

HDF Hydraulic Delay Firing Head

Provides efficient perforating and establishes underbalance before firing

APPLICATIONS

- Multizone delayed tubing-conveyed perforating (TCP)
- HPHT perforating
- Shoot-and-pull and permanent-completion perforating

BENEFITS

- Safer operation because of minimum-required firing pressure
- Rig-time savings with highly accurate underbalance control

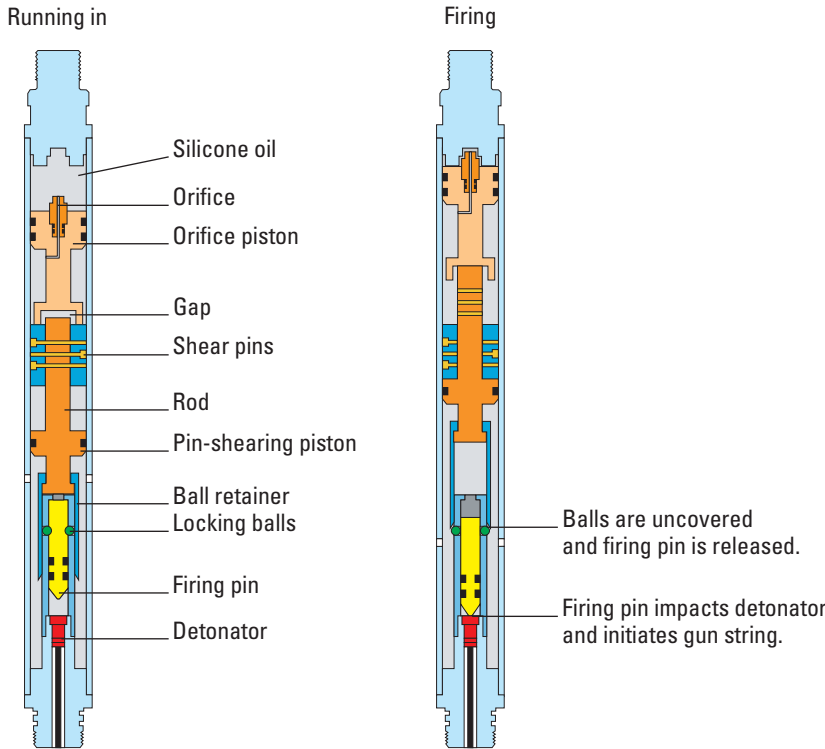
FEATURES

- Independent and sequentially operated shear pin and hydraulic sections
- Adjustable hydraulic delay for underbalance control
- Delay time variable from minutes to hours
- Single or redundant firing system
- Trigger-charge firing system modification option
- Absolute pressure triggering
- Predictable firing delay
- Safety features of all Schlumberger firing systems

The hydraulic delay firing (HDF) head is an absolute-pressure-operated firing head triggered by absolute pressure, the sum of the hydrostatic pressure and the applied pressure. When the absolute pressure exceeds a predetermined level, the activating piston is forced up, breaking the shear pins.

The HDF head is immune to wellbore fluids with high solid content and retains all safety features built into every Schlumberger firing system. The HDF head incorporates a specially designed chamber impervious to debris. Strategic placement of the ball retainer ensures proper functioning regardless of the condition of the wellbore fluid. The new design isolates the shear pins from corrosive wellbore fluid through independent and sequentially operated shear pin and hydraulic sections. Hydraulic delay cannot affect the shear-out process. An adjustable hydraulic delay provides sufficient time for bleeding off pressure, even when nitrogen gas is used, and establishes underbalance before the guns are detonated.

The HDF head is used for multizone TCP to delay firing of the guns until all firing heads in the string are activated and the cushion pressure is established. For HPHT applications, the HDF-H head provides reliable and efficient perforating systems, even in extreme conditions. When no time delay is required, the direct firing head (DFH) can be used as an alternative to the HDF. The DFH has no delay time and is suitable for extreme overbalance fracture treatment at the time of perforating.



HDF-D head for standard applications.

HDF Hydraulic Delay Firing Head

HDF Head Specifications

	HDF-D	HDF-H
OD, in [mm]	1.375 [34.9]	1.500 [38.1]
Temperature rating, [†] degF [degC]	330 [166] at 100 h 300 [149] at 200 h	460 [238] at 100 h 400 [204] at 200 h
Pressure rating, psi [MPa]	20,000 [138] at 100 h at 330 degF 20,000 [138] at 200 h at 300 degF	20,000 [138] at 100 h at 460 degF 27,000 [186] at 200 h at 400 degF
Min. operating pressure, psi [MPa]	500 [3.4]	1,000 [6.9]
Makeup length, in [cm]	54 [137]	61.6 [156]
Weight, lbm [kg]	16.6 [7.53]	19 [8.61]
Tensile strength, lbf [kN]	42,000 [187]	46,000 [205]
Service	H ₂ S	H ₂ S

[†] Max. temperature rating depends on seal package used.

Fill Sub Specifications[†]

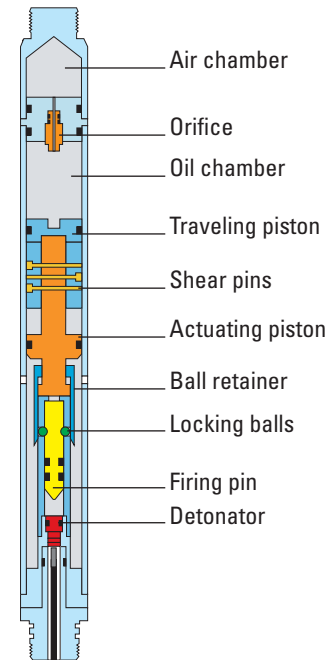
	3.06 in	3.68 in
Max. OD, in [mm]	3.08 [78.2]	3.71 [94.2]
Min. no-go ID, in [mm]	1.185 [30.1]	1.185 [30.1]
Top connection, [‡] in	2 $\frac{3}{8}$	2 $\frac{3}{8}$
Bottom connection, [§] in	2.375	3.000
Temperature rating, degF [degC]	330 [166]	330 [166]
Pressure rating, psi [MPa]	20,000 [138]	20,000 [138]
Burst pressure, psi [MPa]	18,961 [131]	12,976 [89]
Collapse pressure, psi [MPa]	16,129 [111]	11,165 [77]
Length, in [m]	71.4 [1.81]	84.5 [2.15]
Weight, lbm [kg]	76 [34]	87 [39]
Tensile strength, lbf [kN]	234,919 [1,045]	144,962 [645]
Service	H ₂ S	H ₂ S

[†] Fill sub specifications may vary depending on firing head redundancy configuration.

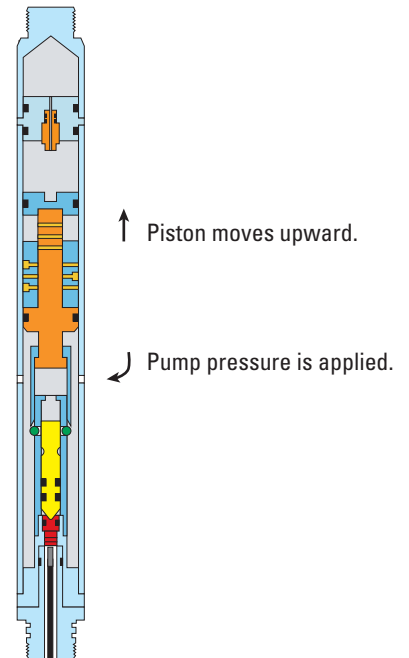
[‡] 8 RD box, EUE

[§] 6 stub acme box

Running in



Firing



HDF-H head for HPHT applications.

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