With the development of drilling technology, the number of large displacement and section horizontal wells is increasing. The large friction and pressure support during the drilling process not only seriously affect the mechanical drilling speed ,but also cause downhole failures easily such as differential pressure jamming ,especially when sliding drilling ， insufficiently apply real and effective drilling pressure to the bit ,which reduces the drilling efficiency and prolongs the well construction period.

The Agitator developed by Pascal Group, through virtual fluid simulation and other technologies, optimizes the structural design and performance parameters and is suitable for various complex drilling conditions, effectively solving the above problems.

Product Features

1. The Agitator can effectively reduce the friction between the BHA and the wellbore in sliding drilling and effectively improve the WOB transmission.
2. Reduce downhole torsion, reduce lateral vibration and improve penetration rate.
3. Directional drilling efficiency can be greatly improved, and more smooth borehole can be drilled.
4. Agitator can be used in vertical wells, motor guided drilling, rotary steering drilling, extended reach wells, and shale gas reservoir drilling.
5. The utility model can solve the problems of supporting pressure, jamming and slipping, and the poor control force of the drill bit on the tool surface.
6. Improve the control of directional drilling tool surface and effectively improve the directional ability.
7. The pressure pulse generated by the Agitator will not interfere with the signal of MWD and will not damage the MWD instrument.
8. The Agitator has good adaptability to conventional PDC bits and roller bits.

Specifications - Agitator

Model		O.D.		Recommended displacement	FRQ	Temperature	WPD	MP	Joint Connection
mm	in	mm	in	L/S	Hz	℃	MPa	kN	
73	2 7/8	73	2 7/8	2.5-5	9	≤160	1.5-2.5	240	2 3/8PAC
121	4 3/4″	121	4 3/4″	9.5-17	11-20	≤160	1.5-2.5	1180	NC38
172	6 3/4″	172	6 3/4″	25-37.8	13-19	≤160	1.5-2.5	2500	NC50
203	8″	203	8″	31.5-63.1	9-18	≤160	3.5-4.5	4000	6 5/8REG

Downhole Motor

Downhole motor is a kind of downhole dynamic drilling tool driven by the power of drilling mud. Mud stream from the outlet of a mud pump flows through a by-pass valve into the motor. This stream produces pressure loss at both inlet and outlet of the pump, to push the rotor into rotating, and to transmit the torque and speed onto the bit. The downhole motor property mainly depends on its property parameters.

Motor Assembly

Downhole motor rotor is manufactured from high quality alloy steel, while s-rotor is made of rubber. High force and tearing strength of the rubber stator allows the tool to run in the high temperatures (about 180 ℃) and high oil mud condition. All these benefits help to maintain effective operation.

We produce the downhole motor with an external coating on the motor rotor that gives the tool a much longer service life.

Cardan Shaft Assembly

The function of cardan shaft is to convert planetary motion into fixed constant rotation of drive shaft, to transmit torque and speed from motor on the drive shaft and to the bit.

Drive Shaft Assembly

The driveshaft assembly converts the eccentric motion of the rotor into concentric rotation for the bearing assembly. It also accommodates any angle set on the adjustable bent housing (or fixed bend housing) and carries the thrust load from the rotor caused by the pressure drop across the power section.

The drive shaft assembly are forged using superior alloy steel, it gives the shaft assembly good strength and toughness and also greatly improve the anti-fatigue capacity during the rotating movement, thus giving the downhole motor a much longer service life.

Pascal Downhole motors come in sizes ranging from Φ43mm to Φ286mm.

By-Pass valve Assembly

Anti-Drop Assembly

Motor Assembly

Drive Shaft Assembly

Cardan Shaft Assembly

Downhole Motor (LZ)

Model	Specification		Drill bit size		Conn. thread		Lobe	stage	Flow rate gpm		Flow rate lpm		Rotating speed rpm		R / unit volume		Working pressure drop	
	in	mm	in	mm	Upper end	Lower end			min	max	min	max	min	max	rev/gal	rev/l	psi	Mpa
5LZ43T-3	1 11/16	43	1 7/8-3	48-76	1 AMMT	1 AMMT	5:6	3	12	25	45	96	262	559	22.03	5.82	348	2
5LZ54T-3	2 1/8	54	2 3/8-3 1/2	60-89	1 1/2Reg 1 1/2AMMT	1 1/2Reg	5:6	3	16	50	60	190	164	519	10.33	2.73	348	2
5LZ60T-3	2 3/8	60	3 1/2-4 3/8	79-111	1 1/2 AMMT	1 1/2 AMMT	5:6	3	21	74	80	280	122	428	5.79	1.53	348	2
5LZ73T-3	2 7/8	73	3 3/4-4 3/4	95-121	2-3/8 Reg	2-3/8 Reg	5:6	3	40	132	150	500	150	500	3.79	1.00	348	2
5LZ73T-4	2 7/8	73	3 3/4-4 3/4	95-121	2-3/8 Reg	2-3/8 Reg	5:6	4	40	95	150	360	201	482	5.07	1.34	464	3
4LZ79T-4	3 1/8	79	3 3/4-4 3/4	95-121	2-3/8 Reg	2-3/8 Reg	4:5	4	40	132	150	500	131	435	3.29	0.87	464	3
7LZ79T-4	3 1/8	79	3 3/4-4 3/4	95-121	2-3/8 Reg	2-3/8 Reg	7:8	4	40	132	150	500	101	335	2.54	0.67	464	3
4LZ89T-5	3 1/2	89	4 1/2-5 7/8	114-149	2-3/8 Reg	2-3/8 Reg	4:5	5	50	151	190	570	160	479	3.18	0.84	580	4
5LZ89T-3	3 1/2	89	4 1/2-5 7/8	114-149	2-3/8 Reg	2-3/8 Reg	5:6	3	66	151	250	570	101	231	1.53	0.40	348	2
7LZ89T-3	3 1/2	89	4 1/2-5 7/8	114-149	2-3/8 Reg	2-3/8 Reg	7:8	3	50	151	190	570	74	222	1.48	0.39	348	2
5LZ95T-5	3 3/4	95	4 5/8-5 7/8	118-149	2-7/8 Reg 2 3/8IF	2-7/8 Reg	5:6	5	85	211	320	800	128	320	1.51	0.40	580	4
7LZ95T-5	3 3/4	95	4 5/8-5 7/8	118-149	2-7/8 Reg 2 3/8IF	2-7/8 Reg	7:8	5	85	211	320	800	163	408	1.93	0.51	580	4
7LZ95T-6.5	3 3/4	95	4 5/8-5 7/8	118-149	2-7/8 Reg 2 3/8IF	2-7/8 Reg	7:8	6.5	85	211	320	800	163	408	1.93	0.51	754	5
5LZ105-7	4 1/8	105	4 3/4-6	121-152	2-7/8 Reg 2 3/8IF	2-7/8 Reg	5:6	7	79	159	300	600	162	324	2.04	0.54	812	6
7LZ105-2.8	4 1/8	105	4 3/4-6	121-152	2-7/8 Reg 2 3/8IF	2-7/8 Reg	7:8	2.8	95	190	360	720	130	259	1.36	0.36	325	2
2LZ120T-6	4 3/4	120	5 7/8-7 7/8	149-200	3 1/2Reg 3 1/2IF	3 1/2Reg	2:3	6	161	349	610	1320	323	700	2.01	0.53	696	5
5LZ120T-4	4 3/4	120	5 7/8-7 7/8	149-200	3 1/2Reg 3 1/2IF	3 1/2Reg	5:6	4	161	349	610	1320	134	290	0.83	0.22	464	3
5LZ120T-5	4 3/4	120	5 7/8-7 7/8	149-200	3 1/2Reg 3 1/2IF	3 1/2Reg	5:6	5	161	349	610	1320	134	290	0.83	0.22	580	4
7LZ120T-4	4 3/4	120	5 7/8-7 7/8	149-200	3 1/2Reg 3 1/2IF	3 1/2Reg	7:8	4	161	349	610	1320	114	247	0.71	0.19	464	3
7LZ120T-5	4 3/4	120	5 7/8-7 7/8	149-200	3 1/2Reg 3 1/2IF	3 1/2Reg	7:8	5	161	349	610	1320	114	247	0.71	0.19	580	4
7LZ120T-7	4 3/4	120	5 7/8-7 7/8	149-200	3 1/2Reg 3 1/2IF	3 1/2Reg	7:8	7	161	349	610	1320	158	342	0.98	0.26	812	6
9LZ120T-4	4 3/4	120	5 7/8-7 7/8	149-200	3 1/2Reg 3 1/2IF	3 1/2Reg	9:10	4	100	251	380	950	61	152	0.61	0.16	464	3
5LZ159T-5	6 1/4	159	6 3/4-8 3/4	171-222	4 1/2Reg 4 IF	4 1/2Reg	5:6	5	251	499	950	1890	114	227	0.45	0.12	580	4
7LZ159T-5	6 1/4	159	6 3/4-8 3/4	171-222	4 1/2Reg 4 IF	4 1/2Reg	7:8	5	251	499	950	1890	95	189	0.38	0.10	580	4
5LZ165T-5	6 1/2	165	8 3/8-9 7/8	213-251	4 1/2Reg 4 IF	4 1/2Reg	5:6	5	251	499	950	1890	114	227	0.45	0.12	580	4
7LZ165T-5	6 1/2	165	8 3/8-9 7/8	213-251	4 1/2Reg 4 IF	4 1/2Reg	7:8	5	251	499	950	1890	95	189	0.38	0.10	580	4
2LZ172T-8	6 3/4	172	8 3/8-9 7/8	213-251	4 1/2Reg 4 1/2IF	4 1/2Reg	2:3	8	301	600	1140	2270	228	454	0.76	0.20	928	6
4LZ172T-7	6 3/4	172	8 3/8-9 7/8	213-251	4 1/2Reg 4 1/2IF	4 1/2Reg	4:5	7	301	600	1140	2270	125	250	0.42	0.11	812	6
5LZ172T-5	6 3/4	172	8 3/8-9 7/8	213-251	4 1/2Reg 4 1/2IF	4 1/2Reg	5:6	5	301	600	1140	2270	104	208	0.35	0.09	580	4
5LZ172T-6	6 3/4	172	8 3/8-9 7/8	213-251	4 1/2Reg 4 1/2IF	4 1/2Reg	5:6	6	301	600	1140	2270	104	208	0.35	0.09	696	5
7LZ172T-5	6 3/4	172	8 3/8-9 7/8	213-251	4 1/2Reg 4 1/2IF	4 1/2Reg	7:8	5	301	600	1140	2270	86	170	0.28	0.08	580	4
7LZ172T-6	6 3/4	172	8 3/8-9 7/8	213-251	4 1/2Reg 4 1/2IF	4 1/2Reg	7:8	6	301	600	1140	2270	86	170	0.28	0.08	696	5
7LZ172T-5.7	6 3/4	172	8 3/8-9 7/8	213-251	4 1/2Reg 4 1/2IF	4 1/2Reg	7:8	5.7	301	600	1140	2270	77	153	0.26	0.07	661	5
7LZ172T-7.5	6 3/4	172	8 3/8-9 7/8	213-251	4 1/2Reg 4 1/2IF	4 1/2Reg	7:8	7.5	301	600	1140	2270	104	207	0.35	0.09	870	6
5LZ203T-5	8	203	9 7/8-12 1/4	251-311	6 5/8 Reg	6 5/8 Reg	5:6	5	301	600	1140	2270	84	167	0.28	0.07	580	4
7LZ203T-4	8	203	9 7/8-12 1/4	251-311	6 5/8 Reg	6 5/8 Reg	7:8	4	301	901	1140	3410	61	181	0.20	0.05	464	3
7LZ203T-5	8	203	9 7/8-12 1/4	251-311	6 5/8 Reg	6 5/8 Reg	7:8	5	301	650	1140	2460	75	162	0.25	0.07	580	4
7LZ216T-5	8 1/2	216	12 1/4-15 1/2	311-394	6 5/8 Reg	6 5/8 Reg	7:8	5	301	901	1140	3410	57	171	0.19	0.05	580	4
5LZ228T-5	9	228	12 1/4-15 1/2	311-394	6 5/8 Reg	6 5/8 Reg	5:6	5	301	901	1140	3410	71	213	0.24	0.06	580	4
7LZ228T-5	9	228	12 1/4-15 1/2	311-394	6 5/8 Reg	6 5/8 Reg	7:8	5	301	901	1140	3410	57	171	0.19	0.05	580	4
3LZ244-6	9 5/8	244	12 1/4-17 1/2	311-445	6 5/8 Reg 7 5/8 Reg	6 5/8 Reg 7 5/8 Reg	3/4	6	600	1199	2270	4540	130	259	0.22	0.06	696	5
5LZ244T-4	9 5/8	244	12 1/4-17 1/2	311-445	6 5/8 Reg 7 5/8 Reg	6 5/8 Reg 7 5/8 Reg	5:6	4	600	1199	2270	4540	92	184	0.15	0.04	464	3
5LZ244T-6	9 5/8	244	13 1/4-17 1/2	311-446	6 5/8 Reg 7 5/8 Reg	6 5/8 Reg 7 5/8 Reg	5:6	6	600	1199	2270	4540	92	184	0.15	0.04	696	5
7LZ244T-4	9 5/8	244	12 1/4-17 1/2	311-445	6 5/8 Reg 7 5/8 Reg	6 5/8 Reg 7 5/8 Reg	7:8	4	600	1199	2270	4540	66	132	0.11	0.03	464	3
7LZ244T-5	9 5/8	244	12 1/4-17 1/2	311-445	6 5/8 Reg 7 5/8 Reg	6 5/8 Reg 7 5/8 Reg	7:8	5	600	1199	2270	4540	82	163	0.14	0.04	580	4
7LZ244T-6	9 5/8	244	12 1/4-17 1/2	311-445	6 5/8 Reg 7 5/8 Reg	6 5/8 Reg 7 5/8 Reg	7:8	6	600	1199	2270	4540	82	163	0.14	0.04	696	5
3LZ286T-3.6	11 1/4	286	14 3/4-26	375-660	6 5/8 Reg 7 5/8 Reg	6 5/8 Reg 7 5/8 Reg	3:4	3.6	901	1500	3410	5680	107	179	0.12	0.03	418	3

Max. pressure drop		Working torque		Max. torque		Output power		Working WOB		Max. bit weight		Weight		Length		Max. starting torque
psi	Map	lb. Ft	Nm.	lb. Ft	Nm.	bhp	kW	kb	kN	lb	kN	lb	kg	ft	m	kN.m
492	3.39	48	66	68	93	5	4	660	3	1320	6	49	22	7.81	2.38	16
492	3.39	103	140	146	198	11	8	880	3	1760	6	49	34	7.81	2.83	16
492	3.39	184	250	260	353	16	12	1100	4	2200	8	75	65	9.28	3.60	35
492	3.39	282	382	398	540	28	21	2640	5	4400	10	143	84	11.81	3.60	62
656	4.52	280	380	396	537	27	20	2640	12	4400	20	185	98	11.81	4.20	95
656	4.52	432	585	610	827	38	28	3520	12	5500	25	216	116	13.78	4.20	95
656	4.52	561	760	792	1074	38	28	3520	16	5500	25	256	116	13.78	4.20	146
819	5.65	559	758	790	1071	54	40	4400	16	7700	35	256	183	13.78	5.00	190
492	3.39	696	943	983	1333	32	24	4400	20	7700	35	403	180	16.40	4.90	189
492	3.39	722	979	1020	1383	32	24	4400	20	7700	35	397	180	16.08	4.90	236
819	5.65	1174	1592	1658	2248	76	57	6600	30	12100	55	397	232	16.08	5.38	245
819	5.65	920	1248	1300	1762	76	57	6600	30	12100	55	511	232	17.65	5.38	398
1065	7.35	1196	1622	1690	2291	98	73	6600	30	12100	55	511	275	17.65	6.38	312
1147	7.91	1217	1650	1720	2331	80	59	7700	35	17600	80	606	297	20.93	5.45	406
459	3.16	730	990	1032	1399	38	28	7700	35	17600	80	655	248	17.88	4.55	413
983	6.78	1063	1441	1502	2036	150	112	11000	50	22000	100	547	461	14.93	6.30	248
656	4.52	1708	2315	2412	3270	100	75	11000	50	22000	100	1016	461	20.65	6.30	360
819	5.65	2134	2894	3015	4087	125	93	11000	50	22000	100	1016	531	20.65	7.12	579
656	4.52	2006	2720	2833	3841	100	75	11000	50	22000	100	1171	461	23.36	6.30	723
819	5.65	2508	3400	3542	4802	125	93	11000	50	22000	100	1016	531	20.65	7.12	680
1147	7.91	2538	3440	3584	4859	175	131	11000	50	22000	100	1171	535	23.36	7.20	850
656	4.52	2348	3183	3316	4496	72	54	11000	50	22000	100	1179	461	23.62	6.30	860
819	5.65	3913	5305	5527	7494	179	133	17600	80	35200	160	1016	964	20.65	7.65	796
819	5.65	4696	6366	6633	8992	179	133	17600	80	35200	160	2125	964	25.10	7.65	1326
819	5.65	3913	5305	5527	7494	179	133	17600	80	35200	160	2125	1055	25.10	7.65	1592
819	5.65	4696	6366	6633	8992	179	133	17600	80	35200	160	2326	1055	25.10	7.65	1326
1311	9.04	3757	5093	5306	7194	344	257	22000	100	37400	170	2326	1315	25.10	9.90	1592
1147	7.91	5976	8102	8442	11445	301	224	22000	100	37400	170	2899	1273	32.48	9.22	1273
819	5.65	5123	6946	7236	9811	215	160	22000	100	37400	170	2806	1105	30.25	8.32	2026
983	6.78	6148	8335	8684	11773	258	192	22000	100	37400	170	2436	1273	27.30	9.22	1736
819	5.65	6261	8488	8844	11990	215	160	22000	100	37400	170	2806	1105	30.25	8.32	2084
983	6.78	7513	10186	10612	14388	258	192	22000	100	37400	170	2436	1273	27.30	9.22	2122
934	6.44	7933	10756	11206	15192	245	183	22000	100	37400	170	2806	1315	30.25	9.90	2546
1229	8.48	7727	10476	10914	14797	322	240	22000	100	37400	170	2899	1315	32.48	9.90	2689
819	5.65	6367	8633	8994	12193	215	160	37400	170	55000	250	2899	1648	32.48	8.37	2619
656	4.52	7074	9590	9991	13546	258	193	37400	170	55000	250	3633	1648	27.46	8.37	2158
819	5.65	7142	9683	10088	13677	233	174	37400	170	55000	250	3633	1648	27.46	8.37	2398
819	5.65	9391	12732	13265	17985	323	241	39600	180	66000	300	3633	1648	27.46	8.50	2421
819	5.65	7504	10173	10599	14370	323	241	39600	180	66000	300	3633	1928	27.89	8.50	3183
819	5.65	9391	12732	13265	17985	323	241	39600	180	66000	300	4251	1928	27.89	8.50	2543
983	6.78	9867	13377	13937	18895	516	385	48400	220	79200	330	4251	3020	27.89	10.70	3183
656	4.52	9294	12600	13127	17797	344	257	48400	220	79200	330	6658	2457	35.10	8.70	3344
983	6.78	13941	18900	19691	26696	516	385	48400	220	79200	330	5417	3020	28.54	10.70	3150
656	4.52	12954	17562	18297	24806	344	257	48400	220	79200	330	6658	2457	35.10	8.70	4725
819	5.65	13044	17684	18424	24978	430	321	48400	220	79200	330	5417	2757	28.54	9.70	4390
983	6.78	15652	21221	22109	29974	516	385	48400	220	79200	330	6078	3020	31.82	10.70	4421
590	4.07	10751	14576	15186	20589	387	289	66000	300	123750	550	6658	3445	35.10	9.80	5305

The Rotary Steerable Downhole Motor is a screw assembly attached to the rotary steerable system above. Because the lower part of the screw has about 2 tons of instruments and drill bit, the torque required for the rotary steerable screw is higher, and it requires stable rotation speed and small vibration during operation.

The rotary steerable screw assembly developed and produced by Pascal has advanced motor design and high-performance rubber and steel. It has excellent performance and can output large torque to drive the lower assembly smoothly and efficiently, breaking rock for customers to save valuable time and costs in corrosive and high-temperature environments.

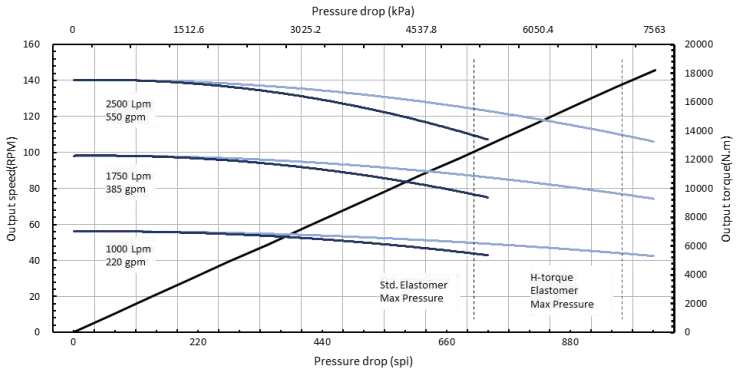
Features and advantages:

1. Imported hard rubber, strong output power;
2. Optimized motor linear design, reducing vibration by 20%;
3. High quality rotor electroplating, certified by SGS;
4. Triple anti-fall measures to prevent falling accidents;
5. High strength internal connection thread, prevent backdown;

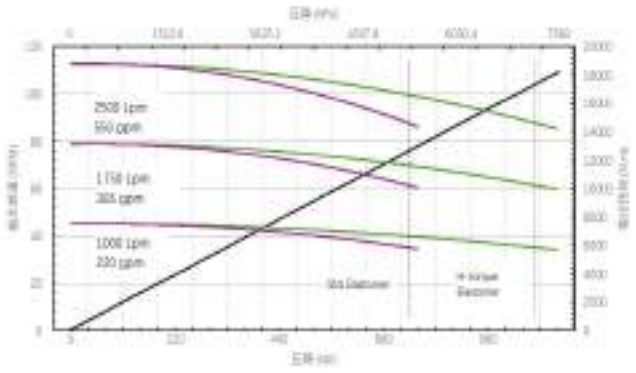
172mm Rotary Steerable Downhole Motor (Sizes can be customized according to customer requirements)		
argument	Metric unit	Imperial unit
Overall length	9356 mm	368.3 in
Motor outside diameter	172 mm	6.75 in
Mass (calculated value)	1431 KG	3154.8 lbs
Applicable bit range	213-251 mm	8 3/8-9 7/8 in
Upper connection thread	NC 50 Box Customized according to customer needs	
Lower connection thread	NC 50 PIN Customized according to customer needs	
Recommended weight on bit	10-14 T	
Maximum weight on bit	18 T	
Maximum lifting weight	200 T	

7LZ172X7.0 Motor performance parameter		
Motor specification	172mm 7/8 head, 4.6 grade	172mm 7/8 head, 3.3grade
Discharge range	1000-2500 lpm 264-660 gpm	1000-2500 lpm 264-660 gpm
Displacement per revolution	0.056 rev/l 0.212 rev/g	0.045 rev/l 0.169 rev/g
Speed range	74-140 rpm 100 RPM@30L/s	45-112 rpm 80 RPM@30L/s
Maximum working pressure drop	1097 psi 7563 kpa	784 psi 5400 kpa
Maximum torque	13955 lbs-ft 18920 N.m	14097 lbs-ft 19113 N.m
Maximum power	145kW	158 kW
Rubber type	Oil-based and water-based mud (up to 165℃)	
Motor throughput	Mud sand content <1.5%, plugging material particle diameter <8mm	
Rotor corrosion resistance	Electroplating (cycle temperature <130℃, chloride content <30000ppm) Tungsten carbide (anti-corrosion, can be used in brine mud)	

Motor performance curve (4.6 grade)



Motor performance curve (3.3 grade)



QY TYPE DOUBLE-ACTING FULL-HYDRAULIC DRILLING JAR

QY type double-acting full- hydraulic drilling jar is a new generation of double-acting hydraulic jar that is fully upgraded by our company on the basis of the original full-hydraulic drilling jar. It has the characteristics of simple operation, adjustable shock tonnage, high temperature resistance, etc. This type of drilling jar adopts a new hydraulic delay release system, which has excellent reliability and wide adaptability. It is suitable for all conventional wells, inclined wells and large displacement wells at all temperatures not higher than 204℃.

Divided by temperature:

Conventional type: ≤ 160 ℃, code QY-I

High temperature type: ≤ 204 ℃, code QY-II

Features

1. The superior machine structure is to further improve the machine maintainability.
2. The unique sealing structure is designed to improve the temperature resistance and improve the sealing reliability.
3. The core mechanism adopts the seal oil bath design to reduce the wear and tear of the moving parts and improve the life of the whole machine.
4. The longer shock stroke can obtain greater shock force.
5. The overflow area of the release channel is increased to reduce the running resistance and greatly improve the shock effect.
6. The operating force of hydraulic releasing mechanism can be controlled on the ground by driller, and can be flexibly adjusted according to the downhole situation.
7. Increase the fast recovery function of the upward and downward strokes. The mandrel moves back to the middle position, and then the jar will do jarring again in either of the two directions.
8. The reset lock function avoids accidental shock and vibration, and the vibration force is adjustable.
9. The mandrel part is made of a new type of laser cladding special wear-resistant alloy, which can be widely used in high-salt and special corrosive environments

Technical parameters table

Model		QY79	QY89	QY95	QY108	QY121	QY165	QY178	QY203	QY241
OD in（mm）		80	90	96	109	122	167	181	206	244
ID in（mm）		25	32	32	38	50	57（70）	70	76	76
operating Temperature(℃)		204								
Tensile strength(KN)		600	750	1000	1350	1950	3750	4650	6030	8500
torsional strength （*KN·m*）		6	7	8	16	25	70	80	135	165
Allowable releaseforce KN	Upward jarring	150	180	200	250	350	700	800	1000	1250
	Downward jarring	60	90	100	120	180	350	400	500	650
Upward/Downward jarring stroke in（mm）		10 7/16				12 1/2				
		265				317.5				
Total stroke in（mm）		20 7/8				25				
		530				635				
connection		2 3/8REG NC23	2 7/8REG NC26	2 7/8REG NC26	NC31	NC35 NC38	NC50	NC50	6 5/8REG	7 5/8REG

Note: The tensile strength and torsion strength are based on the nominal size of the tool and the standard yield and tensile value of the material, which are calculated according to the API RP7G. These data do not have a direct or indirect legal guarantee.

QYS LOCK DOUBLE ACTING FULL HYDRAULIC DRILLING JAR

QYS New Lock Double Acting Full Hydraulic Drilling Jar is a new hydraulic drilling jar with locking mechanism developed on the basis of the structure of QY double-acting full-hydraulic drilling jar. Besides the advantages of QY type, it also has the following advantages.

Divided by temperature:

Conventional type: ≤ 160 ℃, code QYS-I

High temperature type: ≤ 204 ℃, code QYS-II

QYSZ III DOUBLE ACTING HYDRAULIC DRILLING

Features

1.The mechanical locking mechanism prevents unnecessary wear of the internal parts during the working process, and improves the working life.

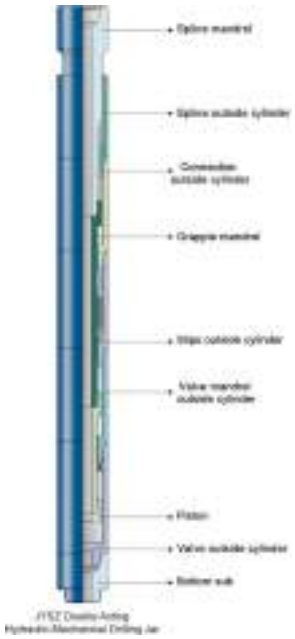
2.The mechanical locking mechanism is functional safety and reliability, which is made by special process. The friction resistance is small, and the locking force is linear stability.

3.The locking mechanism can avoid the failure jarring caused by mis operation when connect simple root to the drill string or contact the hole bottom.

Specifications - Double Acting Hydraulic Drilling Jar

Model		QYS 108	QYS 121	QYS 165	QYS 203	QYS 241
OD in（mm）		109	122	167	206	244
ID in（mm）		38	50.8	57（70）	76	76
Working temperature ℃		150				
Tensile strength （KN）		1350	1950	3750	6230	8500
Torsional strength (KN·m)		16	25	70	135	165
Unlocking Force (KN)	Up jarring	160±25	180±25	420±25	425±25	425±25
	Down jarring	70±25	80±25	180±25	205±25	205±25
Maximum release force (KN)	Up jarring	250	350	700	1000	1250
	Down jarring	120	180	350	500	650
Total stroke in (mm)		20 7/8	25			
		530	630			

The drilling jar is consisting of drilling up jar and drilling down jar in one body, which has stable working performance and strong jarring force both up and down. When in down hole, it can release the struck; it is a desire tool for directional well and deep well.



Working Principle

Up Jarring

Lowering drill string to make drilling jar closed completely (in locking position), elevating drill string by the order of small tonnage to larger tonnage, which make spring and hydraulic cylinder delay, when mandrel move to a position and become release resistance, the spring force stored in drill string will transfer to up forward energy and up jarring. Repeating the above several times can force tool to produce continues up jarring.

Down Jarring

Move up and down the drill string to make drilling jar closed completely (in locking position), lowering drill string to make spring compressed and stored energy. When pressure of jar is larger than the desired lower unlocking force, grapple will slide out from mandrel to release the locking and make down jarring. Repeating the above several times can force tool to produce continues down jarring.

Specifications - JYSZ Double Acting Hydraulic-Mechanical Drilling Jar JYSZ

Model	JYSZ108	JYSZ121	JYSZ159	JYSZ165	JYSZ178	JYSZ203	JYSZ241
OD *in*（*mm*）	109	121	159	165	178	203	241
ID *in*（*mm*）	38	51	57.2	57.2	64	71.4	76.2
API connection	NC31	NC38	NC46	NC50	NC50	6 5/8REG	7 5/8REG
Up jarring free stroke in（mm）	6	6	6	6	6	6	6
	152	152	152	152	152	152	152
Down jarring free stroke in（mm）	6	6	6	6	6	6	6
	152	152	152	152	152	152	152
MAX. jarring force （KN）	250	350	700	700	800	1000	1250
Rated Release Force for Up jarring （KN）	140~190	200~240	400~450	400~450	400~450	450~500	450~500
Rated Release Force for DOwn jarring （KN）	60~80	80~100	180~200	180~200	180~200	190~210	200~220
Max. Tensile Load （KN）	1350	1600	3400	3400	3700	4400	5400
Working Pull Force （KN）	800	1100	2000	2000	2400	2800	3500
Max. Torque（KN·m）	20	20	51	51	60	100	129
Working Torque （KN·m）	10	15	25	25	30	35	40
Pump Area （cm²）	56.7	75.4	126.6	126.6	143.1	198.5	283.4

QJ MECHANICAL DRILLINGJAR

QJ type mechanical drilling jar is a kind of fully-mechanical jarring tools. It can release the drilling tools sticking accidents by providing a up and down jarring force. Basically, it is part of the drill stem, whenever needed, the jarring force can increase the working efficiency.

Up Jarring Working Principle

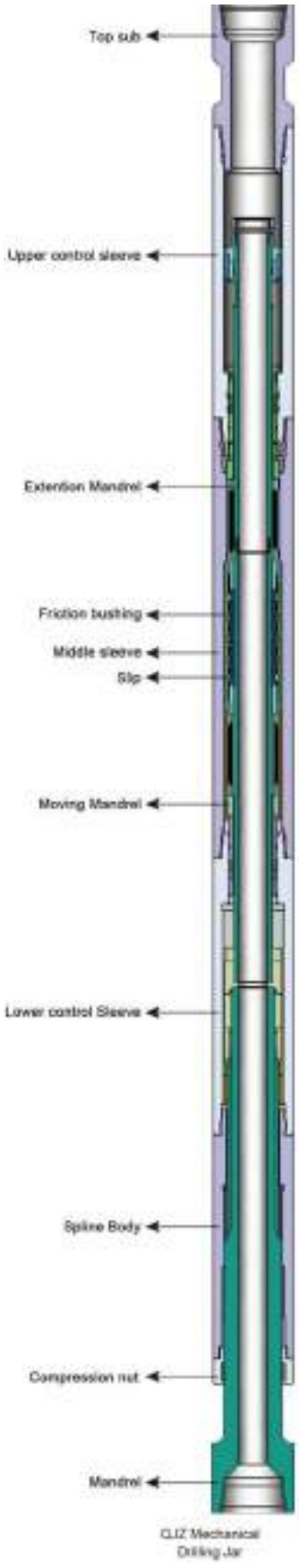
It shows us the jarring state unlocked after be adjusted when it comes to the jarring position the moving axis should snap in the inside threads of the slips. The outer thread of the slips and inside sleeve are under the friction state with. When lifting the drill stem, the upper sub, upper control sleeve, middle sleeve lower control sleeve, lower regulating sleeve, spring type inside sleeve, spring middle sleeve, and spring outer sleeve will move upward while friction sleeve keep still. The slips can be opened when its outer thread top touch the friction sleeve's teeth, at the moment the teeth of the axis will move out from the slips' inside teeth, Then stored power will release and give a up and down double-way force, the tool will return to the state the ready to jarring position. Repeat the following operation, we can release the sticking drilling tools.

Lower Jarring Working Principle

There are a set of spring sleeve on the top of the slips. When the stem gives a pressure on the jar, it can pass through the upper sub, upper control sleeve, upper regularing sleeve to work on the, spring type inside sleeve, spring middle sleeve, and spring outer sleeve. Slips will move upwards while the friction sleeve keep still, until reach the predetermination position, the teeth top of the slips will touch the teeth of the friction sleeve, slips will open to let the moving axis release from the slip's teeth, the down-way jarring force against the upper jarring force.

Specifications - QJZ Mechanical Drilling Jar

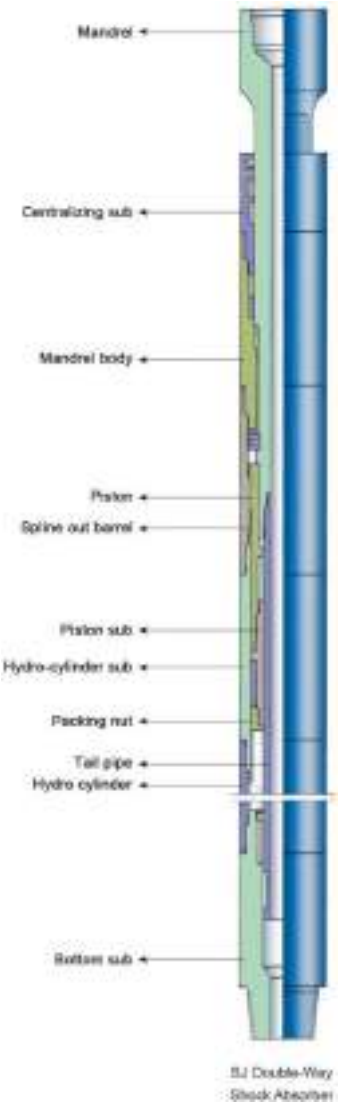
Model	QJ121	QJ159	QJ165	QJ178	QJZ203	QJZ229
OD *in*（*mm*）	121	159	165	178	203	229
ID *in*（*mm*）	51	57	57	57	71.4	76.2
Up Stroke in（*mm*）	7 7/8	5 5/8	5 5/8	5 7/8	5 13/16	8
	200	142	142	149	145	203
Down Stroke in（*mm*）	7 7/8	6 3/4	6 3/4	6 5/8	7	8
	200	172	172	168	178	203
Max. Up Jarring Farce (*KN*)	400	600	620	700	800	1000
Max. Down Jarring Farce (KN)	250	350	350	420	450	500
Max Tensile Load（KN）	1400	2200	2200	2200	2500	3000
Max. Working Torque (*KN·m*)	10	15	15	15	20	25
Connection	NC38	NC46	NC50	NC50	6 5/8REG	7 5/8REG
Pump Area（cm^2）	70.8	115.7	115.7	132.7	174.3	240.4



QJZ Mechanical Drilling Jar

SJ DOUBLE-WAY SHOCK ABSORBER

The SJ type two ways shock absorbers are used to simultaneously slow down or eliminate the vertical or horizontal shock from drill string. It can reduce the damage due to shocking to drill bit, drilling tool and surface drilling tool so as to enhance drilling speed and reduce drilling cost.



SJ Double-Way Shock Absorber

Working Principle

The torsion of bottom hole will be changed with changes in bit structure, formation and bit weight. When the drilling speed reaches up to a certain value, torque and resonance will be happened to drill string. During rotation drilling, the lower part of drilling tool simultaneously bears axially pressure and torque. When bit weight exceeds the limit value, the drilling tool will produce a transverse bending (it means lose steadiness) and torque can also make the drilling tool to lose steadiness to be turned into a twist shape.

1. Two positions are very typical:

The lower bit is suddenly frozen and then torque bumping will be produced unless the cut down rotary energy.

2. Reversing operation in force.

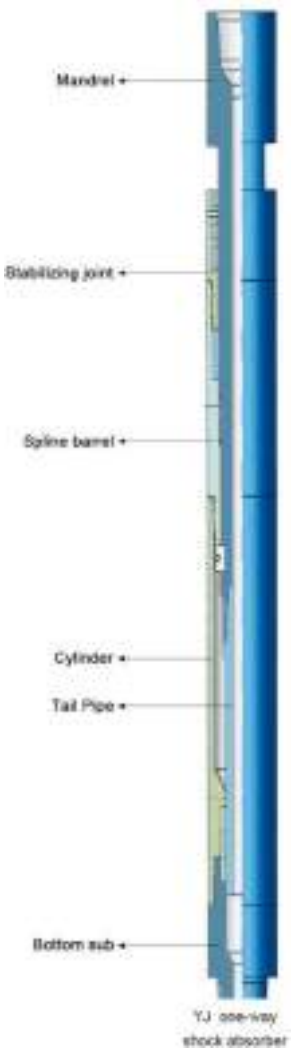
The vertically damping unit is made of mandrel, piston assembly, annular space damping unit and liquid spring of working chamber. Working mechanism: To absorb or release the vibration energy of bit and drill string by means of compressible liquid producing spring deformation in working chamber under the function of pressure. The mandrel moves axially relative to outer barrel when liquid spring is in compression or explanation. Meanwhile, the non-compressible liquid in damping chamber flows through damping space and produces a large number of friction heat so that some vibration and bumping energy are used up. The vertical bumping unit thus can absorb or reduce the drilling tools' energy in vertical vibration and bumping.

The piston change-over unit is composed of spline outer barrel which is connected with piston by rectangular spline pair and the piston inner hole which is connected with mandrel by ladder-shaped spiral pair. Such a group unit can turn the torque vibration and impact load into vertical component of force in working chamber in a twinkling of an eye so that a constant torque is maintained on.

Specifications - SJ Double-Way Shock Absorber

Model	SJ46B	SJ62C	SJ64C	SJ70C	SJ80C	SJ90C	SJ94C
OD *in*（*mm*）	121	160	165	178	203	229	241
ID *in*（*mm*）	38	47	47	57	64	71	71
Max. Stroke in（*mm*）	4 5/16	4 3/4	4 3/4	4 5/16	4 3/4	4 3/4	4 3/4
	110	120	120	100	120	120	120
Ambient temperature （℃）	-40 ~150						
Max. Torque（*KN·m*）	10	15	15	15	20	20	20
Max.Bit weight（*KN*）	200	340	340	400	480	540	540
Tensile Load（*KN*）	1000	1500	1500	1500	1960	1960	1960
Connection	NC38	NC46	NC50	NC50	6 5/8REG	7 5/8REG	7 5/8REG

The YJ type one-way shock absorber (bumper) is a kind of drilling tool. It can affect shock absorbing and shock reduction by means of elastic deforming and anti-coagulation produced from hydraulic oil under the outside force. Its advantages such as simple structure, reliable working performance and easy to maintain can well absorb shocking and vibrating load from drill strings during drilling operation. Therefore, using of shock absorber can raise in structure the service life of drill bit and drill pipe, speed up drilling, get rid of drilling jumping, well protect surface equipment's and drilling tools.



YJ one-way shock absorber

Working Principle

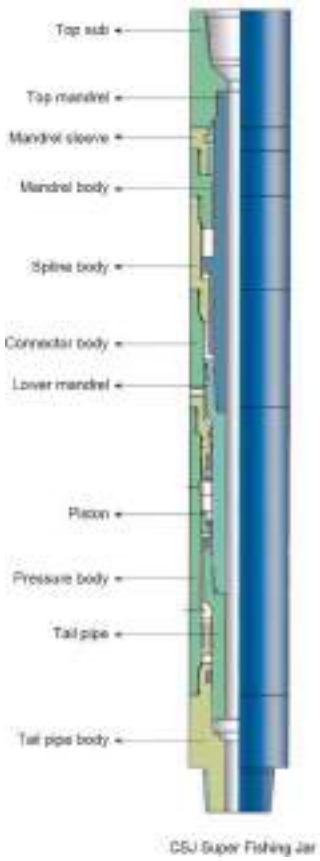
The hydraulic shock absorber is connected between drill bit and drill collar, the torque is transferred from top drill string to mandrel. The spline transfers torque to spline outer barrel, oil cylinder and lower sub, then drive drill bit to rotate.

The bit weight is from the which of top drill tool so that drill bit insert drill into formation to break rock into pieces. The drilling mud is fed through bore of drill pipe and drill collar into mandrel of shock absorber, tailpipe, lower sub bore and ejected into bottom well. Because of the uneven bottom well conditions and special structure of cone bit, the drill bit and drill string during drilling operation would produce severe vibration. The hydraulic shock absorber, by means of compressible deformation of compressed liquid under the function of pressure, absorb the energy from drill bit and drill string vibration. Thus, the shock absorber can reduce the vibration and impact load of drill tools.

Specifications - YJ one-way shock absorber

Model	YJ46C	YJ62C	YJ70C	YJ80C	YJ94C
OD in（mm）	121	160	178	203	241
ID in（mm）	38	47	57	64	70
Max. Stroke in（mm）	4 5/16	4 3/4	4 3/4	5 7/8	5 7/8
	100	120	120	150	150
Max. Bit weight（KN）	250	343	392	450	540
Tensile Strength （KN）	1000	1500	1500	2000	2000
Ambient temperature（℃）	150				
Connection	NC38	NC46	NC50	6 5/8REG	7 5/8REG

CSJ type super fishing jar is a fishing tool which the jarring force is larger than other jar with same specifications. It features a closed structure, reliable performance, easy to adjust and easy to operate. It is a new type of top jarring tool used in oilfield, geological exploration and drilling operation.



CSJ Super Fishing Jar

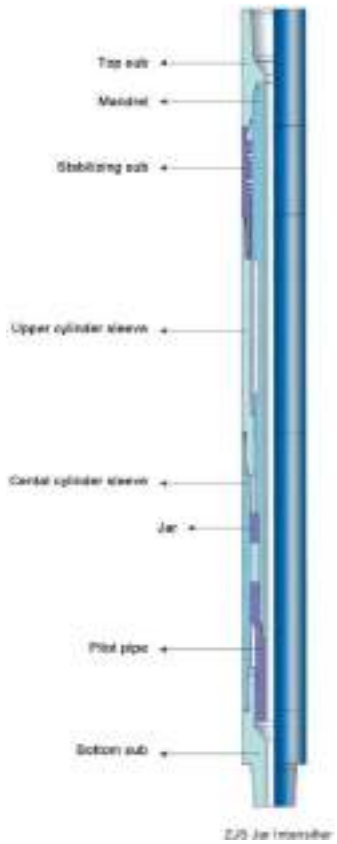
Working Principle

CSJ type super fishing jar effects the top jarring action is by means of hydraulic mechanism which allows taper piston to move in cylinder and stores energy by raising drill tool. When the drill tool attached on the top of super fishing jar is raised, enough time is provided for drill tool to store energy due to the damping action between taper piston and sealing body in pressure body of super fishing jar. When taper piston moves to release bore, the drill tool shall suddenly attract and produce an upward dynamic load along with the instant unloading of high hydraulic oil. The reliable impact working face is designed in the product structure to ensure that large jarring force is provided to stuck fish (drill tool). A desire return mechanism is designed in order to make a reciprocating jarring action. In order to make a rotation for drill tool in down hole and a circulation for fluid, CSJ type of super fishing jar pass torque by means of spline and meanwhile enlarge the watercourse as far as possible to meet the tests with exception of fluid circulation and other applications.

Specifications - CSJ Super Fishing Jar

Model	CSJ31B	CSJ34B	CSJ36B	CSJ42C	CSJ46B	CSJ62B	CSJ64B	CSJ70B	CSJ76B	CSJ80B	CSJ90B
O.D. *in*（*mm*）	80	89	95	108	121	160	165	178	197	203	229
I.D. *in*（*mm*）	25.4	25.4	28	38	45	57	57	60	71	71	76
Stroke in（mm）	298	298	298	305	305	320	320	320	330	330	330
Tensile Load（KN）	300	400	500	700	980	1270	1370	1570	1870	2100	2200
Max. Tension Downhole（KN）	150	180	200	250	400	700	750	800	800	800	1000
Max.Work Torque（*KN·m*）	3	3.5	4	6	8	15	15	17	20	22	25
sealing pressure（MPa）	30										
Max. working temperature（℃）	150										
Connecting	2 3/8REG	NC26	NC26	NC31	NC38	NC50	NC50	NC50	6 5/8REG	6 5/8REG	7 5/8REG

The ZJS type jar intensifier is a kind of down hole fishing jar designed to increase jarring energy to top jar. Therefore, it must be run in conjunction with YSJ type hydraulic top jar or CSJ type super jar. Its main function is to supply acceleration to the upper end of the jar during the free jarring stroke. With a special function, the intensifier is essentially a fluid spring which not only can accelerate the top jarring action but also make the jarring action directly to strike on the fish and reduce damages to the drill tool and fishing tool.



ZJS Jar Intensifier

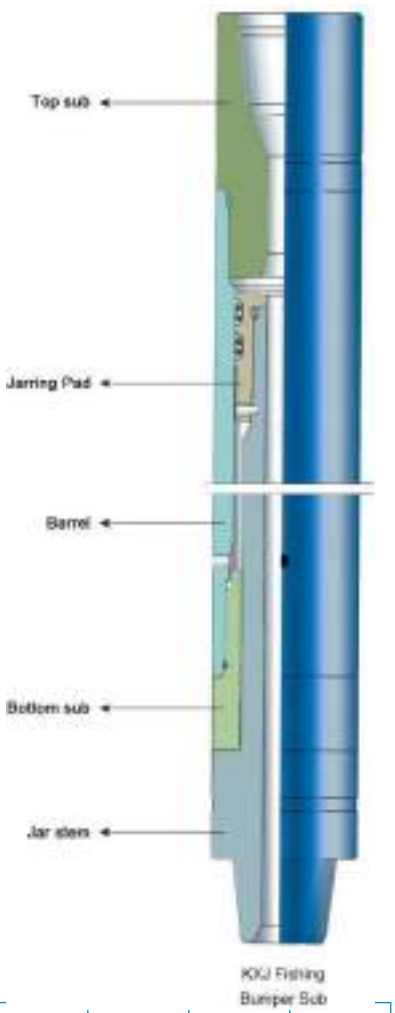
Working Principle

When it is used, the jar intensifier is connected on the top of drill collar and on the lower end of drill stem. When the fishing tool engage the fish and the drill tool is lifted up, the silicone oil in the top chamber of piston is compressed and a large number of energies is thus stored. During lifting, when top jar reaches up to free impact stroke, the stored energy in the jar intensifier will suddenly release, the energy suddenly released will provide a very large acceleration for drill collar and top jar to move upward. When the top jar reaches up to max. Stroke, a strong top jarring action will impact directly on the fish, as a result, one time jarring is produced, and more times jarring will be affected by repeating this course.

Specifications - ZJS Jar Intensifier

Model	ZJS31B	ZJS34B	ZJS36B	ZJS42B	ZJS44B	ZJS46B	ZJS62B	ZJS64B	ZJS70B	ZJS76B	ZJS80B	ZJS90B
O.D.in（mm）	79	89	95	108	114	121	160	165	178	197	203	229
I.D.in（mm）	25 2/5	28	28	38	38	38	57	57	57	71.4	71.4	76
Stroke in（*mm*）	215	215	215	250	250	250	330	330	310	330	330	330
Connecting	2 3/8REG	NC26	NC26	NC31	NC31	NC38	NC50	NC50	NC50	6 5/8REG	6 5/8REG	7 5/8REG
Max. Tension Downhole（*KN*）	300	400	550	700	800	900	1500	1500	1800	2100	2200	2500
Max.Work Torque（*KN·m*）	3	3.5	4	6	7	8	15	15	17	20	20	22
sealing pressure（*MPa*）	30											
Pull down full stroke force（*tf*）	13~15	16~19	17~20	25~30	25~30	30~35	60~65	60~65	75~85	62~67	62~67	75~85

KXJ type bumper jar (hereinafter called as bumper jar) is a mechanical jarring tool. It can make jar repeatedly the stuck drill stem to free from stuck point. When stuck drill stem cannot be released by lifting and jarring, the bumper jar can be rotated to make releasable fishing tool to release fish. When used with mechanical internal cutter, it can provide an expected feeding force to the internal cutter so as to cutting steadily. When used with reversing unit, it can compensate the rising stroke for threads afterreversing.



KXJ Fishing Bumper Sub

Working Mechanism

Energy conversion in jarring operation

Jarring downward is made by means of energy conversion. Raising drill stem shall make bumper jar to be pull down at a certain height to produce potential energy. Go on raising drill stem, the drill stem has a strain energy due to spring strain. When drill stem is lowered suddenly, the energy stored in drill stem force the drill stem to move downward in acceleration. When bumper jar reach a closed position, the above two energies at this instant change into large downward jarring force.

Main factors having influence on jarring force

The bigger hanging weight on top drill stem of bumper jar makes a bigger jarring force;

The longer the spring extension of drill stem is when raising drill stem, the bigger the jarring force is;

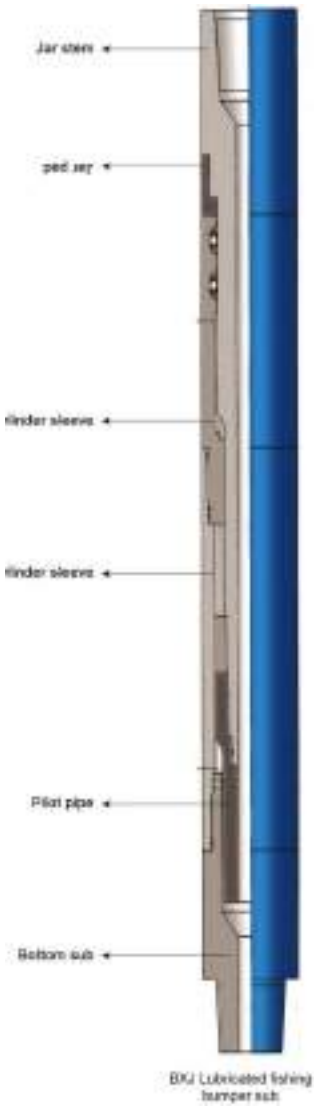
The longer the stroke of the bumper jar is, the bigger the jarring force of jar is.

Specifications - KXJ Type Fishing Bumper Sub

Model	KXJ31B	KXJ34B	KXJ36B	KXJ42B	KXJ46B	KXJ62B	KXJ64B	KXJ70B	KXJ76B	KXJ80B	KXJ85B	KXJ90B
OD *in*（*mm*）	79	89	95	108	121	159	165	178	197	203	219	229
ID *in*（*mm*）	25.4	28	32	38	38	51	51	70	70	70	76	76
sealing pressure（*MPa*）	30											
Max.Tensile Load（*KN*）	300	400	500	700	1200	1430	1430	1530	1630	1630	1630	2200
Max. Working Torque（*KN·m*）	3	3.5	4	6	8	13	13	15	20	20	20	25
Work stroke in（*mm*）	20	20	20	20	39 3/8	55 1/8	55 1/8	55 1/8	59	59	20	59
	508	508	508	508	1000	1400	1400	1400	1500	1500	508	1500
API connection	2 3/8REG	NC26	NC26	NC31	NC38	NC50	NC50	NC50	6 5/8REG	6 5/8REG	6 5/8REG	7 5/8REG

BXJ LUBRICATED FISHING BUMPER SUB

Lubricated fishing bumper sub is one of the jars which produce jarring force by means of the energy caused by heavy weight objects when moving down, its inner chamber is full of hydraulic oil so as to ensure a longer service life. The tool is suitable for deep hole and middle deep hole operation. With some advantages: Can produce strong one way down jarring force, maximum jarring force, continuous down jarring force. Medium jarring force; continuous up jar, low-grade jarring force; can release fishing tool; can act as constant pressure drill tool, simply structure, easy operation, all these make it widely used jarring tool.



BXJ Lubricated fishing bumper sub

Working Principle

Energy conversion in jarring operation

Downward is made by means of conversion. Raising drill stem shall make bumper jar to be pulled down at a certain height to produce potential energy. Go on raising drill stem, the drill stem has a strain energy due to spring strain. When drill stem is lowered suddenly, the energy stored in drill stem the force the drill stem to move downward in acceleration. When bumper sub reaches a closed position, the above energies at this instant change into a large downward jarring force.

Main factors having influenced on jarring force.

Many factors influence on jarring force, but key factors as follows:

1、The bigger hanging weight on top drill stem of bumper jar makes a bigger jarring force.

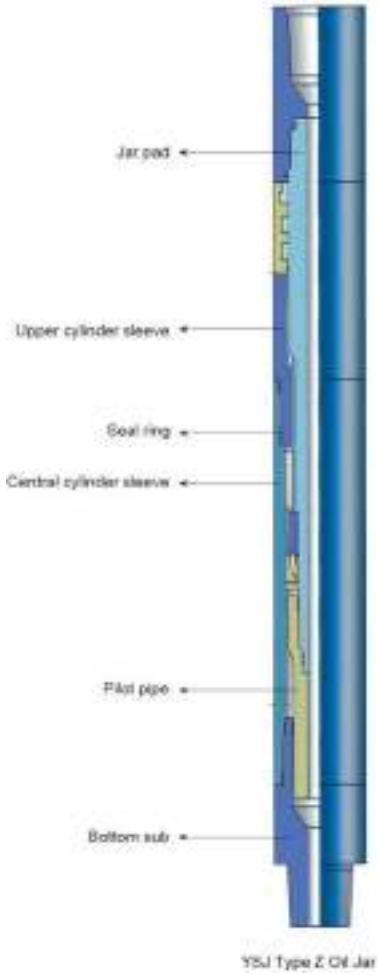
2、The longer the spring extension of drill stem is when raising drill stem, the bigger the jarring force is.

3、The longer the stroke of the bumper jar is, the bigger the jarring force of jar is.

Specifications - BXJ Lubricated fishing bumper sub

Model	BXJ31B	BXJ34B	BXJ36B	BXJ42B	BXJ46B	BXJ62B	BXJ64B	BXJ70B	BXJ80B
OD *in*（*mm*）	80	89	95	108	121	159	165	178	203
ID *in*（*mm*）	25.4	25.4	28	38	38	57	57	70	76.2
sealing pressure（*MPa*）	30								
Max.Tensile Load（*KN*）	300	400	500	700	900	1430	1430	1530	2200
Work stroke in（*mm*）	15 1/2	15 1/2	15 1/2	15 1/2	15 3/4	18 1/8	18 1/8	18 5/16	18 5/16
	394	394	394	394	400	460	460	465	465
API connection	2 3/8REG	NC26	NC26	NC31	NC38	NC50	NC50	NC50	6 5/8REG

YSJ type hydraulic up jar is used to be free from drilling sticking, through hydraulic principle, by means of elastic potential produced from drill tool elastic deformation. Once the elastic potential energy is released, it would produce a large up striking load to reach a purpose of fishing and coring. It features easy structures, strong jarring force, easy to return, convenient operation. If it is used with ZJS type jar intensifier, it may gain better jarring effect.



YSJ Type Z Oil Jar

Working Principle

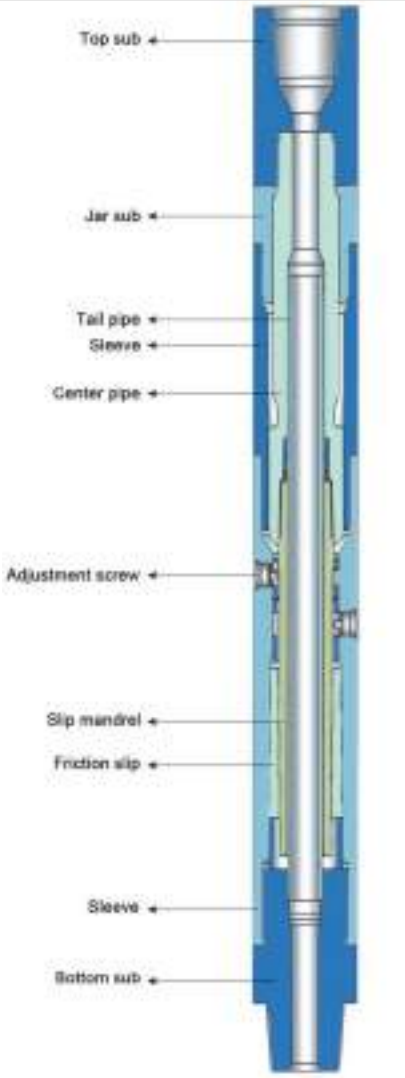
The key principle is: the piston moves up and make hydraulic so that it makes enough time to make drill tool to save energy. With the piston continue to move slowly to releasing bore, after the binding of hydraulic oil is released, elastic potential is released by drill tool saved, immense dynamic loading is passed to drill tool due to jar pad's hitting on the bottom of up jar cylinder liner. A desire returns mechanism makes a reciprocating jarring action.

Specifications - YSJ Type Oil Jar

Model	YSJ95B	YSJ108B	YSJ121C	YSJ159C	YSJ178C	YSJ203C	YSJ229B
OD *in*（*mm*）	95	108	121	159	178	203	229
ID *in*（*mm*）	28	32	38	57	57	76	76
Work stroke in（*mm*）	245	254	330	380	380	380	380
Max. Working Torque（*KN·m*）	4	4.5	7.8	15	19.6	22	25
Max. jarring lifting tons（*KN*）	160	180	300	600	650	800	900
sealing pressure（*MPa*）	30						
Ambient temperature（℃）	150						
Connection	NC26	NC31	NC38	NC50	NC50	6 5/8REG	7 5/8REG

DJ SURFACE BUMPER JAR

The surface jar is an effective tool for resolving the problem of drill tool stuck in down hole. It is connected with the surface section of drill string, the device to adjust the tonnage shall protrude from the rotary disc face, the violent down jarring to the stuck catch can be clearly seen when the surface jar makes jarring operation. The jarring strength for the tool can be easily adjusted and it is an easy operated, unique designed tool which can make continuous down jarring. The surface jar, which not only can bear heavy load and strong torque but also owns a good sealing property and can withstand the mud circulation with high pump pressure, has proven to be a safe, successfully effective releasing tool through many years using.



DJ Surface Bumper Jar (02)

Specifications - DJ Surface Bumper Jar

Model	DJ46B	DJ70B	DJ70C	DJ80B
OD *in*（*mm*）	121	178	178	203
ID *in*（*mm*）	30	47	47	50
Stroke in（*mm*）	1500	1220	1800	2000
Max. jarring force KN	400	680	680	680
Max. Tension Load KN	1200	1500	1500	2100
sealing pressure Mpa	30			
Connection	NC38	NC50	NC50	NC50
Original releasing force（*KN*）	150	200	200	200

Kelly is main driver of the whole drill string. It transmits torsional energy from the rotary table through the drill string to the bit at the bottom of the hole. Pascal Kelly is a long square or hexagonal, precision machined heavy steel bar that is supported by the swivel through the rotary table and is connected to the first joint of drill pipe in the drill string.

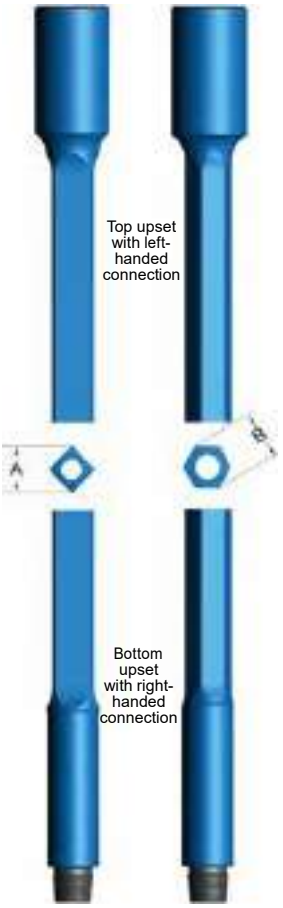
Straightness of the Kelly is very crucial in the manufacturing process, thus straightness inspections are carried out before, during and after each machining operation. The flats are precision-milled to API specifications. All milling processes are performed on specially designed rigid Kelly mills to ensure tight tolerances and high-quality drive sections. Each Pascal Kelly is furnished with a pressed steel thread protector.

Features and Benefits

- Manufactured from AISI 4145H-modified, fully heat-treated alloy steel with a Brinell hardness range of 285-341BHn and a minimum average Charpy impact value of 40 ft-lbs.;
- Ends and drive sections, IDs and connections machined and inspected to API specifications;
- Ultrasonic inspection is performed on all sections;
- Shipped in a protective steel-cased scabbard;

When ordering please specify:

- Kelly type (square or hexagonal);
- nominal size and overall length;
- Upper and lower connections.



Square Kelly (Z03) Hexagonal Kelly (Z04)

Specifications - Rotary Kelly

Nom Size (in)	Top Connection(LH)		Bottom Connection		I.D.(in)		Drive Section(in)	
	Standard O.D.(in)	Optional O.D.(in)	Square O.D.(in)	Hex. O.D.(in)	Square	Hex.	A	B
2 1/2	6 5/8 REG LH 7 3/4	4 1/2 REG LH 5 3/4	NC26 3 3/8		1 1/4		3 1/4	
3	6 5/8 REG LH 7 3/4	4 1/2 REG LH 5 3/4	NC31 4 1/8	NC26 3 3/8	1 3/4	1 1/4	3 3/8	3 3/8
3 1/2	6 5/8 REG LH 7 3/4	4 1/2 REG LH 5 3/4	NC38 4 3/4	NC31 4 1/8	2 1/4	1 3/4	4 7/16	3 15/16
4 1/4	6 5/8 REG LH 7 3/4	4 1/2 REG LH 5 3/4	NC46 6 1/4	NC38 4 3/4	2 13/16	2 1/4	5 1/2	4 25/32
	6 5/8 REG LH 7 3/4	4 1/2 REG LH 5 3/4	NC50 6 3/8	NC38 4 3/4	2 13/16	2 1/4	5 1/2	4 25/32
5 1/4	6 5/8 REG LH 7 3/4		5 1/2 FH 7	NC46 6 1/4	3 1/4	3	6 3/4	5 29/32
	6 5/8 REG LH 7 3/4		NC56 7	NC50 6 3/8	3 1/4	3 1/4	6 3/4	5 29/32
6	6 5/8 REG LH 7 3/4			5 1/2 FH 7		3 1/2		6 13/16
	6 5/8 REG LH 7 3/4			NC56 7		3 1/2		6 13/16

Pascal provides a complete line of drill string products, including a full range of friction welded drill pipes in nominal sizes from 2-3/8" to 6-5/8" and in a wide range of wall thicknesses. Pascal drill pipe adopts a strict quality control regimen to ensure total quality control from initial material qualification, in-process inspection to final out-going quality inspection. We ensure that each joint of drill pipe meets your needs for reliability, durability and performance.

DRILL PIPE

Specification a					OD of pipe	Wall thickness	Dia. of welded neck	Tool joint					
								OD	ID of pin thread	Length of pin thread	Length of box thread	Bevel diameter	Approximate quality
Model	Weight lb/ft	Grade	Upset form	Conn	Ddp mm	t mm	mm	mm	mm	mm	mm	mm	c kg/m
						-12.50%	Max	±0.8	-0.4	±6.4	±6.4	±60.4	
2 3/8	6.65	E	EU	NC 26	60.32	7.11	65.1	85.7	44.5	177.8	203.2	82.95	10.45
2 3/8	6.65	X,G	EU	NC 26	60.32	7.11	65.1	85.7	44.5	177.8	203.2	82.95	10.58
2 7/8	10.4	E	EU	NC 31	73.02	9.19	81	104.8	54	177.8	228.6	100.41	16.25
2 7/8	10.4	X,G	EU	NC 31	73.02	9.19	81	104.8	50.8	177.8	228.6	100.41	16.5
2 7/8	10.4	S	EU	NC 31	73.02	9.19	81	111.1	41.3	177.8	228.6	100.41	17.19
3 1/2	9.5	E	EU	NC 38	88.9	6.45	98.4	120.7	68.3	203.2	266.7	116.28	15.77
3 1/2	13.3	E	EU	NC 38	88.9	9.35	98.4	120.7	68.3	203.2	266.7	116.28	20.77
3 1/2	13.3	X	EU	NC 38	88.9	9.35	98.4	127	65.1	203.2	266.7	116.28	21.76
3 1/2	13.3	G	EU	NC 38	88.9	9.35	98.4	127	61.9	203.2	266.7	116.28	21.9
3 1/2	13.3	S	EU	NC 38	88.9	9.35	98.4	127	54	203.2	266.7	116.28	22.22
3 1/2	15.5	E	EU	NC 38	88.9	11.4	98.4	127	65.1	203.2	266.7	116.28	24.67
3 1/2	15.5	X	EU	NC 38	88.9	11.4	98.4	127	61.9	203.2	266.7	116.28	25.07
3 1/2	15.5	G	EU	NC 38	88.9	11.4	98.4	127	54	203.2	266.7	116.28	25.38
3 1/2	15.5	S	EU	NC 40	88.9	11.4	98.4	139.7	57.2	203.2	266.7	127.4	26.19
4	14	E	IU	NC 40	101.6	8.38	106.4	133.4	71.4	177.8	254	127.4	22.42
4	14	X	IU	NC 40	101.6	8.38	106.4	133.4	68.3	177.8	254	127.4	22.76
4	14	G	IU	NC 40	101.6	8.38	106.4	139.7	61.9	177.8	254	127.4	23.61
4	14	S	IU	NC 40	101.6	8.38	106.4	139.7	50.8	177.8	254	127.4	24.03
4	14	E	EU	NC 46	101.6	8.38	114.3	152.4	82.6	177.8	254	145.26	23.67
4	14	X,G	EU	NC 46	101.6	8.38	114.3	152.4	82.6	177.8	254	145.26	24.12
4	14	S	EU	NC 46	101.6	8.38	114.3	152.4	76.2	177.8	254	145.26	24.46

Specification a					OD of pipe	Wall thickness	Dia. of welded neck	Tool joint					
								OD	ID of pin thread	Length of pin thread	Length of box thread	Bevel diameter	Approximate quality
Model	Weight lb/ft	Grade	Upset form	Conn	Ddp mm	t mm	mm	mm	mm	mm	mm	mm	c kg/m
						-12.50%	Max	±0.8	-0.4	±6.4	±6.4	±60.4	
4 1/2	13.75	E	IU	NC46	114.3	6.88	119.1	152.4	85.7	177.8	254	145.26	22.5
4 1/2	13.75	E	EU	NC50	114.3	6.88	127	168.3	95.3	177.8	254	153.99	23.65
4 1/2	16.6	E	EU	NC50	114.3	8.56	127	168.3	95.3	177.8	254	153.99	27.51
4 1/2	16.6	X,G	EU	NC50	114.3	8.56	127	168.3	95.3	177.8	254	153.99	28.07
4 1/2	16.6	S	EU	NC50	114.3	8.56	127	168.3	88.9	177.8	254	153.99	28.47
4 1/2	16.6	E	IEU	NC46	114.3	8.56	119.1	158.8	82.6	177.8	254	145.26	27.36
4 1/2	16.6	X,G	IEU	NC46	114.3	8.56	119.1	158.8	76.2	177.8	254	145.26	27.73
4 1/2	16.6	S	IEU	NC46	114.3	8.56	119.1	158.8	69.9	177.8	254	145.26	28.04
4 1/2	20	E	EU	NC50	114.3	10.92	127	168.3	92.1	177.8	254	153.99	32.93
4 1/2	20	X,G	EU	NC50	114.3	10.92	127	168.3	88.9	177.8	254	153.99	33.63
4 1/2	20	S	EU	NC50	114.3	10.92	127	168.3	76.2	177.8	254	153.99	34.34
4 1/2	20	E	IEU	NC46	114.3	10.92	119.1	158.8	76.2	177.8	254	145.26	32.94
4 1/2	20	X	IEU	NC46	114.3	10.92	119.1	158.8	69.9	177.8	254	145.26	33.69
4 1/2	20	G	IEU	NC46	114.3	10.92	119.1	158.8	63.5	177.8	254	145.26	33.97
4.5	20	S	IEU	NC46	114.3	10.92	119.1	158.8	57.2	177.8	254	145.26	34.23
5	19.5	E	IEU	NC50	127	9.19	130.2	168.3	95.3	177.8	254	153.99	31.79
5	19.5	X	IEU	NC50	127	9.19	130.2	168.3	88.9	177.8	254	153.99	32.58
5	19.5	G	IEU	NC50	127	9.19	130.2	168.3	82.6	177.8	254	153.99	32.95
5	19.5	S	IEU	NC50	127	9.19	130.2	168.3	69.9	177.8	254	153.99	33.6
5	19.5	E	IEU	5 1/2 FH	127	9.19	130.2	177.8	95.3	203.2	254	170.66	33.22
5	19.5	X,G	IEU	5 1/2 FH	127	9.19	130.2	177.8	95.3	203.2	254	170.66	33.61
5	19.5	S	IEU	5 1/2 FH	127	9.19	130.2	184.2	88.9	203.2	254	170.66	34.89
5	25.6	E	IEU	NC50	127	12.7	130.2	168.3	88.9	177.8	254	153.99	40.73
5	25.6	X	IEU	NC50	127	12.7	130.2	168.3	76.2	177.8	254	153.99	41.8
5	25.6	G	IEU	NC50	127	12.7	130.2	168.3	69.9	177.8	254	153.99	42.11
5	25.6	E	IEU	5 1/2 FH	127	12.7	130.2	177.8	88.9	203.2	254	170.66	42.14
5	25.6	X	IEU	5 1/2 FH	127	12.7	130.2	177.8	88.9	203.2	254	170.66	42.51
5	25.6	G	IEU	5 1/2 FH	127	12.7	130.2	184.2	88.9	203.2	254	170.66	43.35
5	25.6	S	IEU	5 1/2 FH	127	12.7	130.2	184.2	82.6	203.2	254	170.66	43.75
5.5	21.9	E	IEU	5 1/2 FH	139.7	9.17	144.5	177.8	101.6	203.2	254	170.66	35.43
5.5	21.9	X	IEU	5 1/2 FH	139.7	9.17	144.5	177.8	95.3	203.2	254	170.66	36.36
5.5	21.9	G	IEU	5 1/2 FH	139.7	9.17	144.5	184.2	88.9	203.2	254	170.66	37.61
5.5	21.9	S	IEU	5 1/2 FH	139.7	9.17	144.5	190.5	76.2	203.2	254	180.18	39.27
5.5	24.7	E	IEU	5 1/2 FH	139.7	10.54	144.5	177.8	101.6	203.2	254	170.66	39.19
5.5	24.7	X,G	IEU	5 1/2 FH	139.7	10.54	144.5	184.2	88.9	203.2	254	170.66	41.32
5.5	24.7	S	IEU	5 1/2 FH	139.7	10.54	144.5	190.5	76.2	203.2	254	180.18	42.97
6.625	25.2	E	IEU	6 5/8 FH	168.28	8.38	176.2	203.2	127	203.2	279.4	195.66	41.03
6.625	25.2	X	IEU	6 5/8 FH	168.28	8.38	176.2	203.2	127	203.2	279.4	195.66	41.03
6.625	25.2	G	IEU	6 5/8 FH	168.28	8.38	176.2	209.6	120.7	203.2	279.4	195.66	42.6
6.625	25.2	S	IEU	6 5/8 FH	168.28	8.38	176.2	215.9	108	203.2	279.4	195.66	44.73
6.625	27.72	E	IEU	6 5/8 FH	168.28	9.19	176.2	203.2	127	203.2	279.4	195.66	43.79
6.625	27.72	X,G	IEU	6 5/8 FH	168.28	9.19	176.2	209.6	120.7	203.2	279.4	195.66	45.35
6.625	27.72	S	IEU	6 5/8 FH	168.28	9.19	176.2	215.9	108	203.2	279.4	195.66	47.48

Drill Collar is the basic component in the BHA which provides weight on the bit for drilling and keeps the drill string in tension.

Pascal Drill Collar is manufactured from AISI 4145H modified quenched and tempered steel and is heat treated along its entire length for uniform toughness and durability. Strict metallurgical tests are performed per specifications to ensure that the heat treatment produces consistent and maximum hardness through the depth of the bar.

Features and Benefits

- A hardness range of 285 to 341 BH N and a Charpy impact value of 40 lbs/ft are guaranteed for evenly distributed 16 points in any cross sections at room temperature;
- Connections are phosphate coated after machining to protect the threads from corrosive elements and to prevent galling upon initial make-up;
- Thread roots are cold rolled on API and H-90 connections;
- Pressed steel thread protectors are supplied for all drill collar that are equipped with standard connections

When ordering please specify:

- Drill collar OD and ID;
- Overall length;
- Connections required (size and type);
- Special features desired, for example:
  Slick or Spiral;
  Stress Relief Features;
  Slip and/or Elevator Recess;
  Hard banding

Specifications - Drill Collar

Number And Connection Table	OD		ID		Length mm	Bevel Diameter mm	Bending Strength Ratio
	mm	in	mm	in			
NC23-31	79.4	3 1/8	31.8	1 1/4	9150	76.2	2.57:1
NC26-35(2 3/8 IF)	88.9	3 1/2	38.1	1 1/2	9150	84.5	2.42:1
NC31-41(2 7/8 IF)	104.8	4 1/8	50.8	2	9150	101.6	2.43:1
NC35-47	120.6	4 3/4	50.8	2	9150	114.7	2.58:1
NC38-50(3 1/2 IF)	127	5	57.2	2 1/4	9150	121	2.38:1
NC44-60	152.4	6	57.2	2 1/4	9150 or 9450	144.5	2.49:1
NC44-60	152.4	6	71.4	2 13/16	9150 or 9450	144.5	2.84:1
NC44-62	158.8	6 1/4	57.2	2 1/4	9150 or 9450	149.2	2.91:1
NC46-62(4 IF)	158.8	6 1/4	71.4	2 13/16	9150 or 9450	150	2.63:1
NC46-65(4 IF)	165.1	6 1/2	57.2	2 1/4	9150 or 9450	154.8	2.76:1
NC46-65(4 IF)	165.1	6 1/2	71.4	2 13/16	9150 or 9450	154.8	3.05:1
NC46-67(4 IF)	171.4	6 3/4	57.2	2 1/4	9150 or 9450	159.5	3.18:1
NC50-67(4 1/2 IF)	171.4	6 3/4	71.4	2 13/16	9150 or 9450	159.5	2.37:1
NC50-70(4 1/2 IF)	177.8	7	57.2	2 1/4	9150 or 9450	164.7	2.54:1
NC50-70(4 1/2 IF)	177.8	7	71.4	2 13/16	9150 or 9450	164.7	2.73:1
NC50-72(4 1/2 IF)	184.2	7 1/4	71.4	2 13/16	9150 or 9450	169.5	3.12:1
NC56-77	196.8	7 3/4	71.4	2 13/16	9150 or 9450	185.3	2.70:1
NC56-80	203.2	8	71.4	2 13/16	9150 or 9450	190.1	3.02:1
6 5/8 REG	209.6	8 1/4	71.4	2 13/16	9150 or 9450	195.7	2.93:1
NC61-90	228.6	9	71.4	2 13/16	9150 or 9450	212.7	3.17:1
7 5/8 REG	241.3	9 1/2	76.2	3	9150 or 9450	223.8	2.81:1
NC70-97	247.6	9 3/4	76.2	3	9150 or 9450	232.6	2.57:1

Spiral Drill Collar (Z02)

Standard Drill Collar (Z01)

Spiral Grooving

In order to reduce differential pressure sticking, the surface of drill collars can be spiral-grooved.

Spiral Grooved Drill Collars: usual Sizes

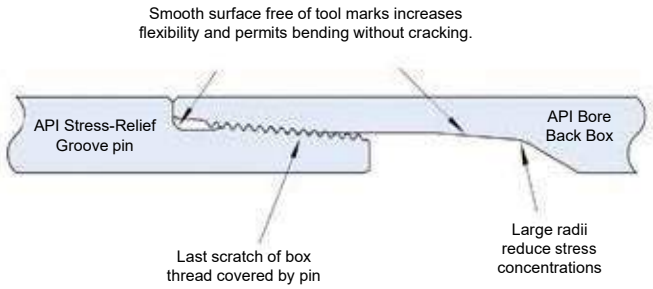
OD	4 3/4"	6 1/4"	6 3/4"	7 1/4"	7 1/2"	8"	9 1/2"	10"	11"
Depth of cut (in)	7/32	9/32	5/16	11/32	11/32	3/8	13/32	7/16	15/32
	±1/32	±1/16	±1/16	±1/16	±1/16	±1/16	±3/12	±3/32	±3/32
Spiral pitch (in)	38	42	46	64	64	68	72	76	80
	±1	±2	±3	±4	±5	±6	±7	±8	±9

note 1-Loss of weight is approximatively 4%, compared to slick drill collars. note 2-Length of spiraled section allows reconditionning of connections.

Stress Relief Groove & Bore Back Box

Stress relief grooves improve bending strength of pin and box connections and, therefore, durability. Stress relief grooves for box and pin are defined by API.

Bore back box is a gradual reduction of internal diameter by gradually increasing material cross sectional area at critical section. This will ultimately drastically reduce stress concentration during static/dynamic loading and prevents box connections from failure.



Hardbanding

We provide several hardbanding materials for customer's choice: Arnco-100xT, Arnco-300xT, TCS-8000;

Slip and Elevator Recess

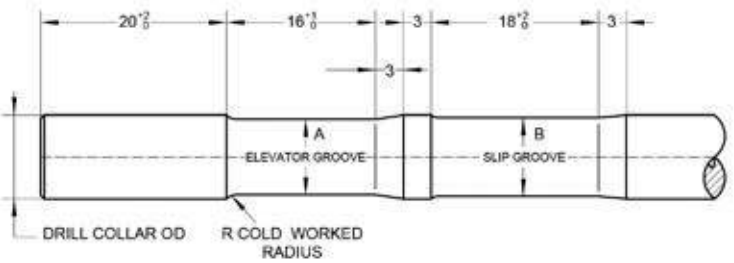
Slip and elevator recesses improve downhole handling efficiency and safety. Slip and elevator recesses are machined in accordance with API 7-1.

Recommended Hardbanding Location

-Drill collars with slip and elevator recesses (ZIP)
4" long wear pad above elevator recess
1" long wear pad above slip recess.
10" long wear pad under slip recess

-Drill collars with slip recess:
10" long wear pad under slip recess,
4" long wear pad above slip recess.

-Drill collars without slip and elevator recesses:
10" long wear pad at 30" from pin shoulder.



Spiral Drill Collar With Slip and Elevator Recess (Z02)

Drill Collars

OD (in)	A (in)	B (in)	R (in)
10	9 1/8	9 1/2	1/4
9 3/4	8 7/8	9 1/4	1/4
9 1/2	8 5/8	9	1/4
9 1/4	8 3/8	8 3/4	1/4
9	8 1/8	8 1/2	1/4
8 1/2	7 3/4	8	3/16
8	7 1/4	7 1/2	3/16
7 3/4	7	7 1/4	3/16
7 1/2	6 3/4	7	3/16
7 1/4	6 1/2	6 3/4	3/16
7	6 1/4	6 1/2	3/16
6 3/4	6	6 1/4	3/16
6 1/2	5 7/8	6	1/8
6 1/4	5 5/8	5 3/4	1/8
6	5 3/8	5 1/2	1/8
5 3/4	5 1/8	5 1/4	1/8
4 3/4	4 1/4	4 3/8	1/8
4 1/8	3 11/16	3 3/4	1/8

Pascal non-magnetic drill collars are made from non-magnetic steel bars with low-strength by combining a proper chemical analysis and rotary hammer forging process with low magnetic permeability and excellent machinability. It will not interfere with the specialized directional equipment but rather will enhance the performance of the drilling operation.

The non-magnetic drill collars function as a housing for the MWD tools, while at the same time provide the weight for drill string. Pascal non-magnetic drill collars are suitable for all types of drilling including straight and directional applications.

Each drill collar is fully inspected by our internal inspection department. All data obtained are recorded on the inspection certificate furnished with each drill collar. API monogram, serial number, OD, ID, type and size of connections are stamped on the recessed mill flats.

We manufacture three type of non-magnetic drill collars according to the customers' order; include Slick, Spiral, and Flex non-Mag Drill Collars.

Slick Non-Mag Drill Collar

Pascal Slick non-Mag Drill Collar provides the required weight on bit, and will not interfere with the directional drilling ability.

Spiral Non-Mag Drill Collar

Pascal Spiral non-Mag Drill Collar is designed to allow greater flow area for drilling fluids, while providing the benefits of non-mag steel for complex drilling programs.

Flex Non-Mag Drill Collar

Pascal Flex non-Mag Drill Collar is thinner and more flexible than standard drill collar. Their ability to make short radius turns, bend for high build angles, and pass-through severe doglegs makes them ideal for use in directional and horizontal applications. Manufactured with non-mag steel, this drill collar is well suited for housing MWD equipment.

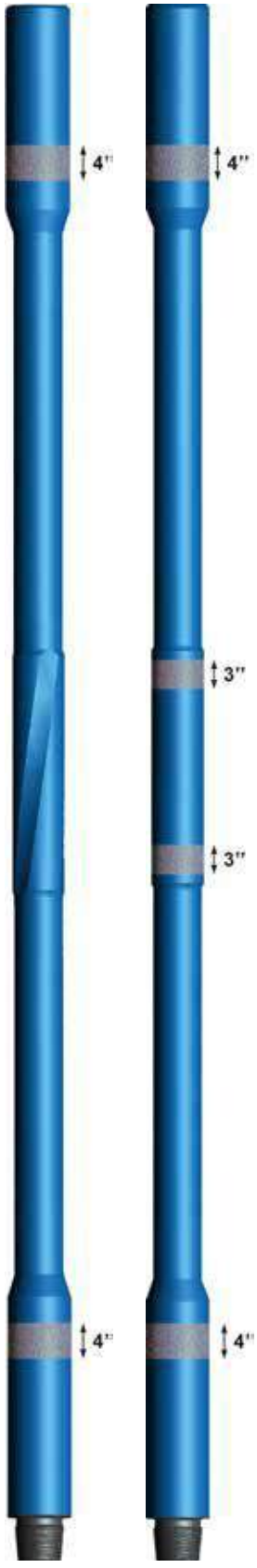
non-Magnetic Drill Collar | Spiral non-Magnetic Drill Collar | non-Magnetic Flex Drill Collar

Heavy Weight Drill Pipe (HWDP) is an intermediate weight drill stem component which is used in conjunction with the drill pipes and drill collars. Pascal HWDP is available in standard, spiral and non-magnetic designs. In some applications, heavy-weight drill pipes also can be used instead of the drill collars.

Pascal HWDP is made from one-piece AISI 4145H modified quenched and tempered steel. It is designed for tought drilling environment in vertical and directional wells. Pascal HWDP is a transition member between drill collar and drill pipe. For directional holes HWDP provides weight-on-bit and additional stiffness to prevent buckling.

Features and Benefits

- A center upset or wear pad to increase tube life, reduce hole drag and differential sticking problems;
- Connections are completed (phosphate coated) to protect them from the elements after machining and to help prevent galling upon initial make-up;
- Thread roots are cold rolled on API and H-90 connections. And pressed steel thread protectors are supplied for standard connections;
- Hardbanding and internal coating can be provided on customer's request.



Spiral Heavy Weight Drill Pipe | Heavy Weight Drill Pipe

Specifications - Heavy Weight Drill Pipe

Size(in)	O. D. (In) P.	I.D. (in)	Tool Joint O.D. (in)	Tool Joint I.D. (in)	Connection	Max.Elevator Diameter (in)	Central upset Dia. (in)	Min.Drift Dia. Size (in)
3 1/2	3 1/2	2 1/4	4 3/4	2 1/4	NC38	3 7/8	4	2
		2 1/16	(4 7/8, 5)	2 1/16				1 13/16
4	4	2 1/2	5 1/4	2 1/2	NC40	4 3/16	4 1/2	2 1/4
		2 9/16		2 9/16				2 5/16
4 1/2	4 1/2	2 11/16	6 1/4	2 11/16	NC46	4 11/16	5	2 7/16
		2 3/4		2 3/4				2 1/2
		2 13/16		2 13/16				2 9/16
5	5	3	6 5/8	3	NC50	5 1/8	5 1/2	2 3/4
5 1/2	5 1/2	3 1/4	(7 1/4,7 1/2)	3 1/4	5 1/2 FH	5 11/16	6	3
		3 3/8		3 3/8				3 1/8
		3 7/8		3 7/8				3 5/8
		4		4				3 3/4
6 5/8	6 5/8	4	8 (8 1/4,8 1/2)	4	6 5/8 FH	6 15/16	7 1/8	3 3/4
		4 1/2		4 1/2				4 1/4
				5				4 3/4

Pascal Integral Blade Stabilizer (IBS) is a one-piece rotating stabilizer which can be placed near bit or higher in the drill string. It is a one-piece construction manufactured from high strength alloy steel (non-magnet steel optional), that prevents differential sticking of the drill string by stabilizing the BHA and keeping drill collars and drill pipes away from the borehole wall. This reduces vibration, drill pipe whirl, and wellbore tortuosity; furthermore, the stabilization maintains drilling trajectory whether drilling straight, horizontal, or directional wells.

Optional Stabilizers

Pascal offers several options for IBS, in both alloy steel and non-magnet materials:

- Spiral Integral Blade Stabilizer;
- Straight Integral Blade Stabilizer;
- non-Magnet Integral Blade Stabilizer;

When ordering please specify:

- Hole size or required blade O.D.;
- Number of blades required (3 or 4 are standard styles);
- Straight or spiral blades;
- Hard facing type;
- Top and bottom connections;
- Body diameter required;
- String or near bit application;
- Alloy steel or non-magnet materials;
- Special features SRG on connections, bored for float etc.

Spiral Integral Blade Stabilizer

Straight Integral Blade Stabilizer

non-Magnet Integral Blade Stabilizer

Specifications - Straight Integral Blade Stabilizer

OD stab		Body OD	ID	Fishing neck length	Crown length	Blade taper angle		Overall length		Connection	
in	mm	mm	mm	mm	mm	Top	Bottom	String type (mm)	Near bit type (mm)	String type	Near bit type lower box connection
3 3/4"	95.3	79.4	31.8	660	254	30°	15°	1480	1370	NC23	2 3/8REG
4 1/2"	114.3	88.9	38.1	660	254	30°	15°	1500	1400	NC26	2 3/8REG
6"	152.4	120.7	50.8	762	305	30°	30°	1760	1600	NC38	3 1/2REG
7 1/2"	190.5	165.1	71.4	762	406	30°	30°	1860	1700	NC46	4 1/2REG
8"	203.2	171.5	71.4	762	406	30°	30°	1860	1700	NC50	4 1/2REG
8 1/2"	215.9	171.5	71.4	762	406	30°	30°	1880	1730	NC50	4 1/2REG
9 1/2"	241.3	171.5	71.4	762	406	30°	30°	1930	1780	NC50	4 1/2REG
12 1/4"	311	203.2	71.4	762	457	30°	30°	2030	1880	6 5/8REG	6 5/8REG
14 3/4"	374.7	203.2	71.4	762	457	30°	30°	2140	1990	6 5/8REG	6 5/8REG
16"	406.4	241.3	76.2	762	508	30°	30°	2180	2030	7 5/8REG	7 5/8REG
17 1/2"	444.5	241.3	76.2	762	508	30°	30°	2260	2110	7 5/8REG	7 5/8REG
20"	508	241.3	76.2	762	508	30°/45°	30°/45°	2200	2050	7 5/8REG	7 5/8REG
22"	558.8	241.3	76.2	762	508	30°/45°	30°/45°	2250	2100	7 5/8REG	7 5/8REG
24"	609.6	241.3	76.2	762	508	30°/45°	30°/45°	2310	2160	7 5/8REG	7 5/8REG
26"	660	241.3	76.2	762	508	30°/45°	30°/45°	2360	2210	7 5/8REG	7 5/8REG
28"	711	241.3	76.2	762	508	30°/45°	30°/45°	2410	2260	7 5/8REG	7 5/8REG
30"	762	241.3	76.2	762	508	30°/45°	30°/45°	2460	2310	7 5/8REG	7 5/8REG
32"	812.8	241.3	76.2	762	508	30°/45°	30°/45°	2510	2360	7 5/8REG	7 5/8REG
34"	863.6	241.3	76.2	762	508	30°/45°	30°/45°	2560	2410	7 5/8REG	7 5/8REG
36"	914	241.3	76.2	762	508	30°/45°	30°/45°	2610	2460	7 5/8REG	7 5/8REG

We offer a complete range of Hard facing to suit all drilling conditions. All Pascal Stabilizers can be banded with the following hard facings.

Crushed tungsten carbide held in a nickel bronze matrix. The 3mm grain size ensures greater concentration of carbide which is ideal for soft formation drilling.

Trapezoidal tungsten carbide inserts held in a sintered carbide nickel bronze matrix. This will give a greater depth of carbide coverage – ideal for high deviation drilling in abrasive formations.

Tungsten carbide inserts set in a powder spray deposit ideal for abrasive formations. 97% bonding guaranteed, certified by ultrasonic report. Recommended for non-magnetic stabilizers.

Tungsten carbide inserts (button type). The inserts have been developed to allow cold insertion and maintain close fit. A greater concentration of inserts on the bottom third of the blade and leading edge will increase surface contact to reduce wear in highly abrasive formations.

This oxy-acetylene process applies tough molten carbide particles of varying sizes held in a nickel chrome matrix which provides excellent bonding properties and greater surface wear characteristics are achieved. Surface hardness levels over 40 HRC. Ideal for GEO-THERMAL applications over 350°

This process is a highly automated way of applying hard face and utilizes a combined arc/plasma stream on the work piece surface. This results a low base metal dilution and a dense, uniform coating, the filling medium can be variety of hard facing consumables.

FIXED DIAMETER HOLE OPENER

Pascal Fixed Diameter Hole Openers are designed for use in soft clays and shales to medium-hard shales and limestones. It is particularly effective in sticky formations where balling problems are encountered. Three jets with replaceable nozzles continuously clean the tool's cutting structure, clearing debris buildup and increasing penetration.

Fixed Diameter Hole Openers are used in the following conditions:

1. When drilling of a big hole is not possible because of rig capacity.
2. When a satisfied penetration rate is not obtained when drilling a big hole, it is used after drilling is completed with a smaller bit.
3. When the hole direction must be controlled.

When ordering please specify:

- Hole size;
- Pilot hole size;
- Top and bottom connections;
- Fishing neck and bottom neck O.D and length;
- Type of cutters.

Type SM
Tooth Type For Soft
To Medium
Formations

Type MH
Tooth Type For Medium
To Hard Formations

Type XH Conical
Button Type For
Hard Formations

Fixed Diameter Hole
Opener

Specifications - Fixed Diameter Hole Opener

Model	Hole Open Diameter	Qty Of Cutters	Min.Pilot Hole	Fishing Neck Diameter	ID.	Top Connection (Pin)	Bottom Connection (Box)	Overall Length
KKQ209	8 1/4"	3	5 1/2"	6 1/2"	1 1/4"	NC46	3 1/2 REG	55"
KKQ216	8 1/2"	3	5 1/2"	6 1/2"	1 1/4"	NC46	3 1/2 REG	55"
KKQ311	12 1/4"	3	8 1/2"	8"	1 1/2"	6 5/8 REG	6 5/8 REG	55"
KKQ406	16"	3	10"	9 1/2"	2 1/4"	7 5/8 REG	6 5/8 REG	59"
KKQ444	17 1/2"	3	10 1/2"	9 1/2"	2 1/4"	7 5/8 REG	6 5/8 REG	59"
KKQ559	22"	3	12 3/4"	9 1/2"	2 1/4"	7 5/8 REG	6 5/8 REG	69"
KKQ584	23"	3	12 3/4"	10"	3"	7 5/8 REG	6 5/8 REG	69"
KKQ610	24"	3	14"	10"	3"	7 5/8 REG	7 5/8 REG	69"
KKQ660	26"	3	17 1/2"	10"	3"	7 5/8 REG	7 5/8 REG	69"
KKQ813	32"	3	17 1/2"	10"	3"	7 5/8 REG	7 5/8 REG	79"
KKQ4-914	36"	4	26"	10"	3 1/2"	7 5/8 REG	7 5/8 REG	87"

Roller Reamers are designed for reaming and stabilization in any type of formation. All parts of the tool are made of special alloy steel and heat treated for hardness. Drilling crews can easily replace any part in the field without using any special tools.

Pascal offers three types of cutters for different type of formation.

When ordering please specify:

- Hole size;
- String type or near bit type;
- Drill collar size;
- Top and bottom connection;
- Type of cutters.

Type B
Hard Formations

Type F
Medium to Hard Formations

Type T
Soft Formations

Roller Reamer

Specifications - Roller Reamer

Hole Size	O.D	I.D.	Fishing neck O.D	Overall length（mm）		Connection	
（in）	（mm）	（mm）	（mm）	String type	Near bit type	String type	Near bit type lower
5 7/8	149.2	25.4	120.7	1470	1370	NC38	3 1/2REG
6	152.4	25.4	120.7	1470	1370	NC38	3 1/2REG
6 1/8	155.6	25.4	120.7	1470	1370	NC38	3 1/2REG
8 3/8	212.7	44.5	165.1	1700	1600	NC50	4 1/2REG
8 1/2	215.9	44.5	165.1	1700	1600	NC50	4 1/2REG
12	304.8	71.4	8 1/4	1800	1700	6 5/8REG	6 5/8REG
12 1/8	308	71.4	8 1/4	1800	1700	6 5/8REG	6 5/8REG
12 1/4	311.2	71.4	8 1/4	1800	1700	6 5/8 REG	6 5/8 REG
16	406.4	76.2	241.3	2100	2000	7 5/8REG	7 5/8REG
17 1/2	444.5	76.2	241.3	2100	2000	7 5/8 REG	7 5/8 REG
20	508	76.2	241.3	2100	2000	7 5/8 REG	7 5/8 REG
22	558.8	76.2	241.3	2200	2100	7 5/8 REG	7 5/8 REG
24	609.6	76.2	241.3	2400	2300	7 5/8 REG	7 5/8 REG
26	660.4	76.2	241.3	2400	2300	7 5/8 REG	7 5/8 REG
28	711.2	76.2	241.3	2400	2300	7 5/8 REG	7 5/8 REG

During drilling, fishing, completion or wireline jobs, it is critical for the downhole tools to have a obstruction-free casing so as to increase efficiency. Casing Scraper removes rust, scale, cement, mud, bullets, paraffin, perforation burrs and other obstructions or foreign material from the inside walls of casing.

Maintaining a clean casing is important during drilling operation, fishing or wireline tools. Likewise, packers, patches, spears, and similar tools require clean surfaces to grip. Obstructions on casing walls frequently cause these tools to fail or become difficult to operate.

Our Casing Scraper removes deposits, burrs, and irregularities from casing that might cause trouble during the operation of packers or other close tolerance equipment.

Casing Scraper has two sets of blades. Each blade is constructed using high quality cast steel for excellent scraping characteristics and long-lasting durability. These scraper blades are designed to scrape over 360° of surface area. The scraper blades are designed with a long taper for passing through casing connections with minimal chance of hanging up.

Operation

The Casing Scraper is normally connected to the work string with a drill bit attached at the bottom. Simply run the scraper into the casing or tubing using rotation or spudding to clean the inside wall of the pipe.

When ordering please specify:

- Casing Scraper model;
- Connection, if non-standard;
- Casing size and weight.

Casing Scraper

Specifications - Casing Scraper

Model	Applicable casing size (lb/ft)	OD of body (mm)	Max. OD of cutter stretch out-Min. OD of cutter stretch out (mm)	ID (mm)	Connection
GX102	4 ″(9.26~13.2)	80	92~81.4	16	2 3/8REG
GX114	4 1/2″(9.5~15.1)	90.5	106~92	20	2 3/8REG
GX114A	4 1/2″(13.5-18.8)	89	102~89	20	2 3/8REG
GX127	5″(11.5~18)	100	118~102	20	2 3/8REG
GX127A	5″(11.5~24.1)	92	118~96.3	18	2 3/8REG
GX140	5 1/2″(14~23)	110	130~114	24	2 7/8REG
GX140A	5 1/2″(17~26.8)	106	127~107.7	24	2 7/8REG
GX146	5 3/4″(14-25.2)	110	138~118	24	2 7/8REG
GX168	6 5/8″(17-34)	130	158~137	24	3 1/2REG
GX178	7″(17~38)	136	168~146	30	3 1/2REG
GX178B	7″(13~40)	136	170.8~143.4	30	3 1/2REG
GX194A	7 5/8″(24~45.3)	136	182~159	30	3 1/2REG
GX219	8 5/8″(24~52)	175	208~183	30	4 1/2REG
GX245	9 5/8″(32.3~61.1)	200	232~207	57	4 1/2REG
GX273	10 3/4″32.75~71.1)	228	262~235	57	6 5/8REG
GX298	11 3/4″（38~87.2）	250	287~255	71	6 5/8REG
GX340	13 3/8″(48~88.2)	286	326~301	71	6 5/8REG
GX473	18 5/8″(73.09~122)	420	460~432	76	7 5/8REG
GX508	20″(84.75~133)	443	493~467	76	7 5/8REG

Rotary Subs are made from AISI 4145H modified quenched and tempered material. In addition, it is designed and manufactured according to API specifications as well as with API monogram. They can be used to crossover from connection size to another or as a disposable component used to extend the connection life of a more expensive drill stem member.

Lift Sub

A lift Sub enables safe and efficient handling of straight OD tubulars such as drill collars, shock tools, jars, directional equipment and other tools by using the drill pipe elevators.

Lift Sub

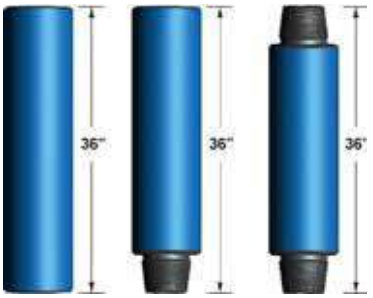
Saver Sub

When rods is added to increase the depth of drilling, the loosening of the threads are now performed at the bottom end of the Saver Sub as opposed to the bottom of the Kelly which is the most valuable part of the drill string. This means that the connection between the top end of the Saver sub and Kelly is seldom used, and suffers minimal wear and tear, whereas the lower connection is used in almost all cases displacing the most wear and tear from the rotary head connection to the much cheaper Saver Sub which is expendable and reduce cost.

Saver Sub

Straight OD Sub

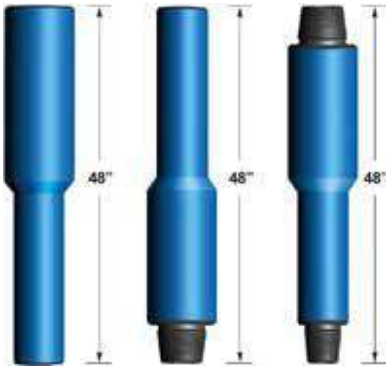
Straight OD Sub is used to connect drill stem members that have a similar outside diameter. The drill bit, downhole tools, heavy weight drill pipe and drill pipe can be crossed over using a straight OD sub.



Straight OD Subs

Reduced Section Sub

Reduced Section Sub is used to connect drill stem parts that have different diameters. This sub can be used to crossover large OD drilling tools or a tapered drill collar string.



Reduced Section Subs

The Circulating Sub is connected between wellhead pipe string and ground circulating system. When casing is running or completed, the circulating sub can be connected to provide fluid circulation.

According to the application, circulating sub is connected between Kelly and casing or between casing and a hose.

Construction

The circulating sub during running casing is equipped with casing pin thread on one end and DP thread, DP box thread or union thread on the other.

Circulating Sub With Drill Pipe Thread

Circulating Sub With Hammer Union Thread

Specifications - Circulating Sub With Drill Pipe Thread

Thread/ Model		I.D. (mm)	Length (mm)
Drill pipe box connection	Casing thread		
NC38	5 BTC	57	580
	5 LTC		
	5 STC		
NC38	5 1/2 BTC	57	580
	5 1/2 LTC		
	5 1/2 STC		
NC50	7 BTC	71	610
	7 LTC		
	7 STC		
NC50	9 5/8 BTC	71	610
	9 5/8 LTC		
	9 5/8 STC		
NC50	10 3/4 BTC	71	610
	10 3/4 STC		
NC50	13 3/8 BTC	71	650
	13 3/8 STC		

Specifications - Circulating Sub With Hammer union Thread

Thread/ Model		I.D. (mm)	Length (mm)
Drill pipe Box connection	Casing thread		
2″1502 Union	5 BTC	50.8	500
2″1502 Union	5 1/2 BTC	50.8	500
2″1502 Union	7 BTC	50.8	500
	7 LTC		
2″1502 Union	9 5/8 BTC		500
	9 5/8 LTC		
2″1502 Union	10 3/4 BTC	50.8	560
	10 3/4 STC		
2″1502 Union	13 3/8 BTC		610
	13 3/8 STC		

Drift is a simple and popular tool for drifting I.D. of casing, tubing, drill pipe and other pipes. It is used to check whether inside diameter of all kinds of pipes are complied with standard, and to determine the max. inside diameter to be drifted after deformation. The drift is thus granted as a necessary tool in workover operation.

Drift for casings is available in two types:

Sub Type Drift manufactured with threads on both top and bottom ends. The top end is connected with the drill string, while the bottom end is standby.

Bail Type Drift comprises of gauge plate and connecting rod.

Double Bail Drift for tubing or drill pipe is usually used on the ground. The shape of drift diameter gauge is a long cylindrical body with sucker rod thread on both ends. Drifting is done manually.

Bail Type Casing Drift | Double Bail Drift | Sub Type Drift

Casing Drift (Sub Type Drift)

Casing Size(in)	O.D. (mm)	Length (mm)	up connection	Bottom Connection
4 1/2	92~95	500	NC26	NC26
5	102~107	500	NC26	NC26
5 1/2	114~118	500	NC31	NC31
5 3/4	119~128	500	NC31	NC31
6 5/8	136~148	500	NC31	NC31
7	146~158	500	NC38	NC38

Tubing Drift (Double Bail Type Drift)

Tubing Size (in)	O.D. (mm)	Length (mm)
2 3/8	500	d-2.38
2 7/8	500	d-2.38
3 1/2	500	d-3.18
4	600	d-3.18

Casing Size(in)	Drill pipe specification(in)	Length (mm)	Minimum diameter(mm)
All sizes	≤ 3 1/2	500	d-3.18
	≥4	600	d-3.18

Drill Pipe Drift (Double Bail Type Drift)

Casing Drift (Bail Type Drift)

Size (in)	Length (mm)	Max.O.D. (mm)
4 1/2	152	d-3.18
5	152	d-3.18
5 1/2	152	d-3.18
6 5/8	152	d-3.18
7	152	d-3.18
7 5/8	152	d-3.18
8 5/8	152	d-3.18
9 5/8	305	d-3.97
10 3/4	305	d-3.97
11 3/4	305	d-3.97
13 3/8	305	d-3.97
16	305	d-4.76
18 5/8	305	d-4.76
20	305	d-4.76

Heavy Weight Drill Pipe Drift (Double Bail Type Drift)

Drill pipe specification(in)	Length (mm)	Minimum diameter	Length (mm)
All sizes	600	d-6.35	d-2.38

Drill Collar Drift (Double Bail Type Drift)

Drill pipe specification (in)	Length (mm)	Minimum diameter (mm)	Length (mm)
All sizes	600	d-3.18	d-2.38

Lifting caps are tools for lifting of drilling tools, such as drill collars or stabilizers

Specifications - Lifting Cap

Connection	O.D. (mm)	Length (mm)	Connection	O.D. (mm)	Length (mm)
7 5/8 REG Pin	220	290	7 5/8 REG Box	230	290
6 5/8 REG Pin	190	280	6 5/8 REG Box	200	280
4 1/2 REG Pin	140	260	4 1/2 REG Box	140	260
3 1/2 REG Pin	111	210	3 1/2 REG Box	111	250
2 3/8 REG Pin	80	190	2 3/8 REG Box	80	200
NC50 Pin	165	270	NC50 Box	165	260
NC46 Pin	150	270	NC46 Box	150	260
NC38 Pin	121	260	NC38 Box	121	260
NC31 Pin	105	220	NC31 Box	105	220
NC26 Pin	89	200	NC26 Box	89	200
2 7/8 EUE Pin	80	220	2 7/8 EUE Box	93	200

Pin Type Lifting Cap

Box Type Lifting Cap

Quick-Detachable Casing Protector

Quick-detachable casing protector is a manual device to protect external threads of casing.
This protector is designed with simple configuration for easy operation. It consists of solid and durable synthetic rubber and high-quality steel plate. Steel plate is fixed with bulge
wheel lock assembly. The bulge wheel assembly can be locked or opened with the pulling handle.

Quick-detachable casing protector is applicable for casing with BTC, LTC, STC, and VAM threads.

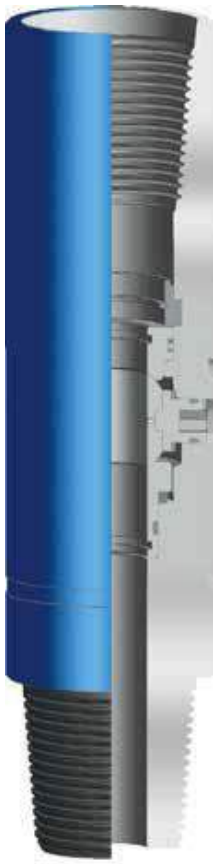
Specifications - Quick-Detachable Casing Protector

Model	Applicable Diameter of Tubulars(in)	Model	Applicable Diameter of Tubulars(in)
2 3/8	2 3/8 Tubing	7 5/8	7 5/8 Casing
2 7/8	2 7/8 Tubing	8 5/8	8 5/8 Casing
3 1/2	3 1/2 Tubing	9 5/8	9 5/8 Casing
4 1/2	4 1/2 Tubing	10 3/4	10 3/4 Casing
5	5 Tubing	13 3/8	13 3/8 Casing
5 1/2	5 1/2 Tubing	16	16 Casing
6 5/8	6 5/8 Tubing	18 5/8	18 5/8 Casing
7	7 Tubing	20	20 Casing

Quick-Detachable Casing Protector

Kelly valve is a manually operated ball type valve for the drill stem, divided into upper and lower sections. The upper Kelly valve is connected between lower end of swivel and upper end of Kelly. The lower Kelly valve is connected between upper end of drill pipe and lower end of Kelly or lower end of Kelly saver subs. The Kelly valve can be opened or closed off by simply turning a special operating wrench 90° according to indicated direction.

The sealing principle for Kelly valve is to ensure a close seat between the ball and the ball seat. The lower seat is supported by a spring. The force provided by the spring keep the ball securely in place with lower seat. During normal drilling operation, the hole is kept unblocked by turning the stem to “on” position; In case of kick or blowout, turn the operating stem to “off” position to close off the internal bore of drill string, the kick or blowout accident is avoided due to a high-pressure sealing situation between ball and the ball seat.



Kelly valve

When ordering please specify:

- Upper or Lower type;
- Tool OD;
- Working pressure: 5,000 / 10,000 / 15,000 psi;
- Tool connection.

Specifications - upper Kelly valve

Model	O.D. (mm)	Thread connection (LH)	I. D. (mm)	Max. Sealing Pressure (MPa)
CS 146K	146	4 1/2 REG	57.2	68.6
CS 197K	197	6 5/8 REG	76.2	68.6
CS 200K	200	6 5/8 REG	76.2	68.6

Specifications - Lower Kelly valve

Model	O.D. (mm)	Thread connection (LH)	I. D. (mm)	Max. Sealing Pressure (MPa)
XS105K	105	NC31	40	68.6
XS121K	121	NC38	44.5	68.6
XS127K	127	NC38	44.5	68.6
XS140K	139.7	NC40	57.2	68.6
XS159K	159	NC46	61	68.6
XS165K	165	NC46	61	68.6
XS168K	168	NC50	71.4	68.6
XS178K	178	NC50 , 5 1/2 FH	71.4	68.6

FULL OPENING SAFETY VALVE

Full Opening Safety valve (FOSV) is a ball type safety valve used to stop flow through the drill string when the drill string is being withdrawn from the well.

Pascal FOSV is a dual body full-opening safety valve, that does not interfere with the running of tools such as core barrels or survey instruments. It is designed to be stabbed into the top joint of drill pipe or tubing string at the rig floor and closed quickly in case a well kicks.

The ball-type design permits the valve to be compact, easy to handle, and have great strength. Standard test pressure is 10,000 psi, but higher-pressure ratings are available.

FOSV and operating wrench be should be maintained on the rig floor at all times.

When ordering please specify:

Connection.
O.D. and I.D.

Full Opening Safety valve

Specifications - Full Opening Safety valve

Model	XS105-T44	XS110-T51	XS124-T62	XS127-T62	XS133-T57	XS134-T62
O.D.	Φ105	Φ110	Φ124	Φ127	Φ133	Φ134
I.D.	Φ44	Φ51	Φ62	Φ62	Φ57	Φ62
Connection	NC26	NC31	2 7/8 EUE	2 7/8 EUE	XT39	NC38
Length	732	726	578	578	800	800

Specifications - Full Opening Safety valve

Model	XS146-T50.8	XS152-T76	XS152-T76	XS178-T76	XS178-T76.2	XS190-T82.6
O.D.	Φ146	Φ152	Φ152	Φ178	Φ178	Φ190
I.D.	Φ50.8	Φ76	Φ76	Φ76	Φ76.2	Φ82.6
Connection	NC31	3 1/2 NU	3 1/2 EUE	3 1/2 EUE	NC46	NC50
Length	832	640	617	675	885	895

Drop-In Check valves prevent return flow during a kick and are suitable for most drilling situations in which return flow through the drill string is a risk and normal operation requires the benefits of a full-bore sub. By preventing upward flow through the drill pipe and allowing fluid to be pumped downward to circulate the well, the valves provide the driller with the means to control the drill pipe pressures when required, significantly improving and simplifying well control.

When a blowout is about to happen, the thread connections of the kelly is screwed out immediately and a check valve is placed into the drill pipe and then pumped downward to the required place. Thus the blowout can be prevented.

When ordering please specify:

- Smallest bore in drill string through which the check valve must pass.
- Landing sub connection size and type.
- Outside diameter of mating tool joints.

Check valve　　Landing Sub

FT Type Drop-in Check valve

Specifications - Drop-In Check valve

Specification	Check valve Assembly O.D.(mm)	Landing Sub O.D.(mm)	Stop Ring I.D.(mm)	Working Pressure (MPa)	API Connection
FT89	34	89	31	35 （70）	NC26
FT105	34	105	31		NC31
FT121	50	121	46		NC38
FT159	54	159	50		NC46
FT168	68	168	64.5		NC50
FT178	68	178	64.5		5 1/2 FH
FT203	68	203	64.5		6 5/8 REG

Inside Blowout Preventor (IBOP) is a special tool, which can be stripped through the BOP preempt to be connected with the added drilling tools as soon as possible. When the blowout occurs during lifting operations, the IBOP have many advantages in situation such as, high pressure rating, reliable seal, easy application and operation.

When the drill tool is lifted out of the hole, blowout could happen due to suction. In event of a blowout, the open position of the IBOP valve allows back flow, easing the installation process. Upon successful installation, the valve can be promptly closed with a relief rod to prevent further back flow. Fluid can then be pumped in from the surface to discharge the IBOP and drill string. The purpose of the blowout prevention can be achieved by the following generic steps: discharging the relief sub; regulation of fluid; commence pump circulation.

When ordering please specify the connection of drill string.

Inside BOP

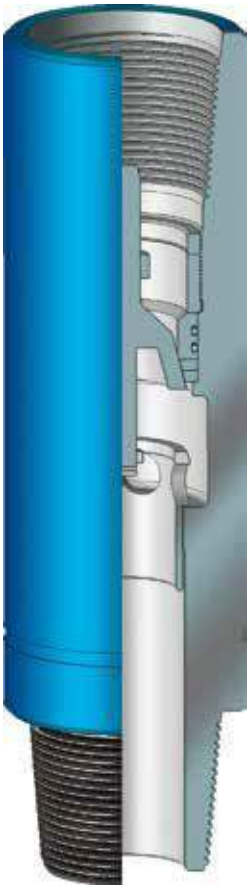
Specifications - Inside BOP

Thread connection	O.D. (in)	I.D. (in)	Length (in)	Working Pressure (MPa)
NC26	3 1/2	1 1/4	27~28	70 (35)
NC31	4 1/8	1 5/8	28~30	70 (35)
NC38	4 3/4	2	30~31	70 (35)
NC46	6 1/4	2 7/16	33~34	70 (35)
NC50	6 5/8	2 13/16	33~34	70 (35)
5 1/2 FH	7	3	35~38	70 (35)
6 5/8 REG	8	3	38	70 (35)
7 5/8 REG	9 1/2	3	38	70 (35)

ARROW TYPE BACK PRESSURE VALVE

Pascal Arrow Type Back Pressure valve is an important tool preventing of blowout.

The design of the Arrow Type Back Pressure valve allows for an on-site determination of back pressure to be set at surface.



FJ Type-Arrow Back Pressure valve

Features and Benefits:

- Metal to metal sealing;
- Simple design allows easy maintenance.

When ordering please specify:

- Size;
- Thread connection.

note: Arrow Type Back Pressure valves are not ideally suited for cementing or abrasive fluids.

Specifications - Arrow Type Back Pressure Valve

Model	O.D.(mm)	Connection	I.D.(mm)	Working Pressure(MPa)
FJ229	229	7 5/8 REG	82	70 (35)
FJ203	203	6 5/8 REG	82	70 (35)
FJ178	178	5 1/2 FH	82	70 (35)
FJ168	168	NC50	82	70 (35)
FJ165	165	NC50	82	70 (35)
FJ159	159	NC46	70	70 (35)
FJ121	121	NC38	56	70 (35)
FJ105	105	NC31	44	70 (35)
FJ89	89	NC26	33	70 (35)

Float valve Sub is an important tool in petroleum exploration and drilling engineering. The float valve sub is connected at upper part of drill bit. The float valve sub is near the bit connecting thread. The float valve sub can also be used at different necessary position of drill string when required. The main application is, when connected with single piece pipe, it prevents mud from coming in and up blocking the hole. When blowout takes place, blowout in drill string will be avoided because nozzle is closed automatically by valve cap of the float valve assembly.

When ordering please specify:

- Float valve type (Model F or Model G);
- Float valve size;
- Connection and O.D of sub.

Model F
Float valve

Model G
Float valve

Model F Float Sub

Model G Float Sub

Float valve Sub

Specifications - Float valve Sub

Model	Sub O.D. (mm)	Connection	valve O.D. (mm)	I.D. (mm)
FFJT241	Φ241.3	7 5/8 REG B×B	Φ121（5F6R）	Φ76.2
FFJT228	Φ228.6	7 5/8 REG B×B	Φ121（5F6R）	Φ76.2
FFJT209	Φ209.6	6 5/8 REG B×B	Φ121（5F6R）	Φ71.4
FFJT203	Φ203.2	6 5/8 REG B×B	Φ121（5F6R）	Φ71.4
FFJT178	Φ177.8	4 1/2 REG B×NC50 B	Φ88（4R）	Φ71.4
FFJT165	Φ165.1	4 1/2 REG B×NC50 B	Φ88（4R）	Φ71.4
FFJT159	Φ158.8	4 1/2 REG B×NC46 B	Φ88（4R）	Φ71.4
FFJT127	Φ127	3 1/2 REG B×NC38 B	Φ61（2F3R）	Φ50.8
FFJT105	Φ104.8	2 7/8 REG B×NC31 B	Φ48（1F2R）	Φ38.1

Cup tester is designed to be attached to the drill string and lowered into the casing beneath the wellhead to test the pressure of the blowout preventer stack and the wellhead. When the cup tester is lowered into the casing beneath the wellhead, pressure is applied to either a test pump or hoisting type cup after filling the hookup with water. This method is fast and accurate.

The Cup Tester assemblies are rated to the API standard mill test pressure for casing sizes up to 10,000 psi. We offer special reinforcing on all cup sizes and casing weight ranges to hold up to 15,000 psi.

When ordering please specify:

- Casing size & weight;
- Connection.

Cup Tester

Specifications - Cup Tester

Model	Connection	Applicable casing dimensions				Rubber cup O.D. (mm)	Bearing area of plug O.D. (mm)	Max.bearing pressure (Mpa)	Length (mm)
		O.D. (in)	I.D.						
			(mm)	Wall thickness	ppf				
TSQ127	NC26	5	114.1-112.0	6.43-7.52	13.0-15.0	A 117	71	70	640
			108.6-104.8	9.19-11.1	18.0-21.4	B 112	62		
TSQ140	NC31	5 1/2	125.7-124.3	6.98-7.72	15.5-17.0	A 129	82	70	700
			121.4-118.6	9.17-10.54	20.0-23.0	B 125	74		
TSQ178	NC38	7	164.0-159.4	6.91-9.19	20.0-26.0	A 167	148	70	700
			157.1-152.5	10.36-12.65	29.0-35.0	B 160	130		
TSQ245	NC50	9 5/8	226.6-224.4	8.94-10.03	36.0-40.0	A 230	302	35	840
			222.4-216.8	11.05-13.84	43.5-53.5	B 226	287		
TSQ273	NC50	10 3/4	255.3-250.1	8.89-11.43	40.5-51.0	A 259	413	35	840
			247.9-242.8	12.57-15.11	55.5-65.7	B 251	381		
TSQ339	NC50	13 3/8	320.4-317.9	9.65-10.92	54.0-61.0	A 325	628	35	840
			315.3-313.6	12.19-13.06	68.0-72.0	B 320	602		
TSQ508	NC50	20	485.7-482.6	11.13-12.70	94-106.5	A 490	1570	35	1010
			475.7	16.13	133	B 480	1494		

Pascal Series 150 Releasing and Circulating Overshot is an external fishing tool for engage, pack off and retrieve tubular fish, especially for fishing drill collar and drill pipe. The grapple of the overshot can be designed for different sizes of fish, so one overshot can be dressed with different size of grapple components for fishing different sizes of fish.

Construction

Pascal Series 150 Overshot consists of three outside parts: Top Sub, Bowl, and Standard Guide. The Basic Overshot may be dressed with either of two sets of internal parts, if the fish diameter is near the maximum catch of the Overshot, a Spiral Grapple, Spiral Grapple Control, and Type “A” Packer are used. If the fish diameter is considerably below maximum catch size (½” or more) a Basket Grapple and a Mill Control Packer are used.

When ordering please specify:

- The model of the overshot
- The hole, casing size or O.D. of overshot
- Top connection
- O.D of the fish

FS = Full Strength
SH = Slim Hole


Basket grapple


Basket grapple mill control packer


Inner seal


Outer seal


Series 150 Overshot with Basket Grapple


A Packer


Spiral grapple


Spiral grapple control


Series 150 Overshot with Spiral Grapple

Series 150 Overshot (L01)

Specifications - Series 150 Overshot

Model	O.D (mm)	Max.Catch Size(mm)		API Connection	Model	Product Code	O.D. (mm)	Max.Catch Size (mm)		API Connection
		Spiral Grapple	Basket Grapple					Spiral Grapple	Basket Grapple	
LT-T89F.S.	89	60.3	48.3	NC26	LT-T200F.S.	L01-2500	200	159	141	NC50
LT-T98S.H.	98	79.4	66.7	NC26	LT-T200S.H.	L01-5500	200	171.5	155.6	NC50
LT-T102F.S.	102	73	60.3	NC26	LT-T206S.H.	L01-2700	206	178	163	NC50
LT-T114S.H.	114	89	73	NC31	LT-T206F.S.	L01-2600	206	165	149	NC50
LT-T119S.F.S.	119	95.3	82.6	NC31	LT-T210F.S.	L01-5100	210	168	149	NC50
LT-T121S.H.	121	98.4	85.7	NC31	LT-T232S.H.	L01-3000	232	203	187	NC50
LT-T138F.S.	138	105	89	NC38	LT-T245F.S.	L01-3100	245	203	184	6 5/8REG
LT-T143S.H.	143	121	108	NC38	LT-T257F.S.	L01-5200	257	216	197	6 5/8REG
LT-T146F.S.	146	121	108	NC38	LT-T270F.S.	L01-3300	270	228.6	209.6	6 5/8REG
LT-T149S.H.	149	127	114	NC38	LT-T286F.S.	L01-3500	286	244.5	225.4	6 5/8REG
LT-T168S.H.	168	139.7	120.6	NC50	LT-T298F.S.	L01-3600	298	257	238.1	6 5/8REG
LT-T181F.S.	181	146	127	NC50	LT-T324	L01-4300	324	286	267	6 5/8REG
LT-T194S.F.S	194	159	141	NC50	LT-T350	L01-4400	350	305	286	6 5/8REG

Pascal Series 150 Releasing and Circulating Overshot can be equipped with a wide range of accessories to meet a variety of complex fishing environmental.

Extension Sub

An extension sub is assembled between the top sub and the bowl. It is used when the upper portion of the fish is damaged or cannot be engaged. This accessory will permit the overshot to be lowered far enough over the fish to ensure secure engagement and pack off. They are available in lengths from 24 to 60 inches. When ordering, specify overshot O.D. Unless otherwise specified. Extension Subs will be furnished in a standard 36-inch length.

Extension Sub

Wall Hook Guide

Wall Hook Guide

If the fish is positioned in a washed out section of the hole, it may be difficult to engage the top of the fish using a conventional overshot guide. A wall hook guide can be used to capture the neck of the fish, centralize it, and then properly guide the fish into the bowl.

Oversize Guide

Oversized Guide properly guides the fish into the overshot when the hole size is considerably larger than the diameter of the fish and the overshot may pass alongside the fish without engaging it. Installation of an oversized guide instead of a standard guide will ensure alignment of the fish with the overshot.

Oversize Guide

Mill Extension

Overshot Mill Extension interiors are faced with incoloy to a size that will mill away a flared or jagged fish to enable it to pass up into and be engaged by the Grapple in the Bowl. Mill Extensions are installed between the Bowl and the standard, oversize or wall hook guides.

Mill Guide

Overshot Mill Guides are designed to remove badly flared or jagged metal from the top of the fish. Mill Guides are used in place of the Standard or Oversized Guide to trim the fish so it can enter the overshot.

Mill Guide

Mill Extension

SERIES 70 SHORT CATCH OVERSHOT

The Pascal Series 70 Short Catch Overshot is an external fishing tool designed to retrieve tubular fish when the top of the fish is too short to be engaged with other overshot. The Grapple Control is positioned above the Basket Grapple rather than below it to allow the Basket Grapple to occupy the lowest position in the Bowl. This enables the overshot to firmly engage and retrieve a very short fish

Construction

The Pascal Series 70 Short Catch Overshot assembly consists of a Top Sub, Bowl, Basket Grapple Control, and a Basket Grapple. Although the Series 70 Overshot has no Guide, the components function in the same manner as the standard Series 150 Releasing and Circulating Overshot.

Catching the Fish

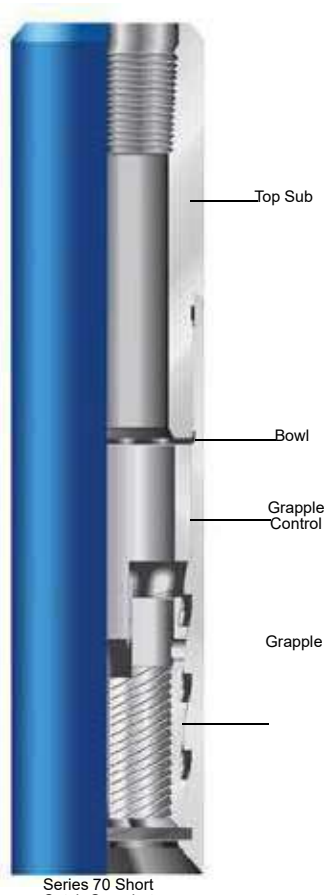
Attach the Overshot to the bottom end of the fishing string and run it into the hole. Series 70 Overshot assembly is rotated to the right and lowered as the fish enters the expandable grapple. With the fish in the grapple, stop right-hand rotation and exert an upward pull to fully capture the fish.

Releasing the Fish

A sharp downward force (bump) is applied to the Overshot to break the hold of the grapple within the bowl. The Overshot is then rotated to the right while it is slowly elevated to release the grapple from the fish.

When ordering please specify:

The model of the overshot.
The hole, casing size or O.D. of overshot
Top connection
O.D of the fish
note: We can design Overshot according to customers' request



Series 70 Short Catch Overshot

Specifications - Series 70 Short Catch Overshot

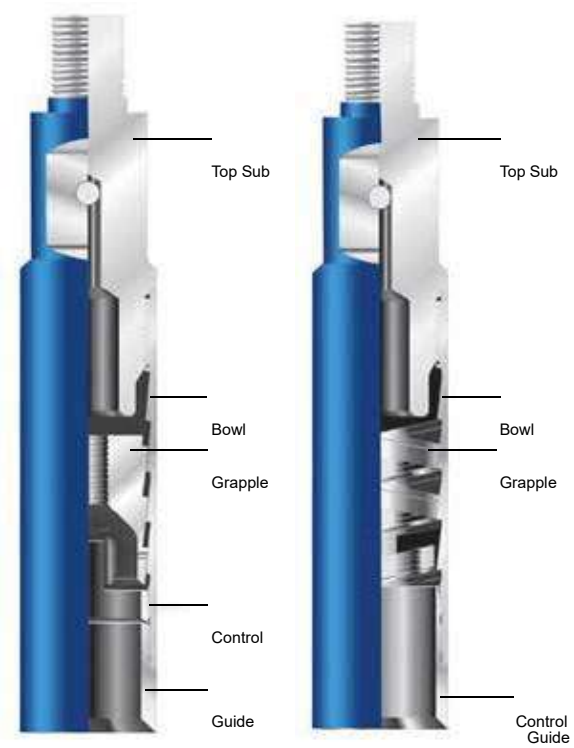
Model	O.D. (mm)	Max. Fishing Size (mm)	Connection Box	Type
DYLT-T59	59	41.3	7/8Rod	S.H.
DYLT-T81	81	60.3	2 3/8NU	
DYLT-T92	92	63.5	NC26	S.H.
DYLT-T95	95	66.6	NC26	S.H.
DYLT-T100	100	77.7	NC26	S.H.
DYLT-T105	105	77.7	NC26	S.H.
DYLT-T111	111	85.7	NC31	S.H.
DYLT-T114	114	82	NC31	
DYLT-T117	117	77.7	NC31	F.S.
DYLT-T119A	119	92.8	NC31	S.H.
DYLT-T121	121	95.2	NC38	S.H.
DYLT-T133	133	104.8	NC38	F.S.
DYLT-T140	140	95.2	NC38	F.S.
DYLT-T143	143	92.8	NC38	F.S.
DYLT-T146	146	108	NC38	F.S.
DYLT-T150	150	120.6	NC38	S.H.
DYLT-T159	159	133.3	NC38	S.H.
DYLT-T161	161	133.3	NC38	
DYLT-T168	168	120.7	NC38	F.S.
DYLT-T194	194	152.4	NC50	F.S.
DYLT-T200	200	158.7	NC50	F.S.
DYLT-T203	203	162	NC50	F.S.
DYLT-T206	206	162	NC50	
DYLT-T210	210	165.1	NC50	F.S.
DYLT-T210A	210	159	NC50	
DYLT-T213	213	177.8	NC50	S.H.
DYLT-T216	216	177.8	NC50	F.S.
DYLT-T235	235	196.8	6 5/8REG	F.S.
DYLT-T247	247	203.2	6 5/8REG	F.S.
DYLT-T254	254	209.6	6 5/8REG	F.S.
DYLT-T286	286	228.6	6 5/8REG	F.S.

Pascal Series 10 Sucker Rod Overshot is a professional fishing tool, designed for engaging and retrieving sucker rods, couplings, and other tubular from inside tubing strings.

Pascal Series 10 Sucker Rod Overshot consists of a Top Sub, Bowl, Grapple, and a Guide. According to the size of the fish, there are two types of grapples available: Basket Grapple or Spiral Grapple. Pascal Series 10 is a simply tool to use, no matter engaging or releasing operation, in fact just need to rotate the fishing string on right hand.

Engaging a Fish
When overshot nears the top of the fish, slowly rotate to the right as the overshot is lowered over the fish. After the fish is engaged, allow right-hand torque to release from the fishing string. Then raise the fish by pulling upward on the fishing string.

Releasing a Fish
Bump down or drop the weight of the fishing string against the Overshot to break the hold of the grapple within the bowl. Elevate the fishing string while slowly rotating it to the right until the Overshot has cleared the fish.



Series 10 Overshot with Basket Grapple

Series 10 Overshot with Spiral Grapple

Series 10 Overshot

Specifications - SERIES 10 OVERSHOT

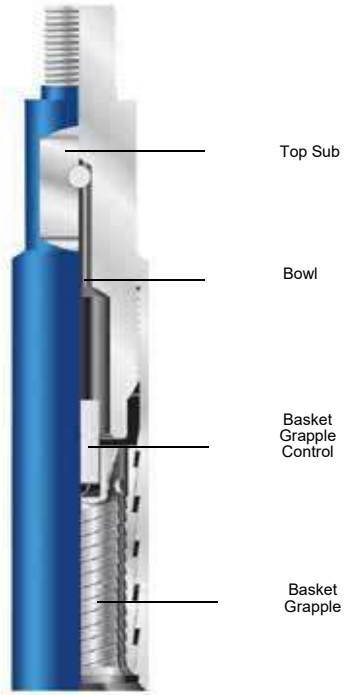
Max.Catch Size(Spiral Grapple) （mm）	27	38.1	41.3	44.5	49.2	46	50.8	60.3
Max.Catch Size(Basket Grapple) （mm）	22.2	33.3	36.5	39.7	44.5	41.3	46	55.6
O.D （mm)	39.7	45.2	48.4	52.4	57	58.7	58.7	72.2
Type	S.H.	S.H.	S.H.	S.H.	S.H.	F.S.	S.H.	S.H.
Connection	3/4Rod	3/4Rod	3/4Rod	3/4Rod	7/8Rod	7/8Rod	7/8Rod	1Rod

SERIES 20 OVERSHOT

Pascal Series 20 Short Catch Sucker Rod Over shorts are designed for conditions when sucker rods, couplings, and other portions of a fish are too short for retrieval with a standard overshot.

The Pascal Series 20 Short Catch Sucker Rod Overshot consists of a Top Sub, Bowl, Basket Grapple Control, and a Basket Grapple. The Grapple Control is located at the top end of the tool between the Top Sub and the Basket Grapple. The position of the Grapple Control above the Basket Grapple rather than below it allows the Basket Grapple to occupy the lowest position in the bowl.

This permits the exposed part of the fish to enter the Basket Grapple where it can be firmly and securely grasped. Operation of the Pascal Series 20 Short Catch Sucker Rod Overshot is the same as the Pascal Series 10 Sucker Rod Overshot.



Series 20 Short Catch Overshot

Specifications - SERIES 20 OVERSHOT

Model	O.D.（mm）	Max. Fishing Size（mm）	Connection（PIN）	Type
DYLT-TC32	32	22.2	5/8Rod	
DYLT-TC35	35	25.4	5/8Rod	
DYLT-TC38	38	28.6	3/4Rod	
DYLT-TC41	41.3	31.8	3/4Rod	
DYLT-TC45	45	34.9	3/4Rod	
DYLT-TC47	47	34.9	3/4Rod	
DYLT-TC47A	47	37.3	3/4Rod	
DYLT-TC49A	49	38.1	3/4Rod	S.H.
DYLT-TC49	49.2	34.9	3/4Rod	
DYLT-TC57	57.2	44.5	7/8Rod	
DYLT-TC59	59	41.3	7/8Rod	
DYLT-TC59A	59	46	7/8Rod	S.H.
DYLT-TC71	71	54	7/8Rod	
DYLT-TC72	72	55.6	1Rod	
DYLT-TC73A	73	54	1Rod	
DYLT-TC73	73	58.7	1Rod	S.H.
DYLT-TC80	80	60.3	2 3/8NU	
DYLT-TC83	83	63.5	2 3/8NU	
DYLT-TC86	86	66.7	2 3/8NU	

RELEASING AND REVERSING OVERSHOT

Type DLT-T Releasable Reversing Overshot, a new type of fishing tool, has many advantages owned by various overshot, box tap and the like. Its distinguishing features are as follows: to unscrew and recover the stuck fish; To release the fish down hole if necessary; to circulate the washing fluid as one of the accessories for reversing tools. It is widely used in well servicing.

Releasing and Reversing Overshot

Structure and Application

Consisting of top sub, spring, bowl, retaining seat, slip, control key, seal ring, seal seat, guide and so on. The upper end of top sub is connected with other tools and drill tool. The lower end of top sub is connected with bowl equipped with spring in the interior. There are three control keys uniformly distributed in the inner wall of the upper end of bowl. the control keys are used to control the position of retaining seat. Three keys are inserted separately in three grooves in the tapered interior section of lower end in bowl where three keys are used to transmit torque. The tapered interior section produces a pinch force against the slip to trigger the fishing operation. The inclined angle among three control keys play an important role in retaining conformance of the slip with the bowl to ensure that the tools can be released easily from the fish.

The retaining seat is installed at the upper end of the external bowl where the three keys are placed. The retaining seat not only can slide axially, but also rotates round the axial line moving with the slip which is installed in the internal circular recess.

Specifications - Table 1 Releasing and Reversing Overshot Connection LH

Model	O.D. (mm)	Max. Fishing Size (mm)	Allowed Pull (KN)	Releasing Pull & Allowed Torque		Connection (Box LH)
				Pull (KN)	Torque (N.m)	
DLT-T95×48	95	48.3	250	120	3100	2 7/8 REG
DLT-T105×60	105	63.5	350	150	5750	NC31
DLT-T114×73	114	78.6	420	180	7750	NC31
DLT-T134×89	134	93.2	500	180	10250	NC38
DLT-T145×102	145	101.6	700	200	11050	NC38
DLT-T160×114	160	114.3	900	200	12150	NC38
DLT-T185×127	185	127	1200	240	13500	NC50
DLT-T200×140	200	139.7	1500	240	15300	NC50

Specifications - Table 2 Releasing and Reversing Overshot connection RH

Model	O.D. (mm)	Max. Fishing Size (mm)	Allowed Pull (KN)	Releasing Pull & Allowed Torque		Connection (Box LH)
				Pull (KN)	Torque (N.m)	
DLT-T105×60F	105	63.5	350	150	5750	NC31
DLT-T114×73F	114	78.6	420	180	7750	NC31
DLT-T134×89F	134	93.2	500	180	10250	NC38
DLT-T160×114F	160	114.3	900	200	12150	NC38

LIFTING-LOWERING AND RELEASING OVERSHOT

Lifting-Lower and releasing overshot is a fish tool in the casing which fishes fractured tubing and drill string. If fish drill string is stuck heavily and hard to complete fishing work, while need to release fish, may get back the tool by bumping drill string down and lift directly.
The product is excellent for fishing operations as it does not require rotation. Fishes can be caught or released through simple lifting or lowering of the tool.

Lifting-Lowering and Releasing Overshot

Structure

Lifting-Lower and Releasing Overshot is composes of top sub, bowl, guide pin, guide sleeve, joint sleeve, plug, roller pin, slip, guide, as shown in the figure. The box thread of top sub is connected with drill stem and the pin thread is connected with the bowl; The bottom of bowl is connected to the guide. An inner cone in the bowl matches the slip. Box thread of guide sleeve is connected with joint sleeve, track trenches are milled on another outer surface: three long trenches and three short trenches act as guiding and reversing. When guide pin locates in long trench is in the condition of fish. When guide pin locates in short trench is in the condition of release. Joint sleeve is two petals formation. It makes slip and guide sleeve connection and by roller pin act as bearing. The inner surface of slip has fish thread, guide is on the bottom and can make fish introduce into slip successfully.

Working Principle

The tool complete fishing and releasing fish through long, short track trenches. When the tool reaches the top of fish, it is lowered and is in contact with the fish. Through lifting and lowering, guide pin is in the position of long or short trench, slip is in the situation of fishing or releasing, in the condition of non-rotating complete fishing and releasing fish.

Specifications - Lifting-Lowering and Releasing Overshot

Model	O. D.(mm)	Connection	Catch Size (in)
TFLT48	95	NC26	1.9
TFLT60	105	NC31	2 3/8
TFLT73	115	NC31	2 7/8
TFLT89	134	NC38	3 1/2
TFLT114	150	NC38	4 1/2

Pascal Releasing Spear provide a more effective means to engage and retrieve an internal fish from the well. It is ruggedly built to withstand severe jarring and pulling strains. It engages the fish over a large area without damaging of the fish. The simple design prevents small parts being lost or damaged in the hole during operation. It may be used with other equipment such as pack-off assemblies and internal cutters. If the fish cannot be pulled, the spear can be easily be released and disengaged.

Spear Assembly
with Shoulder Type Mandrel

Construction

The Releasing Spear consists of a mandrel, grapple, releasing ring, and a bull nose nut. The mandrel is made of specially heat-treated high strength alloy steel; and may be ordered either as a flush type to enter completely into a fish or as a shoulder type to provide a positive landing position on top of the fish. Size and type of the upper box connection can be customized provide according to customer's exact specification.

When ordering please specify:

- The model of the releasing spear.
- Top connection
- The exact size and weight of the fish
- Flush or shoulder type mandrel

Specifications-Releasing Spear LM-T

Model	Nut O.D. (mm)	Catch size (in)	I.D (mm)
LM-T48	35	1.9	8
LM-T60	45	2 3/8	8
LM-T73	54	2 7/8	10
LM-T89	66	3 1/2	10
LM-T102	76	4	16
LM-T114	88	4 1/2	16
LM-T127	98	5	25
LM-T140	108	5 1/2	30
LM-T168	130	6 5/8	30
LM-T178	145	7	50
LM-T219	174	8 5/8	71
LM-T245	174	9 5/8	71
LM-T273	210	10 3/4	71
LM-T273-1	222	10 3/4	71
LM-T340	210	13 3/8	71
LM-T340-1	222	13 3/8	71

Spear Assembly
with Flush Type Mandrel

Specifications-Releasing Spear LM-B

Model	Nut O.D. (mm)	Catch size (in)	I.D(mm)
LM-T48-B	35	1.9	8
LM-T60-B	47	2 3/8	10
LM-T73-B	58	2 7/8	10
LM-T89-B	71	3 1/2	12
LM-T102-B	82	4	16
LM-T114-B	92	4 1/2	19
LM-T127-B	98	5	22
LM-T140-B	108	5 1/2	25
LM-T168-B	130	6 5/8	25
LM-T178-B	145	7	50
LM-T219-B	174	8 5/8	71
LM-T245-B	174	9 5/8	71
LM-T273-B	210	10 3/4	71
LM-T273-B1	222	10 3/4	71
LM-T340-B	210	13 3/8	71

Segment-Type Spear Grapple

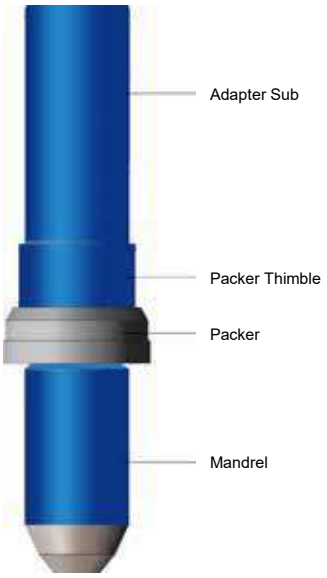
The Segment-Type Spear Grapple enhances the spear's effectiveness by providing an extended catching range beyond the maximum range of the standard one-piece grapple. Pascal Segment-Type Spear Grapple is used in place of the standard one-piece Grapple on the 9 5/8" Spears. This enhances the spear's capability of engaging up to 20".

Segment-Type Spear Grapple consists of a grapple body, eight grapple segments, two retainer rings, six retainer ring screws, six retainer ring spacers, and sixteen grapple segment screws.

Segment-Type
Spear Grapple

Pack-off Assembly

Pack-off Assembly is available for all Pascal Spear Assemblies and is designed to efficiently pack-off all sizes of tubing and casing. Circulation through the fish is enabled by attaching the Spear Pack-off Assembly to the bottom of the spear with a sub type nut.



Spear Pack-off Assembly

Spear Stop Sub

The Pascal Releasing Spear Stop Sub Assembly is an accessory designed to convert a releasing spear with a flush-type mandrel into a shouldered type spear. It is installed in the box connection at the top of the mandrel when the use of a positive stop is desired or required. A stop ring can be added to increase shoulder diameter. All stop rings are furnished with left-hand threads.

Optional Nuts

Mill Type to mill away burrs, Sub Type to connect and run other tools below the Spear, and Sidehill Type to center the spear in greatly oversize holes to assure entry of the Spear into the fish.

Stop Sub

Sub Type nut

Mill Type nut

Sidehill Type nut

Stop Ring

In drilling and workover operation, the reversing spear is a tool mainly used for fishing of drill pipe, oil pipe and casing from fish hole. It can be used with internal cutter, bumper jar, etc.

Specifications - Reversing Spear

Model	O.D (mm)	Thread Conn (RH)	I.D (mm)	Min. Fishing size (mm)	Lead-in Diameter of Spear Rod(mm)
DLM-T48	86	NC26	7	39.7	37
DLM-T60	105	NC31	8	49.7	46.5
DLM-T73	105	NC31	8	62	56
DLM-T89	105	NC31	16	75	71
DLM-T102	121	NC38	16	88.2	83
DLM-T114	121	NC38	16	99.8	93
DLM-T127	127	NC38	20	107	98
DLM-T140	140	NC38	25	118	107
DLM-T178	178	NC50	30	150.4	142
DLM-T245	245	6 5/8REG	70	213.5	205
DLM-T273	273	6 5/8REG	70	232.6	215
DLM-T340	340	6 5/8REG	76	313.6	253

Reversing Spear

The reversing subs is also called reversing spear which is a special tool for reversing stuck drill stem above stuck point in drilling and workover operation. In treatment of stuck drill stem, it can work as a fishing pin tap in reversing operation. When fish is stuck or cannot be reversed in fishing or reversing operation, the fish can be reversed from reversing sub and the fishing drill tool is tripped out.

Reversing Sub (L08）

Specifications - Reversing Sub

Table 1. DKJ Reversing Sub (thread connection LH, catch thread RH)

Model	O.D (mm)	I.D. (mm)	Thread Conn (LH)	Fishing Thread (RH)
DKJ105	105	14	NC31	NC31
DKJ105	105	18	NC31	2 7/8 NU
DKJ121	121	20	NC38	NC38
DKJ140	140	20	NC40	NC40
DKJ159	159	28	NC46	NC46
DKJ165	165	28	NC50	NC46
DKJ165	165	28	NC50	NC50
DKJ165	165	32	NC50	5 1/2 FH
DKJ178	178	32	5 1/2 FH	5 1/2 FH
DKJ190	190	32	NC50	6 5/8 REG
DKJ203	203	32	NC50	NC61
DKJ203	203	32	NC50	6 5/8 FH
DKJ203	203	32	NC50	7 5/8 REG

Specifications - Reversing Sub

Table 2. DKJ Reversing Sub (thread connection RH, catch thread LH)

Model	O.D (mm)	I.D. (mm)	Thread Conn (RH)	Fishing Thread (LH)
DKJ105A	105	14	NC31	NC31
DKJ121A	121	20	NC38	NC38
DKJ146A	146	25	4 1/2 FH	4 1/2 FH
DKJ168A	168	28	NC50	NC50
DKJ168A	168	28	NC50	NC46
DKJ178A	178	32	5 1/2 FH	5 1/2 FH
DKJ178A	178	32	NC50	NC56

Specifications - Reversing Sub

Table 3. DKJ Reversing Sub (thread connection RH, catch thread RH)

Model	O.D (mm)	I.D. (mm)	Thread Conn (RH)	Fishing Thread (RH)
DKJ93B	93	18	2 7/8 EU	2 7/8 EU
DKJ105B	105	14	NC31	NC31
DKJ114B	114	28	3 1/2 EU	3 1/2 EU
DKJ121B	121	18	NC38	NC38
DKJ140B	140	20	NC40	NC40
DKJ165B	165	28	NC50	NC46
DKJ165B	165	28	NC50	NC50
DKJ178B	178	32	5 1/2 FH	5 1/2 FH
DKJ178B	178	32	NC50	NC56
DKJ210B	210	32	6 5/8 FH	6 5/8 FH

The Cable Fishing Hook is generally used to catch electric pump cables or wirelines and broken pieces of the bent sucker rods in casing.

Cable Fishhook

Specifications - Cable Fishhook

Outside size (mm)	Connection	Catch	For Casing size (in)
Φ120 x 1800	NC31	Electric cables	5 1/2 Casing
Φ140 x 1800	NC31	Electric cables	6 5/8 Casing
Φ150 x 1800	NC38	Electric cables	7 Casing

SLIDING BLOCK SPEAR

The Sliding Block Spear is an internal fishing tool used for fishing fallen objects that are generally used in oil perforation process, such as drill pipe, tubing, wash pipe, liner, packer, water distributor, etc. It can also be used for the reversing of stuck fallen objects and it can be used in conjunction with other tools such as jar and back-off tool.

Sliding Block Spear

Specifications - Sliding Block Spear

Model	O.D. (mm)	Connection (Box)	I.D. (mm)	Dia. of spear rod (mm)	I.D. of fish (mm)	O.D. of fish (in)	Length (mm)
HLM-SS60	121	NC38	12(Side bore)	46	49.66	2 3/8	1200
	79	2 3/8 REG	12(Side bore)	47	50.7		1000
HLM-SS73	105	NC31	12(Side bore)	51	54.6	2 7/8	1200
	79	2 3/8 REG	12(Side bore)	55	62		1200
	121	NC38	12(Side bore)	57	62		1200
HLM-SS89	121	NC38	15(Side bore)	65	70.2	3 1/2	1200
	121	NC38	15(Side bore)	70	76.2		1200
HLM-SS114	122	NC31	18(Side bore)	86	90-95	4 1/2	1200
	168	NC50	18(Side bore)	88	92.5-97.2		1200
	122	NC31	18(Side bore)	91	97.2-103.9		1200
HLM-SS127	168	NC50	18	97	101.6-116	5	1200
HLM-SS140	141	NC31	18	108	114.3-121.4	5 1/2	1200
	168	NC38	20	112	118.6-124.3		1265

The Taper Tap is a special internal catch fishing tool that engages with dropped tubular objects such as drill pipes and tubes by tapping threads on the object surfaces. It is a highly effective tool in the fishing of dropped tubular objects with couplings especially when the tapered threads engaged with the fish couplings. The taper tap can be used for different fishing operations when equipped with left hand threaded or right-hand threaded drill pipes and tools. The taper tap is made from high strength alloy steel, heat treated for maximum strength and ruggedness. The cutting threads are hardened (wicked) with cutting grooves to ensure proper tapping of threads on the fishes.

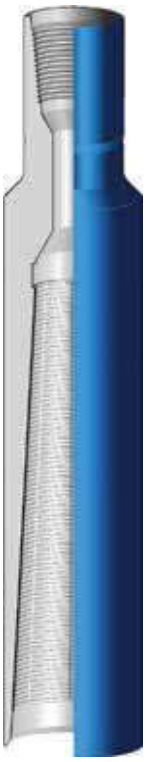
Specifications - Taper Tap

Model	Large wicker O.D. (mm)	Small wicker O.D. (mm)	ID (mm)	O.D.(mm)	Catch Size(in)
GZ47×28-NC26	47	28	10	86	1.9 Tubing
GZ60×38-NC26	60	38	12	86	2 3/8 Tubing
GZ70×45-NC26	70	45	16	86	2 7/8 Tubing
GZ86×56-NC31	86	56	20	105	3 1/2 Tubing
GZ98×65-NC38	98	65	25	121	4 Tubing
GZ110×77-NC50	110	77	25	168	4 1/2 Tubing
GZ62×40-NC26	62	40	16	86	2 3/8 Drill pipe
GZ85×60-NC31	85	60	25	105	3 1/2 Drill pipe
GZ109×79-NC50	109	79	25	168	4 1/2 Drill pipe
GZ130×95-NC50	130	95	38	168	5 1/2 Drill pipe
GZ160×145- NC50	160	145	51	168	6 5/8 Drill pipe
GZ122×92-NC50	122	92	38	168	5 Casing
GZ135×109-NC50	135	109	51	168	5 1/2 Casing
GZ162×137- NC50	162	137	51	168	6 5/8 Casing
GZ172×147-6 5/8REG	172	147	51	203	7 Casing
GZ187×161-6 5/8REG	187	161	51	203	7 3/4 Casing
GZ215×185-7 5/8REG	215	185	51	241	8 5/8 Casing
GZ237×211-7 5/8REG	237	211	51	241	9 5/8 Casing
GZ85×52-NC31	85	52	20	105	Φ76.2-Φ57.2(mm)

Taper Tap

The die collar, also known as skirted taper tap, is a special external fishing tool that engages with the dropped tubular objects such as drill pipes and oil tubing, by tapping on the external wall of the objects. It can be used in fishing cylindrical objects without inner bore or stuck inner bore.

The die collar is a long cylindrical integral structure composed of a Sub, a Tap body with cutter threads in the cone shaped interior. The die collar is made of high strength alloy with cutting grooves in the fishing threads.



Die Collar

Specifications - Die Collar

Model	Large wicker O.D. (mm)	Small wicker O.D. (mm)	OD(mm)	Catch size(mm)
MZ55×40-NC26	55	40	86	48
MZ68×50-NC26	68	50	95	60
MZ80×62-NC26	80	62	114	73
MZ96×74-NC31	96	74	127	89
MZ110×90-NC38	110	90	143	102
MZ122×102-NC38	122	102	162	114
MZ135×110-NC50	135	110	175	127
MZ148×128-NC50	148	128	190	140
MZ167×140-NC50	167	140	203	159
MZ178×153-6 5/8 REG	178	153	211	168
MZ190×166-6 5/8 REG	190	166	219	178
MZ210×185-6 5/8 REG	210	185	247	203
MZ239×216-7 5/8 REG	239	216	280	228
MZ251×229-7 5/8 REG	251	229	290	241

The internal hook is a fishing tool generally used inside casings and oil tubing's for fishing ropes and other fishes such as wire-lines, cables, logging wire-lines and paraffin cutters.

There are two types of internal hooks for different fishing applications: Dead (fixed) hook and Live (adjustable) hook.

Internal Hook

Specifications - Internal Hook

Model	O.D.(mm)	Connection	For Casing/Tubing Size(in)
NG70	70	2 3/8 PAC	3 1/2
NG90	90	NC26	4 1/2
NG110	110	NC31	5 1/2
NG136	136	NC31	6 5/8
NG150	150	NC38	7
NG176	176	NC38	8 5/8
NG190	190	NC38	9 5/8

The External Hook is used inside casings and tubing's to catch all kinds of ropes, lifting bails, hollow short cylinders, short rope slings such as wire-lines, logging steel pieces, cables, etc.

External Hook

Specifications - External Hook

Model	O.D.(mm)	Connection	For Casing/Tubing Size(in)
WG70	70	2 3/8 PAC	3 1/2
WG90	90	NC26	4 1/2
WG110	110	NC31	5 1/2
WG136	136	NC31	6 5/8
WG150	150	NC38	7
WG176	176	NC38	8 5/8
WG190	190	NC38	9 5/8

REVERSE CIRCULATION FISHING MAGNET

Pascal Reverse Circulation Junk Basket (RCJB) is designed to remove all types of small junk objects from the well hole. The tool's main feature is that it eliminates the possibility of pulling a wet string during fishing operation with its reverse drainage design. The RCJB can also be used as a fish magnet when fitted with a magnet insert, while maintaining its reverse fluid circulation feature.

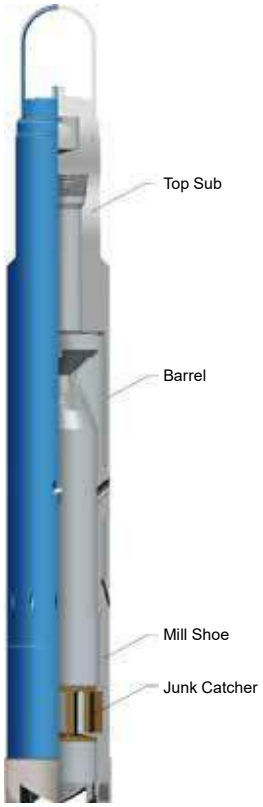
Operation

Pascal RCJB is normally attached at the bottom of the fishing string, lowered to a point several feet from the bottom of the well. Begin circulation of the junk basket to wash the hole. Stop circulation and drop the steel ball. (When the steel ball is dropped into the valve seat, reverse fluid circulation is activated. The fluid travels outward and downward through the inner passage of the barrel and out through the vents in the lower end. The fluid is then deflected to the center of the tool and up through the return holes in the upper end of the barrel. The reverse fluid circulation carries the junk into the barrel above the junk catcher. Restart the circulation; slowly rotate the junk basket while lowering the tool until a 10-inch core has been cut. Stop rotation and circulation and pull the tool and junk from the hole.

Type B Mill Shoe
Finger Shoe

Type C Mill Shoe

Magnet Insert



Reverse Circulation
Junk Basket

Specifications - Reverse Circulation Junk Basket

Model	OD of barrel (mm)	Max. fishing size (mm)	OD of steel ball (mm)	Connection (Box)	Hole size (mm)
LL-F86	86	51	23	NC26	92～98
LL-F89	89	57	23	NC26	95～102
LL-F92	92	57	23	NC26	95～102
LL-F101	101	63.5	23	NC26	105～114
LL-F114	114	78	28	NC31	117～127
LL-F123	123	90.5	28	NC31	130～140
LL-F130	130	95	34	NC38	143～152
LL-F146	146	111	34	NC38	155～165
LL-F159	159	121	34	NC46	168～187
LL-F178	178	130	42	NC50	190～210
LL-F200	200	154	42	NC50	212～241
LL-F206	206	157	45	NC50	216～241
LL-F232	232	179	57	NC50	244～270
LL-F257	257	194	57	6 5/8REG	273～295
LL-F279	279	211	57	6 5/8REG	298～317
LL-F301	301	219	57	6 5/8REG	320～346
LL-F330	330	249	57	6 5/8REG	349～406
LL-F381	381	279	57	6 5/8REG	406～444
LL-F508	508	406	57	7 5/8REG	559～660
LL-F559	559	426	57	7 5/8REG	610～711

The Pascal S-Fishing Magnet is a junk retrieval tool designed to retrieve small metal, odd-shaped objects such as mill metal shavings, bit cones, cutters, bearings, slips, tong pins, and hand tools from the bottom of the well bore. Typically, these damaging junk objects are the result of bit failures, mill cuttings, and fallen un-drillable objects which can only be removed by magnetic attraction. The tool is designed with many fluid circulation ports that wash away cuttings and other debris to prevent any interference with the magnetic contact. A variety of guides are available to aid in different retrieval situation.

Standard
Fishing Magnet

Construction

Pascal S-Fishing Magnet consists of a top sub, housing, magnet element, pole plate, and standard flush guide. The body is manufactured from high strength alloy steel. The magnet element is a powerful permanent magnet that will not lose its charge when handled properly. The magnet body, housing, and pole plate are threaded and welded together during assembly with the magnet element in place. The standard flush bottom guide is threaded and can be easily removed.

Operation

Pascal S-Fishing Magnets are usually run on tubing and drill pipes. With wireline adaptors, it can also be run on wireline. The S-Fishing Magnet is attached at the bottom of the fishing string and lowered until it is six to twelve inches within the fish. Circulate to wash the fish. Reduce circulation and lower the fishing magnet to the fish. Slowly rotate to ensure positive contact. Upon positive contact, stop the circulation and lift the fishing magnet from the hole to retrieve the junk.

Cut-Lipped Guide

Mill-Type Guide

Wireline Adapter

Optional Accessories

A flush guide is standard. Lipped guides and mill guides are also available. The lipped guide centralizes the fish to ensure proper direct contact with the magnet. The mill guide enables milling of any soft formation or settling to free debris at the bottom of the hole.

Model 型号	O.D. (mm)	Thread Connection	Attracted Weight(KN)	Temperature In well（℃）	Hole Size (mm)
CL38	38	5/8"ROD PIN	≥0.049	<210	φ51～φ70
CL57	57	3/4"ROD PIN	≥0.11	<210	φ70～φ92
CL64	64	3/4"ROD PIN	≥0.22	<210	φ76～φ95
CL70	70	2 3/8NUE PIN	≥0.22	<210	φ86～φ105
CL76	76	2 3/8REG PIN	≥0.38	<210	φ86～φ105
CL79	79	2 3/8REG PIN	≥0.38	<210	φ86～φ105
CL83	83	2 3/8NUE PIN	≥0.4	<210	φ95～φ108
CL86	86	2 3/8REG PIN	≥3	<210	φ95～φ108
CL89	89	2 3/8REG PIN	≥3	<210	Φ100～φ114
CL102	102	2 3/8REG PIN	≥5	<210	Φ110～φ121
CL114	114	2 7/8REG PIN	≥6	<210	φ121～φ140
CL125	125	2 7/8REG PIN	≥7	<210	φ143～φ152
CL127	127	2 7/8REG PIN	≥7	<210	φ143～φ152
CL140	140	3 1/2REG PIN	≥9	<210	φ152～φ165
CL146	146	3 1/2REG PIN	≥9	<210	φ160～φ184
CL152	152	3 1/2REG PIN	≥9	<210	φ168～φ190
CL178	178	4 1/2REG PIN	≥11	<210	φ190～φ216
CL190	190	4 1/2REG PIN	≥13	<210	φ203～φ229
CL200	200	4 1/2REG PIN	≥15	<210	φ216～φ241
CL203	203	4 1/2REG PIN	≥15	<210	φ219～φ241
CL229	229	6 5/8REG PIN	≥18	<210	φ241～φ279
CL254	254	6 5/8REG PIN	≥20	<210	φ267～φ311
CL267	267	6 5/8REG PIN	≥22	<210	φ279～φ330
CL292	292	6 5/8REG PIN	≥26	<150	φ311～φ356
CL356	356	6 5/8REG PIN	≥28	<150	Φ381～φ445
CL381	381	7 5/8REG PIN	≥30	<150	Φ406～φ483
CL406	406	7 5/8REG PIN	≥32	<150	Φ432～φ508
CL483	483	7 5/8REG PIN	≥35	<150	Φ508～φ610
CL559	559	7 5/8REG PIN	≥45	<150	Φ610～φ711

REVERSE CIRCULATION FISHING MAGNET

Pascal Reverse Circulation Fishing Magnet is a new fishing tool designed based on Pascal Standard Fishing Magnet. It combines advantages of Reverse Circulation Fishing Basket and Fishing Magnet. Its unique reverse-circulation design enhances its cleaning performance at the bottom of well bore.

Construction

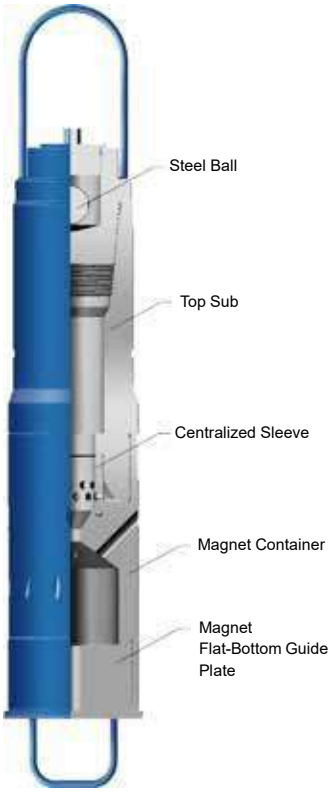
Pascal Reverse Circulation Fishing Magnet comprises of lifting bail, top sub, housing, magnet element, pole plate, standard flush guide, and steel ball. Other optional guides are available for different fishing operations.

Operation

Lower the fishing magnet to a depth, approximately 40 inches from the bottom of the well bore. Circulate to wash the fish, reduce circulation and lower the fishing magnet to the bottom of hole to attract the fish. Slowly rotate to ensure positive contact between the fish and the magnet. Lift up 10 to 20 inches, drop the steel ball into the fishing string, and pump the steel ball into the valve seat. Rotate and circulate for a moment, discontinue circulation and lift the fishing magnet from the hole.

Optional Accessories

A flush guide is standard. Lipped guides and mill guides are also available.



Reverse Circulation Fishing Magnet

Specifications - Reverse Circulation Fishing Magnet

Model	O.D. (mm)	Thread Connection	Attracted Weight (KN)	Temperature In well (℃)	Hole Size (mm)
CLF79	79	NC23 BOX	≥0.38	＜210	φ86～φ105
CLF86	86	NC23 BOX	≥3	＜210	φ95～φ108
CLF102	102	NC26 BOX	≥5	＜210	φ110～φ121
CLF114	114	NC31 BOX	≥6	＜210	φ121～φ140
CLF125	125	NC38 BOX	≥7	＜210	φ143～φ152
CLF127	127	NC38 BOX	≥7	＜210	φ143～φ152
CLF140	140	NC38 BOX	≥9	＜210	φ152～φ165
CLF146	146	NC38 BOX	≥9	＜210	φ160～φ184
CLF152	152	NC38 BOX	≥9	＜210	φ168～φ190
CLF165	165	NC38 BOX	≥10	＜210	φ178～φ203
CLF178	178	NC50 BOX	≥11	＜210	φ190～φ216
CLF190	190	NC50 BOX	≥13	＜210	φ203～φ229
CLF200	200	NC50 BOX	≥15	＜210	φ216～φ241
CLF203	203	NC50 BOX	≥15	＜210	φ219～φ241
CLF225	225	NC50 BOX	≥18	＜210	φ241～φ279
CLF254	254	6 5/8REG BOX	≥20	＜210	φ267～φ311
CLF265	265	6 5/8REG BOX	≥22	＜210	φ279～φ330
CLF267	267	6 5/8REG BOX	≥22	＜210	φ279～φ330
CLF292	292	6 5/8REG BOX	≥26	＜150	φ311～φ356
CLF356	356	6 5/8REG BOX	≥28	＜150	φ381～φ445
CLF381	381	7 5/8REG BOX	≥30	＜150	φ406～φ483
CLF406	406	7 5/8REG BOX	≥32	＜150	φ432～φ508
CLF508	508	7 5/8REG BOX	≥40	＜150	φ559～φ660

DITCH MAGNET

The ditch magnet is the most effective means of trapping and removing metal particles from the drilling mud that are not filtered by the shale shaker. This unit will capture all metals through magnetic attraction and hold them until they can be removed from the mud stream. The magnet is particularly valuable and useful during milling operations. Removal of mill cuttings and debris reduces wear of mud pumps, drill bit and other equipment. It eliminates problems caused by the harmful debris that are returned to the downhole with the drilling mud. They are equally effective during washover and fishing operations.

Structure

The ditch magnet is made of a high-performance magnet with strong magnetic field. It is simple, rugged and has high power to weight ratio.

Operation

Ditch magnet is easy to operate. It is most effective when suspended by soft line in the mud ditch or shaker discharge. When the cuttings or debris attached are full, it should be removed and cleaned. Remove the magnet from the mud ditch and open the inserting plate from the end with the pull rod. When the magnetic pole body is pulled out, all cuttings and debris will drop off. The magnet body shall be cleaned with fresh water and assemble again for use.

Maintenance

Frequency of cleaning for the unit per day is directly dependent on the milling rate. Higher milling rate will mean high cleaning frequency.To clean the unit, remove the Magnet and clean it with fresh or salt water hose. Wipe all cuttings from the unit and assemble it back for normal operation. During other operations when there are less return cuttings or metal shavings, the unit need not be cleaned so frequently.

Ditch Magnet

Specifications - Ditch Magnet

Model	OD (mm)	Magnetic Effective Area(mm)	Strength of Magnetic Pole Surface（Gs）	Strength From 10mm To Magnetic Pole Surface （Gs）
18″	200×460	125×400	1400	700
24″	200×620	125×525	1400	700
36″	200×920	125×825	1400	700

Flat Bottom Junk Mill

The Flat Bottom Junk Mill is the most commonly used milling tool. It is designed to mill a wide variety of junk such as squeeze tools, packers, tubing, bridge plugs and similar objects.

Flat bottom junk mill (M08)

Tapered Mills

The Tapered Mill is designed for milling through various types of downhole obstructions, and reaming out liners and whipstock windows. It works well in collapsed casing as well as tight spots.

Tapered Mill (M11)

Concave Junk Mills

The Concave Mill is designed for milling bit cones and other loose objects. It keeps the fish in a centralized fix location under the mill for greater milling effectiveness.

Concave Bottom Junk Mill (M04)

Economill

The Economill is an effective tool for light duty milling jobs such as packers, bridge plug, and cement. This mill can be easily make-up and break-out with standard bit breakers.

Economill (M25)

Bladed Junk Mill

Bladed Junk Mill is dressed with high-quality tungsten carbide to ensure optimal performance in all applications. They are suitable for all types of general junk milling, as well as for removing packers, retainers, and squeeze tools.

Bladed Junk Mill (M26)

String Junk Mill

The String Mill is designed to clean casing and whipstock windows. Its short leading and trailing angles, allow the mill to clean "bird nest" and other obstructions in the string, while the bottomhole tool is milling. This string mill assures that the milled section maintains full gage.

String Junk Mill (M27)

Pilot Mill

The Pilot Mill is best used for milling stuck tubular tools, such as liner, liner hanger, wash pipe, rotary shoe or drill pipe. The pilot assembly keeps the tubular tools in a centered position, while the milling blades mill the product away.

Pilot Mill (M12)

Skirted Junk Mill

The Skirted Junk Mill is designed for milling tubular fish, either inside casing or in open hole. Should the fish be plugged, it is far better to use a shoe-type guide with a flat mill to avoid sidetracking.

Skirted Junk Mill (M22)

Junk Sub (Fishing Cup) is normally used to catch and remove junks that are too heavy to be circulated preventing them from settling at the bottom of the well-bore. Typical junks are shivers and fallen objects such as carbide tooth, drill bit and bearings which are too heavy to be removed from the well-hole through conventional fluid circulation. Junk Sub's main function is to keep well bottom clean to increase bit service life, reduce and prevent drill bit from unexpected damage.

Junk Sub

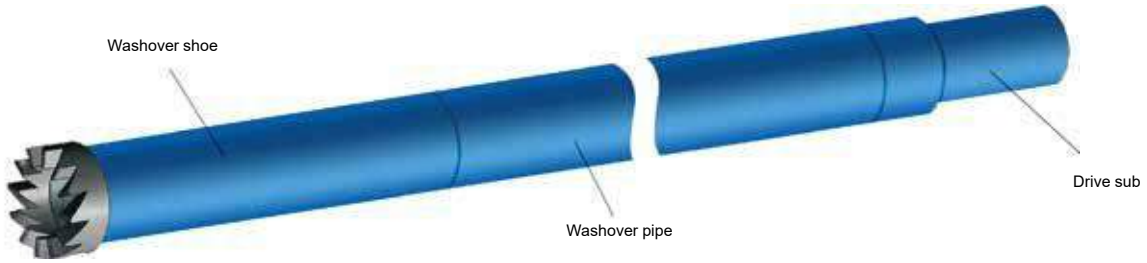
Structure

As the outer diameter of the external bowl is bigger, the space between the external bowl and the well hole is reduced guiding most of the fluid through the cup. The mandrel diameter at the cup mouth is bigger with larger annular space. Thus, the fluid forms a swirl at the cup mouth as the fluid flows down through the cup with a sudden reduction in capacity at the bottom. Through this working principle, some heavy objects will drop in the cup and be fished out, ensuring that the well-bore bottom is cleaned.

Specifications - Junk Sub

Model	Bottom Conn. × Top Conn	OD of cup(mm)	OD of upper end	ID (mm)	L of cup(mm)	OAL(mm)	Hole size(mm)
LB79	2 3/8REG B*2 3/8REG P	79	79	19	250	845	88.9～98.4
LB89	2 3/8REG B*2 3/8REG P	89	78	19	250	845	108～117.5
LB94	2 3/8REG B*2 3/8REG P	94	79	19	250	850	108～117.5
LB102	2 7/8REG B*2 7/8REG P	102	93.5	31.8	250	850	117.5～124
LB114	3 1/2REG B*3 1/2REG P	115	105.5	38.1	250	915	130～149
LB127	3 1/2REG B*3 1/2REG P	127	108	38.1	250	915	152.4～162
LB133	3 1/2REG B*3 1/2REG P	133	108	38.1	250	915	152.4～162
LB140	3 1/2REG B*3 1/2REG P	140	108	38.1	250	915	165～190.5
LB146	3 1/2REG B*3 1/2REG P	146	108	38.1	250	915	168～190.5
LB165	4 1/2REG B*4 1/2REG P	165	140	57.2	250	915	190.5～216
LB168	4 1/2REG B*4 1/2REG P	168	140	57.2	250	915	190.5～216
LB178	4 1/2REG B*4 1/2REG P	178	146	57.2	250	915	219～244.5
LB194	4 1/2REG B*4 1/2REG P	194	146	57.2	250	950	229～273
LB200	4 1/2REG B*4 1/2REG P	200	146	57.2	250	950	229～273
LB219	6 5/8REG B*6 5/8REG P	219	197	76.2	250	950	244～289
LB241	6 5/8REG B*6 5/8REG P	241	197	76.2	250	960	292～330
LB245	6 5/8REG B*6 5/8REG P	245	203	76.2	250	960	292～330
LB245	6 5/8REG B*6 5/8REG P	245	197	88.9	250	960	292～330
LB273	6 5/8REG B*6 5/8REG P	273	203	76.2	250	960	330～375
LB286	6 5/8REG B*6 5/8REG P	286	203	76.2	250	1000	330～375
LB327	7 5/8REG B*7 5/8REG P	327	241.3	76.2	250	1050	375～444.5
LB327	7 5/8REG B*7 5/8REG P	327	225.4	102	250	1000	375～444.5
LB340	7 5/8REG B*7 5/8REG P	340	225.4	76.2	250	1080	381～444.5
LB381	7 5/8REG B*7 5/8REG P	381	241.3	76.2	250	1065	432～508
LB473	7 5/8REG B*7 5/8REG P	473	241.3	76.2	250	1120	508～559

Washover pipe is a special tool commonly used to release stuck section of drill string in the well bore. Pascal offers a complete range of washover pipe for the industry. Pascal provides a unique FJWP thread that adopts a two-step double shoulder threaded connection which assures quick make up and high torsional strength.



Specifications - Washover Pipe

Model	O.D	I.D	Wall Thickness	Min. Hole Size	Max. Mill Size	Max. Tensile Load kN	Connection Field Torque N.m	Seal Pressure MPa.
	mm							
TXG95.3	95.3	82.6	6.35	105	79.4	180	4070	20
TXG 101.6	101.6	84.6	8.5	114.3	82.5	355	6750	20
TXG 114.3	114.3	99.6	7.36	120.7	95.3	345	6780	20
TXG 114.3	114.3	97.2	8.56	120.7	93.7	390	9490	20
TXG 127	127	108.6	9.19	146.1	104.8	440	12202	20
TXG 139.7	139.7	124.3	7.72	152.4	121	460	12200	20
TXG 139.7	139.7	121.4	9.17	152.4	117.5	500	14914	20
TXG 139.7	139.7	118.6	10.55	152.4	114.3	550	17630	20
TXG 146	146	130.2	7.92	162	127	500	14914	20
TXG 146	146	128.1	9	162	121	560	16269	20
TXG 152.4	152.4	136	8.25	178	133.3	525	16270	20
TXG 168.3	168.3	150.4	8.94	187.3	146	600	21693	15
TXG 177.8	177.8	159.4	9.19	200	152.4	640	24404	15
TXG 193.7	193.7	174.6	9.53	212.7	171.5	700	31183	15
TXG 193.7	193.7	171.8	10.92	212.7	168.3	810	36607	15
TXG 193.7	193.7	168.3	12.7	212.7	165	1060	43386	15
TXG 203.2	203.2	184.2	9.53	216	181	820	32539	15
TXG 206.4	206.4	187.6	9.4	216	184.2	830	32539	15
TXG 206.4	206.4	185.1	10.67	216	181	905	40680	15
TXG 206.4	206.4	182.5	11.94	216	179.4	1025	47460	15
TXG 219	219	196.2	11.43	244.5	195.3	1100	47453	15
TXG 219	219	193.7	12.7	244.5	192	1220	54232	15
TXG 228.6	228.6	207	10.8	250.8	203	1260	47453	15
TXG 244.5	244.5	220.5	11.99	266.7	215.9	1460	67791	15
TXG 244.5	244.5	216.8	13.84	266.7	206.4	1560	81349	15
TXG 273	273	250.2	11.43	298.5	244.5	1620	81349	15
TXG 273	273	247.9	12.57	298.5	241.3	1640	88128	15
TXG 298.5	298.5	273.6	12.42	323.9	266.7	1800	108465	10
TXG 339.7	339.7	313.6	13.06	365.1	304.8	2020	149140	10
TXG 406.4	406.4	373.1	16.66	444.5	356	2500	254894	7

Drive Sub

Drive Sub provides the crossover connection between fishing string and the washover pipe. Each sub is machined from high-grade alloy steel and heat treated to provide maximum strength and durability.

Drive Sub

Lift Plug

Lift Plug is designed to provide an economical method of handling washover strings. It is available in all thread types and sizes to support all connections. In addition, it has sufficient shoulder diameter to support and ensure proper handling of the washover string.

Lift Plug

Washover Safety Joint

Washover safety joint is manufactured to provide safe and easy make-up and release of washover tools whenever disengagement of washover string is necessary. This dependable, rugged tool is designed for tough field applications to transmit torque in either direction when placed in the washover string.

Washover Safety Joint

Rotary Shoes

Rotary Shoes are manufactured from specially heat treated alloy to provide ultimate toughness and durability. They are used to cut and create a clearance between the fish and the wall of the well bore.

Rotary Shoe

The ND-J type internal cutter is a down-hole mechanical cutting tool designed to cut casings, tubing's and drill pipes. The main advantages are its simple structure, reliable performance and high cutting efficiency. In order not to cut the casing and tubing couplings, the cutter shall be kept away from these couplings during operation. Depending on drilling conditions, it can be used in conjunction with coupling locator to locate the position of the nearest coupling from the cutter. When the internal cutter is used with the releasing spear, it can cut and remove the cut tubing in one fishing operation. Alternatively, a separate fishing tool can be used to remove cut pieces.

Working Principle

Lower the internal cutter to a designated cutting depth, rotate (3 rounds) the cutter mandrel in the clockwise direction to separate the sliding sleeve and the sliding sheet. At this instance, with the spring effect, the friction block will be pressed against the pipe wall. In addition, due to the engagement of the sliding sleeve and sheet, the main center body and the slip portion is pushed upwards along the tapered slip cone, expanding the slip diameter. As the slip diameter expands, it bites on the internal wall of the drill pipe. At this moment, anchor the cutter on the pipe wall and lift the cutter mandrel by 10mm. After which, slowly lower and rotate mandrel, as the cutters (3 pcs) move down the tapered cutter block, it open up radially to cut the pipe wall.

The cutting operation is completed when the mandrel pressed against the end of the thrust ring. Lift the mandrel to release and reposition the cutters via its own weight and the function of the blade spring. As the mandrel is lifted, the sliding sleeve and sheet re-engage back to its original position. In addition, as the tapered slip cone moves upwards, the slip loses its grip on the pipe wall and the cutter releases its anchor on the wall. Continue to lift mandrel until the locating ring engages with the guide nut before pulling the tool out.

When ordering please specify:

- Pipe size and weight to be cut.
- Top connection.

Mechanical Internal Cutter
(x04)

Specifications - Mechanical Internal Cutter

Model	O.D.(mm)	Connection (mm)	ID(mm)	ID of cut pipe(mm)	Weight Pipe(ib/ft)
ND-J73×55	55	1.9 NU	8	59～62	6.4～7.9(2 7/8 TBG)
ND-J89×68	68	1.9EU	13	74.2～78	7.7～10.2(3 1/2 TBG)
					9.5(3 1/2D.P.)
ND-J114×91	91	NC26	16	97～104	12.6～15.2(4 1/2 TBG)
					9.5～15.1(4 1/2CSG)
					13.75～16.6(4 1/2D.P.)
ND-J114×89	89	NC26	16	95～104	12.6～17(4 1/2 TBG)
					9.5～16.9(4 1/2CSG)
					13.75～16.6(4 1/2D.P.)
ND-J127×102	102	NC26	18	108.6～116	11.5～18(5CSG)
					19.5(5 D.P.)
ND-J127×96	96	NC26	16	103-116	11.5～23.2(5CSG)
					19.5(5 D.P.)
ND-J140×108	108	NC31	18	108.6～116	14～23(5 1/2CSG)
					21.9～24.7(5 1/2D.P.)
ND-J178×145	145	NC38	38	152.5～161.7	23～35 (7 CSG)
ND-J203×167	167	NC50	44	183～193.7	16～26 (8 CSG)
ND-J219×181	181	NC50	44	190.7～205.6	24～49 (8 5/8 CSG)
ND-J245×203	203	NC50	50	216.8～228.6	32.3～53.5 (9 5/8 CSG)
ND-J273×228	228	6 5/8REG	57	242.8～252.7	45.5～65.7 (10 3/4 CSG)
ND-J340×298	298	6 5/8REG	76	313.6～323	48～72 (13 3/8 CSG)

Pascal Multi-string Cutter is built to withstand extreme shock encountered while cutting multiple strings of un-centralized conductor pipes. The unique construction of this tool enables the rugged cutter arms to expand outward up to 5 times the diameter of the tool body. The cutter can achieve maximum stability under all types of adverse cutting conditions, including hard spots, eccentricity, interrupted cuts, etc.

For example, a 13 3/8” casing cutter, the diameter is only 11 3/4”. However it can handle and cut a wide range of pipes with varying weights up to a 60” diameter.

Multi-String Cutter
(G01)

Features and Benefits

- Cuts multiple strings smoothly, even when the strings are not concentric;
- Support maximum expansion of blades, up to 5 times body diameter;
- Rugged 3-bladed construction provides fast cut at high speed;
- Cutter arms can be changed on rig floor.

When ordering please specify:

- Casing size or range to be cut;
- Top connection;
- Body OD.

Specifications - Multi-String Cutter

Table 1. NDD Multi-layer Casing Cutter

O.D (mm)	Connection	Casing O.D (in)	
		Min.	Max.
NDD127×102	2 7/8REG	5	9 5/8
NDD140×111	2 7/8REG	5 1/2	9 5/8
NDD168×133	NC38	6 5/8	16
NDD178×146	NC38	7	16
NDD245×203	6 5/8REG	9 5/8	30
NDD245×210	6 5/8REG	9 5/8	30
NDD273×238	6 5/8REG	10 3/4	36
NDD340×298	6 5/8REG	13 3/8	60
NDD406×368	6 5/8REG	16	60

Table 2. Product Code And Casing Size

NDD127×102	NDD140×111	NDD168×133	NDD178×146	NDD245×203	NDD245×210	NDD273×238	NDD340×298	NDD406×368
NDD127×102-01A 5	NDD140×111-01A5 1/2	NDD168×133-01A6 5/8	NDD178×146-01A7	NDD245×210-01A 9 5/8	NDD245×210-01A 9 5/8	NDD273×238-01A 10 3/4~11 3/4	NDD340×298-01A 13 3/8~16	NDD406×368-01A 16
NDD127×102-01B 5~7	NDD140×111-01B5 1/2~7	NDD168×133-01B7~9 5/8	NDD178×146-01B7~9 5/8	NDD245×210-01B 10 3/4~13 3/8	NDD245×210-01B 10 3/4~13 3/8	NDD273×238-01B 10 3/4~16	NDD340×298-01B 13 3/8~20	NDD406×368-01B 16~20
NDD127×102-01C 5~9 5/8	NDD140×111-01C5 1/2~9 5/8	NDD168×133-01C9 5/8~11 3/4	NDD178×146-01C9 5/8~11 3/4	NDD245×210-01C 10 3/4~16	NDD245×210-01C 10 3/4~16	NDD273×238-01C 10 3/4~20	NDD340×298-01C 13 3/8~30	NDD406×368-01C 16~30
		NDD168×133-01D11 3/4~16	NDD178×146-01D11 3/4~16	NDD245×210-01D 13 3/8~20	NDD245×210-01D 13 3/8~20	NDD273×238-01D 10 3/4~30	NDD340×298-01D 20~36	NDD406×368-01D 20~36
				NDD245×210-01E 20~30	NDD245×210-01E 20~30	NDD273×238-01E 20~36	NDD340×298-01E 30~60	NDD406×368-01E 30~60

Section mills are primarily used to milling sections in the casing (for side tracking, gravel packing) and perforation zones. Pascal section mill is available in a variety of Casing sizes, ranging from 4 1/2" to 13 3/8". The blades are all dressed to enable simultaneously milling of the casing. The milling rate is usually limited by the ability of the fluid in removing the cuttings.

Section Mill

When ordering please specify:

- Tool model
- Size and weight of Casing to be milled
- Top connection

Specifications - Section Mill

Model	Connection	Body O.D (mm)	Max. OD when cutter opened (mm)	OD of stabilizer block		Casing Size (in)
				Casing wallthickness (mm)	OD of stabilizer block (mm)	
DX114	2 3/8 REG	96	130	5.2	100	4 1/2
				5.68	99	
				6.35	98	
DX127	2 7/8 REG	104	150	5.59	112	5
				6.43	111	
				7.52	108	
DX140	2 7/8 REG	114	165	6.2	124	5 1/2
				6.98	122	
				7.72	121	
DX168	3 1/2 REG	140	200	7.32	150	6 5/8
				8.94	147	
				10.59	144	
				12.06	141	
DX178	3 1/2 REG	152	215	8.03	158	7
				9.19	156	
				10.36	154	
DX245	4 1/2 REG	210	310	7.92	225	9 5/8
				8.94	223	
				10.03	221	
				11.05	218	
				11.99	216	
DX340	6 5/8 REG	292	394	8.38	319	13 3/8
				9.65	316	
				10.92	314	
				12.19	311	
				13.06	309	

H type safety joint, is an essential safety tool for sub-surface drilling. It is built to withstand all kinds of loads (axial pulling or pressing) and it aid in torque transmission. In downhole operations, safety joints are normally added to the drill string as a precaution to support any tool recovery emergencies. The safety joint allows quick release and disengagement of the tool should they become stuck, so that the drill stem above can be removed. On top of that, while resuming the downhole operation, the safety joint ensures quick and easy to reconnect of drill stem.

Type H Safety Joint

Specifications - H Type Safety Joint

Model	O.D. (mm)	I.D. (mm)	Thread Connection
HAJ89	89	15	NC26
HAJ95	95	20	NC26
HAJ105	105	30	NC31
HAJ121	121	38	NC38
HAJ159	159	50	NC46 , NC50
HAJ165	165	50	NC46 , NC50
HAJ178	178	57	NC50 , 5 1/2 FH
HAJ203	203	71.4	6 5/8 REG

TYPE AJ SAFETY JOINT

AJ type safety joint is a specialized joint consisting of two parts. This specialized joint protects the drilling stem during drilling, fishing, repairing and testing operations. It is used to handle and manage well bottom accident. During drilling and coring operations, it is connected to the required position of drilling stem to protect the drilling stem without any influence on the normal working of drilling tool.

Type AJ Safety Joint

Specifications - AJ Type Safety Joint

Model	O.D. (mm)	I.D. (mm)	Thread Connection
AJ-C86	86	38	NC26
AJ-C95	95	44	NC26
AJ-C105	105	51	NC31, 2 7/8 NU, 2 7/8 EUE
AJ-C121	121	57	NC38
AJ-C159	159	71.4	NC46 , NC50
AJ-C165	165	71.4	NC50
AJ-C178	178	71.4	NC50 , 5 1/2 FH
AJ-C203	203	76	6 5/8 REG
AJ-C228	228	76	7 5/8 REG

Impression Block is an effective tool used to determine the dimensions, configuration, condition, and location of the top end of a fish in the hole.

Construction

Pascal Impression Blocks are manufactured with a high strength alloy steel body and a soft lead insert at the lower end. All impression blocks come with a watercourse that allows flushing of the fish top before the tool is lowered against it. Impression blocks without a watercourse can be furnished upon request.

Operation

Attach the impression block to the bottom of the fishing string and lower into the well-hole. Do not rotate the tool, slowly lower the impression block to the point of contact with the fish. Apply weight on the impression block to make an imprint of the fish on the soft lead insert and lift it from the hole.

When ordering, please specify:

- Complete assembly or part number
- Top connection
- Lead O.D.

Specifications - Impression Blocks

Model	O.D(mm)	I.D(mm)	Thread connection(BOX)	Casing/tubing Size(in)
QM79	79	12	NC23	4
QM89	89	12	NC26	4 1/2
QM98	98	12	NC26	5
QM110	110	12	NC31	5 1/2
QM146	146	20	NC38	7
QM203	203	25	NC50	9 5/8
QM305	305	38	6 5/8REG	13 3/8

HYDRAULIC BUCKING UNIT

CZJ Open Type Quick-Rotary Hydraulic Bucking Unit is the Hydraulic Make/Break Unit with an Open Type Hydraulic Spinner (Quick-Rotary) Assembly. Open Type Quick Rotary Spinner enables easy loading and unloading of tools during operation. The ease of operation greatly improves work efficiency, and reduces the risk of tools damage due to collision.

CZJ Type Open Quick-Rotary Bucking Unit

Specifications - Open Type Quick-rotary Hydraulic Bucking unit

Model	Motor Power (KW)	Clamp Pipe Dia. Range (mm)	Max. Makeup Torque (KN•m)	Max. Breakout Torque (KN•m)	Pipe Dia. For Quick Makeup / Breakout unit(mm)	Motor Speed (rpm)	Max. Working Pressure (MPa)	Quick Makeup / Breakout unit Torque (KN•m)	Max. Tons For Push/Pull Cylinder (KN)	Stroke For Push/ Pull Cylinder (mm)
CZJ320	15	Φ73-310	10-118	168	Φ73-340	1460	12	2.5-4.0	150	1500
CZJ400	15	Φ73-390	15-150	180	Φ73-340	1460	12	2.5-4.0	150	1500

CZPT-II HYDRAULIC MAKE-UP/BREAK-OUT PLATFORM

CZPT-II Hydraulic make-up/break-out platform is mainly used with Make/Break unit assisting in the pre-assembly of drilling tools, whereby special guiding and alignment of tools are required for proper locking and unlocking of threads during assembly. The precision of tool alignment is the key to fast and accurate make-up and break-out of tools either in the workshop or on the rig. CZPT-II is generally designed to support all types of Make-up/Break-out Unit for its pre-assembly tool alignment and thread guiding. CZPT-II ensures high production efficiency during make-up/break-out of tools.

This device adopts the working design of industry's push/pull assembly. It is highly automated, supports a wide range of tools and tube diameter (Φ62-260mm) in thread guiding and tool alignment. In order to ensure maximum protection of work piece surface during operation, the unit uses special rotary screw clamps (quick-rotary screw tongs) with no teeth marks. It's ease of operation and maintenance help users save operating cost and time.

CZPT-II Hydraulic Make-up/Break-out Platform

Specifications - CZPT-II Hydraulic Make-up/Break-out Platform

Model	Max. Rated Working Pressure (MPa)	Make-up/Break-Out Torque Of Rotary Screwing Tongs (n•M)	Clamping Dia. Range Of Clamping Tongs (mm)	Clamping Dia. Range Of Rotary Screwing Tongs (mm)	Motor Power (KW)
CZPT-II	10	0-2506	Φ62—Φ260	Φ62—Φ260	11

LMST- Ⅱ DOWNHOLE MOTOR TESTER &SYJ HYDRAULIC JAR

Downhole motor tester is designed to test the seal performance of new and refurbished downhole motors in the workshop or at the rig site. It serves as a quick verification tool for new and refurbished downhole motor to ensure that it's within specification and in working order before operation in the rig. The tester consists of a tool support structure, water supply system, hydraulic system and control system. The tester is highly automated, easy to operate and support a wide range of downhole motors and tools.

LMST- Ⅱ Downhole Motor Tester

Specifications - LMST-II Downhole Motor Tester

Model	Main Motor Power	Hydraulic Pump Motor Power	Driving Speed	Application Dia. Range	Max. Torque	Working Pressure Of Water System	Max. Working Pressure Of Hydraulic System
LMST-II	75KW	11KW	40 r /min	Φ89~Φ290	15000n•m	8MPa	20MPa

SYJ HYDRAULIC JAR TESTER

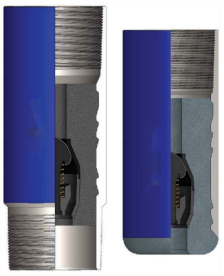
SYJ Hydraulic Jar Tester is a self-contained unit designed to test the tensile strength and pressure performance of Jars, Absorbers and Jars Intensifiers. In addition, it can be used to test the strength of thread connection on downhole drilling tools. Tester has high safety feature and is designed to handle big push/pull tonnages. It's ease of operation and maintenance help users save operating cost and time.

SYJ Hydraulic Jar Tester

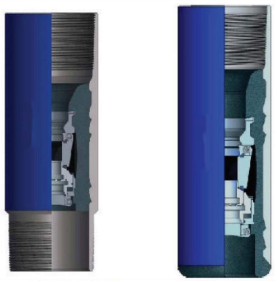
Specifications - SYJ Hydraulic Jar Tester

Model	Motor Power (KW)	Motor Speed (r/Min)	Max Pressure (MPa)	Max Work Pressure (MPa)	Oil Tank Capacity (L)	Max Push(T)	Max Pull(T)	Test Tool Length Range (m)
Sy J150	15	1460	31.5	20	400	150	130	1-9m
SyJ150B	15	1460	31.5	20	400	150	130	1-10m
SyJ150C	15	1460	31.5	20	400	150	130	1-11m

The floating equipment includes a floating collar and a floating shoe, which are mainly used to guide the casing string to enter the well smoothly, adjust the buoyancy of the casing string when the casing is lowered, and the back pressure valve prevents the cement slurry from flowing back into the casing, and accurately control the height of the cement plug in the casing during cementing, so as to ensure the cementing quality. The floating collar and the floating shoe are generally used in a complete set, the floating shoe is at the lowest end of the casing, and the floating collar and the floating shoe are spaced between several casings, and the floating collar can be used for the rubber plug to touch and press.



Single float collar / shoe



The Differential fill float collar/shoes

Specifications - float collar

Specification (mm)/(in)		O.D. (mm)	I.D. (mm)	Height (mm)	Water hole diameter(mm)	Connection	Pressure (MPa)	Single weight (KG)
140	5-1/2	160	127.3-118.6	500	45	API/ Special thread	35	36
168	6-5/8	187.8	153.6-144.1	550	45	API/ Special thread	35	40
178	7	200	166-150.4	550	45	API/ Special thread	35	54
194	7-5/8	219.	178.4-162	550	45	API/ Special thread	35	62
219	8-5/8	244.5	205.6-190.8	550	45	API/ Special thread	35	70
244	9-5/8	269.7	226.6-214.3	550	70	API/ Special thread	35	76
273	10-3/4	298	258.9-242.8	550	70	API/ Special thread	35	96
298	11-3/4	323.9	281.5-273.6	600	70	API/ Special thread	35	118
340	13-3/8	365	320.4-313.6	600	70	API/ Special thread	35	146
406	16	431.8	384.1-381.3	650	70	API/ Special thread	21	180
473	18-5/8	508	450.9	650	70	API/ Special thread	21	228
508	20	531.2	485.7-475.7	650	70	API/ Special thread	21	310

Specifications - float shoe

Specification (mm)/(in)		O.D. (mm)	I.D. (mm)	Height (mm)	Water hole diameter(mm)	Connection	Pressure (MPa)	Single weight (KG)
140	5-1/2	160	127.3-118.6	490	45	API/ Special thread	35	38
168	6-5/8	187.8	153.6-144.1	560	45	API/ Special thread	35	45
178	7	200	166-150.4	560	45	API/ Special thread	35	54
194	7-5/8	219.1	178.4-162	560	45	API/ Special thread	35	62
219	8-5/8	244.5	2.05.6-190.8	560	45	API/ Special thread	35	72
244	9-5/8	269.7	226.6-214.3	570	70	API/ Special thread	35	86
273	10-3/4	298	258.9-242.8	570	70	API/ Special thread	35	100
298	11-3/4	323.9	281.5-273.6	570	70	API/ Special thread	35	120
340	13-3/8	365	320.4-313.6	580	70	API/ Special thread	35	146
406	16	431.8	384.1-381.3	580	70	API/ Special thread	21	188
473	18-5/8	508	450.9	580	70	API/ Special thread	21	240
508	20	531.2	485.7-475.7	650	70	API/ Special thread	21	304

Pascal 's Casing centralizer is a cementing tool which applied to centralize casing to improving the cementing quality. The cement could be concreted firmed between casing and borehole wall.

Structure

Commonly, there are two types casing centralizer of bow spring and rigid, sometimes, there is semi - rigid casing centralizer type. Depends on different circumstances, suitable centralizer is chosen.

As one useful cement tool, rigid centralizer enables casing run easily in wellbore of Horizontal and Deviated well with its shape of stream - lined. The ID of centralizer is bigger than OD of casing.
Slip - on centralizer from pin end and tighten up the set screws or fixed with stop collar: There are three kinds of Rigid Centralizer available roller centralizer, spiral blade rigid centralizer and straight blade centralizer. The material for both kinds of centralizers can be cast steel, cast aluminum, polymer etc.

There are two types of bow spring casing centralizer: Not - welded and welded, which can be single or double bow. For easily installation, hinged centralizer is preferred. After casing is connected, centralizer can be placed on joint. Otherwise, centralizer should be fixed on designed position of casing with stop collar. Slip - on welded centralizer can be slipped onto casing from pin end then fixed with stop collar

Model

Pascal spring casing centralizer (slip - on one piece type, hinged non - welded type, hinged welded type, slip - on welded type, single bow, double bow)
Pascal Rigid casing centralizer (roller centralizer, spiral blade type, straight blade type, cast steel, cast aluminum, nylon, polymer)

c

Heavy duty stand-off band

Semi rigid bow spring centralizer(welded centralizer)

Cement umbrella

Semi rigid bow spring centralizer (Braided centralizer)

Composite resin/rubber centralizer

Bow spring centralizer

(Integral type centralizer)

Cementing plug is a kind of oil casing cementing operation tool, which isolates cement slurry and mud when injecting cement to prevent mud from seeping into the cement slurry and affecting the cementing quality. Scrape the casing to improve the effect of slurry replacement. When the rubber plug sits on the float collar, it is a clear indication that the slurry is in place. The rubber stopper uses a multi-stage sealing design for better sealing performance.

The new special yellow cementing plug (polyurethane) developed by Pascal has better performance, replacing the traditional set of standard top plug bottom plug and stage collar operation, meeting the needs of high temperature environment, with higher wear resistance and wall scraping effect.

Features and advantages:

1. Standard cementing plug has excellent applicability and can be used with various types of float shoes/collars.
2. The top plug and bottom plug are designed with multiple sealing structures, with excellent sealing performance.
3. The scraping wing is made of special composite formula material with excellent wear resistance, tear resistance and flexibility, which is suitable for cleaning all kinds of complex well walls.
4. The internal skeleton has a variety of structures to choose from, the overall material can be selected phenolic resin, polyurethane, modified plastics, special composite non-metallic materials, with excellent strength, impact resistance and easy drilling and other advantages.
5. Each type of elongated rubber plug is suitable for large inclination well, horizontal well deep well, ultra-deep well, suitable well depth: ≤5000 meters.
6. The rubber plug can choose the anti-turning structure, which can greatly improve the drilling speed.
7. PDC and cone bit can be drilled, easy to backflow after breaking.
8. Available in various sizes.

Special yellow cementing plug

Composite cored non rotating top plug

Composite cored non rotating bottom plug

Specifications - Special yellow cementing plug

Model	OD mm	Overall length mm
139.7mm	134±1.5mm	200±2mm
114.3mm	109±1.5mm	200±2mm
139.7mm	135±1.5mm	304±2mm
177.8mm	169±1.5mm	234±2mm

Note: Other special specifications can be made according to customer requirements

Pascal mechanical stage collar is a cementing tool commonly used in deep Wells, exploration Wells and complex Wells. The conventional single cementing operation is replaced by a two-stage cementing operation to solve the cementing problem in the case of leakage, large cement volume and large temperature difference. It is mainly used for cementing operations in the following situations:

1.The amount of cement injection is too large;

2. The formation cannot withstand excessive liquid column pressure;

3. Containment of special formations;

4. Prevent annular air channeling after cementing;

5. The upper and lower temperature difference of sealing section is large, and the performance of cement slurry is not easy to adjust;

6. Double stage cementing for inclined and horizontal Wells.

Features and advantages:

1. The grading hoop body and the lower joint are metal to metal sealed, and there is an auxiliary rubber seal to provide sealing pressure perfection.

2. The strength of all components meets or exceeds the API standard of the corresponding casing

3. Suitable for vertical Wells or inclined Wells ≤40°;

4. The length of the design tool is short, which can effectively reduce the bending stress;

5. The internal structure design has a unique locking mechanism, air-tight sand prevention structure and anti-rotation device;

6. All accessories are made of rubber/aluminum material with good drill ability, and have a good anti-rotation mechanism, easy to drill;

Free Fall Opening

Closing Plug

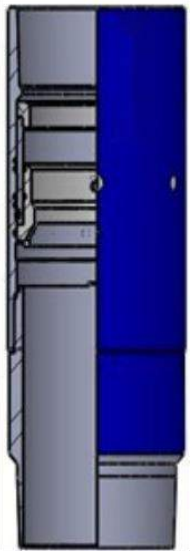
Mechanical Stage Collar

1st stage latch down wiper plug and latch-in baffle plate

The Pascal No Drill Mechanical Stage Collar has realized the No drill design on the basis of meeting the requirements of the ordinary stage collar.

Features and advantages:

1. Meet the advantages of mechanical stage collar.
2. Opening pressure is displayed at wellhead. Closing pressure. Shedding pressure, clear operating information
3. After the completion of cementing, just pressurize the wellhead, destroy the limit constraint of the bearing seat, close the rubber plug and the bearing seat fall off, and the bottom of the well where the weight falls, without drilling.



NO Drill Mechanical Stage Collar

Closing Plug

Free Fall Opening

1st stage latch down wiper plug and latch-in baffle plate

The Pascal ultra-high pressure and high temperature mechanical drill/ no-drill stage collar achieves a breakthrough design based on the common mechanical stage collar.

Features and advantages:

1. Meet all the advantages of mechanical stage collar.
2. New interior design, higher pressure bearing capacity and long-term sealing ability under high temperature environment
3. Composite sealing components resistant to high temperature and high pressure are used
4. The whole material is special metal
5. Use a variety of metal treatment processes to enhance the overall material performance.

High pressure &high temperature drill/no-drill Mechanical Stage Collar

Closing Plug

Free Fall Opening

1st stage latch down wiper plug and latch-in baffle plate

Pascal hydraulic stage collars. **Features and advantages:**

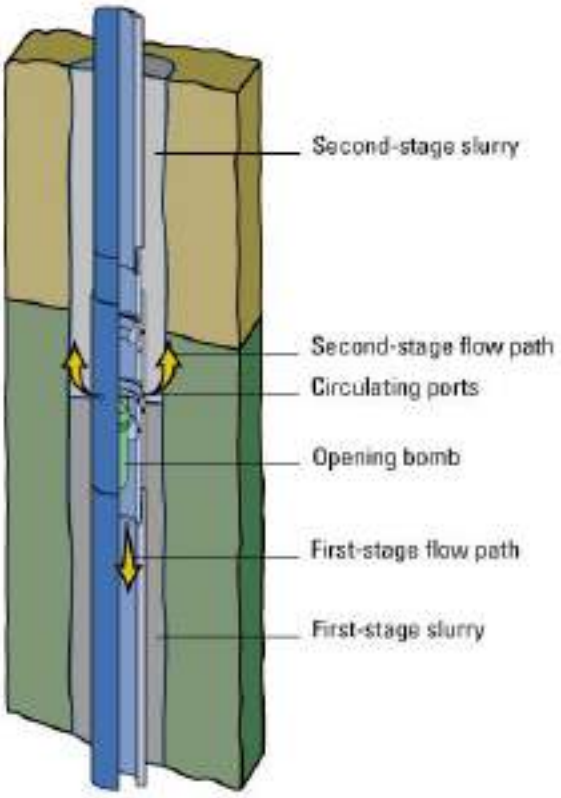
1. Can be used in horizontal and highly deviated well bores and applications where opening of the stage collar after displacement of the first stage cements required.
2. The opening pressure can be changed to allow opening of the tool through wide range of pressures.
3. The opening free fall trip device is optionally available for use if the stonerollers opened mechanically.

Hydraulic Stage Collar

The JLZX's packer type stage collar is an integrated tool of mechanical stage collar and packer. It is a special device to complete the cementing operation in two times. After the completion of the first stage cementing, the packer realizes the annular sealing.

Features and advantages:

1. The original mechanical stage collar is highly integrated with the casing external packer, simplifying the construction procedure and reducing the construction risk;
2. The packer expands independently and is not affected by the impact pressure during the primary cementing.
3. Continuous construction, no need to wait for solidification after the completion of primary cementing, continue to carry out secondary cementing operations to reduce auxiliary work to reduce costs.
4. Effective containment of special layers;
5. Prevent annular air channeling after cementing;



1st stage latch down wiper plug

Free Fall Opening

Closing Plug

Packer type Stage Collar

Pascal packer can meet the needs of various process operations and completions, and is widely used in various process measures such as interzone sealing, high pressure acidification, stratified acidification, stratified production measurement and drainage gas production, workover, casing refill and water injection mud, gravel packing, etc., as well as well completion and production, to protect oil and gas formations, prevent pollution, sand control, etc.

The packers produced by Pascal are classified according to the sealing method of the packers, which can be divided into four types: self-sealing, compression, expansion and combined:

1. Self-sealing packer: A packer that relies on the interference and working pressure difference between the outer diameter of the packer and the inner diameter of the casing to seal.
2. Compression packer: The packer that compresses the packer by axial force and makes the outer diameter of the packer larger to achieve sealing.
3. Expansion packer: A packer that relies on radial force and hydraulic pressure in the packer cavity to expand the outer parts of the seal to achieve sealing.
4. Combined packer: It is a packer that is sealed by any combination of self-sealing, compression and expansion.

Features and advantages:

1. The model type covers the needs of various sealing operations;
2. Reliable structure, simple operation, reliable setting;
3. Special high-strength slips, can withstand high bidirectional pressure difference;
4. The sealing assembly in the packer adopts special structure and material, which has good sealing property and is suitable for harsh environment;
5. The packer is designed with large diameter and inner coating to meet the normal test requirements;
6. The material can be customized to meet the operation needs in corrosive environment;

Packer