

ROLLER CONE COMPARISON CHART

STEEL TOOTH		1. STANDARD ROLLER BEARING					4. SEALED ROLLER BEARING					5. SEALED ROLLER BEARING GAGE PROTECTED					6. SEALED JOURNAL BEARING					7. SEALED JOURNAL BEARING GAGE PROTECTED								
Series	FORMATIONS	Types	VAREL	Hughes Christensen	Smith Bits	Reed Hycalog	Security DBS	VAREL	Hughes Christensen	Smith Bits	Reed Hycalog	Security DBS	VAREL	Hughes Christensen	Smith Bits	Reed Hycalog	Security DBS	VAREL	Hughes Christensen	Smith Bits	Reed Hycalog	Security DBS	VAREL	Hughes Christensen	Smith Bits	Reed Hycalog	Security DBS			
1	Soft Formations with Low Compressive Strength and High Drillability	1	L111, L3A	R1	DSJ	Y11	XS1	ETR1					CR1G, ETR1G, L115	GTX-1, GTX-G1	GSSH+, MSDSSH, XR+	T11, EMS11G, ETS11G	XT1		STX-1	FDS, FDS+	HP11, EHT11, RT1		CH1G, CHS1G, CM1G, ER1G, ERS1G	GT-1, GT-G1H, GX-1V, GX-1X, MX-1, MXL-1, MXL-1V, MXL-1X, MXL-3, MX-X1	TCT+, TCTI+, XR+	TC10, TC11, RT1G, SL11, D11	QH1			
		2	L121				XS2												L126		FDT	HP12		CH2G, ER2G, L127			SL12	QH2		
		3	L131	R3		Y13	XS3			GTX-3	SDG			CR3G, ETR3G	GTX-G3	GGH+, MGG, MGGH+, MSDGH, SDGH	T13, EMS13G, ETS13G	XT3				H13		CH3G	MX-3	MFDGH	HP13G, D13	QH3		
2	Medium to Medium Hard Formations/ High Compressive Strength	1	L2				XS4						L215		MSVH, SVH		XT4, SVH		ETD4				ER4G, CH4G, L217	ATJ-G4		FVH, GFVH	HP21G	QH4		
		2																												
		3																												
3	Hard, Semi-Abrasive and Abrasive Formations	1	L1																											
		2	LH1	R7																										
		3																												
		4																												QH7

Indicates Bit Series

HE24DMRSV

Number System

One Digit: Steel Tooth cutting structure
Softest-to-Hardest (1-3)

Two Digits:
TCI cutting structure
Softest-to-hardest (00-99)

Even numbers- Predominately chisel-shaped inserts
Odd numbers- Predominately conical-shaped inserts

Feature Name	Feature Code	TCI Bit	Steel Tooth Bit
Air Drilling Journal Bearing	A	Configured for Air Circulation	-
Tungsten Carbide Coated Cones	E	Optional Feature ¹	-
Cone Back Row Insert Protection	G	Standard Feature	Optional Feature ¹
Steel Center Air Jet Nozzle	H	Optional Feature ³	-
Center Jet Nozzle	J	Optional Feature ²	Optional Feature ²
Mud Motor Shirttail Hardfacing	M	Standard Feature	Standard Feature
Stabilization Inserts	R	Optional Feature ¹	Optional Feature ¹
Leading Edge Shirttail Inserts	S	Optional Feature ¹	Optional Feature ¹
V-Jet nozzle	V	Standard Feature on 547 and softer	-
Diamond Enhanced Shirttail	Z	Optional Feature ¹	Optional Feature ¹

¹ optional features are available at extra cost
² optional feature (on 7 1/2" and larger bits only) are available

³ optional feature on Air Circulation Bits Only (available in 7 1/2" and larger bits) are available at extra cost

Diamond Feature	Enhanced Nomenclature	TCI Bits	Steel Tooth Bits
33% Back Row	D	•	•
50% Back Row	D1	•	•
66% Back Row	D2	•	•
100% back Row	D3	•	•
33% Back Row + 100% Gage	DD	•	
50% Back Row + 100% Gage	D1D	•	
66% Back Row + 100% Gage	D2D	•	
100% Back Row + 100% Gage	D3D	•	
Full Diamond Structure	D3DD	•	
Diamond Leading Edge Shirttail	Z	•	•



VAREL
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TUNGSTEN CARBIDE INSERT		5. SEALED ROLLER BEARING GAGE PROTECTED						7. SEALED JOURNAL BEARING PROTECTED					
FORMATIONS		Types	VAREL	Hughes Christensen	Smith Bits	ReedHycalog	Security DBS	VAREL	Hughes Christensen	Smith Bits	ReedHycalog	Security DBS	
4	Soft Formations with Low Compressive Strength and High Drillability	1	CR04, ETR04	GTX-00, GTX-00H, GTX-03, GTX-03C, GTX-03H	G02B, G02B, G02T, G04B, G103B, GS01B, GS03B, GS03UB, GS04B, GSI01B, GSI03B, TCT101	T41, EMS41H	XT00 to XT05	CH04, HE04, HE04V	GT-00, GT-03, GTX-00, GX-00, MX-00, MX-03, MXL-00, MXL-03, MXL-05	GFSI01B, GFSI06B, MFI04, MFS04, CH04V	R01A, TD41A, R03A, TD41H, TD41	QH00 to QH05, XS00 to XS05	
		2			G08B, GS05B, GS08B, GSI06B, GSI06U	T412, EMS42H	XT06 to XT09	CH09	GT-09C, HX-3, MX-09C, STR-09C	FHI08, GF05, GF05B, GF0FWB, GF105B, GFS05B, GFS05UB, GFS06, MF05B, MF05T	R07A, TD42H	QH06 to QH09, XS06 to XS09	
		3	CR12, CR13, CR14, ETR14	GTX-09, GTX-09H, GTX-11, GTX-11H, GX-11, MX-11, MX-11H	G10B, G10T, G11YB, G12B, GS10, GS10B, GS12B, GS12SDB, GS12UB, GSI12B, GSI12UB, TCT10, TCT11, TCT12	T43, EMS43A, EMS43H	XT10 to XT13	CH12, CH13, CH14, CH14V, CH18, ETD14, HE13, ER14, HE12V, HE14V	GT-09, GX-03, GX-09, GXD-09, HX-09C, MX-09, MX-09G, MX-09H, MXL-09, MXL-11, MXLB-09, STX-09, STX-09C, STX-09H, MXL-31	F10, F12, FG10, GF08B, GF10, GF10B, GF10HB, GF10HUB, GF108, GFS10B, GFS11YB, MFI10T, MFS10T, XR10T, XR12, F1, F10B, CH14V	R09A, TD43A, HP43A, R12A, TD43H, SL43H, HP43, RD12, D43	QH10 to QH13, XS10 to XS13	
		4	CR18, CR20, ETR18		15JS, G15B, G18DBD, G18B, GS15B, GS18, GS18B, GS18UB, GSI15B, GSI15UB, GSI18B, M15S, MGS18	T44, EMS44H, EMS44A	XT14 to XT17	CH18, HE18, HE18V	GT18, GT18C, GX-11, GX-18, GX-18C, MX-09CG, MX-18, MX-18C, MX-18CH, MX-18G, MX-18H, MXL-11, MXL-18, MXL-18H, STX-18, ST-18H	FHI18B, F18, GF15, GF15B, GF15H, GF15HB, GF15SD, GFS15, GFS15B, MF15, MF15B, MF15HB, MF15T, XR15, XR15T, XR15G	R14A, TD44A, HP44X, R14, R15, TD44, R15A, TD44H, HP44H, RD15, D44	QH14 to QH17, XS14 to XS17	
5	Soft to Medium Formations with Low Compressive Strength	1	ETR24	GTX-20	2JS, G20, G20B, G25, G25SD, GS20B, GS20SDB, GSI20B	T51, EMS51A, EMS51H	XT18 to XT23	CH20, CH24, ETD24, ETD25, HE20V, HE21V, HE22V, HE23V, HE24, HE24V, CM24MRS	GT-20, GT-20S, GXD-20, GXM-20, MXL-20, MXLB-20, STX-20, STX-20G, STX-20H	F2, F20, F25Y, FH16B, FH16HB, FH20, FH20B, FH23, FHI20, FHI20B, FHI21, FHI21B, FHI21H, FHI23, FHI23B, FHI23U, GF20, GF20B, GF20HB, GF20SDBD, GF21, GF21SD, GF25, GF25Y, GF20SD, GF20S, GFS20B, GFS20UB, MF05HB, MF05WB, MF15H, MF20, MF20B, MFS20, TCT20, TCT20Y, TCT120, XR20, XR20B, XR20HT, XR20T, XR20WT, XR25, XR25T, XRSI20	R19A, R20A, TD51A, HP51A, R21A, TD51X, HP51X, RD21, D51, R22A, TD51H, SL51H, HP51H, R23A	QH18 to QH23, XS18 to XS23	
		2		GTX-20C	G28B, G28HB, GS26SDB	T52, EMS52H	XT24 to XT27	CH25, CH28V, CH29, CH29H, CH29V, HE26V, HE27V, HE28, HE28V, HE29HV, CM28MRS	GT-20C, GT-28, GT-28C, GTX-20G, GTX-22, GX-20, GX-20C, GX-20H, GX-22, GX-22S, GX-23, GX-25, GX-28, GXD-25S, GXD-28, MX-20, MX-20H, MX-20C, MX-20G, MX-22, MX-28	F20Y, F26Y, F26YG, F27, F27A, F27I, F27Y, F27Y, FH24Y, FH28, FH28W, FHI24Y, FHI25, FHI25B, FHI26, FHI28, FHI28W, FHI29, GF26, GF27Y, GF28, GF128B, GFS26, GFS26U, GF528H, GFSI28B, GFSI28UB, XR20TY, XR20Y, XR20YDD	R24A, R24, TD52A, TD52R, R25A, TD52X, TD52A, RD25, D52, R27, TD52I, R28A	QH24 to QH27	
		3	CR34		3JS, G30, G30B, GS30B, GS30SDB	T53, EMS53, EMS53A, ETS53A	XT28 to XT33	CA34, CH31, CH34, ETD34, HE31V, HE34, HE34V, V537, CM34, CM34MRS	GT-30, GX-30, GX-30C, GX-30S, GXD-30, GXD-30S, HR-30C, HX-30, MX-30, MX-30C, MX-30G, MX-30H, MXL-28, MXL-28C, MXL-30, STX-30, STX-30C	F3, F30, F30T, F30WY, F30Y, F3W, FH30, FH30U, FH30UB, FH32, FHI30, FHI30B, FHI30Y, FHI31, GF30, GF30B, GF30SD, GF30SDBD, GF30WB, GF30Y, GF30YSD, GF130B, GF30S, GFS30B, MF3, MF30B, MF30T, MFS30, XR30, XR30T, XR30WT, XR32T, XR32WT, XR130, XR130V	R30A, TD53A, R30, TD53, RD33, D53, TD53H, HP53H, TD53B, JA53	QH28 to QH33, XS28 to XS33	
		4	CR35, ETR38	GTX-30C, GTX-30H, GTX-33, MXL-34			T54	XT34 to XT39	AF35, AF37, CA35, CH35, CH37, CH37A, CH38, CM38, CH39, ETD35, ETD35A, ETD38, HE37V, HE38V, HE39, HE39H	GT-30C, GT-30H, GX-35, GX-38, GX-38C, GX-38CH, GXD-38CH, HR-38C, HR-38CH, MX-35, MX-35C, MX-35CG, MX-38C, MXL-35, MXL-38, STX-35, XL-30A	F37, F37HUY, F37HY, F37Y, F39HY, FH35, FH35Y, FHI35, FHI37HY, FHI38Y, GF37, GF37B, GF37Y, GF135B, GF135YB, MF37, TCT137Y, XR30TY, XR30Y, XR30YA, XR35, XR35Y, XRI35	R34A, TD54A, R34, R35A, R35, R36A, TD54X, TD54, R36	QH34 TO QH39, XS34 to XS39
6	Medium Hard Formations with High Compressive Strength	1	ETR44	GTX-40C	4JS, G40YB	ETS61A	XT40 to XT45	AF45, AF45H, CA44, CH44, ETD44, HE44, HE44V, HE45, CM44, CM44MRS, CM45	GX-44C, GX-44G, GX-45C, HR-44, MX-40G, STX-40	F4, F40, F40YA, F45H, F47WYA, F47Y, F47YA, FH40, FH45, FHI40, FHI45, G40WY, GF40, GF40B, GF40H, GF40HWY, GF40V, GF40Y, GF40YB, GF47Y, GFH47Y, GF145, MF45H, MF47, MF4H, XR38, XR40, XRH40Y	R40A, TD61A, SL61A, HP61A, TD61H, R40, TD61, SL61	QH40 to QH45, XS40 to XS45	
		2		STX-40C, STX-44C			EMS62	XT46 to XT51	AF47, CH45, ETD45A, ETD47, ETD48, HE45A, HE47, HE48, V627, CM47, CM47MRS, CM48, CM48MRS,	GX-44C, MX-40, MX-40CG, MX-44C, MXL-44C, STX-44C	GFSI01B, GFSI06B, MFI04, MFS04, GF45HY, GF45Y, GF45YB, GF47HY, XR40Y, XR40YA, XR40YDD, XR45WY, XR45Y, XR50	R44A, TD62A, SL62A, SL62X, HP62A, R45, R48, TD62, HP62, JA62	QH46 to QH51
		3						CH54, CH55, CH57AH, CM54, ETD55, ETD57, CM54D2MRZ, CM54DMRS, CM54MRS, CM55D2MRZ, CM55MRS, HE55, HE57	XL-40A, HR-55RG, MXL-55, STX-50, XL-50A	F50YA, F57Y, FHI50Y, FHI55, GF50YB, GF57, GF150Y, GF150YB, MF57, XR50WY, XR50Y	R50, SL63, TD63, HP63	QH52 to QH58	
		4						CH67, CM67, HE67, CM67MRS	HR-66, HR-68, MX-50, MX-50R, MX-50RG, MX-55, MX-66, MXL-66, MXL-68, STX-66	F59HY, F59Y, F67, F67Y, GF65YB, XR60Y, XR65Y, XRI65Y	R60, TD64, HP64, R65, TD64H, HP64H	QH61 to QH69	
7	Hard, Semi- Abrasive and Abrasive Formations	1					XT71 to XT75					QH71 to QH75, XS71 to XS75	
		3	V735				XT77 to XT81		HR-70, STX-70, TX-77	F7, XR68Y, XR70Y	R70, TD73, SL73	QH77 to QH81	
		4					XT83 to XT89					QH83 to QH89	
8	Extremely Hard and Abrasive Formations	1					XT91, XT93		HR-88, HR-89, HR-88, HR-89	F80Y, GF80Y, XR80Y	R80, TD81, HP81	QH91, QH93, XS91, XS93	
		2					XT95, XT97		GX-95, GX-95, HR-90, HR-98, MX-95	F85Y		QH95, QH97	
		3					XT99	HE85, HE95	HR-99, MX-89, STX-88, STX-90, STX-99, GX-99, HR-99, MX-89, STX88, STX-90, STX-99	F90Y, F95Y, FHI90Y, XR90Y	R85, R90, TD83, SL83, HP83	QH99	