facing.

## STEEP TAPER CLAY BIT

For Hardpan, Dry Clay & Compacted Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810575	5 HOLE	12 MM	3.5"	3/4"	7.0 lbs.
2810580	5 HOLE	12 MM	4.0"	3/4"	7.5 lbs.
2810585	5 HOLE	12 MM	4.5"	3/4"	8.5 lbs.



## STEEP TAPER ANGLED CONICAL CLAW BIT\*

For Rocky & Abrasive Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810600	5 HOLE	12 MM	4.0"	3/4"	7.0 lbs.
2810605	5 HOLE	12 MM	5.0"	3/4"	8.5 lbs.
2810014	6 HOLE	16 MM	4.0"	3/4"	8.0 lbs.
2810610	6 HOLE	16 MM	5.0"	3/4"	9.0 lbs.
2810615	6 HOLE	16 MM	6.0"	3/4"	13.0 lbs.
2810620	6 HOLE	16 MM	5.0"	1.0"	10.5 lbs.
2810625	6 HOLE	16 MM	6.0"	1.0"	13.0 lbs.

\*Includes tungsten carbide embedded hard facing.



## ANGLED CONICAL CLAW BIT\*

For Rocky and Abrasive Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810450	5 HOLE	12 MM	3.5"	3/4"	7.0 lbs.
2810015	5 HOLE	12 MM	4.0"	3/4"	7.5 lbs.
2810455	5 HOLE	12 MM	5.0"	3/4"	8.5 lbs.
2810460	6 HOLE	16 MM	4.0"	3/4"	9.5 lbs.
2810465	6 HOLE	16 MM	5.0"	3/4"	12.0 lbs.
2810466	6 HOLE	16 MM	6.0"	3/4"	14.0 lbs.
2810470	6 HOLE	16 MM	4.0"	1.0"	13.0 lbs.
2810035	6 HOLE	16 MM	5.0"	1.0"	16.0 lbs.
2810475	6 HOLE	20 MM	5.0"	1.0"	16.0 lbs.
2810480	6 HOLE	20 MM	6.0"	1.0"	18.0 lbs.

\*Includes tungsten carbide embedded hard facing.



## "ROUGHNECK" RIPPER BIT\*

For Sedimentary Rock, Hardpan, Dry Clay & Compacted Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810006	5 HOLE	12 MM	4.0"	3/4"	7.5 lbs.
2810058	5 HOLE	12 MM	4.5"	3/4"	9.0 lbs.
2810007	5 HOLE	12 MM	5.0"	3/4"	10.0 lbs.
2810420	6 HOLE	16 MM	4.5"	3/4"	9.5 lbs.
2810030	6 HOLE	16 MM	5.0"	3/4"	12.0 lbs.
2810431	6 HOLE	16 MM	6.0"	3/4"	13.5 lbs.
2810425	6 HOLE	20 MM	5.0"	1.0"	12.5 lbs.
2810008	6 HOLE	20 MM	6.0"	1.0"	13.0 lbs.



\*Includes tungsten carbide embedded hard facing.

## "ROUGHNECK" STEEP TAPER RIPPER BIT\*

For Sedimentary, Rock, Hardpan, Dry Clay & Compacted Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810210	5 HOLE	12 MM	4.0"	3/4"	7.5 lbs.
2810440	5 HOLE	12 MM	4.5"	3/4"	7.0 lbs.
2810441	5 HOLE	12 MM	5.0"	3/4"	8.0 lbs.
2810445	6 HOLE	16 MM	4.0"	3/4"	9.5 lbs.
2810235	6 HOLE	16 MM	5.0"	3/4"	12.0 lbs.
2810625	6 HOLE	20 MM	5.0"	1.0"	12.0 lbs.
2810640	6 HOLE	20 MM	6.0"	1.0"	13.5 lbs.
281641	6 HOLE	20 MM	8.0"	1.0"	15.5 lbs.



\*Includes tungsten carbide embedded hard facing.

## PADDLE BIT REPLACEMENT BOLTS

PADDLE BIT REPLACEMENT BOLTS		
PART #	DESCRIPTION	QTY
2810251	12MM x 20MM x 1.75MM	5 PACK
2810670	16MM x 35MM x 2.00MM	6 PACK



## HEX L-KEYS FOR PADDLE BITS

HEX L-KEYS FOR PADDLE BITS	
PART #	DESCRIPTION
2810396	10MM LONG ARM HEX KEY FITS 12MM BOLTS
2810397	14MM LONG ARM HEX KEY FITS 16MM BOLTS
2810398	3/8" LONG ARM HEX KEYS FITS 1/2" BOLTS
2810399	1/2" LONG ARM HEX KEYS FITS 5/8" BOLTS





**VERMEER® COMPATIBLE HDD TOOLS**

**PAGES 20 - 34**

# VERMEER® SIDE-LOAD, BOLT-ON TRANSMITTER HOUSINGS

## FOR VERMEER® DIGITRAK® TRANSMITTERS

Side-Load bolt-on transmitter housings are available for use on all Vermeer® drill rig models.

The side load feature provides quick and easy field installation and removal of transmitter sonde and batteries. All sizes feature:

- Replaceable tailpieces to increase the longevity of the housing.
- Heat treated replaceable nozzles for maximum durability and steering.
- Compatible with all styles of OEM type bolt-on pilot bits (paddle bits).

Please contact your Hole products representative for additional details.

VERMEER® DIGITRAK® COMPATIBLE TRANSMITTER HOUSING				
PART #	DRILL RIG MODEL	HOLE PATTERN	O.D.	CONNECTION
2810234	D7 x 11, D9 x 13, D10 x 15	6 HOLE	2.625"	2" IF BOX
2810232	D16 x 20, D18 x 22, D20 x 22, D24 x 26	6 HOLE	2.750"	2" IF BOX
2810122	D24 x 40, D33 x 44, D36 x 50	6 HOLE	3.250"	2 3/8" API REG BOX
2810742*	D24 x 40, D40 x 40, D36 x 50, D50 x 100	6 HOLE	3.50"	2 3/8" API REG BOX
2810741	D36 x 50, D50 x 100, D80 x 100, D100 x 120	6 HOLE	4.25"	2 7/8" IF BOX

\*Severe Duty Model



## REPLACEMENT COVERS

VERMEER® COMPATIBLE REPLACEMENT COVERS		
PART #	DRILL RIG MODEL	FITS PART #
2815091	D7 x 11, D9 x 13, D10 x 15	2810234
2815092	D16 x 20, D18 x 22, D20 x 22, D24 x 26	2810232
2815093	D24 x 40, D33 x 44, D36 x 50	2810122

## TAIL PIECES FOR VERMEER® HOUSINGS

Tail pieces or housing adapters are expendable subs designed to extend the life of the transmitter housing and allow for the use of multiple threads on a single housing. All tailpieces are manufactured from heat treated chrome-moly steel for maximum durability.

VERMEER® DIGITRAK® COMPATIBLE TAIL PIECES		
PART #	DRILL RIG MODEL	CONNECTION
2810101	D7 x 11, D9 x 13, D10 x 15	1.625" LP HEX PIN x 2" API IF PIN
2810208	D16 x 20, D24 x 26	2.125" LP HEX PIN x 2" API IF PIN
2810154	D24 x 40, D40 x 40	2.125" LP HEX PIN x 2 3/8" API REG PIN
2810245	D24 x 40, D40 x 40	#350 - API H90S* PIN 2 3/8" API REG PIN*
2810209	D16 x 20, D24 x 26	#350 - API H90S* PIN 2" API IF PIN*

\* #350-API H90S thread is compatible with Vermeer® #350 HAWKEYE thread.



## VERMEER® HOUSING ACCESSORIES REPLACEMENT BOLTS

VERMEER® COMPATIBLE REPLACEMENT BOLTS			
PART #	DESCRIPTION	BOLT SIZE	# REQUIRED
2810337	HOUSING BOLT (LARGE)	1/2" - 13 x 3/4"	2
2810339	HOUSING BOLT (SMALL)	3/8" - 16 x 3/4"	1



## WATER NOZZLES

VERMEER® COMPATIBLE WATER NOZZLES		
PART #	DESCRIPTION	NOZZLE SIZE
2810050	SONDE HOUSING NOZZLE	1/8"
2810051	SONDE HOUSING NOZZLE	3/16"



# VERMEER® DRIVE COLLARS

Drive collars are designed to fit over the flats on starter rods, limiting over torquing of the threads.

VERMEER® COMPATIBLE DRIVE COLLARS			
PART #	SIZE	DRILL RIG MODEL	DESCRIPTION
2810303	2.00"	D7 x 11, D10 x 15	HEX COLLAR
281306	2.00"	D7 x 11, D10 x 15	SHARK TEETH HEX COLLAR
2810185	2.50"	D16 x 20, D24 x 26, D26 x 40, D40 x 40, D18 x 22	HEX COLLAR
2810302	2.50"	D16 x 20, D24 x 26, D24 x 40, D40 x 40, D18 x 22	SHARK TEETH HEX COLLAR
2810304	2.625"	#350 API-H90S*	OCTAGON COLLAR

\* #350-API H90S thread is compatible with Vermeer® #350 HAWKEYE thread.

VERMEER® COMPATIBLE HARDFACED DRIVE COLLARS			
PART #	SIZE	DRILL RIG MODEL	DESCRIPTION
2810189	2.00"	D7 x 11, D10 x 15	HARDFACED HEX COLLAR
2810183	2.50"	D16 x 20, D24 x 26, D26 x 40, D40 x 40, D18 x 22	HARDFACED HEX COLLAR
2810184	2.625"	#350 API-H90S*	HARDFACED OCT. COLLAR
2810347	2.625"	#400 QUICKFIRE	HARDFACED HEX COLLAR

\* #350-API H90S thread is compatible with Vermeer® #350 HAWKEYE thread.





# VERMEER® DRIVE CHUCKS

Drive chucks are machined from a solid billet of heat treated chrome-moly steel for maximum strength and performance.

VERMEER® COMPATIBLE DRIVE CHUCKS		
PART #	DRILL RIG MODEL	CONNECTION
2812039	D7 x 11, D7 x 11A	1.66" ROD #200 FST 1
2812063	D10 x 14, D10 x 15	1.66" ROD #200 FST 1
2812040	D16 x 20, D18 x 22, D20 x 22	1.90" ROD #250 FST 1
2810241	D16 x 20, D18 x 22, D20 x 22	2.06" ROD #400 FST 1
2815055	D24 x 40, D40 x 40	2.375" ROD #600 FST 1
2812064	D50 x 100, D80 x 100	2.875" ROD #900 FST 1
2812065	D40 x 100, D80 x 100	3.500" ROD #800 FST 1



## VERMEER® STARTER RODS

Starter rods are manufactured from heat treated 4350 alloy steel (unless otherwise noted), making them significantly stronger and more durable. These rods are designed specifically for use under the stresses of horizontal directional drilling projects.

VERMEER® COMPATIBLE STARTER RODS (Standard) (Chrome - Moly steel - 152,000 PSI tensile strength)		
PART #	DRILL RIG MODEL	DRILL ROD
2813309	D36 x 50, D36 x 50 SERIES II	#650 FST 1 x 2.125" LP
2813308	D36 x 50, D36 x 50 SERIES II	#700 FST 1 x 2.125" LP
2810342	D24 x 40, D40 x 40	#600 FST 1 x QF400
2810343	D20 x 22, D20 x 22 SERIES II	#400 FST 1 x QF400
2810341	D16 x 20, D16 x 20 SERIES II	#250 FST 1 x QF400
2810336	D24 x 40, D24 x 40 SERIES II	#600 FST 1 x 2.125" LP
2810338	D16 x 20, D18 x 22, D20 x 22	#400 FST 1 x 2.125" LP
2813307	D16 x 20, D18 x 22, D20 x 22	#250 FST 1 x 2.125" LP
2810333	D7 x 11, D10 x 15	#200 FST 1 x 1.625" LP
2810295	D24 x 40, D40 x 40	FST 1 2.375" x 1/2" x 13" x 3/4" BOLT*
2810280	D16 x 20, D18 x 22, D20 x 22	FST 1 2.060" x 1/2" x 13" x 3/4" BOLT*

\* #350-API H90S thread is compatible with Vermeer® #350 HAWKEYE thread.

VERMEER® COMPATIBLE STARTER RODS (High Strength) (Nickel chrome - Moly steel - 182,000 PSI tensile strength)		
PART #	DRILL RIG MODEL	DRILL ROD
2810190	D24 x 40, D40 x 40	#600 FST 1 x 2.125" LP
2810260	D16 x 20, D18 x 22, D20 x 22	#400 FST 1 x 2.125" LP
2810265	D16 x 20, D18 x 22, D20 x 22	#250 FST 1 x 2.125" LP
2810270	D7 x 11, D10 x 15	#200 FST 1 x 1.625" LP



## VERMEER® SAVER SUBS

Hole Products offers a wide range of saver subs to protect your drive chuck and drill rods. All subs are machined to exacting standards and composed of heat treated chrome-moly steel.

VERMEER® COMPATIBLE SAVER SUBS		
PART #	DRILL RIG MODEL	CONNECT TYPE
2810188	D7 x 11, D7 x 11A, D10 x 14, D10 x 15	1.660" ROD #200 FST 1
2810193	D7 x 11 SERIES II	1.660" ROD #200 FST 1
2810199	D16 x 20, D18 x 22, D20 x 22	1.900" ROD #250 FST 1
2810218	D16 x 20, D18 x 22, D20 x 22	2.0625" ROD #400 FST 1
2810198	D24 x 40 - S/N 383 & BELOW	2.375" ROD #600 FST 1
2810195	D24 x 40 - S/N 384 & ABOVE	2.375" ROD #600 FST 1
2810194	D24 x 40 SERIES II	2.375" ROD #600 FST 1
2812069	D33 x 44, D36 X 50	2.375" ROD #650 FST 1
2815056	D36 x 50	2.625" ROD #700 FST 1
2812066	D50 x 100, D80 x 100	2.875" ROD #900 FST 1
2812067	D50 x 100, D80 x 100	3.500" ROD #800 FST 1
2812052	D100 x 120	3.500" ROD #1000 FST 1

## VERMEER® CROSS OVER SUBS

Hole Products offers a wide range of cross over and saver subs. All subs are machined to exacting standards and composed of high strength alloy steel. Additional cross over subs are available on request.

VERMEER® COMPATIBLE CROSS OVER SUBS			
PART #	DRILL RIG MODEL	CONNECTION TYPE	NET WT.
2810154	D7 x 11, D9 x 13, D10 x 15, D16 x 20, D18 x 22, D20 x 22, D24 x 40, D40 x 40	2.125" LP HEX (P) x 2.375" API REG (P)	14.0 lbs.
2810301	D7 x 11, D9 x 13, D10 x 15, D16 x 20, D18 x 22, D20 x 22, D24 x 40, D40 x 40	2.125" LP HEX (P) x 2.875" API REG (P)	18.0 lbs.
2812068	D7 x 11, D9 x 13, D10 x 15, D16 x 20, D18 x 22, D20 x 22, D24 x 40, D40 x 40	2.125" LP HEX (P) x 2.375" API REG (B)	11.0 lbs.
2812071	D50 x 100, D60 x 90	2.875" #900 FST 1 (B) x 2.875" API REG (P)	22.0 lbs.
2812072	D100 x 120	3.500" #1000 FST 1 (B) x 2.875" API REG (P)	18.0 lbs.
2812073	D100 x 120	3.500" #1000 FST 1 (B) x 3.500" API REG (P)	25.0 lbs.
2812074	D36 x 50, D40 x 55, D16 x 20, D18 x 22, D20 x 22, D24 x 40, D40 x 40	2.375" #650 FST 1 (P) x 2.375" FST 1 (P)	10.0 lbs.
2810245	D36 x 50, D40 x 55, D16 x 20, D18 x 22, D20 x 22, D24 x 40, D40 x 40	#350-API H90S (P) x 2.375" API REG (P)*	14.5 lbs.
2812075	D36 x 50, D40 x 55, D16 x 20, D18 x 22, D20 x 22, D24 x 40, D40 x 40	#350-API H90S (P) x 2.875" API REG (P)*	15.0 lbs.

\* #350-API H90S thread is compatible with Vermeer® #350 HAWKEYE thread.

# VERMEER® DRILL RODS

Hole Products offers a complete line of HDD drill rod for use with all Vermeer® rig models. Rods are manufactured using premium quality materials and the most advanced manufacturing techniques, thus providing maximum strength and durability.

VERMEER® - COMPATIBLE DRILL RODS									
PART #	RIG MODEL	TUBE O.D. (in)	TOOL JOINT (O.D.) (in)	LGTH.	CONNECT TYPE	MAX TORQUE (ft./lbs.)	BEND RADIUS	RACK	NET WT.
2812103	D7 x 11 D9 x 13	1.660"	1.875"	6.0'	#200 FST1	1,500	6.20%	33/50	26 lbs.
2812104	D16 x 20 D18 x 22	1.900"	2.125"	10.0'	#250 FST 1	2,000	10.20%	40	52 lbs.
2812105	D20 x 22 D24 x 26 D23 x 30	2.0625"	2.250"	10.0'	#400 FST 1	2,600	9.80%	40	57 lbs.
2812106	D24 x 40 D23 x 30	2.375"	2.625"	10.0'	#600 FST 1	4,000	9.30%	50	77 lbs.
2812107	D36 x 50 D40 x 55 (#650 x 10')	2.375"	2.750"	10.0'	#650 FST 1	5,000	9.30%	50/52	79 lbs.
2812110	D36 x 50 (#650 x 15')	2.375"	2.750"	15.0'	#650 FST 1	5,000	13.90%	40	113 lbs.
2812108	D36 x 50 D40 x 55 (#700 x 10')	2.625"	3.100"	10.0'	#700 FST 1	5,000	6.90%	45	117 lbs.
2812109	D36 x 50 D40 x 55 (#700 x 15')	2.625"	3.100"	15.0'	#700 FST 1	5,000	10.40%	35	165 lbs.
2810300	D50 x 100 D60 x 90	2.875"	3.250"	15.0'	#900 FST 1	9,000	8.70%	40	175 lbs.
2812057	D80 x 100 D50 x 100 D60 x 90	3.500"	3.625"	15.0'	#800 FST 1	10,000	7.50%	12/24	220 lbs.
2818105	D100 x 120	3.500"	4.375"	20.0'	#1000 FST 1	15,000	10.20%	9/18	335 lbs.



## VERMEER® ROD WIPERS

Rods are drawn through the wipers allowing them to act as a squeegee while removing tooling from the hole. Hole Products provides high quality rod and casing wipers to remove soil, mud, and water from drill rods.

Rod wipers are available in multiple sizes, with or without steel, and split or dual. Please contact your Hole Products representative for additional details.

VERMEER® - COMPATIBLE ROD WIPER - FLAT PROFILE					
PART #	DRILL RIG MODEL	ROD SIZE	O.D.	I.D.	THICKNESS
3150035	D7 x 11, D9 x 13, D10 x 15	1.660" #200 FST 1	9"	1 1/2"	3/4"
3150050	D16 x 20, D18 x 22, D20 x 22	1.900" #250 FST 1	9"	1 3/4"	3/4"
3150134	D18 x 22, D20 x 22	2.063" #400 FST 1	9"	1 7/8"	3/4"
3150133	D24 x 40, D23 x 30	2.375" #600 FST 1	9"	2 1/4"	3/4"
3150166	D36 x 50	2.375" #650 FST 1	9"	2 1/8"	3/4"



## VERMEER® BREAKOUT JAWS

Breakout jaws fit into the wrenches of HDD rigs to make and break rod and casing joints.

Hole Products' jaws are machine faced from special grade tool steel and heat treated to the optimal level, making them extremely hard but not brittle. In field tests our jaws consistently outperform others in both gripping ability and jaw life.

VERMEER® COMPATIBLE BREAKOUT JAWS			
PART #	DRILL RIG	DRILL ROD	JAW TYPE
2811038	D7 x 11 SERIES II, D7 x 11A, D9 x 13, D10 x 15	1.660" #200 FST 1	STATIONARY
2811039	D7 x 11 SERIES II, D7 x 11A, D9 x 13, D10 x 15	1.660" #200 FST 1	CYLINDER
2814861	D16 x 20, D16 x 20A, D18 x 22, D20 x 22	1.900" #250 FST 1	INSERT
2814862	D16 x 20, D16 x 20A, D18 x 22, D20 x 22	1.900" #250 FST 1	CYLINDER
2814863	D18 x 22, D24 x 26	1.900" #250 FST 1	CYLINDER W/TAB
2814869	D20 x 22	2.063" #400 FST 1	STATIONARY
2814864	D20 x 22	2.063" #400 FST 1	STATIONARY
2814862	D20 x 22	2.063" #400 FST 1	CYLINDER
2814866	D20 x 22	2.063" #400 FST 1	CYLINDER W/TAB
2811036	D24 x 40 SERIES II, D24 x 40A	2.375" #600 FST 1	STATIONARY
2814870	D33 x 44	2.375" #600 FST 1	STATIONARY
2814871	D33 x 44	2.375" #600 FST 1	INSERT
2811041	D36 x 50	2.375" #600 FST 1	STATIONARY
2814872	D40 x 40	2.375" #600 FST 1	CYLINDER
2814873	D50 x 100	2.875" #900 FST 1	CYLINDER
2814874	D50 x 100	2.875" #900 FST 1	INSERT
2814875	D50 x 100, D80 x 100	3.500" #800 FST 1	CYLINDER
2814876	D80 x 100	3.500" #800 FST 1	INSERT
2814877	D100 x 120	3.500" #800 FST 1	INSERT





## VERMEER® COMPATIBLE PADDLE BITS



Hole Products offers a wide range of HDD paddle bits for use on all Vermeer® drill rigs. Bits are available in a wide range of styles and sizes for use in a variety of formations.

All bits are manufactured using premium materials and many are hardfaced using a tungsten carbide embedding process, thus ensuring maximum wear life.

Please contact your Hole Products representative for specific recommendations regarding soil conditions and bit selection.

### SOIL TYPE DEFINITIONS\*:

**SANDY:** Loose sand or any soil that is predominately comprised of sand

**LIGHT:** Clay, silt, soft to medium soils that contain moisture

**MEDIUM:** Consolidated clays, semi-compacted soils

**HARD:** Compacted soils

**ROCKY:** Chunk rock, gravel, any non-consistent type of rock

**SOFT ROCK:** Slate, soft limestone, sandstone, and shales

**MEDIUM ROCK:** Limestone, sandstone, dolomite, shales

**HARD ROCK:** Hard limestone, granite, schist, trap rock, and quartzite

*\*Soil conditions often vary throughout a pilot bore which may affect the actual performance of the bit.*



## ECONOMY CHISEL BIT\*

For Normal Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810555	7 HOLE	1/2" x 13	3.5"	3/4"	6.0 lbs.
2812076	7 HOLE	1/2" x 13	4.0"	3/4"	7.0 lbs.
2812077	7 HOLE	1/2" x 13	4.5"	3/4"	9.0 lbs.
2812078	7 HOLE	1/2" x 13	5.0"	3/4"	10. lbs.
2812070	7 HOLE	1/2" x 13	6.0"	3/4"	10.5 lbs.

\*Includes tungsten carbide embedded hard facing.



## HARDFACED CHISEL BIT\*

For Sand & Sandy Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2812079	7 HOLE	1/2" - 13	3.5"	3/4"	7.0 lbs.
2810041	7 HOLE	1/2" - 13	4.0"	3/4"	8.0 lbs.
2810043	7 HOLE	1/2" - 13	4.5"	3/4"	10.0 lbs.
2810042	7 HOLE	1/2" - 13	5.0"	3/4"	11.0 lbs.
2810059	7 HOLE	1/2" - 13	6.0"	3/4"	12.0 lbs.
2810560	7 HOLE	1/2" - 13	4.0"	1.0"	11.0 lbs.
2810565	7 HOLE	1/2" - 13	4.5"	1.0"	12.0 lbs.
2810011	7 HOLE	1/2" - 13	5.0"	1.0"	13.0 lbs.
2810048	7 HOLE	1/2" - 13	6.0"	1.0"	14.0 lbs.
2810053	7 HOLE	5/8" - 11	5.0"	1.0"	12.5 lbs.
2810054	7 HOLE	5/8" - 11	6.0"	1.0"	13.5 lbs.

\*Includes tungsten carbide embedded hard facing.



## BUTTON CHISEL BIT\*

For Hard, Rocky Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2812080	7 HOLE	1/2" - 13	3.5"	3/4"	7.0 lbs.
2812081	7 HOLE	1/2" - 13	4.0"	3/4"	9.0 lbs.
2812050	7 HOLE	1/2" - 13	4.5"	3/4"	10.0 lbs.
2812082	7 HOLE	1/2" - 13	5.0"	3/4"	11.0 lbs.
2812086	7 HOLE	5/8" - 11	5.0"	1.0"	12.0 lbs.

\*Includes tungsten carbide embedded hard facing.



## RADIUS BUTTON BIT

For Rocky & Abrasive Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810370	7 HOLE	1/2" - 13	3.5"	3/4"	7.5 lbs.
2810158	7 HOLE	1/2" - 13	4.0"	3/4"	8.0 lbs.
2815023	7 HOLE	1/2" - 13	4.5"	3/4"	9.0 lbs.
2810375	7 HOLE	1/2" - 13	5.0"	3/4"	10.5 lbs.
2810381	7 HOLE	1/2" - 13	6.0"	3/4"	13.5 lbs.
2810380	7 HOLE	1/2" - 13	5.0"	1.0"	12.5 lbs.
2810382	7 HOLE	1/2" - 13	6.0"	1.0"	14.0 lbs.
2810383	7 HOLE	5/8" - 11	5.0"	1.0"	13.0 lbs.
2810384	7 HOLE	5/8" - 11	6.0"	1.0"	14.0 lbs.



## BUTTON TAPER BIT

For Hard, Rocky Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810750	7 HOLE	1/2" - 13	3.5"	3/4"	7.0 lbs.
2810013	7 HOLE	1/2" - 13	4.0"	3/4"	8.0 lbs.
2815024	7 HOLE	1/2" - 13	4.5"	3/4"	10.0 lbs.
2810017	7 HOLE	1/2" - 13	5.0"	3/4"	11.0 lbs.
2810026	7 HOLE	5/8" - 11	6.0"	1.0"	13.0 lbs.
2810055	7 HOLE	5/8" - 11	7.0"	1.0"	14.0 lbs.



## HARDFACED STEEP TAPER BIT

For Sand, Wet Clay with Cobble					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2812083	7 HOLE	1/2" - 13	3.5"	3/4"	6.5 lbs.
2810164	7 HOLE	1/2" - 13	4.0"	3/4"	7.0 lbs.
2812084	7 HOLE	1/2" - 13	4.5"	3/4"	7.5 lbs.
2810230	7 HOLE	1/2" - 13	5.0"	3/4"	8.0 lbs.
2812085	7 HOLE	1/2" - 13	6.0"	3/4"	7.5 lbs.
2812088	7 HOLE	5/8" - 11	5.0"	1.0"	9.5 lbs.
2812089	7 HOLE	5/8" - 11	6.0"	1.0"	10.5 lbs.



## STEEP TAPER CLAY BIT\*

For Hardpan, Dry Clay & Compacted Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810590	7 HOLE	1/2" - 13	3.5"	3/4"	8.0 lbs.
2810595	7 HOLE	1/2" - 13	4.0"	3/4"	9.0 lbs.
2815026	7 HOLE	1/2" - 13	4.5"	3/4"	10.0 lbs.
2815027	7 HOLE	1/2" - 13	5.0"	3/4"	12.0 lbs.
2811088	7 HOLE	1/3" - 13	6.0"	3/4"	14.0 lbs.

\*Includes tungsten carbide embedded hard facing.



## STEEP TAPER ANGLED CONICAL CLAW BIT\*

For Hardpan, Dry Clay & Compacted Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810854	7 HOLE	1/2" - 13	3.5"	3/4"	8.5 lbs.
2810855	7 HOLE	1/2" - 13	4.0"	3/4"	9.5 lbs.
2810856	7 HOLE	1/2" - 13	4.5"	3/4"	10.5 lbs.
2810857	7 HOLE	1/2" - 13	5.0"	3/4"	12.0 lbs.
2810585	7 HOLE	1/2" - 13	5.5"	3/4"	13.0 lbs.
2810859	7 HOLE	5/8" - 13	5.0"	1.0"	15.0 lbs.

\*Includes tungsten carbide embedded hard facing.



## ANGLED CONICAL CLAW BIT\*

For Rocky and Abrasive Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810450	7 HOLE	1/2" - 13	3.5"	3/4"	8.5 lbs.
2810159	7 HOLE	1/2" - 13	4.0"	3/4"	9.5 lbs.
2810197	7 HOLE	1/2" - 13	4.5"	3/4"	10.5 lbs.
2810027	7 HOLE	1/2" - 13	5.0"	3/4"	12.0 lbs.
2810028	7 HOLE	1/2" - 13	6.0"	3/4"	14.0 lbs.
2810490	7 HOLE	1/2" - 13	4.0"	1.0"	13.0 lbs.
2810495	7 HOLE	1/2" - 13	4.5"	1.0"	14.5 lbs.
2810500	7 HOLE	1/2" - 13	5.0"	1.0"	16.0 lbs.
2815033	7 HOLE	1/2" - 13	6.0"	1.0"	18.0 lbs.
2810505	7 HOLE	5/8" - 11	5.0"	1.0"	16.0 lbs.
2810510	7 HOLE	5/8" - 11	6.0"	1.0"	18.0 lbs.
2810511	7 HOLE	5/8" - 11	8.0"	1.0"	20.0 lbs.

\*Includes tungsten carbide embedded hard facing.



## "ROUGHNECK" RIPPER BIT\*

For Sedimentary Rock, Hardpan, Dry Clay & Compacted Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2810031	7 HOLE	1/2" - 13	4.0"	3/4"	9.5 lbs.
2810025	7 HOLE	1/2" - 13	5.0"	3/4"	12.0 lbs.
2810512	7 HOLE	1/2" - 13	6.0"	3/4"	13.0 lbs.
2810435	7 HOLE	1/2" - 13	5.0"	1.0"	14.0 lbs.
2810029	7 HOLE	1/2" - 13	6.0"	1.0"	15.0 lbs.
2810630	7 HOLE	5/8" - 11	5.0"	1.0"	15.0 lbs.
2810655	7 HOLE	5/8" - 11	6.0"	1.0"	16.0 lbs.
2810668	7 HOLE	5/8" - 11	8.0"	1.0"	18.0 lbs.



\*Includes tungsten carbide embedded hard facing.

## "ROUGHNECK" STEEP TAPER RIPPER BIT\*

For Sedimentary, Rock, Hardpan, Dry Clay & Compacted Soil					
PART #	BOLT PATTERN	BOLT SIZE	WIDTH	THICK	NET WT.
2815015	7 HOLE	1/2" - 13	4.0"	3/4"	9.5 lbs.
2812017	7 HOLE	1/2" - 13	4.5"	3/4"	9.5 lbs.
2815017	7 HOLE	1/2" - 13	5.0"	3/4"	12.0 lbs.
2815018	7 HOLE	1/2" - 13	6.0"	3/4"	12.0 lbs.
2810655	7 HOLE	5/8" - 11	4.0"	1.0"	9.5 lbs.
2810645	7 HOLE	5/8" - 11	4.5"	1.0"	10.5 lbs.
2810660	7 HOLE	5/8" - 11	5.0"	1.0"	11.5 lbs.
2810666	7 HOLE	5/8" - 11	6.0"	1.0"	12.5 lbs.



\*Includes tungsten carbide embedded hard facing.

## PADDLE BIT REPLACEMENT BOLTS

PADDLE BIT REPLACEMENT BOLTS		
PART #	DESCRIPTION	QTY
2810250	5/8" X 1" x 11 THD.	6 PACK
2810675	1/2" X 1" x 13 THD.	6 PACK



## HEX L-KEYS FOR PADDLE BITS

HEX L-KEYS FOR PADDLE BITS	
PART #	DESCRIPTION
2810396	10MM LONG ARM HEX KEY FITS 12MM BOLTS
2810397	14MM LONG ARM HEX KEY FITS 16MM BOLTS
2810398	3/8" LONG ARM HEX KEYS FITS 1/2" BOLTS
2810399	1/2" LONG ARM HEX KEYS FITS 5/8" BOLTS





# BACKREAMERS

Hole Products offers a full line of HDD backreamers in a wide range of sizes and styles for maximum productivity in a variety of ground conditions.

Please contact your Hole Products representative for specific recommendations regarding soil conditions and backreamer selection.



SOLID BODY FLUTED



STACKED PLATE SPIRAL FLUTED



CLAY REAMER



TAPERED WING FLY CUTTER



WINGED BACKREAMER

## BACKREAMER APPLICATION CHART

	SOIL TYPE	SANDY	LIGHT	MEDIUM	HARD	ROCKY	SOFT ROCK	MEDIUM ROCK	HARD ROCK
BACKREAMER STYLE	FLUTED	5	5	4	3	2	1	2	3
	STACKED PLATE SPIRAL	5	5	4	3	2	1	2	3
	CLAY REAMER	4	4	3	2	1	3	5	5
	TAPERED WING FLY CUTTER	5	5	4	3	2	2	1	1
	WINGED BACKREAMER	2	2	1	2	5	4	5	5

1 = Best      2 = Good      3 = Fair      4 = Less Recommended      5 = Not Recommended

### SOIL TYPE DEFINITIONS\*:

**SANDY:** Loose sand or any soil that is predominately comprised of sand

**LIGHT:** Clay, silt, soft to medium soils that contain moisture

**MEDIUM:** Consolidated clays, semi-compacted soils

**HARD:** Compacted soils

**ROCKY:** Chunk rock, gravel, any non-consistent type of rock

**SOFT ROCK:** Slate, soft limestone, sandstone, and shales

**MEDIUM ROCK:** Limestone, sandstone, dolomite, shales

**HARD ROCK:** Hard limestone, granite, schist, trap rock, and quartzite

*\*Soil conditions often vary throughout a pilot bore which may affect the actual performance of the backreamer.*

# REAMER REPLACEMENT PARTS

REPLACEMENT REAMER JETS (STEEL)		
PART #	DESCRIPTION	QNTY.
2811065	1/8" NPT THD, x 1/8" HOLE	12 PACK
2811066	1/8" NPT THD, x 3/16" HOLE	12 PACK
2811067	1/4" NPT THD, x 3/16" HOLE	12 PACK
2811068	1/4" NPT THD, x 1/4" HOLE	12 PACK
2811069	3/8" NPT THD, x 1/4" HOLE	12 PACK
2811070	3/8" NPT THD, x 5/16" HOLE	12 PACK



REPLACEMENT CARBIDE CUTTERS			
PART #	DESCRIPTION	HEIGHT	NET WT.
2810019	#1 ST, SMALL SHARK TOOTH	1.250"	2.5 oz.
2810020	#2 ST, MEDIUM SHARK TOOTH	1.50"	5.0 oz.
2810021	#3 ST, LARGE SHARK TOOTH	2.160"	13.0 oz.
2810022	#1 C, SMALL CONICAL TOOTH	0.840"	2.0 oz.
2810023	#2 C, MEDIUM CONICAL TOOTH	1.26"	6.0 oz.



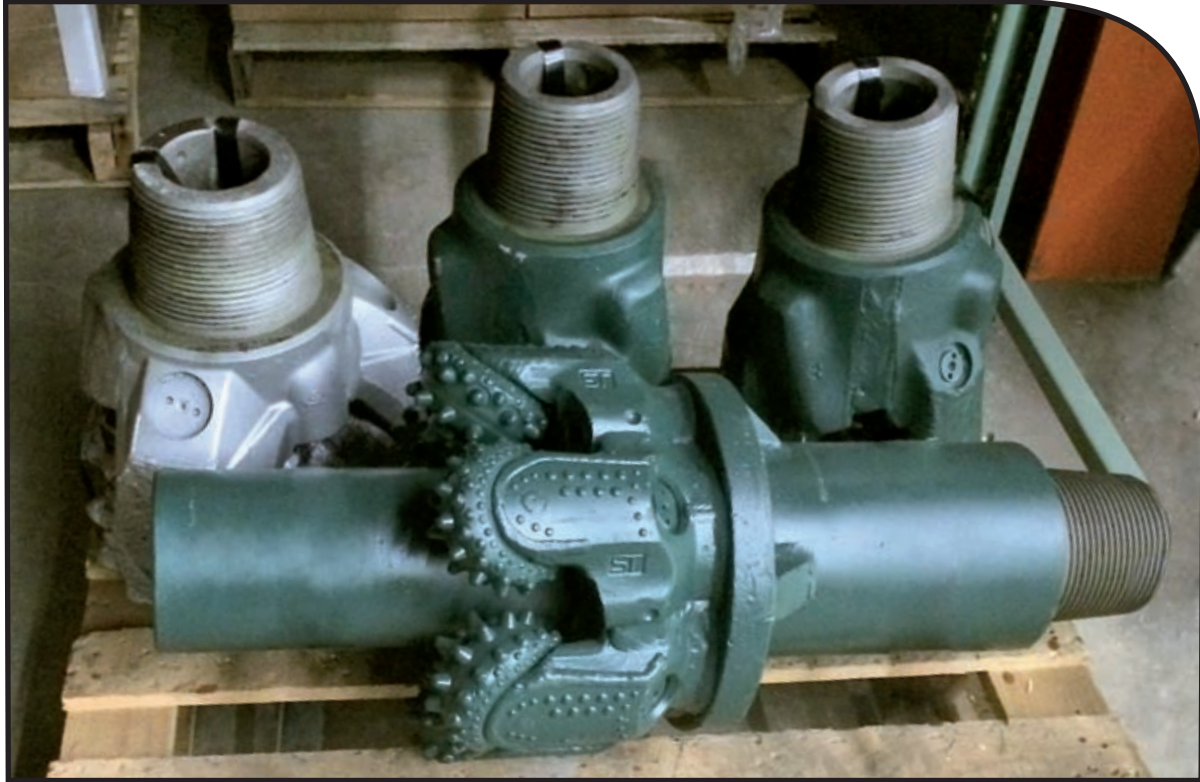
*\*Please contact your Hole Products representative for additional sizes and styles.*

## THREADED WELD-ON SPUDS

Hole Products offers a large selection of Weld-on spuds for Vermeer and Ditch Witch, that range in sizes and thread options. Please contact your Hole Products representative for sizing information.



## TRICONE BITS



Hole Products offers a large selection of new and used (re-tip and re-run) steel tooth and tungsten carbide insert HDD tricone bits ranging in size from 2  $\frac{15}{16}$ " – 26"+. Tricones are available with open or sealed bearings, regular or jet circulation, and a wide range of additional custom features to optimize penetration rates and extend bit life in particular formations and under specific operating parameters.

Steel teeth and/or tungsten carbide inserts come in a variety of shapes, sizes, and grades of tungsten carbides to address specific drilling conditions. TCI bits offer increased durability over steel tooth bits but also carry a higher cost.

Open bearing bits feature bearings without a seal that are open to outside debris. Open bearing bits are generally cheaper than sealed bearing bits, and recommended for shallower holes. Sealed bearing tricone bits are available for use in applications where, historically, bearing life has limited bit performance. Sealed roller bearing bits extend the bearing life, allowing for increased utilization of the cutting structure.

To make tricone bit selection easier, Hole Products follows the IADC bit classification system. The IADC Code describes a tricone bit; it tells you what the bit is, steel tooth or carbide insert, the formations the bit is meant for drilling, and the bearing/seal type.

Please contact your Hole Products representative for additional details and assistance selecting the tricone bit best suited for your specific drilling conditions.



## IADC CODE - TRICONE BITS

**First Digit** - 1, 2, and 3 designate steel tooth bits and the formation being drilled, with 1 for soft, 2 for medium, and 3 for hard formations. 4, 5, 6, 7, and 8 designate tungsten carbide insert bits and the formation being drilled, with 4 being the softest and 8 the hardest formation.

**Second Digit** - 1, 2, 3 and 4 are further broken down by the formation, with 1 being the softest and 4 the hardest.

**Third Digit** - Classifies the bit according to bearing/seal type and special gauge/wear protection.

1. **Open Bearing** - On these bits the cones will spin freely. The bit has a front row of ball bearings and a back row of roller bearings.
2. **Open Bearing, Air-Cooled** - Cones are similar to #1, but have air injection directly to the cones to cool the bearings. Air flows into the cone through the passage ways inside the pin. (Not for use in mud applications.)
3. **Open Bearing with Gauge Protection** - Carbide inserts in the heel of the cone.
4. **Sealed Roller Bearing** - These bits have an o-ring seal with a grease reservoir for bearing cooling. The seal acts as a barrier against mud and cuttings to protect the bearings.
5. **Sealed Roller Bearing with Gauge Protection** - Carbide inserts in the heel of the cone.
6. **Sealed Journal Roller Bearing** - These bits are strictly oil/grease cooled with nose bearings, o-ring seal and a race for maximum performance.
7. **Sealed Journal Rolling Bearing with gauge protection** - Carbide inserts in the heel of the cone.

**Fourth Digit** – used to indicate additional features.

**Example 1:**

IADC Code: 321

**Bit Description:**

- 3 = Steel Tooth, Hard Formations
- 2 = Semi-Abrasive and Abrasive Formations.
- 1 = Open Bearing

**Example 2:**

IADC Code: 514

**Bit Description:**

- 5 = Tungsten Carbide Insert, Soft to Medium Formation
- 1 = Soft Formations
- 4 = Sealer Roller Bearing

TRICONE BITS - STANDARD CONNECTION SIZES *	
SIZE	STANDARD PIN CONNECTION
3 1/2" to 4 1/2" inclusive	2 3/8" API
4 5/8" to 5" inclusive	2 7/8" API
5 1/8" to 7 3/8" inclusive	3 1/2" API
7 1/2" to 9 3/8" inclusive	4 1/2" API

*\*Additional bit sizes up to 26" available on request.*

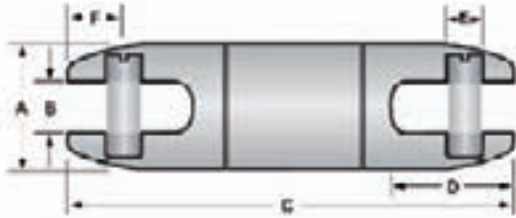
## DIRECTIONAL DRILLING SWIVELS

Hole Products offers a complete line of HDD swivels. D.Drill® swivels prevent boring equipment's rotational torque from interfering with the product being pulled. These swivels are greasable and double sealed to keep contaminants out. It is recommended to flush swivels with grease after each use to purge any contaminants that may have penetrated past the seals into the swivel while boring.

Swivels are available with varying tension ratings for all of your HDD applications. Please contact your Hole products representative for additional details.

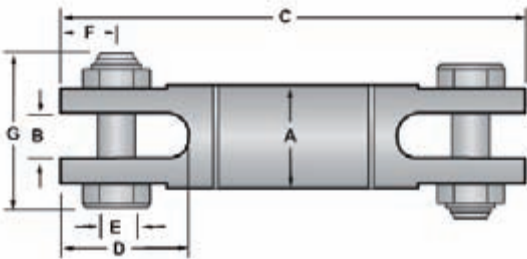
### 400 D.DRILL® DIRECTIONAL DRILLING SWIVEL

PART #	TENSION (lbs.)	COMPRESSION (lbs.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)
2810219	1,800	595	7/8	.38	4.83	1.03	.31	.53
2810221	4,000	1,300	1 1/4	.56	6.57	1.34	.37	.59
2810222	8,500	2,800	1 5/8	.63	7.22	1.59	.56	.78
2810223	10,000	3,300	2	.75	8.29	1.77	.63	.71
2810224	20,000	6,600	2 1/2	1.00	11.44	2.79	.88	1.23
2810225	30,000	10,000	3	1.31	13.27	3.56	1.13	1.37



### 819 D.DRILL® DIRECTIONAL DRILLING SWIVEL

PART #	TENSION (lbs.)	COMPRESSION (lbs.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)	G (in.)
2810211	8,500	2,800	1 1/8	.63	6.85	1.59	.56	.78	2.36
2810212	10,000	3,300	2	.75	7.83	1.81	.63	.75	2.89
2810226	20,000	6,600	2 1/2	1.00	10.93	2.84	.88	1.25	3.67
2810213	30,000	10,000	3	1.31	12.75	3.56	1.13	1.37	4.50
2810214	45,000	15,000	4	1.63	15.25	4.00	1.25	1.84	5.58
2810215	60,000	20,000	4 5/8	1.75	17.48	4.62	1.50	2.13	6.31
2810227	90,000	30,000	6	2.00	18.27	4.50	1.75	2.18	6.59
2810228	120,000	40,000	8	2.25	21.71	5.25	2.00	2.50	8.25



# CLEVIS BY CLEVIS SWIVELS

Four bearings and a larger, steel constructed shaft design produces one of the strongest swivels on the market. Please contact your Hole products representative for additional details.

CLEVIS BY CLEVIS PULLBACK SWIVELS			
PART #	DESCRIPTION	TOTAL WORK LOAD	NET WT.
2810243	PULLBACK SWIVEL	8,500 lbs.	4.0 lbs.
2810247	PULLBACK SWIVEL	10,000 lbs.	6.0 lbs.
2810248	PULLBACK SWIVEL	12,000 lbs.	9.0 lbs.
2810249	PULLBACK SWIVEL	16,000 lbs.	12.0 lbs.
2810252	PULLBACK SWIVEL	22,000 lbs.	16.0 lbs.
2810253	PULLBACK SWIVEL	32,000 lbs.	25.0 lbs.
2810254	PULLBACK SWIVEL	44,000 lbs.	25.0 lbs.
2810256	PULLBACK SWIVEL	60,000 lbs.	60.0 lbs.
2810257	PULLBACK SWIVEL (CLEVIS x 3.5" API IF)	90,000 lbs.	120.0 lbs.
2810258	PULLBACK SWIVEL (CLEVIS x CLEVIS)	90,000 lbs.	120.0 lbs.
2810261	PULLBACK SWIVEL	120,000 lbs.	230.0 lbs.



CLEVIS BY CLEVIS SWIVEL

# BOLT-ON PULLBACK SWIVELS

BOLT-ON PULLBACK SWIVELS			
PART #	DESCRIPTION	TOTAL WORK LOAD	NET WT.
2810244	BOLT-ON PULLBACK SWIVEL	8,500 lbs.	4.0 lbs.



BOLT-ON PULLBACK SWIVEL

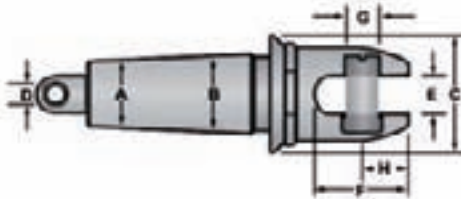
## INNERDUCT PULLING EYES

Hole Products offers innerduct pulling eyes for use with various pipe types and sizes. Please contact your Hole products representative for additional details.

### SWIVEL HEAD INNERDUCT PULLING EYES

Reduce twisting and binding of the innerduct as it is installed. The use of an innerduct pulling eye also eliminates the need for a separate swivel on each pulling eye when installing single innerducts into individual conduits or multiple innerducts into a single conduit.

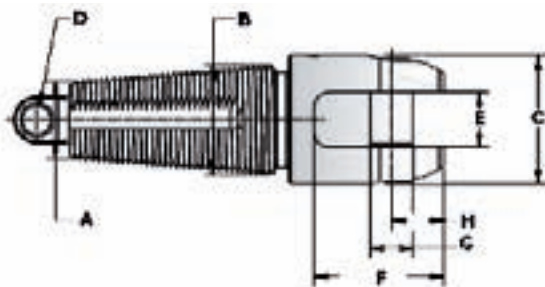
SWIVEL HEAD INNERDUCT PULLING EYES								
PART #	NOMI-NAL SIZE	INNERDUCTS I.D. RANGE (A-B)	MAX O.D. (C)	HOLE DIAMETER (D)	SLOT WIDTH (E)	SLOT DEPTH (F)	PIN DIAMETER (G)	PIN CENTER (H)
2810427	1" - 1 1/4"	1.06"-1.43"	1.75"	.44"	.56"	1.31"	.44"	.56"
2810428	1 1/2"	1.37"-1.68"	2.00"	.44"	.56"	1.31"	.44"	.56"
2810429	2"	1.93"-2.12"	2.44"	.44"	.56"	1.31"	.44"	.56"



### CLEVIS HEAD INNERDUCT PULLING EYES

Provides the same tapered threads as Swivel Head Innerducts. Clevis Head Innerduct Pulling eyes feature a slotted head with clevis pin to permit direct attachment to multiple pulling harness leg ends.

CLEVIS HEAD INNERDUCT PULLING EYES								
PART #	NOMINAL SIZE	INNERDUCTS I.D. RANGE (A-B)	MAX O.D. (C)	HOLE DIAMETER (D)	SLOT WIDTH (E)	SLOT DEPTH (F)	PIN DIAMETER (G)	PIN CENTER (H)
2810421	3/4"	.71"-.87"	1.25"	.25"	.56"	1.34"	.38"	.59"
2810321	1"	.93"-1.06"	1.38"	.25"	.56"	1.34"	.44"	.56"
2810422	1 1/4"	1.06"-1.43"	1.75"	.38"	.75"	1.78"	.63"	.81"
2810423	1 1/2"	1.37"-1.68"	2.00"	.38"	.75"	1.78"	.63"	.72"
2810424	1 3/4"	1.68"-1.81"	2.25"	.38"	.75"	1.78"	.63"	.72"
2810426	2"	1.93"-2.12"	2.50"	.38"	.75"	2.50"	.88"	1.23"

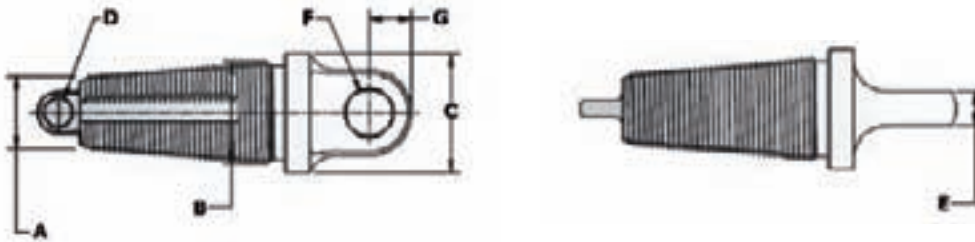


## FIXED HEAD INNERDUCT PULLING EYES

Provides maximum pulling strength using tapered buttress threads that thread into the innerduct. These eyes will not pull out of the innerduct until the pulling tensions have exceeded the maximum pulling tensions recommended by the innerduct manufacturers, when properly sized and installed.

*NOTE: The actual innerduct inside diameter (I.D.) will determine correct pulling eye size. The I.D. measurement must be greater than dimension A and smaller than dimension B.*

FIXED HEAD INNERDUCT PULLING EYES							
PART #	NOMINAL SIZE	INNERDUCTS I.D. RANGE (A-B)	MAX O.D. (C)	HOLE DIA. (D)	TANG THK. (E)	TANG HOLE DIA. (F)	TANG HOLE LOCATION (G)
2812019	3/4"	.71"-.87"	1.25"	.25"	.38"	.50"	.50"
2812024	1"	.93"-1.06"	1.38"	.25"	.38"	.50"	.50"
2812014	1 1/4"	1.06"-1.43"	1.75"	.38"	.50"	.66"	.63"
2812096	1 1/2"	1.37"-1.68"	2.00"	.38"	.50"	.66"	.63"
2812097	1 3/4"	1.68"-1.81"	2.25"	.38"	.50"	.66"	.75"
2812098	2"	1.93"-2.12"	2.50"	.38"	.50"	.81"	.75"



## PULLING EYES

Hole Products offers a variety of sleeved and non-sleeved pulling eyes, which provide optimum gripping power with a watertight design.

Additional sizes and styles are available upon request.

SLEEVED PE & PVC PULLING EYES					
PART #	SIZE	LENGTH	CONDUIT I.D.		LEAD CONE
			MIN	MAX	
2810319	1 1/4"	6.23"	1.25"	1.50"	1.76"
2810323	1 1/2"	6.23"	1.50"	1.75"	2.01"
2810324	2"	8.18"	1.88"	2.15"	2.45"
2810322	2 1/2"	8.80"	2.31"	2.56"	3.01"
2815051	3"	11.89"	2.69"	3.13"	3.63"
2810173	4"	14.11"	3.50"	4.06"	4.63"
2810326	6"	19.60"	5.06"	6.00"	6.76"
2815022	8"	21.53"	6.63"	7.69"	8.84"



## SHACKLES

Shackles are available in a number of sizes to connect pulling grips and pullers to the swivel.

ANCHOR SHACKLES, SCREW PIN			
PART #	BODY SIZE	TOTAL WORK LOAD	NET WT.
2815169	5/16"	1,500 lbs.	3.0 oz.
2815170	3/8"	2,000 lbs.	4.5 oz.
2815171	7/16"	3,000 lbs.	8.0 oz.
2815172	1/2"	4,000 lbs.	11.0 oz.
2815073	5/8"	6,500 lbs.	1.5 lbs.
2815075	3/4"	9,500 lbs.	2.0 lbs.
2815176	7/8"	13,000 lbs.	3.5 lbs.
2815177	1.0"	17,000 lbs.	5.5 lbs.



## PULLING SLINGS

Hole Products offers 2, 3, 4, and 6 way pulling slings with multiple cable sizes, designed for use with different working loads.

Pulling slings are an inexpensive way to hook up and pull multiple ducts at a time.

Due to the vast number of custom options, please contact your Hole Products representative to assist with choosing the right sling for your requirements.



A= Max. Width  
 B= Separation Between Legs  
 C=Lead Ring Diameter

## PULLING GRIPS

Hole Products offers pulling grips made of high quality galvanized steel strand to assure long life. Fiber optic pulling grips feature a special weave that provides positive holding power while allowing the grip to remain flexible, ensuring cable protection.

Please see the selection guide below, or contact a Hole Products representative for additional details.

### SELECTING THE CORRECT GRIP:

1. Determine your cable O.D.
2. Find the grip size that encompasses your cable O.D.
3. Whenever possible, use a closed mesh that assembles over the cable end. If the cable end is not available, use a split mesh.
4. Where available, select an eye style that suits your needs.
5. Estimate the tension to be put on the grip, establish the working load you require and compare this to the listed approx. breaking strength of the grip to ensure that the grip will be strong enough.

**Note: This item is made to order.**

CALCULATING GRIP SIZE FOR MULTIPLE CABLE OF THE SAME DIAMETER								
NUMBER OF CABLE/ BUNDLES	2	3	4	5	6	8	9	GRIP DIAMETER RANGE (in)
INDIVIDUAL CABLE DIAMETER RANGE	.30-.38	.25-.31	.22-.27	.19-.24	.17-.22	.15-.19	.14-.18	.50-.61
	.38-.44	.31-.36	.27-.31	.24-.29	.22-.26	.19-.23	.18-.21	.62-.74
	.44-.59	.36-.49	.31-.42	.29-.38	.26-.34	.23-.31	.21-.28	.75-.99
	.59-.75	.49-.63	.42-.54	.38-.48	.34-.43	.31-.39	.28-.35	1.00-1.24
	.75-.90	.63-.76	.54-.65	.48-.58	.43-.52	.39-.46	.35-.42	1.25-1.49
	.90-1.07	.76-.89	.65-.77	.58-.67	.52-.60	.46-.54	.42-.49	1.50-1.74
	1.07-1.22	.89-1.02	.77-.88	.67-.77	.60-.69	.54-.62	.49-.56	1.75-1.99
	1.22-1.53	1.02-1.28	.88-1.10	.77-.96	.69-.86	.62-.77	.56-.71	2.00-2.49
	1.53-1.83	1.28-1.53	1.10-1.32	.96-1.16	.86-1.03	.77-.93	.71-.85	2.50-2.99
	1.83-2.14	1.53-1.79	1.32-1.54	1.16-1.35	1.03-1.20	.93-1.08	.85-.99	3.00-3.49
	2.14-2.44	1.79-2.05	1.54-1.76	1.35-1.54	1.20-1.37	1.08-1.24	.99-1.13	3.50-3.99
	2.44-2.75	2.05-2.30	1.76-1.98	1.54-1.74	1.37-1.55	1.24-1.39	1.13-1.27	4.00-4.49
2.75-3.06	2.30-2.56	1.98-2.20	1.74-1.93	1.55-1.72	1.39-1.55	1.27-1.41	4.50-4.99	

## MINCON® HDD DRILLING SYSTEMS



Hole Products offers a complete range of Mincon® hardrock drilling tools for use in horizontal directional drilling industry. These tools are specifically designed for use in medium to hard rock drilling conditions where conventional directional drilling systems cannot perform when hardrock is encountered. All Mincon® drilling systems provide the necessary equipment to convert any HDD drill from a mud drilling machine to a pneumatic drilling machine.

### PILOT BORE SYSTEMS:

**HDD40** – The Mincon® HDD40 Hard Rock Horizontal Directional Drilling system is the ideal tool for drilling 4 1/4" (108mm) pilot bores in hard rock formations.

**HDD50** – The Mincon® HDD50 Hard Rock Horizontal Directional Drilling system is the ideal tool for drilling 5 1/4" (133mm) pilot bores in hard rock formations.

**HDD60** – The Mincon® HDD60 Hard Rock Horizontal Directional Drilling system is the ideal tool for drilling 6 1/4" (159mm) pilot bores in hard rock formations.

### PULL REAMER:

**HDD80** – The Mincon® HDD80 Hard Rock Horizontal Directional Pull Reamer is the ideal tool for hammer reaming a 5 1/4" (133mm) pilot bore out to 10-12" (254-305mm) and 6 1/4" pilot bore out to 14" (356mm) in hard rock formations. The HDD80 Pull Reamer hammer can be used in conjunction with the equipment of the HDD hard rock pilot bore systems to convert HDD drills from mud drilling to pneumatic drilling machines.



# MINCON® HDD DRILLING SYSTEMS

MINCON® HDD DRILLING SYSTEMS						
DRILLING SYSTEM	HDD40		HDD50		HDD60	
PART #	2815002		2815000		2810680	
SPECIFICATIONS	Imperial	Metric	Imperial	Metric	Imperial	Metric
HAMMER O.D.	3.35"	85 mm	4.06"	103 mm	4.88"	124 mm
PILOT BIT SIZE	4.25"	108 mm	5.25"	133 mm	6.25"	159 mm
HAMMER LENGTH	73.5"	1867 mm	79.0"	2007 mm	81.0"	2057 mm
HAMMER WEIGHT	109 lbs.	49.4 kgs.	180 lbs.	81.8 kgs.	302 lbs.	137 kgs.
PISTON WEIGHT	8 lbs.	3.6 kgs.	16.3 lbs.	7.4 Kgs	33.6 lbs.	15 kgs.
BIT SHANK TYPE	HDD40		HDD50		HDD60	
BACKHEAD THREAD	2 3/8" API Reg Pin		2 3/8" API Reg Pin		3 1/2" API Reg Pin	
DRIVE CHUCK*	2814905		2814934		2815012	

## SYSTEM FEATURES

- Dual steering point design incorporating slanted drill bit and 2° bent sub provides more responsive steering capabilities while transitioning in and out of rock formations.
- High frequency hammer cycle transmits less vibration that can be detrimental to sensitive electronics. Rock formations fracture into smaller pieces which are easier to flush out of the bore hole. Less stress transmitted to drill pipe and tool joints. Provides the most effective steering in any pneumatically powered HDD system.
- High pressure/high volume compressed air powers drilling operations and requires minimal torque and feed pressure loads on drill machine increasing overall life of drill.
- Shorter body design compared to competitive models allows for easier steering in the bore hole and less rotational stresses on hammer body.
- Existing locating electronics (DCI, Sub SITE, or WIRELINE) can be used.
- Support Station delivers compressed air mixed with a water/polymer (3-5 gal/min) and rock drill oil (2-4 pints/hr) to operate the drilling cycle resulting in minimal, environmentally friendly clean up. Can be used on environmentally sensitive locations using biodegradable rock drill oils.

## SYSTEM COMPONENTS

- Complete Hammer
- Sonde Carriage
- 4 - Safety Whip Checks
- 20' High Pressure Air Hose (1,000 psi.)
- 30' High Pressure Air Hose (1,000 psi.)
- 40' Clear Water Supply Hose
- Support Station
- TriLite Valve Controller W/ Connectors
- Slant Drill Bit
- Sonde Alignment Tool
- Sonde Torque Wrench
- 4 - Air Couplers

# MINCON® HDD PULL REAMER

MINCON® PULL REAMER		
HDD80		
PART #	2815001	
SPECIFICATIONS	US	Metric
HAMMER OUTSIDE DIAMETER	9.055"	230 mm
PILOT BIT SIZE	5.25" - 6.25"	133 - 159 mm
HAMMER LENGTH	61.0"	1550 mm
HAMMER WEIGHT	406 lbs.	184.5 kgs.
PISTON WEIGHT	58.1 lbs.	26.4 kgs.
BIT SHANK TYPE	HDD80	
BACKHEAD THREAD	3 1/2" API Reg Pin	



## SYSTEM FEATURES

- Patented reverse air flow hammer cycle allows for pull reaming of pilot bore of 5 1/4" (133mm) out to 10-12" (254-305mm) and 6 1/4" out to 14" (356mm).
- High frequency hammer cycle transmits less vibration to drill pipe and tool joints. Rock formations fracture into smaller pieces which are easier to flush out of the bore hole. Less stress transmits to pipe joints and gearbox assembly reducing maintenance requirements to drill. Provides the most effective steering in any pneumatically powered HDD system.
- High pressure/high volume compressed air powers drilling operations and requires minimal torque and feed pressure loads on drill machine increasing overall life of drill.
- A range of bits are offered with different grades of standard carbide and diamond enhanced carbide to maximize bit life in every drilling condition.
- Attachments can be used to pull utilities as the hole is reamed.
- Support station delivers compressed air mixed with a water/polymer (3-5 gal/min) and rock drill oil (2-4 pints/hr) to operate the drilling cycle resulting in minimal, environmentally friendly clean up. Can be used on environmentally sensitive locations using biodegradable rock drill oils.



## RAILHEAD® UNDERGROUND PRODUCTS



Hole Products offers a complete line of Railhead® HDD drilling tools. Railhead® products are built tough and designed to fit all major brands of HDD machines.

The Railhead® product line includes: Incredibit® rock bits and housings, Endurance™ housings and bits, direct bore bits and housings, and a wide range of backreamers.

Hole Products offers many styles of connection options available to Railhead®, including Direct Connect, easy connect, Quick Connect and end load sonde housing adapter. Railhead's® Direct Connect system offers advanced features for speed, strength and options. The Railhead® Quick Connect system is the finest of its kind in the market, and allows you to attach and remove your drillhead or reamer in less than two turns. Railhead's® Endurance Housings incorporate the patented Stress Relief structure with the key and keyword design to take much of the side stress off the bolts.

In addition, Hole Products offers a complete line of drive collars, lead rods, paddle bits, housings, housing savers, and much more.

Please contact your Hole Products representative for additional information regarding Railhead® Underground products.

## INCREDBIT®

Railhead's INCREDBIT® drill head is named for its ability to bore and steer through tough, rocky conditions. Its patented technology allows contractors to accomplish bores in ground that cannot be drilled with conventional bits. It also allows smaller machines to drill through some conditions that would otherwise require a mud motor. It is truly a multi-purpose bit that steers through soft conditions as well as rock and cobble.

The INCREDBIT® comes in two configurations for different rock formations. The standard INCREDBIT® is designed for soft to medium rock formations. The aggressive INCREDBIT® is for boring harder rock formations.

STANDARD INCREDBIT® ROCK BITS		
PART #	DESCRIPTION	AVERAGE HOLE DIAMETER
2810710	2 3/4" STANDARD	4"
2810715	3" STANDARD	5"
2810112	3 1/2" STANDARD	6"
2810110	4 1/8" STANDARD	9"
2810177	5" STANDARD	10-12"

AGGRESSIVE INCREDBIT® ROCK BITS		
PART #	DESCRIPTION	AVERAGE HOLE DIAMETER
2810720	3" AGGRESSIVE	5"
2810113	3 1/2" AGGRESSIVE	6"
2810111	4 1/8" AGGRESSIVE	9"



## INCREDBIT® SONDE HOUSINGS

INCREDBIT® SONDE HOUSING	
PART #	DESCRIPTION
2810685	2 3/4" "NON-SUBSITE" INCREDBIT SONDE HOUSING
2810695	2 3/4" "SUBSITE 86B/BH SPECIFIC" INCREDBIT SONDE HOUSING
2810690	3" INCREDBIT SONDE HOUSING
2810115	3 1/2" INCREDBIT SONDE HOUSING
2810114	4 1/8" INCREDBIT SONDE HOUSING
2810705	5" INCREDBIT SONDE HOUSING



## ENDURANCE™ HOUSINGS

The Endurance™ product line consists of a series of conventional bits and sonde housings that are designed for contractors who do not drill in the kind of conditions that require an INCREDIBIT®.

### RAILHEAD ENDURANCE HOUSINGS

PART #	DESCRIPTION
2810700	3" ENDURANCE SONDE HOUSING
2810725	3 1/2" ENDURANCE SONDE HOUSING



### RAM ENDURANCE HOUSING - DITCH WITCH®

PART #	RIG	HOLE PATTERN	DESCRIPTION
2810740	DITCH WITCH	5	2 3/4" SONDE HOUSING
2810121	DITCH WITCH	5	3" SONDE HOUSING
2810123	DITCH WITCH	6	3 1/2" SONDE HOUSING



### RAM ENDURANCE HOUSING - VERMEER®

PART #	RIG	HOLE PATTERN	DESCRIPTION
2810730	VERMEER	7	2 3/4" SONDE HOUSING
2810120	VERMEER	7	3" SONDE HOUSING
2810735	VERMEER	7	3 1/2" SONDE HOUSING



## RAILHEAD ENDURANCE™ PADDLE BITS

Railhead paddle bits are desired for use with endurance housings and are available in sizes from 3 1/2" to 6". They are offered in a number of styles for use in a variety of formations.

Paddle bits are also available for use with Ditch Witch® and Vermeer® housings.

ENDURANCE™ BUTTON BIT			
PART #	DESCRIPTION	WIDTH	HOUSING
2811031	BUTTON BIT W/ PULLING HOLE	3 1/2"	2 3/4" OR 3"
2811032	BUTTON BIT W/ PULLING HOLE	4"	2 3/4" OR 3"
2811066	BUTTON BIT W/ PULLING HOLE	4"	3 1/2"
2811034	BUTTON BIT W/ PULLING HOLE	5"	3 1/2"
2811042	BUTTON BIT W/ PULLING HOLE	5"	4 1/8"
2811043	BUTTON BIT W/ PULLING HOLE	6"	4 1/8"



ENDURANCE™ IRON CLAW BIT			
PART #	DESCRIPTION	WIDTH	HOUSING
2811044	IRON CLAW W/ PULLING HOLE	3 1/2"	2 3/4" OR 3"
2811045	IRON CLAW W/ PULLING HOLE	4"	2 3/4" OR 3"
2811046	IRON CLAW W/ PULLING HOLE	4"	3 1/2"
2812009	IRON CLAW W/ PULLING HOLE	5"	3 1/2"
2811047	IRON CLAW W/ PULLING HOLE	5"	4 1/8"
2811048	IRON CLAW W/ PULLING HOLE	6"	4 1/8"



ENDURANCE™ SHARP SHOOTER BIT			
PART #	DESCRIPTION	WIDTH	HOUSING
2811049	SHARP SHOOTER W/ PULLING HOLE	3 1/2"	2 3/4" OR 3"
2811050	SHARP SHOOTER W/ PULLING HOLE	4"	2 3/4" OR 3"
2810118	SHARP SHOOTER W/ PULLING HOLE	4"	3 1/2"
2815059	SHARP SHOOTER W/ PULLING HOLE	5"	3 1/2"
2810119	SHARP SHOOTER W/ PULLING HOLE	5"	4 1/8"
2811051	SHARP SHOOTER W/ PULLING HOLE	6"	4 1/8"



ENDURANCE™ STEEP TAPER TOUGHNECK BIT			
PART #	DESCRIPTION	WIDTH	HOUSING
2811052	STEEP TAPER ROUGHNECK	5"	3 1/2"



## DIRECT BORE HOUSINGS

Direct Bore housings are designed for tough bore conditions. They feature a box end connection, stronger door, and compatibility with a variety of bits.

DIRECT BORE HOUSING		
PART #	DESCRIPTION	CONNECTION
2815145	3 1/8" DIRECT BORE HOUSING	2" IF BOX x ROTOLOCK PIN
2815150	3 5/8" DIRECT BORE HOUSING	2 3/8" API BOX x ROTOLOCK PIN
2815155	4" DIRECT BORE HOUSING	2 7/8" API BOX x ROTOLOCK PIN



## DIRECT BORE BITS

Direct Bore rock bits are designed to provide great steering and control in all soil, loose rock, and rock formations. Direct Bore bits are available in sizes from 3 1/2" to 13".

DIRECT BORE BITS		
PART #	DESCRIPTION	CONNECTION
2810745	4" DIRECT BORE 1	2" IF PIN
2815120	4 1/4" DIRECT BORE 1	2 3/8" API PIN
2815125	4 1/4" AGGRESSIVE	2 3/8" API PIN
2815130	5" DIRECT BORE 1	2 7/8" API PIN
2815135	9" DIRECT BORE 1	4 1/2" API PIN
2815140	13" DIRECT BORE 1	4 1/2" API PIN



2" IF PIN  
DIRECTBORE BIT



2 3/8" API PIN  
STANDARD DIRECTBORE BIT 1



2 7/8" API PIN  
DIRECTBORE BIT 1



## RAILHEAD® EXTReam™ REAMERS

The EXTReam™ is a true rock reamer designed for hard rock and rocky conditions. They feature no moving parts and field replaceable rock teeth. EXTReam™ reamers are available in 5 sizes from 6" to 16" for use on 7,000 lb. to 140,000 lb. drills.



## RAILHEAD® IncrediPull PULLERS

The IncrediPull pullers attach quickly and easily to Railhead Incredibit® rock bits. This puller is a perfect fit for FFTP projects.



## GRUNDOMAT® PIERCING TOOL



Illustration courtesy of TT Technologies, Inc.; all rights reserved to TT.

GRUNDOMAT® pneumatic piercing tools provide accurate horizontal bores beneath roads, railways, and landscaping across North America and around the world. TT's pneumatic tools are used in trenchless applications ranging from pipe pulling, pipe ramming, pipe bursting, sliplining, and directional drilling.

The reciprocating stepped-cone chisel head action of the GRUNDOMAT® tool is unique because it hammers away at solid obstacles. This two-stroke action means that the piston's impact is concentrated on the reciprocating tool head for optimum boring performance.

Compressed air repeatedly propels the piston against the rear of the chisel head assembly. This first compresses the pre-tensioned steel spring which forces the chisel head assembly forward independently of the main casing to provide a pilot bore. Then, the same continuous force thrusts the main casing ahead.

### GRUNDOMAT® FEATURES:

- Reverse Made Easy: 5-inch through 7-inch diameter Grundomats are equipped with a new patented reverse mechanism. You can easily reverse the Grundomat during the bore, by adjusting a lever on the lubricator control system. There is no need to turn the air hose or stop the tool.
- Easily launched by hand or from cradle
- Patented reciprocating stepped-cone chisel head
- Minimal tool setup for fast, profitable work
- Durable construction means little maintenance

## GRUNDOMAT® VERSATILITY

**PIPE RAMMING** – Converting the GRUNDOMAT® for pipe ramming is a simple operation. A tapered pipe-driving adapter is placed on the front of the tool. The GRUNDOMAT®'s percussive power easily rams steel pipe and casings under sidewalks, roadways and other structures. With models ranging in size from 1 3/4 inches to 7 inches in diameter, the GRUNDOMAT® can be used for ramming a wide range of pipe diameters.

**PIPE EXTRACTION** – The GRUNDOMAT® can be used to drive steel pipe out of the ground, a process called pipe pushing or pipe extraction. During pipe extraction, a pipe-pushing adapter is placed on the front of the piercing tool. The tool's percussive force is then used to literally drive out an existing service line. Often the new pipe is pulled into place behind the tool, but also functions as the air supply for the GRUNDOMAT® through the use of an air nipple.

**PIPE BURSTING** – Various adapters and expanders are available for the GRUNDOMAT® to allow it to be configured for bursting applications. Size for size replacement and nominal size upsize replacements can be easily accomplished with the GRUNDOMAT® configured for pipe bursting.

**DEAD END & VERTICAL BORING** – The GRUNDOMAT® is ideal for vertical or dead end boring. With the GRUNDOMAT®'s patented reverse mechanism, the tool can be reversed out of a bore simply by adjusting a level on the lubricator control mechanism.

**KEYHOLE** – Minimal excavation service line installations called keyholes help municipalities and utilities save time, manpower and money. The superior accuracy of the GRUNDOMAT® piercing tool makes these installations possible. The tool is launched from a small launch pit at the house or business receiving the new installation. An even smaller pit is used at the main. When the GRUNDOMAT® arrives on target at the main, the new pipe is attached to the front of the tool. The GRUNDOMAT® is then reversed out, pulling the new pipe in place.

## GRUNDOMAT® TOOL SPECIFICATIONS

GRUNDOMAT® TOOL SPECIFICATIONS						
PART #	MODEL	TOOL DIAMETER	LENGTH	NET WEIGHT	AIR CONS. CFM	STROKES/ MINUTE
2830106	45 P	1 3/4"	39"	20 lbs.	12	580
2830099	55 P	2 "	43"	32 lbs.	18	480
2830100	65 P	2 1/2"	52"	55 lbs.	25	460
2830101	75 P	3"	57"	75 lbs.	32	400
2830104	85 P	3 1/3"	61"	101 lbs.	32	390
2830107	95 P	3 3/4"	68"	143 lbs.	53	320
2830105	100 P	4"	68"	148 lbs.	53	320
2830108	110 P	4 1/4"	66"	212 lbs.	64	325
2830109	130 P	5"	69"	258 lbs.	92	340
2830110	145 P	5 3/4"	78"	370 lbs.	120	310
2830111	160 P	6 1/4"	79"	437 lbs.	159	320
2830112	180 P	7"	87"	573 lbs.	159	280

## DRILLING FLUIDS, ADDITIVES, GROUTS AND EQUIPMENT



Hole Products offers a complete line of specially designed, high performance bentonite drilling fluids, additives, grouts, thread compounds, equipment, and accessories from the industry's leading manufacturers including Baroid®, Cetco®, ChemGrout®, GeoLoop®, Johnson®, PDSCo.®, Red Flint®, Unimin®, GeoPro®, Bestolife®, Jetlube®, and more.





All products are supported by our experienced team, offering the industry's best technical advice, service, and support.

Please contact your Hole Products representative for additional product information, SDS's, or technical assistance.



# BAROID® DRILLING FLUIDS

BAROID® DRILLING FLUIDS				
	PART #	UNIT SIZE	PRODUCT	PRODUCT DESCRIPTION
	3400084	50 lbs.	AQUAGEL®	AQUAGEL® bentonite functions as a viscosifier and filtrate reducer in freshwater drilling fluids.
	3400085	50 lbs.	AQUAGEL GOLD SEAL®	AQUAGEL GOLD SEAL® contains no polymer additives or chemical treatments. It functions as a viscosifier and filtrate reducer in freshwater drilling fluids.
	3400205	3000 lbs.		
	3451009	50 lbs.	BIO-BORE™	BIO-BORE™ concentrate is a free-flowing dry powder for use in various HDD drilling applications, particularly in situations where clay-based drilling fluids are restricted.
	3400055	50 lbs.	BORE-GEL®	BORE-GEL® fluid system is a single sack, boring fluid system specially formulated for use in (HDD) applications.
	3400131	14 lbs.	POLY BORE™	When mixed with fresh water, a small quantity of POLY BORE™ polymer provides a clear, solid-free, viscous borehole stabilizing fluid.
	3400180	35 lbs.		
	3400080	50 lbs.	QUIK GEL®	QUIK GEL® viscosifier imparts viscosity, fluid loss control and gelling characteristics to freshwater-based drilling fluids.
	3400081	50 lbs.	QUIK GEL GOLD™	QUIK GEL GOLD™ viscosifier provides an optimized grind size which results in easy mixing and rapid hydration characteristics.
	3400210	50 lbs.	ZEOGEL®	ZEOGEL® attapulgite clay helps provide high yield and rheological stability in systems that contain large concentrations of salt.
	3400029	20 lbs.	CLAY-DRILL™	CLAY-DRILL™ polymer-based HDD fluid is designed to provide borehole stabilization, counteract the sticking tendencies of clay, and maximize clay/shale inhibition without the need for additional additives. Please contact your Hole Products representative for additional unit sizes.













## CETCO® DRILLING FLUIDS

CETCO® DRILLING FLUIDS				
	PART #	UNIT SIZE	PRODUCT	PRODUCT DESCRIPTION
	3400145	50 lbs.	HYDRAUL-EZ®	HYDRAUL-EZ® is designed to maintain borehole integrity in horizontally drilled boreholes.
	3400115	50 lbs.	PREMIUM GEL®	PREMIUM GEL® is used for all types of freshwater mud rotary drilling where higher solids are desired.
	3400133	50 lbs.	PUREGOLD® GEL	PUREGOLD® GEL is recommended for environmental rotary drilling where ambient groundwater quality and soil chemistry must be maintained.
	3400110	50 lbs.	SUPER GEL X®	SUPER GEL X® may be used for all types of freshwater mud rotary drilling.












## ADDITIONAL DRILLING FLUIDS

OTHER MANUFACTURERS DRILLING FLUIDS				
	PART #	UNIT SIZE	PRODUCT	PRODUCT DESCRIPTION
	3400132	50 lbs.	FLORIGEL® H-Y	FLORIGEL® H-Y is designed for use in drill fluids whenever ionic contamination from materials such as salts, gypsum, sea water and cement is encountered or anticipated.
	3400114	5 gal.	SUPER MUD	SUPER MUD is a liquid polymer slurry which is primarily used as a soil stabilizer to prevent sloughing and/or collapse of a borehole.

# BAROID® ADDITIVES













BAROID® ADDITIVES				
	PART #	UNIT SIZE	PRODUCT	PRODUCT DESCRIPTION
	3400021	5 gal.	AQP-2™	AQP-2™ foaming agent can be added to fresh water for air/foam, air/gel-foam, or mist drilling applications.
	3400117	4 - 1 gal. jars	AQUA-CLEAR® PFD	AQUA-CLEAR® PFD concentrated liquid polymer is a dispersant that provides superior mud and sediment removal from the producing formation and gravel pack.
	3450037	5 gal.		
	3451010	5 lbs.	BARA-DEFOAM® 500	BARA-DEFOAM® 500 defoamer is designed for topical applications to break down foam associated with air/foam drilling operations.
	3400025	5 gal.	CON DET®	CON DET® is used as a wetting agent that promotes bit cleaning and reduces stickiness of clay.
	3450026	10 lbs.	DIAMOND SEAL®	DIAMOND SEAL® is intended for use primarily as a lost circulation material for horizontal directional drilling.
	3400035	1 gal.	EZ-MUD® POLYMER EMULSION	EZ-MUD® is used primarily as a borehole stabilizer. It can also be added to low-solids drilling fluids to help increase lubricity, fluid viscosity, and to help improve carrying capacity of air/foam injection fluids.
	3400030	5 gal.		
	3400036	14 lbs.	EZ-MUD® DRY POLYMER	EZ-MUD® DP water-soluble polymer, disperses and dissolves in fresh water rapidly. When mixed with fresh water, EZ-MUD DP polymer hydrates quickly and forms a clear, viscous fluid.
	3400098	10 lbs.	EZ-MUD® GOLD	EZ-MUD® GOLD can be mixed with water to improve drill hole stability for rotary mud-circulation drilling and to improve carrying capacity for air or air/foam drilling.
	3400099	40 lbs.		
	3400094	5 lbs.	EZ-MUD® PLUS	EZ-MUD® PLUS is used primarily as a viscosifier and borehole stabilizer to help prevent reactive shales and clays from swelling and sloughing.
	3451015	5 gal.	EP MUDLUBE®	EP MUDLUBE® modified tall oil fatty acid can be used to impart extreme pressure lubricating properties to drilling fluids.
	3451013	5 gal.	FUSE-IT®	FUSE-IT® is a fast-acting lost circulation material designed to help seal off loss circulation zones, allowing the operator to return to normal drilling activities.
	3450010	30 lbs.	N-SEAL™	N-SEAL™ lost circulation material can be used as an additive for loss of circulation in concentrations up to 70 lbs./100 gal.

# BAROID® ADDITIVES

BAROID® ADDITIVES				
	PART #	UNIT SIZE	PRODUCT	PRODUCT DESCRIPTION
	3400040	20 lbs.	NO-SAG®	NO-SAG® is used to enhance the carrying capacity of both clay and polymer-base drilling fluids.
	3400350	5 gal.	NXS-LUBE®	NXS-LUBE® extreme pressure lubricant is specially formulated to help provide friction reduction in water-based fluids.
	3400065	5 gal.	PENETROL®	PENETROL® wetting agent is designed to help counteract the sticking tendencies of clay and enhances the rate of penetration.
	3400020	5 gal.	QUIK-FOAM®	QUIK-FOAM® foaming agent can be added to fresh, brine, or brackish water for air/foam, air/gel-foam, or mist drilling applications.
	3400015	55 gal.		
	3400185	5 gal.	QUIK-MUD® D-50	QUIK-MUD® D-50 liquid polymer dispersion is used primarily as a viscosifier and borehole stabilizer to prevent reactive shale and clay from swelling and sloughing.
	3400355	10 lbs.	QUIK-MUD® GOLD	QUIK-MUD® GOLD clay/shale stabilizer assists in reducing swelling and/or dispersion. It also promotes borehole stabilization in water sensitive formations. It also assists in minimal rotational torque and circulating pressure.
	3400356	40 lbs.		
	3400362	20 lbs.	QUIK-TROL® GOLD	QUIK-TROL® GOLD polymer, when added to an AQUAGEL®, QUIK-GEL®, or BORE-GEL® slurry, yields a low filtrate drilling fluid system suitable for drilling in water sensitive formations.
	3400215	40 lbs.		
	3400043	50 lbs.		
	3400044	20 lbs.	QUIK-TROL® GOLD LV	QUIK-TROL® GOLD LV filtration control additive, when added to an AQUAGEL, QUIK-GEL or BORE-GEL slurry, yields a low filtrate drilling fluid system suitable for drilling in water sensitive formations.
	3400046	40 lbs.		
	3400220	50 lbs.		
	3400045	20 lbs.	QUIK-TROL® LV	QUIK-TROL® LV polymer, when added to a QUIK-GEL or BORE-GEL slurry, yields a drilling mud system suitable for drilling in sandy formation.
	3400225	40 lbs.		
	3450005	50 lbs.	SODA ASH	SODA ASH granular powder is primarily used to help condition and soften make-up water and raise pH.
	3400360	5 gal.	SYSTEM FLOC 360®	SYSTEM FLOC 360® polymeric flocculant is used to flocculate clays and shales encountered in drilling operations and facilitate disposal of water-based drilling fluids.



# CETCO® ADDITIVES

CETCO® ADDITIVES				
	PART #	UNIT SIZE	PRODUCT	PRODUCT DESCRIPTION
	3400340	5 gal.	CLAY CUTTER™	CLAY CUTTER™ is an ideal additive for HDD bores in reactive clay soils.
	3400086	5 gal.	DRILL-TERGE™	DRILL-TERGE™ is designed to control interfacial tension and inhibit the hydration and dispersion of clay and shale.
	3400137	14 lbs.	INSTA-VIS™ DRY	INSTA-VIS DRY™ improves drilling efficiency in both horizontal and vertically drilled holes by controlling shales and clays.
	3400108	5 gal.	INSTA-VIS™ PLUS	INSTA-VIS™ PLUS is a multi-functional liquid polymer designed to improve drilling efficiency in both horizontal and vertical drilled holes.
	3400068	5 gal.	LIQUI-TROL™	LIQUI-TROL™ vicosifer is a modified natural cellulosic polymer, in an ultra-clean oil. It is suitable for drilling in water sensitive formations.
	3400333	7.5 lbs.	PROSHOT™	PROSHOT™ is an easy mixing, water soluble, polymer used in horizontal and vertical drilling applications.
	3400334	2 lbs.	REL PAC®	REL-PAC® is designed to increase borehole stability in a variety of rotary and horizontal drilling applications.
	3400335	5 gal.	SUPER PAC™	SUPER PAC™ is an easy mixing, liquid polymer that enhances the properties of a bentonite drilling fluid.
	3400135	45 lbs.	SUPER THIN™	SUPER THIN™ is a highly concentrated additive which reduces drilling fluid viscosity, and assist in settling solids.
	3400336	2 lbs.	SUSPEND-IT™	SUSPEND-IT™ is designed to enhance gel strength of the drilling fluid for improved suspension and transporting of drill cuttings, gravel, and cobble on long bores.
	3400116	25 lbs.	VARIFLO® QD	VARIFLO® QD is a coarse granular, high-viscosity blend of guar gum formulated for easy and quick dispersion in drilling applications.
	3400119	43 lbs.	VERSAFOAM® PLUS	VERSAFOAM® PLUS is an ultra high-yielding, biodegradable, liquid foaming agent for use in fresh and saltwater air rotary drilling.

## THREAD COMPOUNDS

THREAD COMPOUNDS			
PART #	UNIT SIZE	PRODUCT	PRODUCT DESCRIPTION
3100005	1 GAL.	COPR PLUS	COPR PLUS is an environmentally friendly non-lead non-zinc thread compound, which provides protection against galling and seizing protection.
3100010	2 GAL.		
3100011	5 GAL.		
3100050	1 GAL.	KOPR-KOTE®	KOPR-KOTE® is formulated to help prevent downhole joint make-up. It has a very high static friction factor that helps prevent downhole joint make-up when excessive drilling torques are encountered.
3100055	2 GAL.		
3100070	1 GAL.	KOPR-KOTE® ARCTIC	KOPR-KOTE® ARCTIC is designed for extreme cold weather environments where fluid film strength is important and grease consistency remains the same.
3100071	2 GAL.		
LOCKING COMPOUND			
3100085	8 OZ	BAKERLOK® THREAD COMPOUND KIT	BAKERLOK® is a thread locking compound, commonly used for casing, tubing, and drilling joints to prevent accidental detaching of string components during drilling.

## DOPE BRUSHES

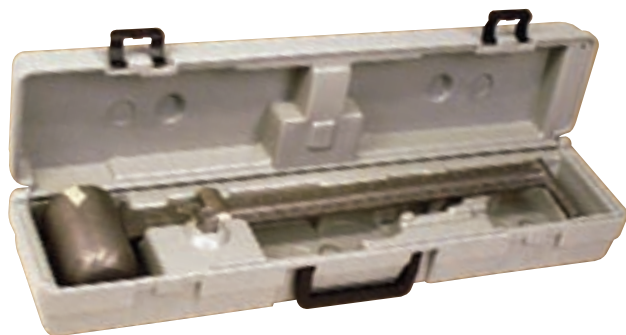
DOPE BRUSHES			
PART #	DESCRIPTION	TRIM LENGTH	OVERALL LENGTH
6100020	STRAIGHT W/ GUARD	2 1/2"	16"
3100025	BEVELED W/ GUARD	2 1/2"	16"



## MUD SCALE/BALANCE

Hole Products offers durable mud scales/balances to provide simple and accurate measurements of drilling fluid density (weight). Our complete kits include a high impact plastic case to protect the scale/balance during transport and to provide a solid working platform.

MUD SCALE/BALANCE	
PART #	DESCRIPTION
3710000	COMPLETE MUD SCALE



## MARSH FUNNEL AND MEASURING CUP

Marsh funnels and measuring cups are used to determine an accurate measure of the drilling fluid's viscosity. Viscosity is a measurement of a fluid's resistance to flow; the greater the resistance, the higher the viscosity.

FUNNEL & MEASURING CUP	
PART #	DESCRIPTION
3710001	MARSH FUNNEL
3710002	MARSH CUP



## SAND CONTENT TEST KIT

Sand content kits measure the percentage of sand (by volume) suspended within the drilling fluid. Excessive sand may result in the deposition of a thick filter cake on the wall of the hole. High sand content may also cause excessive abrasion affecting pump parts and pipe connections.

SAND CONTENT TEST KIT	
PART #	DESCRIPTION
3710033	SAND CONTENT TEST KIT



## TEST STRIP INDICATORS

Quick and accurate field tests for determining pH, iron, and calcium levels in drilling fluids and water.

**PH Test Strips** - Field measurement of drilling fluid pH and adjustments to the pH are fundamental to the effectiveness of drilling fluids and additives.

**Iron Test Strips** - Used to determine the iron content in water.

**Hardness Test Strips**- Used to measure the hardness of water.

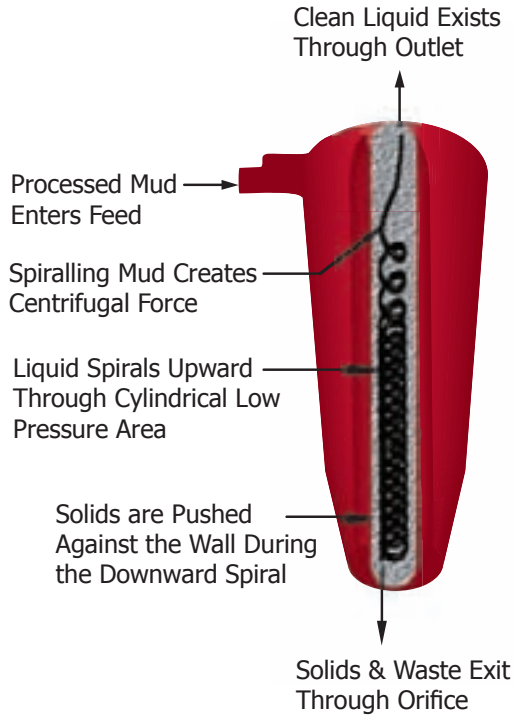
**Calcium Test Strips** - Used to determine the calcium content of the make-up of water and soda ash (sodium carbonate).

TEST STRIP INDICATORS	
PART #	DESCRIPTION
3710005	PH TEST STRIPS - 50/BTL
3710006	IRON TEST STRIPS - 100/BTL
3710075	HARDNESS TEST STRIPS - 50/BTL
3710090	CALCIUM TEST STRIPS - 25/BTL



# MINI-MUD DESANDER

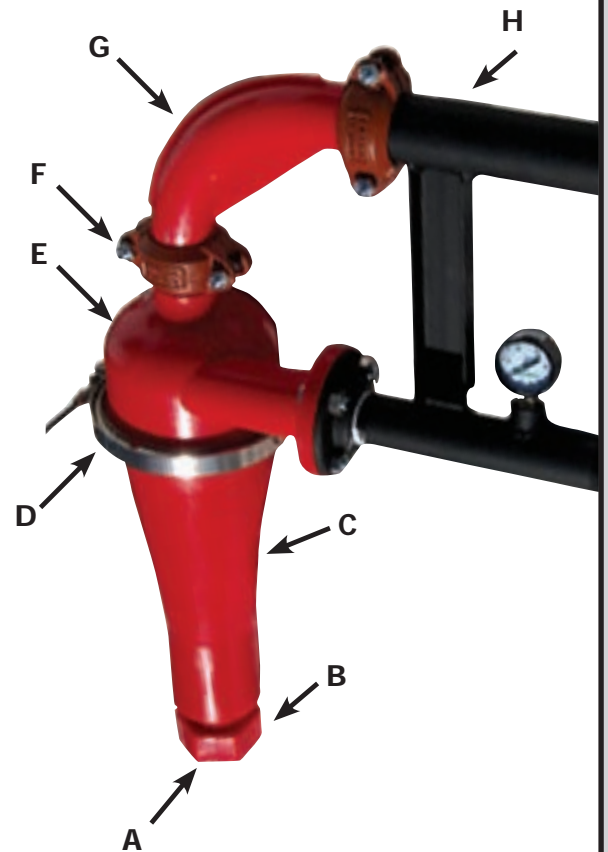
The mini-mud desander is designed to separate fine particles from your drilling fluids that would otherwise be recirculated. Maintaining clean drilling fluid with good density and weight will help increase the life of pumps, swivels, and hoses, and ensure cuttings are carried away from the borehole.



## How the MINI-MUD DESANDER WORKS

There are no moving parts in the cone. Centrifugal forces are generated within the cone by high speed rotation of the drilling fluid which separates solids from liquids. The mini-desander has two exits on the axis; the smaller on the bottom (underflow) and larger (outlet) at the top. The underflow is used for denser or thicker waste products, while the overflow takes the cleaned fluid up the center of the cone and back into the circulating system for reuse.

MINI MUD DESANDER		
ITEM	PART #	DESCRIPTION
A-H	3710010	COMPLETE MINI MUD DESANDER
A	3710011	ADJUSTABLE ORIFICE (Underflow located at this hole)
B	3710016	ADJUSTABLE NUT
C	3710017	BOTTOM CONE SECTION
D	3710024	STAINLESS STEEL BAND CLAMP 5"
E	3710023	TOP CONE SECTION (Overflow located at the neck of this opening)
F	3710015	VITAUIC W/ EPDM GASKET
G	3710013	ELBOW 90°
H	3710100	PIPE ASSEMBLY



## PUMPS & SPARES

Hole Products offers a full range of pumps and spares for use within the construction, rotary, sonic, environmental, geotechnical, surface and underground coring, and water well drilling markets.

Our product offering includes: centrifugal pumps, American Manufacturing piston pumps, FMC Technologies® "Bean" piston pumps, American Manufacturing duplex power pumps, Gardner Denver® duplex power pumps, and progressive cavity (Moyno®) pumps.

Please contact your Hole Products representative for pump selection assistance, specific performance details, detailed installation and operation guides, and ordering assistance.



## MUD CLEANING SYSTEMS

Hole Products offers a complete line of MudSlayer® portable mud cleaning systems. These systems are available in a range of sizes for use on all drill sites.

These portable systems are designed to clean and recycle drilling mud by removing rocks and sand, thus reducing wear and tear on pumps, tooling and other parts. In addition, mud cleaning systems eliminate the need for settling pits and mud pans, and reduce the amount of water needed to drill, thus helping to maintain clean and safe jobsites.

Please contact your Hole Products representative for additional details.



# ACCESSORIES

## ALTURNAMATS®

AlturnaMATS® are virtually indestructible. They are made of 1/2" thick recycled polyethylene able to withstand vehicles weighing up to 60 tons.

- Easily supports 60 - ton loads
- Rugged 1/2" thick recycled polyethylene
- Bold cleat design for great traction
- Build a roadway or working platform in minutes
- Leave turf smooth, even in soft conditions
- No more splintered, warped, water logged plywood
- Simply hosing down leaves the mats clean
- Available in both black or white mats
- Mats can be locked together with Turn-A-Links forming a continuous roadway or workable platform
- Limited Lifetime Warranty



ALTURNAMATS®

### CLEATED BOTH SIDES

PART #	DESCRIPTION
3900045	2' X 4' - BLACK
3900050	2' X 6' - BLACK
3900020	2' X 8' - BLACK
3900060	3' X 6' - BLACK
3900015	3' X 8' - BLACK
3900005	4' X 8' - BLACK

### SMOOTH BOTH SIDES

PART #	DESCRIPTION
3900075	2' X 4' - BLACK
3900080	2' X 6' - BLACK
3900055	2' X 8' - BLACK
3900085	3' X 6' - BLACK
3900115	3' X 8' - BLACK
3900120	4' X 8' - BLACK

### SMOOTH ONE SIDE

PART #	DESCRIPTION
3900090	2' X 4' - BLACK
3900095	2' X 6' - BLACK
3900100	2' X 8' - BLACK
3900105	3' X 6' - BLACK
3900110	3' X 8' - BLACK
3900004	4' X 8' - BLACK

## TRACER WIRE

Tracer wire is used to detect, locate, and identify buried gas, water, sewer, telecommunication, and electrical utility lines. Hole Products offers tracer wire with a variety of jacket colors, tensile strengths and in multiple lengths.

Our tracer wire provides excellent abrasion, crush, chemical, and moisture resistance. It is a low cost preventative option to expensive digging mistakes. We offer many different options that meet UL, ASTM, ICEA/NEMA and Direct Burial Rated standards.

### AVAILABLE OPTIONS:

- Sizes #18 to 1/0 AWG
- Solid up to #4 AWG and Stranded in all sizes
- Hard-drawn copper available
- Colors standardized by the American Public Works Association (APWA) Uniform Color Code for Underground Utility Lines

Please contact your Hole Products representative for additional details.



## SOIL PROBES

Made with solid steel replaceable handle and shaft.

SOIL PROBES	
PART #	DESCRIPTION
4750130	48" UNIT WITH HANDLE, SHAFT & TIP
4750128	54" UNIT WITH HANDLE, SHAFT & TIP
4750129	66" UNIT WITH HANDLE, SHAFT & TIP
4750131	72" UNIT WITH HANDLE, SHAFT & TIP



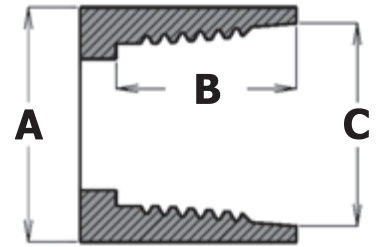




**HDD THREAD REFERENCE GUIDE**  
PAGES 72-75

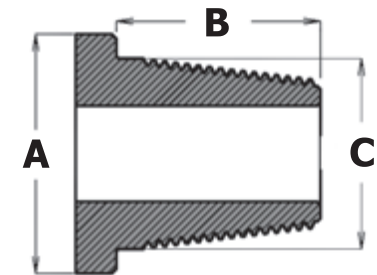
# HDD THREAD REFERENCE GUIDE

API IF BOX				
BOX SIZE	A	B	C	TPI
2" IF	2 5/8"	2 3/4"	2 15/16"	4
2 3/8" IF	3 5/8"	3 1/8"	2 15/16"	4
2 7/8" IF	4 1/4"	3 5/8"	3 1/2"	4
3 1/2" IF	5"	4 1/8"	4 1/8"	4
4 1/2" IF	6 3/4"	4 5/8"	5 5/16"	4
6 5/8" IF	9 1/2"	5 1/8"	7 1/2"	4



**API IF &  
API REG BOX**

API IF PIN				
PIN SIZE	A	B	C	TPI
2" IF	2 5/8"	2 1/4"	2"	4
2 3/8" IF	3 5/8"	2 7/8"	2 3/4"	4
2 7/8" IF	4 1/4"	3 3/8"	3 1/4"	4
3 1/2" IF	5"	3 7/8"	3 7/8"	4
4 1/2" IF	6 3/4"	4 3/8"	5 1/8"	4
6 5/8" IF	9 1/2"	4 7/8"	7 3/8"	4



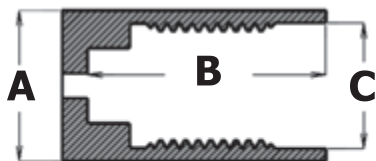
**API IF &  
API REG PIN**

API REG BOX				
BOX SIZE	A	B	C	TPI
2 3/8" API REG	3 3/8"	3 1/8"	2 11/16"	5
2 7/8" API REG	3 7/8"	3 5/8"	3 1/16"	5
3 1/2" API REG	4 3/4"	3 7/8"	3 9/16"	5
4 1/2" API REG	5 3/4"	4 3/8"	4 11/16"	5
6 5/8" API REG	7 7/8"	5 1/8"	6 1/16"	4

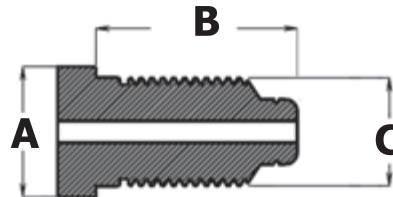
API REG PIN				
PIN SIZE	A	B	C	TPI
2 3/8" API REG	3 3/8"	3 1/8"	2 1/2"	5
2 7/8" API REG	3 7/8"	3 3/8"	2 7/8"	5
3 1/2" API REG	4 3/8"	3 5/8"	3 3/8"	5
4 1/2" API REG	5 3/4"	4 1/8"	4 1/2"	5
6 5/8" API REG	7 7/8"	4 7/8"	5 7/8"	4

CASE® BSW BOX				
BOX SIZE	A	B	C	TPI
2 1/2" BSW	3" OCT.	4 3/4"	2 1/3"	4

CASE® BSW PIN				
PIN SIZE	A	B	C	TPI
2 1/2" BSW	3" OCT.	4 5/8"	2 1/2"	4



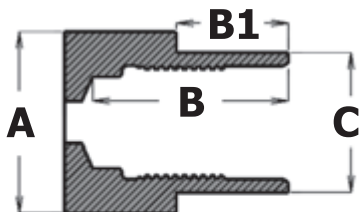
CASE® BOX



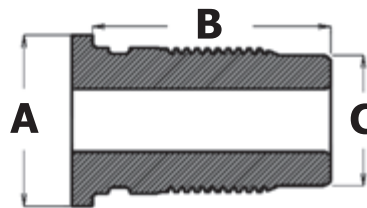
CASE® PIN

DITCH WITCH® EZ BOX					
BOX SIZE	A	B	B1	C	TPI
3.5-4 EZ	5"	5 7/8"	2 5/16"	4 1/8"	4
1.31-6 EZ2	2 1/8"	2 1/4"	1 1/8"	1 9/16" OCT.	6
1.63-6 EZ2	2 5/8"	2 15/16"	1 5/8"	2" OCT.	6
2.0-6 EZ2	3 1/4"	3 1/2"	2"	2 1/2" OCT.	6
2.25-6 EZ2	3 1/2"	3 15/16"	2 1/4"	2 3/4" OCT.	6
2.63-6 EZ2	4"	4 5/8"	2 3/8"	3 1/8"	6
1.88-6 EZ3	2 1/2"	4"	2 1/4"	2 1/4" OCT.	6
2.25-6 EZ3	3 1/2"	5"	2 5/8"	2 3/4" OCT.	6

DITCH WITCH® EZ PIN				
PIN SIZE	A	B	C	TPI
3.5-4 EZ	4 1/8" OCT.	5 3/4"	3 1/8"	4
1.31-6 EZ2	1 9/16" OCT.	2 3/16"	1 1/8"	6
1.63-6 EZ2	2" OCT.	2 3/4"	1 7/16"	6
2.0-6 EZ2	2 1/2" OCT.	3 3/8"	1 5/8"	6
2.25-6 EZ2	2 3/4" OCT.	3 3/4"	2 1/16"	6
2.63-6 EZ2	3 1/8" OCT.	4 3/8"	2 7/16"	6
1.88-6 EZ3	2 1/4" OCT.	4 1/16"	1 11/16"	6
2.25-6 EZ3	2 3/4" OCT.	5 1/16"	2 1/16"	6

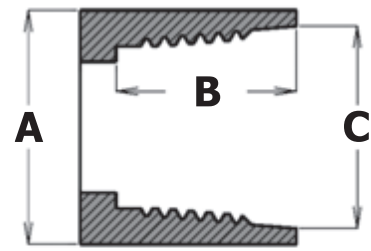


DITCH WITCH® EZ BOX

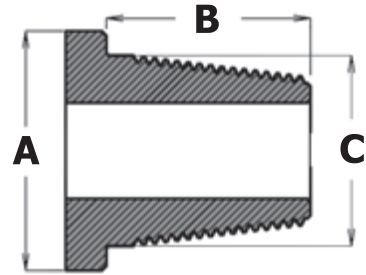


DITCH WITCH® EZ PIN

DITCH WITCH® BOX				
BOX SIZE	A	B	C	TPI
1.21-6	1 1/2"	1 3/4"	1 1/4"	6
1.3-5	2"	2 1/4"	1 5/8"	5
1.41-6	1 3/4"	2"	1 7/16"	6
1.47-6	2 3/8"	2 11/16"	1 7/8"	4
1.69-6	2 1/2"	2 15/16"	1 7/8"	6
1.94-4	2 5/8"	2 15/16"	2 1/8"	4
2.11-4	3"	3 5/16"	2 1/4"	4
2.4-4	3 1/4"	3 15/16"	2 9/16"	4
2.59-4	3 1/2"	3 5/8"	2 3/4"	4
2.77-4	3 1/4"	2 1/2"	2 13/16"	4
3.25-4	4 1/8"	3 1/4"	3 7/16"	4
3.27-4	4"	5 1/4"	3 5/16"	4
3.44-4	4 1/2"	5 1/4"	3 7/8"	4



**DITCH WITCH®,  
RADIUS®, & RAMON® BOX**



**DITCH WITCH®  
& RAMON® PIN**

DITCH WITCH® PIN				
PIN SIZE	A	B	C	TPI
1.21-6	1 1/2"	1 3/4"	1"	6
1.3-5	2"	2 1/4"	1"	5
1.41-6	1 3/4"	2"	1 3/16"	6
1.47-6	2 3/8"	2 11/16"	1 1/4"	4
1.69-6	2 1/2"	2 15/16"	1 5/16"	6
1.94-4	2 5/8"	2 15/16"	1 5/16"	4
2.11-4	3"	3 3/8"	1 1/2"	4
2.4-4	3 1/4"	3 15/16"	1 9/16"	4
2.59-4	3 1/2"	3 5/8"	1 15/16"	4
2.77-4	3 1/4"	2 1/2"	2 1/8"	4
3.25-4	4 1/8"	3 1/8"	2 7/8"	4
3.27-4	4"	5 1/4"	2 3/16"	4
3.44-4	4 1/2"	5 1/4"	2 5/8"	4

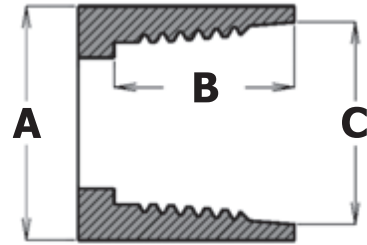
RADIUS® BOX				
BOX SIZE	A	B	C	TPI
3"	3 1/2"	3"	2 15/16"	6
3 1/2"	4"	3"	3 3/16"	6
4 1/2"	4 1/4"	3"	3 5/16"	6
5"	5"	4"	4 1/8"	5
6 1/2"	6 1/2"	4 1/2"	5 1/8"	5

RAMON® BOX				
BOX SIZE	A	B	C	TPI
2 1/2"	3" HEX.	4"	2 1/2"	4 1/2

RAMON® PIN				
PIN SIZE	A	B	C	TPI
2 1/2"	3" HEX.	3 15/16"	1 7/8"	4 1/2

UNJ BOX				
BOX SIZE	A	B	C	TPI
2"	2 1/2" HEX.	3 5/8"	2"	4 1/2

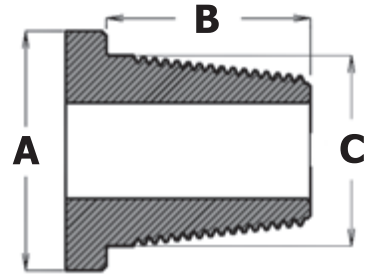
UNJ PIN				
PIN SIZE	A	B	C	TPI
2"	2 1/2" HEX.	3 9/16"	1 1/2"	4 1/2



UNJ & VERMEER® BOX

VERMEER® LOW PROFILE BOX				
BOX SIZE	A	B	C	TPI
1 5/8" LP	2" HEX.	2 7/8"	1 5/8"	8
2 1/8" LP	2 1/2" HEX.	3 1/2"	2 1/8"	8

VERMEER® LOW PROFILE PIN				
PIN SIZE	A	B	C	TPI
1 5/8" LP	2" HEX.	2 3/4"	1 5/8"	8
2 1/8" LP	2 1/2" HEX.	3 3/8"	2 1/16"	8



UNJ & VERMEER® PIN

VERMEER® FS1 BOX				
BOX SIZE	A	B	C	TPI
1.660" FS1 BOX #200	1 7/8"	2"	1 11/16"	4 1/2
1.900" FS1 BOX #250	2 1/8"	2 1/2"	1 15/16"	4 1/2
2.0625" FS1 BOX #400	2 1/4"	2 1/2"	2"	4 1/2
2.375" FS1 BOX #600	2 5/8"	2 1/2"	2 1/8"	4 1/2
2.375" FS1 BOX #650	2 3/4"	2 1/2"	2 1/4"	4 1/2
2.625" FS1 BOX #700	3 1/8"	3"	2 5/8"	4 1/2
2.875" FS1 BOX #900	3 1/4"	3 1/2"	2 3/4"	3 1/2
3.500" FS1 BOX #800	3 5/8"	3 1/2"	3 1/5"	3 1/2
3.500" FS1 BOX #1000	4 3/8"	3 1/2"	3 7/8"	3 1/2

VERMEER® FS1 PIN				
PIN SIZE	A	B	C	TPI
1.660" FS1 BOX #200	1 7/8"	2"	1 1/8"	4 1/2
1.900" FS1 BOX #250	2 1/8"	2 1/2"	1 1/4"	4 1/2
2.0625" FS1 BOX #400	2 1/4"	2 1/2"	1 3/8"	4 1/2
2.375" FS1 BOX #600	2 5/8"	2 1/2"	1 1/2"	4 1/2
2.375" FS1 BOX #650	2 3/4"	2 1/2"	1 5/8"	4 1/2
2.625" FS1 BOX #700	3 1/8"	3"	1 7/8"	4 1/2
2.875" FS1 BOX #900	3 1/4"	3 1/2"	1 7/8"	3 1/2
3.500" FS1 BOX #800	3 5/8"	3 1/2"	2 1/4"	3 1/2
3.500" FS1 BOX #1000	4 3/8"	3 1/2"	2 7/8"	3 1/2

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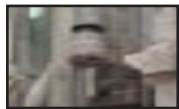
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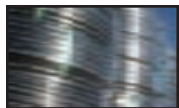
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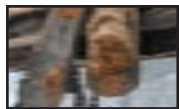
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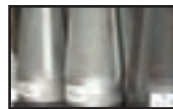
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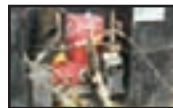
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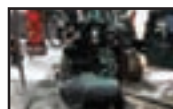
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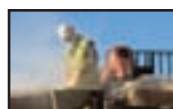
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