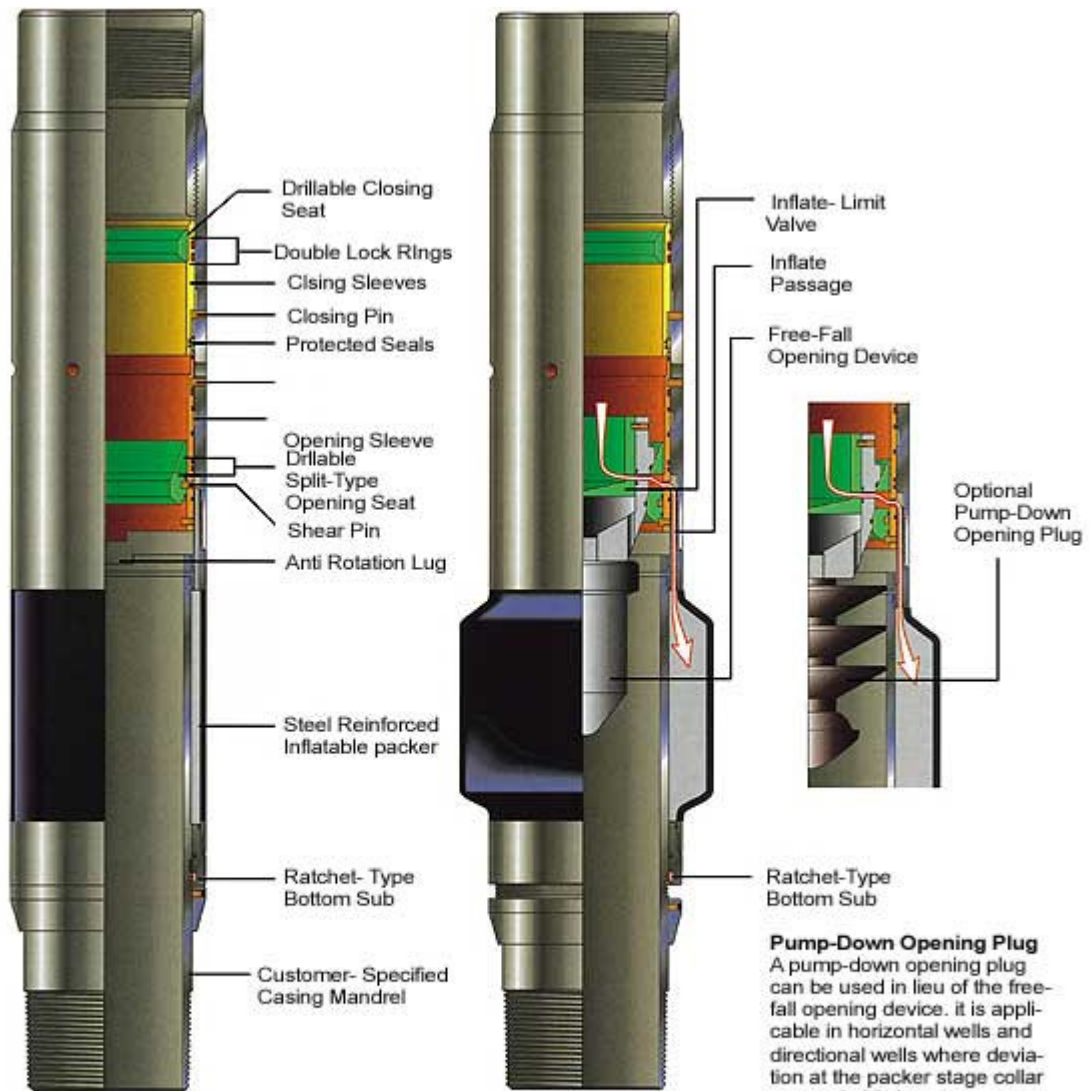




Type 778-100 PackerStage Cementing Collar*

This widely accepted Davis product combines an inflatable packer and a stage cementing collar into a singular unit. The stage collar portion of this tool uses the same sleeve and mechanical systems as the field-proven Davis Type 778 Stage Cementing Collar.

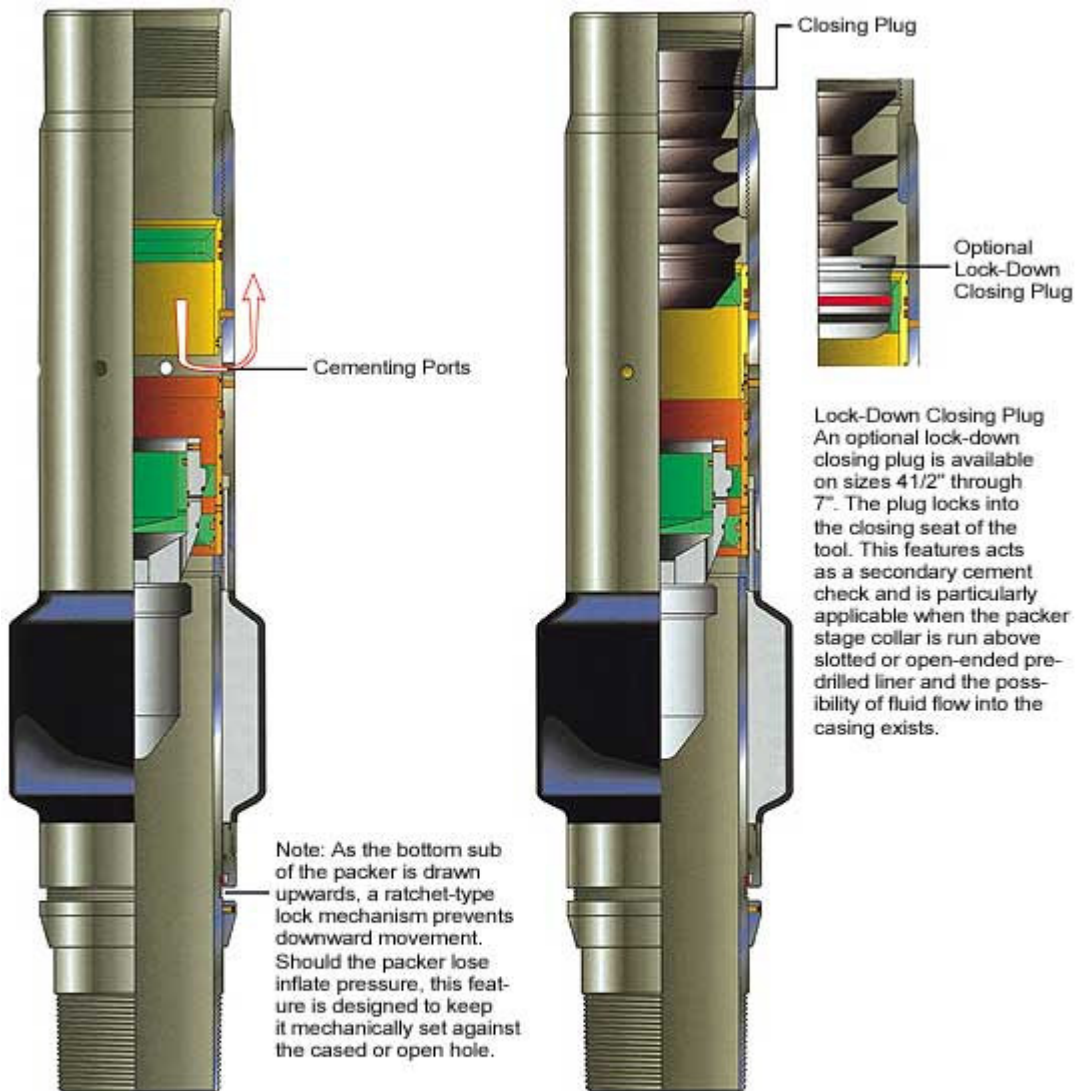


Running in Hole

Shows packer stage cementing collar in running position with opening and closing sleeves pinned in place. Lower section of split-type opening seat isolates inflation passage preventing premature inflation of the packer.

Inflating Element

The free-fall opening device enters split-type opening seat shearing the pins in the lower section. This allows lower section to move down exposing the inflatable packer element to the fluid and pressure inside the casing. Fluid enters the packer element through the double-seal in the free-fall opening device and the split-type opening seat and inflation passage in the tool body.



Opening Cement Ports

With the free-fall opening device in place, pressure applied to the casing shears the pins in the opening sleeve and moves it downward to the open and locked position. This movement seals off the inflate passage and permanently traps the correct inflate pressure in the packer. The inflate-limit valve in the free-fall opening device insures that the correct inflate pressure is achieved but never exceeded when opening tool.

Closing Cement Ports

Once cement has been displaced and the closing plug seats in the closing sleeve, additional pressure is applied to the casing. This pressure shears the pins and allows the closing sleeve to travel downward to its final closed and locked position. The pressure required to do this varies with tool size and the type of job performed.

Lock-Down Closing Plug
 An optional lock-down closing plug is available on sizes 4 1/2" through 7". The plug locks into the closing seat of the tool. This feature acts as a secondary cement check and is particularly applicable when the packer stage collar is run above slotted or open-ended pre-drilled liner and the possibility of fluid flow into the casing exists.

The packer portion of this tool uses the same element design as the field proven Davis Type 100 Integral Casing Packer. This element consists of an inner tube housed and protected by continuous, mechanically end anchored, spring steel reinforcing strips that are leafed on top of each other. These strips are encased in an oil-resistant outer rubber. Expansion is obtained by injecting fluid into the inner tube. This injection forces partial unleafing of the steel strips which in turn stretches the outer rubber until it effects a full length seal against the bore it is run in, whether cased or open hole.

While the packer is expanding, the bottom end of the element is drawn up on a ratchet type locking mechanism. This feature is intended to keep the element mechanically expanded so it can provide some form of support in the event of hydraulic failure.

Once inflation pressure is reached, simultaneous sealing of the fluid injection inlets and opening of the cementing ports occur. This action allows the immediate introduction of fluid to the annulus after the packer is set. The inflation of the packer also serves to center the tool in the well bore, leading to uniform distribution of cement as it exits the casing.

Although the combination packer stage collar serves two purposes, it is only one tool. This means that it can be serviced by one person, which eliminates the cost of the second person who would be required if a stage collar and inflatable packer were individually purchased from two separate companies.

The Davis Type 778-100 Packer Stage Cementing Collar has multiple applications. It can be used to:

- Keep the hydrostatic head of second stage cement off first-stage cement.
- Keep the hydrostatic head of second stage cement off pressure sensitive zones below it.
- Keep cement from falling around pre-drilled or slotted liners.
- Selectively place cement across widely separated zones of interest.
- Prevent gas migration that can ruin primary cement jobs and lead to annular gas problems at the surface and expensive squeeze work.

*U.S. Patent No. 5,024,273

Nominal Casing Size	Type Number 778-100	Wt. Range(Lbs)	Drill out I.D(In.)	Maximum Dia.(In.)	Opening		Closing		Opening Seat I.D(In)	Closing Seat I.D(In)	Maximum Recommended Differential Pressure (PSI) Across Packer in Various Hole Sizes (In.)						
					Pressure (PSI)	Force (Lbs.)	Pressure (PSI)	Force (Lbs.)			1000	1500	2000	2500	3000	3500	4000
					4 -1/2	450-575	9.5-13.5	3.95			5 -3/4	900	16000	1500	26000	2.75	3.125
5	500-638	11.5-15.0	4.3	6- 3/8	900	20000	1500	33000	2.75	3.25	11 -1/4	10 -3/4	10 -1/4	9 -3/4	9 -1/4	8- 3/4	8 -1/4
5 -1/2	550-700	14.0-17.0 20.0-23.0	4.892 4.658	7	1500	39,000	1500	39,000	3.438	4.062	12	11 -1/2	11	10 -1/2	10	9 -1/2	9
6 -5/8	663-800	20.0-28.0	6.030	8	900	34,000	1500	57,000	4.250	5.000	13	12 -1/2	12	11 -1/2	11	10 -1/2	10
7	700-825	23.0-26.0 29.0-35.0	6.276 6.200	8- 1/4	1500	61,000	1500	62,000	4.625	5.125	13 -1/4	12 -3/4	12 -1/4	11 -3/4	11 -1/4	10 -3/4	10 -1/4
7 -5/8	763-900	26.4-33.7	6.825	9- 1/16	900	44,000	1500	62,000	4.625	5.125	13 -1/4	12 -3/4	12 -1/4	11 -3/4	11 -1/4	10- 3/4	10 -1/4
8 -5/8	863-1025	24.0-32.0	7.98	10 -1/4	900	58,000	1500	95,000	5.750	6.75	15 -1/4	14 -3/4	14 -1/4	13 -3/4	13- 1/4	12 -3/4	12- 1/2
9 -5/8	963-1125	32.3-40.0 43.5-53.5	8.921 8.600	11 -1/4	900	70,000	1500	117,000	7,000	7.750	16 -1/4	15 -3/4	15 -1/4	14 -3/4	14 -1/4	13 -3/4	13 -1/4
10- 3/4	1075-1275	40.5-45.5 55.5-65.7	9.95 9.600	12- 3/4	800	80,000	1200	120,000	8,000	8.750	17 -3/4	17 -1/4	16 -3/4	16 -1/4	15 -3/4	15 -1/4	14 -3/4
13 -3/8	1338-1575	54.5-61.0 68.0-72.0	12.515 12.415	15 -3/4	600	89,000	1200	178,000	10.250	11.25	22 -1/4	21 -3/4	21 -1/4	19 -3/4	19 -1/4	18- 3/4	18 -1/4