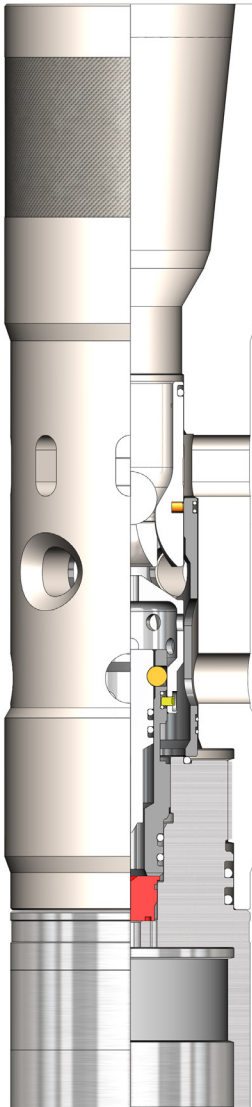


PRODUCT INFORMATION:

DESCRIPTION:



This Heavy Duty Differential Safety Firing Head was designed to be used in overbalanced tubing conveyed perforating in highly deviated wells, wells with open perforations, when achieving an absolute pressure is not possible, in a situation where it is desirable to allow the tubular to fill itself, or while tripping in the well.

This Firing Head has a set of ports to allow circulation of well fluids prior to activation. A drop ball is introduced into the work string, which conveyed the firing head down hole. The ball can be allowed to free fall or be pumped down to the differential piston. The piston is pinned to a predetermined differential pressure and, once the ball is seated, then pressure is applied against the piston and seated ball. When the piston is sheared free, it will strike the Hydro-Safety Impact assembly releasing the firing pin. In the low flow configuration, pressure can subsequently be applied to the Hydro-Safety Impact assembly to assure proper function in heavy and viscous fluid applications. This action will allow the well's hydrostatic pressure to drive the released firing pin into the detonator. Once the firing head assembly is activated a set of ports are exposed, allowing circulation of well fluids after detonation.

The standard differential piston uses a 1" ball.

The pressure piston can be differentially pinned up to 6,000 psi @ 72°F.

ADVANTAGES:

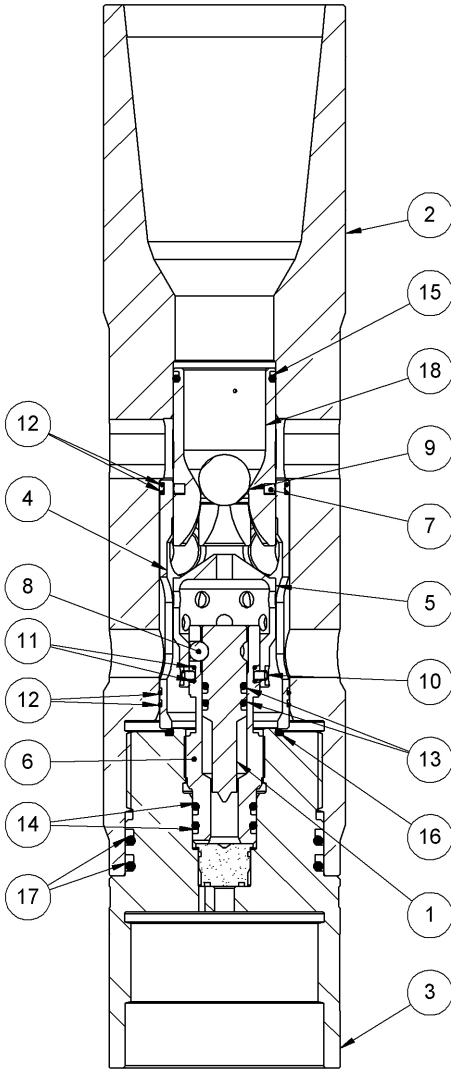
- Overbalanced Perforating in highly deviated wells with open perforations
- When achieving an absolute pressure is not possible
- When it is desirable to allow the tubing to fill itself while tripping in the well
- NC-38 (3-1/2 IF) connection strengthens and simplifies BHA
- High Shock Resistant Design for P&A application
- Suitable for heavy mud applications with low flow configuration

SPECIFICATIONS:

TOP THREAD	3-1/2 IF (NC-38) Box
O.D.	4-3/4" (120.6 mm)
OVERALL LENGTH	20-3/4" (52.7cm)
MAX TEMPERATURE <sup>1</sup>	250°F (121°C)
MIN. OPERATING HYDROSTATIC	500 psi (3.4 MPa)
MAX. OPERATING HYDROSTATIC	16,000 psi (110 MPa)
FLOW AREA PRE-FIRED	0.69 in <sup>2</sup> (4.45 cm <sup>2</sup> )
FLOW AREA POST FIRE	4.76 in <sup>2</sup> (30.7 cm <sup>2</sup> )
TENSILE STRENGTH	250,000 lbs (41981 daN)

The maximum temperature can be increased to 400°F (204°C) by substituting the 90 durometer Nitrile O-Rings with 90 durometer Viton O-Rings. Refer to the Time vs Temperature chart for Explosives to confirm any explosives requirements.

**BILL OF MATERIALS: TC-022-4750-200**



ITEM	PART NUMBER	QTY.	DESCRIPTION
-	TC-022-4750-200	-	Heavy Duty Ball Activated Differential Safety Firing Head, Low Flow
1*	TC-022-0000-800	1	Firing Pin
2	TC-022-4500-010	1	BADSFH HD Upper Housing, 4-3/4 OD, NC-38
3	TC-022-4500-011	1	Body, 4.5 OD Det. Body, Heavy Duty
4*	TC-022-4500-013	1	Shear Ring, Support Sleeve
5*	TC-022-4500-014	1	Retainer Cap, HD
6*	TC-022-4500-015	1	Housing, Firing Pin, HD
7*	SF-010-0189-045	12	Shear Pins, (Owen)
8*	ST-040-0375-000	3	Retaining Ball
9*	ST-040-1000-000	1	Drop Ball - 1" dia.
10*	PF-010-019-025B	6	Slotted Set Screw, #10-32 X 1/4" Long, Brass Shear Screw
11*	OOO-N569-024	2	O-Ring, N-90
12*	OOO-N569-035	4	O-Ring, N-90
13*	OOO-N569-208	2	O-Ring, N-90
14*	OOO-N569-214	2	O-Ring, N-90
15*	OOO-N569-224	1	O-Ring, N-90
16*	OOO-N569-226	1	O-Ring, N-90
17*	OOO-N569-341	2	O-Ring, N-90
18*	TC-022-4500-016	1	Piston, 15/16" Flow Port, Heavy Duty, Low Flow
A	Reference	1	Percussion Detonator (sold separately)
-	TC-022-4750-299	-	Redress Kit (Low Flow, 1" Ball)
-	TC-022-4750-298	-	Redress Kit (Low Flow, 1" Ball, HT)
-	TC-022-4750-399	-	Redress Kit (High Flow, 1" Ball)
-	TC-022-4750-398	-	Redress Kit (High Flow, 1" Ball, HT)
	MAN-TC-022-4750		Assembly Manual

ITEM	PART NUMBER	QTY.	DESCRIPTION
-	TC-022-4500-012	1	Piston, 15/16" Flow Port, Heavy Duty, High Flow
-	TC-022-4500-016	1	Piston, 15/16" Flow Port, Heavy Duty, Low Flow
-	TC-022-4500-021	1	Piston, 5/8" Flow Port, Heavy Duty, Low Flow
-	TC-022-4500-017	-	Shear Sleeve Installation Tool
-	TC-022-4500-020	-	Ball Seat Gage
-	TC-022-4500-022	-	Installation Tool, Firing Pin O-Ring
-	TAG-3813-415	-	Tie Down, HD Top Sub

\* Denotes parts in Redress Kits

High Temperature Kit contains Viton O-Rings.

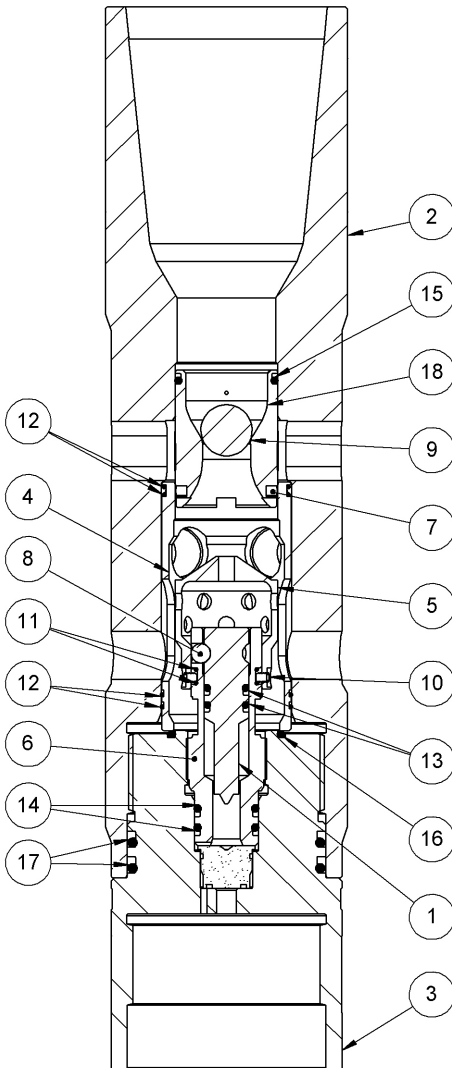


# Heavy Duty Ball Activated Differential Safety Firing Assembly

PRODUCT INFORMATION:

High Flow

## BILL OF MATERIALS: TC-022-4750-000



ITEM	PART NUMBER	QTY.	DESCRIPTION
-	TC-022-4750-000	-	Heavy Duty Ball Activated Differential Safety Firing Head, High Flow
1*	TC-022-0000-800	1	Firing Pin
2	TC-022-4500-010	1	BADSFH HD Upper Housing, 4-3/4 OD, NC-38
3	TC-022-4500-011	1	Body, 4.5 OD Det. Body, Heavy Duty
4*	TC-022-4500-013	1	Shear Ring, Support Sleeve
5*	TC-022-4500-014	1	Retainer Cap, HD
6*	TC-022-4500-015	1	Housing, Firing Pin, HD
7*	SF-010-0189-045	12	Shear Pins, (Owen)
8*	ST-040-0375-000	3	Retaining Ball
9*	ST-040-1000-000	1	Drop Ball - 1" dia.
10*	PF-010-019-025B	6	Slotted Set Screw, #10-32 X 1/4" Long, Brass Shear Screw
11*	OOO-N569-024	2	O-Ring, N-90
12*	OOO-N569-035	4	O-Ring, N-90
13*	OOO-N569-208	2	O-Ring, N-90
14*	OOO-N569-214	2	O-Ring, N-90
15*	OOO-N569-224	1	O-Ring, N-90
16*	OOO-N569-226	1	O-Ring, N-90
17*	OOO-N569-341	2	O-Ring, N-90
18*	TC-022-4500-012	1	Piston, 15/16" Flow Port, Heavy Duty, High Flow
A	Reference	1	Percussion Detonator (sold separately)
-	TC-022-4750-299	-	Redress Kit (Low Flow, 1" Ball)
-	TC-022-4750-298	-	Redress Kit (Low Flow, 1" Ball, HT)
-	TC-022-4750-399	-	Redress Kit (High Flow, 1" Ball)
-	TC-022-4750-398	-	Redress Kit (High Flow, 1" Ball, HT)
	MAN-TC-022-4750		Assembly Manual

ITEM	PART NUMBER	QTY.	DESCRIPTION
-	TC-022-4500-012	1	Piston, 15/16" Flow Port, Heavy Duty, High Flow
-	TC-022-4500-016	1	Piston, 15/16" Flow Port, Heavy Duty, Low Flow
-	TC-022-4500-021	1	Piston, 5/8" Flow Port, Heavy Duty, Low Flow
-	TC-022-4500-017	-	Shear Sleeve Installation Tool
-	TC-022-4500-020	-	Ball Seat Gage
-	TC-022-4500-022	-	Installation Tool, Firing Pin O-Ring
-	TAG-3813-415	-	Tie Down, HD Top Sub