

VAREL INTERNATIONAL  
WORKOVER BITS FOR  
REMEDIAL, RE-ENTRY AND  
FRAC PLUG DRILLING  
APPLICATIONS



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INTERNATIONAL

Varel International offers the industry's broadest selection of high quality drill bits for remedial, re-entry and frac plug drilling applications including:

- Our classic open bearing steel tooth bits, the renowned L2, L1 and LH1, proven in workover applications worldwide.
- The newly introduced DuraTech line of sealed bearing steel tooth bits.
- The Compass Series, high performance small diameter sealed bearing tungsten carbide insert bits.
- Tough-Drill Series and Navigator Series PDC drill bits.

Our bits are produced under the highest quality standards to ensure they withstand your most demanding workover needs.

Every Varel roller cone bit is designed with an emphasis on consistency, excellence and continuous improvement. Furthermore, all are manufactured in accordance with the ISO 9001:2008 and API Q1 quality management guidelines. (API License Number 7-1-0035.1 Varel Roller Cone Manufacturing)



## Industry Leading Roller Cone Rock Bits for Re-entry and Remedial Operations

The multifaceted demands of workover operations demand top bit performance. Varel's roller cone workover bits are designed to deliver across the spectrum of workover applications including; drilling cement, drilling composites and plugs, paraffin clean out, scale clean out, thru tubing operations, coiled tubing operations and drill ahead re-entries.

### › Process Controls

Critical tooth hardfacing processes on steel tooth bits are continually monitored and updated to ensure the highest quality hardfacing deposit.

### › Advanced Metallurgy

Varel uses tightly specified premium materials and processing techniques in the manufacture of our oilfield workover bits insuring oilfield grade quality in our complete line.

### › Heat Treatment

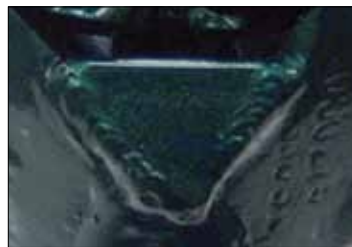
Heat treatment is key to bearing reliability. Varel's heat treatment process selectively carburizes and hardens bearing faces and wear surfaces, while ensuring a tough core microstructure. This combination provides long, reliable bearing performance.

Varel's classic line of open bearing steel tooth bits, including the L2, L1, and LH1 incorporate open throat hydraulics. These bits accommodate either regular through string flow or reverse circulation which is frequently used to control a re-entered well.



### › Forged Steel Tooth Cutting Structure

Varel was the pioneer in the development of forged cones for steel tooth rotary cone rock bits. This superior method provides stronger, more impact-resistant teeth when compared with milling because the metal grain structure from the forging process is preserved, resulting in higher load bearing, longer bit life and faster penetration.



### › Skirting

Bit skirting is an option for reverse circulation applications. Drill bit skirts are created through welding a triangular piece of mild steel between the legs of the bit toward the cones with the intention of directing fluid to the bottom of the hole to pick up cuttings before turning and exiting the center of the bit. Bits annotated with a K feature bit skirting.



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## ▼ L2

### IADC Code 211

**Compressive Strengths:** 4,000 to 10,000 (psi)

**All Regular Circulation:** 2-15/16" and larger

**Gage Types:** "A" Tooth

**Formations:** Wide range of medium formations such as altered limestones, shales, anhydrite and other formations with medium compressive strengths.

**Features:** Moderately skewed cone design. Teeth hardfaced on one flank to resist abrasion. Vented "A" type gage gives high rates of penetration.



## ▼ L1

### IADC Code 321

**Compressive Strengths:** 8,000 – 18,000 (psi)

**All Regular Circulation:** 3-1/2" and larger

**Gage Types:** "A" Tooth

**Formations:** Specifically designed for fast penetration in formations that are hard, but not particularly abrasive.

**Features:** Designed to conform to latest drilling techniques requiring heavier weights. Similar in design to the LH1, but does not have webbed heel row.



## ▼ LH1

### IADC Code 331

**Compressive Strengths:** 9,000 – 20,000 (psi)

**All Regular Circulation:** 2-7/8" and larger

**Gage Types:** "U" Tooth

**Formations:** Hard formations, such as pyrite, chert, dolomites, granite porphyry and other formations which have high compressive strengths and are abrasive.

**Features:** Closely spaced, strong short teeth for maximum crushing and chipping.

## ▼ DURATECH BITS



This steel tooth series of products delivers rapid rate of penetration (ROP) and new hardmetal protection for life-enhancing durability in the most demanding environments. This series incorporates Varel's new technology sealed bearing system. DuraTech bits can withstand the added stress that operators place on bits when additional weight and greater RPMs are necessary.

The series is designed to provide:

- Added durability in abrasive environments
- Increased ROP
- Directional responsiveness
- A solution for sticky shale drilling

## ▼ COMPASS BITS



Re-entries, multi-laterals, and coiled tubing drilling all require steerability, reliability and efficient rate of penetration. Engineered with application specific technology, the new Compass Series Slimhole Bits provide excellent steerability and high rates of penetration even when weight on bit is limited.

These tungsten carbide insert bits are equipped with a patented bearing package to provide long, reliable performance in deep hole, long reach sections where increased RPMs in motor applications are commonly encountered.

## ▼ PDC BITS



Varel's leading lines of matrix and steel body PDC drill bits are also available for workover applications including coiled tubing, composite plugs and drilling ahead in motor applications. Remedial PDC bits are available in sizes ranging from 3-1/2" to 8-1/2", please contact your Varel Representative for specific information.

## Connection Options

Our availability chart highlights bits that are available with either 4-Thread N-Rod connection or standard API connection.

Workover Bit Availability					
DIAMETER		SOFT / MEDIUM			PIN SIZE
Inches	mm	IADC 211	IADC 321	IADC 331	
2 7/8	73.1			LH1	4 THD N Rod
2 15/16	74.7	L2		LH1	4 THD N Rod
3	76.2			LH1	4 THD N Rod
3 1/8	79.4	L2			4 THD N Rod
3 1/4	82.6	L2			4 THD N Rod
3 3/8	85.8	L2			4 THD N Rod
3 1/2	88.9	L2	L1		2 3/8
3 5/8	92.1	L2	L1		2 3/8
3 3/4	95.3	L2		LH1	2 3/8
3 7/8	98.5	L2	L1	LH1	2 3/8
4	101.6	L2	L1	LH1	2 3/8
4 1/8	104.8	L2	L1	LH1	2 3/8
4 1/4	108.0	L2		LH1	2 3/8
4 1/2	114.3	L2		LH1	2 3/8
4 5/8	117.5	L2			2 7/8
4 3/4	120.7	L2	L1	LH1	2 7/8
4 7/8	123.9	L2		LH1	2 7/8
5	127.0	L2		LH1	2 7/8
5 1/8	130.2	L2			2 7/8
5 1/4	133.4	L2			2 7/8
5 3/8	136.6	L2			2 7/8
5 1/2	139.7	L2			2 7/8
5 5/8	142.9	L2			3 1/2
5 3/4	146.1	L2			3 1/2
5 7/8	149.3	L2			3 1/2
6	152.4	L2			3 1/2
6 1/8	155.6	L2	L1		3 1/2
6 1/4	158.8	L2			3 1/2
6 1/2	165.1	L2			3 1/2
6 5/8	168.3	L2			3 1/2
6 3/4	171.5	L2			3 1/2
7 7/8	200.1	L2			4 1/2
8 1/2	215.9	L2			4 1/2

APPROX WT		COMPASS SERIES	DURATECH SERIES
lbs	kg		
4	1.8		
5	2.3		
5	2.3		
5	2.3		
6	2.3		
6	2.3		
8	3.6		
8	3.6		
10	4.5		
10	4.5		DT4
10	4.5		
10	4.5		
10	4.5		
11	5.0	CM34	
13	5.9		
13	5.9	CM44	DT4
13	5.9	CM44	
15	6.8		
23	10.4		
19	8.6		
19	8.6		
19	8.6	CM34, CM55	
23	10.4	CM18, CM24, CM34, CM48, CM55	
19	8.6		
23	10.4	CM24, CM34	
27	12.2	CM18, CM24, CM25, CM28, CM34, CM44, CM45, CM48	DT4
27	12.2	CM24, CM25, CM28, CM34, CM38, CM35, CM44, CM47, CM48, CM54, CM55, CM57, CM67	
27	12.2	CM24, CM25, CM28, CM34, CM38, CM44, CM48	DT1
29	13.2	CM24, CM47, CM55, CM54	DT1
29	13.2		
32	14.5	CM24, CM34, CM38, CM44, CM47, CM54, CM55	
70	31.8		DT1
75	34.0		DT3

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