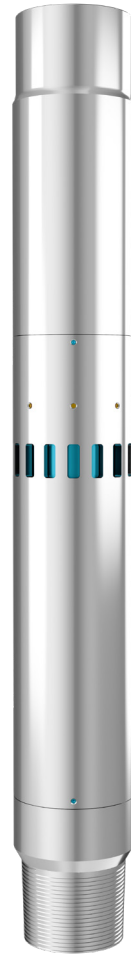


Defender

The Defender™ is a multistage frac sleeve for cemented or openhole applications and is activated by atmospheric pressure. The Defender comes in the single open (SO) configuration or with the option to close each stage individually as required mechanically (MOC). The Defender's shutoff capability makes it the sleeve of choice to eliminate water production during post-stimulation flowback.

The sleeve is ideal for straddle stimulation but can be run as a first-stage toe sleeve for ball-drop, plug-and-perf, or coiled tubing annular stimulations. The stimulation is performed down casing or by using our Cup-Cup or Cup-Packer straddle bottom-hole assemblies (BHA).



Features

- Variable activation pressures
- Activation pressure is based on absolute internal pressure
- Full-casing frac port flow area
- Each MOC type sleeve can be closed after treatment with a mechanical shifting tool.
- May be used as a multistage frac valve, or as a pressure-activated toe port
- Full-bore ID

Benefits

- Accurate initiation pressure does not rely on formation pressure
- Compatible with both cemented and open hole applications
- Can be run with hydraulically activated or swellable packers
- Unlimited number of stages

Applications

- Acid or proppant stimulations
- Single point entry completions
- High stage counts
- Formations with a high frequency of screenouts
- Formations with water shutoff concerns
- Ball-drop system toe initiation

Technical data

Defender	Sleeve Type	OD in. (mm)	ID in. (mm)	Length in. (m)	Burst psi (kPa)	Collapse psi (kPa)	Tensile lbf (daN)
450 (Slim)	MOC	5.330 (135.40)	3.930 (99.80)	40.60 (1.03)	10,000 (68,900)	10,000 (68,900)	236,200 (105,000)
450 L80 (Deep)	MOC	5.600 (142.20)	3.873 (98.40)	44.20 (1.12)	7,630 (52,600)	7,300 (50,300)	236,200 (105,000)
450 P110 (Deep)	MOC	5.600 (142.20)	3.873 (98.40)	44.20 (1.12)	10,000 (68,900)	10,000 (68,900)	258,980 (115,200)
550	MOC	7.000 (177.80)	4.930 (125.22)	40.90 (1.04)	14,038 (96,789)	10,846 (74,781)	445,335 (198,095)
7%	SO	8.250 (209.55)	6.535 (165.99)	68.70 (1.74)	10,310 (71,084)	8,591 (59,233)	757,282 (336,856)

NOTE: Length may vary.

MOC denotes multi-open close.

SO denotes single open.