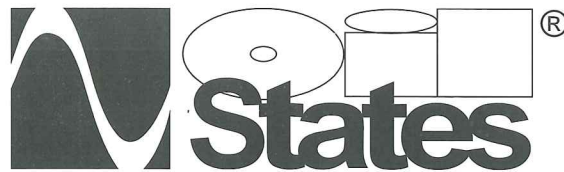
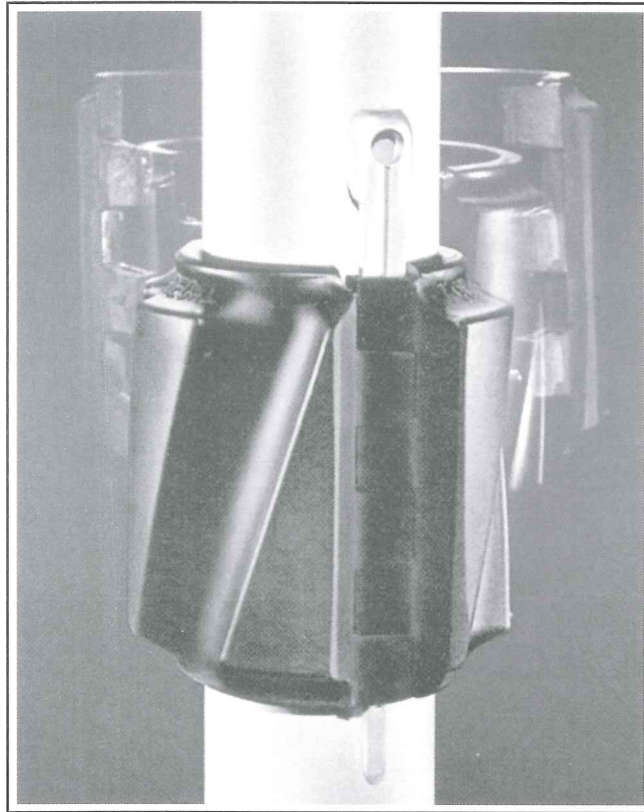


Regal Drill Pipe/ Casing Protectors



Casing, drill string protection:

A "must" today

With today's well drilling and completion costs, the useful life of downhole tubular goods must be maximized. Drill pipe must be used efficiently and with close attention paid to maintaining drill string integrity. Casing strings and liners—because they are so essential to both drilling and completion—must be kept free of damage for the life of the well.

More and more operators and drilling contractors are insisting on using extra protection to resist abrasion and other downhole tubular goods damage. Perhaps the most practical protective device for this purpose today is the combination drill pipe/casing protector. It is designed to protect the I.D. of the casing from wear caused by the drill string. It also protects tool joints from similar wear.

Regal drill pipe/casing protectors are steel-reinforced rubber pads which, when installed around drill pipe, offer an expendable downhole wear surface. The drill pipe, tool joints and casing all benefit.

Why are drill pipe/casing protectors used?

Intermediate casing strings and liners are run into the open hole and cemented to protect upper formations from production fluids and to prevent sloughing off of formations and possible contamination of water-bearing formations. No hole is perfectly straight, and the drill string will make contact with the I.D. of the casing at some point or points and cause abrasion - additionally, drill pipe "spirals" or "corkscrews" in response to torque. This causes the drill pipe to contact the casing I.D. in numerous places. Regal drill pipe/casing protectors serve to offset these wear points, offering themselves to abrasion and wear in place of the drill string and casing.

How do they work?

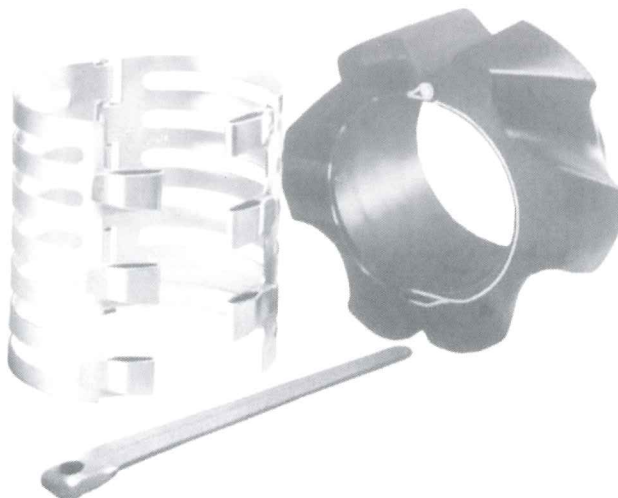
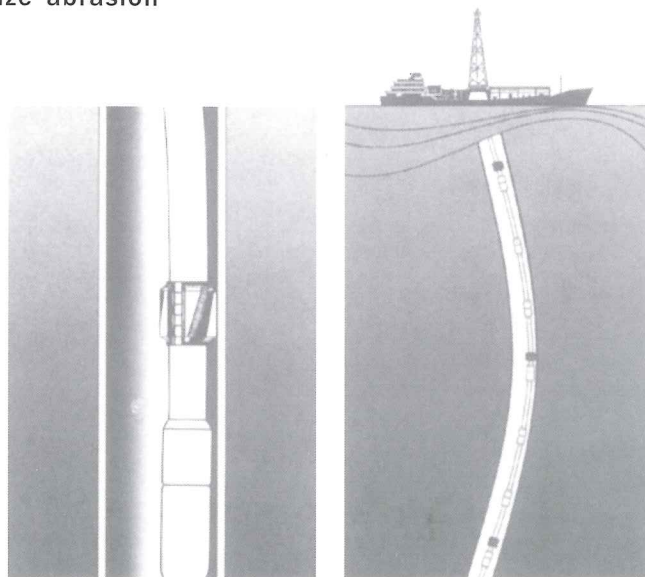
Regal drill pipe/casing protectors present a sacrificial wear surface. To be effective, they must be made of the proper rubber compound so they are not so soft as to wear away too quickly, but not so hard as to cause casing wear themselves. They must not slip once they are attached, and are designed so that they do not "ring" the drill pipe. And, of course, they should be easy to install and remove.

Where should drill pipe/casing protectors be used?

- In deviated holes: When any hole is deviated intentionally drill pipe/casing protectors should be used to lessen casing wear caused by the drill string and tool joints.
- In deep holes: When drilling deep holes, where intermediate casing strings or liners are used, drill pipe/casing protectors help minimize abrasion damage to casing.
- At fast rotary speeds: When drilling wells where rotary speeds might cause harmonic vibration, drill pipe/casing protectors should be used. Even in straight holes, drill pipe tool joints will sometimes contact casing.

Usually this kind of wear is indicated by brightly burnished tool joints on drill pipe that has not been run in the open hole below the casing.

- Under high torque: Some formations and certain drilling conditions require excessive torque for drill string rotation. When this resistance occurs near the bit, the drill pipe will tend to "corkscrew" in the hole, causing wear. Drill pipe/casing protectors minimize wear in this situation.
- Offshore: Drilling from drillships and semi-submersibles requires risers, which tend to deflect due to ocean currents and/or movement of the rig relative to the ocean floor. Drill pipe/casing protectors help guard against abrasion of the riser I.D.



Features

There are certain unique features associated with Regal drill pipe/casing protectors. They are:

1. **Hinged can:** Regal offers the hinged can and two-piece molding of the protector. The hinge makes the Regal protector the least troublesome to install and remove.

2. **Minimum rubber between can and pipe:** Because Regal protectors are locked onto the drill pipe with a long, tapered pin to provide gripping force, a minimum pad of rubber is used between can and pipe. This thin pad is less inclined to creep than thicker pads.

3. **Long tapered pin:** The Regal design allows the tapered pin to be driven into the latch mechanism, thus providing a tight, uniform load on the pipe to prevent slippage.

4. **Spiral flutes:** When clearance dictates the need for a fluted protector,

consideration must be given to the shape of the flutes. Spiral flutes create less vibration than straight axial flutes. Regal spiral flutes are designed so that as the pipe and protector rotate there is continuous contact between the protector and the casing I.D.

5. **Top and bottom tapered shoulder:** The Regal protector provides a tapered shoulder at top and bottom. This allows the compression wave in the shoulder to dissipate before it reaches the pipe. This prevents kneading of the pipe at the ends of the protector, which contributes to drill pipe ringing.

6. **Slick or fluted design:** Selection of slick or fluted protectors is largely a matter of personal preference. The fluted design of the Star King™ allows for more standoff area between drill pipe and casing. It also allows for more flow area for a given drill pipe O.D. The Slick™ design, on the other hand, causes less vibration and somewhat better casing wear protection. Either choice extends

the useful life of drill pipe and casing.

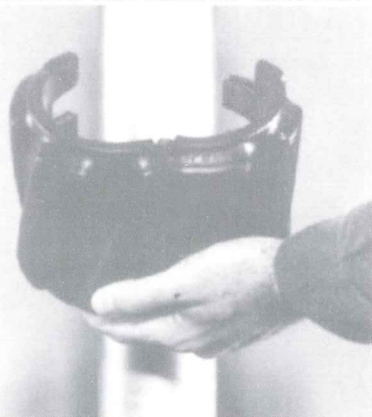
7. **Easy installation:** Regal drill pipe/casing protectors are easy to install because they are hinged, and are secured with the tapered pin. The hinge allows the protectors to be wrapped around the drill pipe easily, and driving the tapered pin into the closure eyelets clamps the protector around the drill pipe tightly. The tapered pin can be driven with a hammer and "drive it" or with an air-operated chipping-hammer and special tip available from Regal.

Regal

Quality, utility, dependability

Regal drill pipe/casing protectors are the latest of their kind in the petroleum industry; built to last, yet simple to install and remove. A proven product to extend the useful life of your drill string, casing strings and liners, Regal drill pipe/casing protectors lead the way.

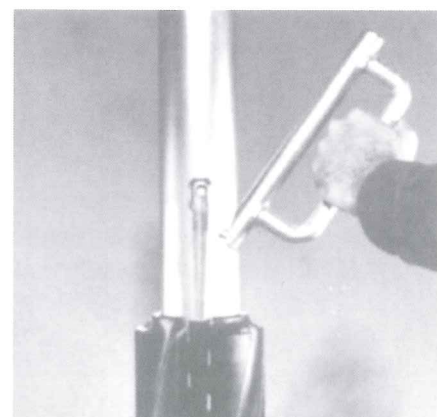
Installation and removal instructions



1. Open hinged protector and place on drill pipe.



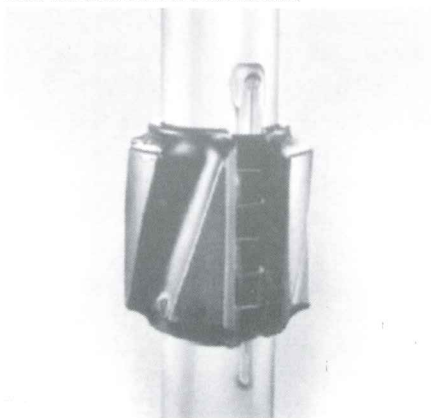
2. Close protector around pipe by hand, insert pin through top receiving slot, and push down until it is seated into second slot.



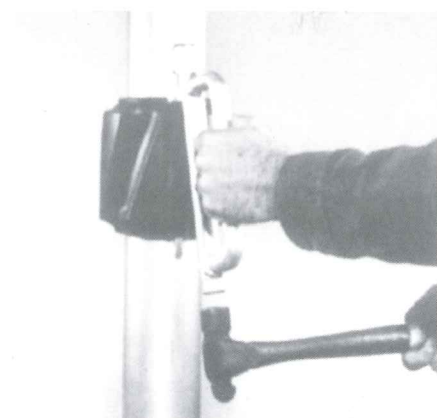
3. Place hand tool "drive it" in head of pin.



4. Drive pin through protector until it is tight on pipe. The pin will protrude one-half inch or more depending on size and wear of pipe.



5. Protector fully installed and locked on pipe.



6. Remove by applying "drive it" as shown and drive tapered pin upward until free from protector.

DRILL PIPE SIZE				2-7/8"		3-1/2"			4"		4-1/2"		5"					5-1/2"		
Bypass Area Thru Tool Joint				3.63 in²		5.67 in²			8.30 in²		11.05 in²		14.18 in²					17.93 in²		
Protector O.D.				4-9/16" F*		5-1/4" S**	5-1/2" F*	5-3/4" F*	5-5/8" S**	6-3/4" F*	6-3/4" S**	7-1/4" F*	7" S**	7-1/4" F*	7-1/4" S**	7-1/2" F*	7-1/2" S**	7-3/4" S**	8" F*	
Protector Area				13.54 in²		20.89 in²		19.02 in²	22.60 in²	22.05 in²	28.96 in²	35.42 in²	34.84 in²	37.80 in²	35.68 in²	40.22 in²	38.17 in²	42.27 in²	44.75 in²	43.12 in²
CASING DATA				BYPASS AREA																
O.D.	Wgt.	I.D.	Area																	
5½"	13.0	5.044	19.98	6.44																
	14.0	5.012	19.72	6.19																
	15.5	4.950	19.24	5.70																
	17.0	4.892	18.79	5.26																
	20.0	4.778	17.93	4.39																
6"	23.0	4.670	17.12	3.59																
	15.0	5.524	23.96	10.43																
	16.0	5.500	23.75	10.22																
	18.0	5.424	23.10	9.57																
	20.0	5.352	22.49	8.95																
6-5/8"	23.0	5.240	21.56	8.03																
	26.0	5.140	20.74	7.21																
	17.0	6.135	29.48		8.59	10.46														
	20.0	6.049	28.73		7.84	9.71														
	24.0	5.921	27.52		6.63	8.50														
7-5/8"	26.0	5.855	26.89		6.00	7.87														
	28.0	5.791	26.33		5.44	7.31														
	32.0	5.675	25.29		4.40	6.27														
	20.0	7.125	39.87		18.98	20.85	17.27	17.82												
	24.0	7.025	38.76		17.87	19.74	16.16	16.71												
8-5/8"	26.4	6.969	38.14		17.25	19.12	15.54	16.09												
	29.7	6.875	37.12		16.23	18.10	14.52	15.07												
	33.7	6.765	35.94		15.05	16.92	13.34	13.87												
	39.0	6.625	34.47		13.58	15.45	11.87	12.42												
	24.0	8.097	51.49				28.89	29.44	22.53	16.07	16.65									
9-5/8"	28.0	8.017	50.47				27.87	28.42	21.51	15.05	15.63									
	32.0	7.921	49.27				26.67	27.22	20.31	13.85	14.43									
	36.0	7.825	48.08				25.48	26.03	19.12	12.66	13.24									
	38.0	7.775	47.47				24.87	25.42	18.51	12.05	12.63									
	43.0	7.651	46.02				23.42	23.97	17.06	10.60	11.18									
10-3/4"	32.3	9.001	63.62						34.66	28.20	28.78	25.82	27.94	23.40	25.45	21.35	18.87	20.50		
	36.0	8.921	62.51						33.55	27.09	27.67	24.71	26.83	22.29	24.34	20.24	17.76	19.39		
	40.0	8.835	61.31						32.35	25.89	26.47	23.51	25.63	21.09	23.14	19.04	16.56	18.19		
	43.5	8.755	60.20						31.34	24.78	25.36	22.40	24.52	19.98	22.03	17.93	15.45	17.08		
	47.0	8.681	59.19						30.23	23.77	25.35	21.39	23.51	18.97	21.02	16.92	14.44	16.07		
10-3/4"	53.5	8.535	57.27						28.85	21.79	22.37	19.41	21.53	16.99	19.04	14.94	12.46	14.09		
	32.8	10.192	81.54									43.74	46.06	41.32	43.37	39.27	36.79	38.42		
	40.0	10.054	79.35									41.55	43.71	39.13	41.18	37.08	34.60	36.23		
	45.0	9.960	77.87									40.07	42.19	37.65	39.70	35.60	33.12	34.75		
	48.0	9.902	76.97									39.17	41.29	36.75	38.80	34.70	32.22	33.85		
	51.0	9.850	76.16									38.36	40.48	35.94	37.99	33.89	31.41	33.04		
10-3/4"	54.0	9.794	75.15									37.35	39.47	34.93	36.98	32.88	30.40	32.03		

Star King™



Part Number	Size		Item Wt. #
	Drill Pipe	Installed O.D.	
DPP-2845-F	2-7/8"	4-9/16"	3.2
DPP-3552-F	3-1/2"	5-1/4"	3.5
DPP-3557-F	3-1/2"	5-3/4"	3.9
DPP-4056-F	4"	5-5/8"	3.8
DPP-4067-F	4"	6-3/4"	4.3
DPP-4572-F	4-1/2"	7-1/4"	4.9
DPP-5072-F	5"	7-1/4"	5.8
DPP-5075-F	5"	7-1/2"	5.8
DPP-5580-F	5-1/2"	8"	6.7

Slick™



Part Number	Size		Item Wt. #
	Drill Pipe	Installed O.D.	
DPP-3552-S	3-1/2"	5-1/4"	3.4
DPP-4567-S	4-1/2"	6-3/4"	5.7
DPP-5070-S	5"	7"	5.8
DPP-5072-S	5"	7-1/4"	6.1
DPP-5075-S	5"	7-1/2"	6.9
DPP-5577-S	5-1/2"	7-3/4"	7.6



Oil States Industries, Inc.

P.O. Box 670

Arlington, Texas 76004-0670

T 817-548-4200

F 817-548-4252

www.oilstates.com