



Absolute Pressure Firing Head with Auto Fill and Auto Vent

TC-324-2375

MAN-TC-324 (R1)

Owen Oil Tools

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Owen Oil Tools pre-assembles its tools as per the field operating manual. It is the responsibility of the purchaser to insure that this tool is assembled as required, prior to use.

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NOTE
2000 psi minimum set pressure
recommended

Description

The Absolute Pressure Firing Head with Auto Fill and Auto Vent is used in TCP applications where pressure is applied internally to the tubing string in order to detonate the perforating guns. The Absolute Pressure Firing Head with Auto Fill and Auto Vent may be converted to the Auto Fill or to the Non-Vented version with conversion kits.

Wellbore fluids are free to circulate until the ball is dropped from surface and seats in the piston. At this time, the pressure applied to the tubing string acts on a piston that is held in place by precision shear pins. These shear pins are designed to shear at a predetermined load thereby allowing the operator to accurately determine the firing pressure of the head. When activated, the firing pin drives into the percussion initiator thus detonating the gun system. Simultaneously, the automatic drain allows circulation through the tubing string.

Features and Benefits

- Compact size and rugged design make it ideal for use in horizontal or deviated wellbores
- Fits directly onto any Gun Top Sub with GO, 2.750 Acme thread connection
- Tool has connections for both 2-3/8" (60.3mm) and 2-7/8" (73mm) EUE threads
- Tool may be converted between Non-Vented, Auto Vent and Auto Fill and Auto Vent versions
- A low pressure [7,290 psi (50 200 kPa) maximum pinning pressure] and a high pressure [10,544 psi (72 700 kPa) maximum pinning

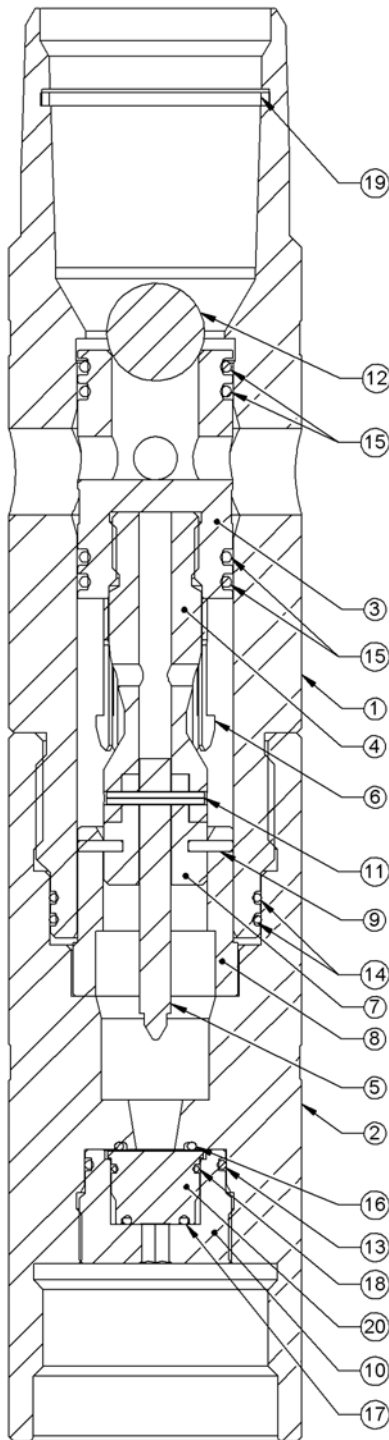
	Low Pressure		High Pressure	
Maximum OD	3.375 in	85.7 mm	3.375 in	85.7 mm
Minimum ID of Housing	1.600 in	40.6 mm	1.600 in	40.6 mm
Overall Length	16.6 in	421 mm	16.6 in	421 mm
Tensile	214,394 lb (95 367 daN)			
Maximum Temperature ¹	250° F (121° C)			
Flow Area	0.765 in ² (4.94 cm ²)			
Maximum Pressure	7,290 psi	50.2 MPa	10,544 psi	72.7 MPa
Minimum Pressure (Minimum 2 pins required)	810 psi	5.6 MPa	1,318 psi	9.1 MPa
Connections	2-3/8 in (60.3 mm) EU Box / 2-7/8 in (73.0 mm) EU Pin Up GO 2.750 Acme Box Down			
Product (with Auto Vent)	TC-323-2375-000		TC-323-2375-200	
Product (with Auto Vent and Fill)	TC-324-2375-000		TC-324-2375-200	
Product (Non-Vented)	TC-326-2375-000		TC-326-2375-200	
Redress Kit	TC-323-2375-099		TC-323-2375-299	

¹The maximum temperature can be increased to 450° (230°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

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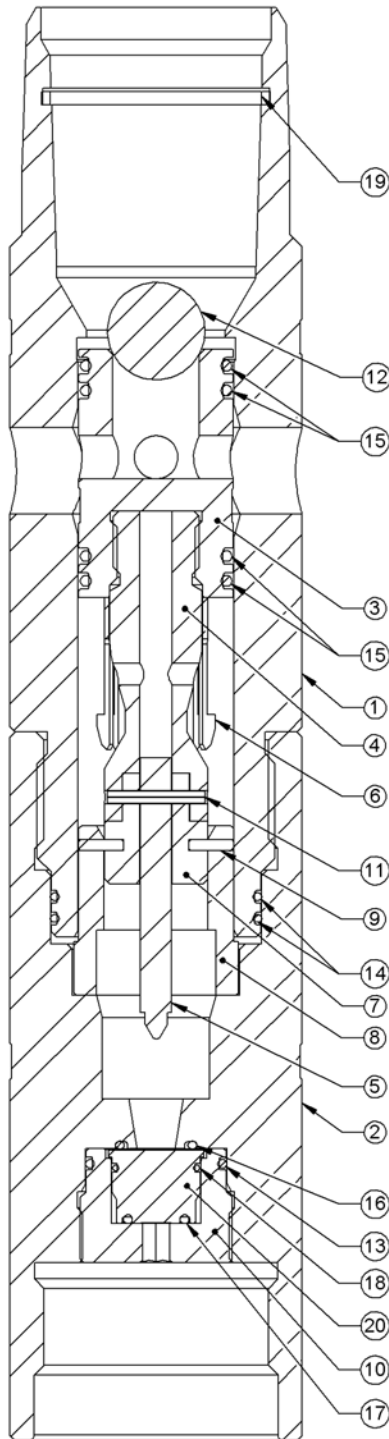
Item	Part Number	Qty	Description
--	TC-324-2375-000	--	Absolute Pressure Firing Head with Auto Fill and Auto Vent, Low Pressure
1	TC-323-0000-000	1	Upper Housing 2-3/8" Hydraulic Firing Head (vented)
2	TC-323-0001-000	1	Bottom Sub 2-3/8" Hydraulic Firing Head
3	TC-324-0000-000	1	Piston (Auto Fill and Auto Vent Applications)
4	TC-323-0003-000	1	Catch Collet Mandrel
5	TC-323-0004-000	1	Firing Pin
6	TC-323-0005-000	1	Catch Collet
7	TC-323-0006-000	1	Shear Pin Ring, Low Pressure
8	TC-323-0007-000	1	Shear Pin Collar, Low Pressure
9	SF-010-0125-051	18	Shear Pin 0.125" OD, 0.51" LG.
10	TC-011-0002-000	1	Initiator Retaining Nut
11	PF-120-0156-113H	1	Roll Pin, 0.156" OD x 1.125" LG.
12	ST-035-1125-CHR	1	Chrome Ball, 1.125" OD
13	OOO-N569-127	1	O-Ring 90 Durometer Nitrile
14	OOO-N569-140	2	O-Ring 90 Durometer Nitrile
15	OOO-N569-222	4	O-Ring 90 Durometer Nitrile
16	OOO-N569-116	1	O-Ring 90 Durometer Nitrile
17	OOO-N569-113	1	O-Ring 90 Durometer Nitrile
18	OOO-N569-020	1	O-Ring 90 Durometer Nitrile
19	MI-305-2375-000	1	2-3/8" EUE API Seal Ring
20	Reference	1	Percussion Detonator
--	MAN-TC-324	--	Assembly Manual
--	TC-323-2375-099	--	Re-dress Kit for Absolute Firing Head

Item	Part Number	Qty	Description
--	TC-324-2375-099	--	Absolute Pressure Firing Head with Auto Fill and Auto Vent Redress Kit, Low Pressure
4	TC-323-0003-000	1	Catch Collet Mandrel
5	TC-323-0004-000	1	Firing Pin
6	TC-323-0005-000	1	Catch Collet
7	TC-323-0006-000	1	Shear Pin Ring, Low Pressure
8	TC-323-0007-000	1	Shear Pin Collar, Low Pressure
9	SF-010-0125-051	18	Shear Pin 0.125" OD, 0.51" LG.
11	PF-120-0156-113H	1	Roll Pin, 0.156" OD x 1.125" LG.
12	ST-035-1125-CHR	1	Chrome Ball, 1.125" OD
13	OOO-N569-127	1	O-Ring 90 Durometer Nitrile
	OOO-N569-125*	1	O-Ring 90 Durometer Nitrile*
14	OOO-N569-140	2	O-Ring 90 Durometer Nitrile
15	OOO-N569-222	4	O-Ring 90 Durometer Nitrile
16	OOO-N569-116	1	O-Ring 90 Durometer Nitrile
17	OOO-N569-113	1	O-Ring 90 Durometer Nitrile
18	OOO-N569-020	1	O-Ring 90 Durometer Nitrile
19	MI-305-2375-000	1	2-3/8" EUE API Seal Ring

To convert from TC-324-2375-000 to TC-323-2375-000 replace Item #3 with TC-323-0002-000 and remove ST-035-1125-CHR

To convert from TC-324-2375-000 to TC-326-2375-000 replace Item #1 with TC-326-0000-000; Item #3 with TC-323-0002-000 and remove ST-035-1125-CHR

*Item 13, OOO-N569-125 is used with Initiator Retaining nut 4000060-0002 which is used in the legacy Firing Head



Item	Part Number	Qty	Description
--	TC-324-2375-200	--	Absolute Pressure Firing Head with Auto Fill and Auto Vent, High Pressure
1	TC-323-0000-000	1	Upper Housing 2-3/8" Hydraulic Firing Head (vented)
2	TC-323-0001-000	1	Bottom Sub 2-3/8" Hydraulic Firing Head
3	TC-324-0000-000	1	Piston (Auto Fill and Auto Vent Applications)
4	TC-323-0003-000	1	Catch Collet Mandrel
5	TC-323-0004-000	1	Firing Pin
6	TC-323-0005-000	1	Catch Collet
7	TC-323-0006-200	1	Shear Pin Ring, High Pressure
8	TC-323-0007-200	1	Shear Pin Collar, High Pressure
9	SF-010-0156-051	16	Shear Pin 0.156" OD, 0.51" LG.
10	TC-011-0002-000	1	Initiator Retaining Nut
11	PF-120-0156-113H	1	Roll Pin, 0.156" OD x 1.125" LG.
12	ST-035-1125-CHR	1	Chrome Ball, 1.125" OD
13	OOO-N569-127	1	O-Ring 90 Durometer Nitrile
14	OOO-N569-140	2	O-Ring 90 Durometer Nitrile
15	OOO-N569-222	4	O-Ring 90 Durometer Nitrile
16	OOO-N569-116	1	O-Ring 90 Durometer Nitrile
17	OOO-N569-113	1	O-Ring 90 Durometer Nitrile
18	OOO-N569-020	1	O-Ring 90 Durometer Nitrile
19	MI-305-2375-000	1	2-3/8" EUE API Seal Ring
20	Reference	1	Percussion Detonator
--	MAN-TC-324	--	Assembly Manual
--	TC-323-2375-299	--	Re-dress Kit for Absolute Firing Head

Item	Part Number	Qty	Description
--	TC-324-2375-299	--	Absolute Pressure Firing Head with Auto Fill and Auto Vent Redress Kit, High Pressure
4	TC-323-0003-000	1	Catch Collet Mandrel
5	TC-323-0004-000	1	Firing Pin
6	TC-323-0005-000	1	Catch Collet
7	TC-323-0006-200	1	Shear Pin Ring, High Pressure
8	TC-323-0007-200	1	Shear Pin Collar, High Pressure
9	SF-010-0156-051	18	Shear Pin 0.156" OD, 0.51" LG.
11	PF-120-0156-113H	1	Roll Pin, 0.156" OD x 1.125" LG.
12	ST-035-1125-CHR	1	Chrome Ball, 1.125" OD
13	OOO-N569-127	1	O-Ring 90 Durometer Nitrile
	OOO-N569-125*	1	O-Ring 90 Durometer Nitrile*
14	OOO-N569-140	2	O-Ring 90 Durometer Nitrile
15	OOO-N569-222	4	O-Ring 90 Durometer Nitrile
16	OOO-N569-116	1	O-Ring 90 Durometer Nitrile
17	OOO-N569-113	1	O-Ring 90 Durometer Nitrile
18	OOO-N569-020	1	O-Ring 90 Durometer Nitrile
19	MI-305-2375-000	1	2-3/8" EUE API Seal Ring

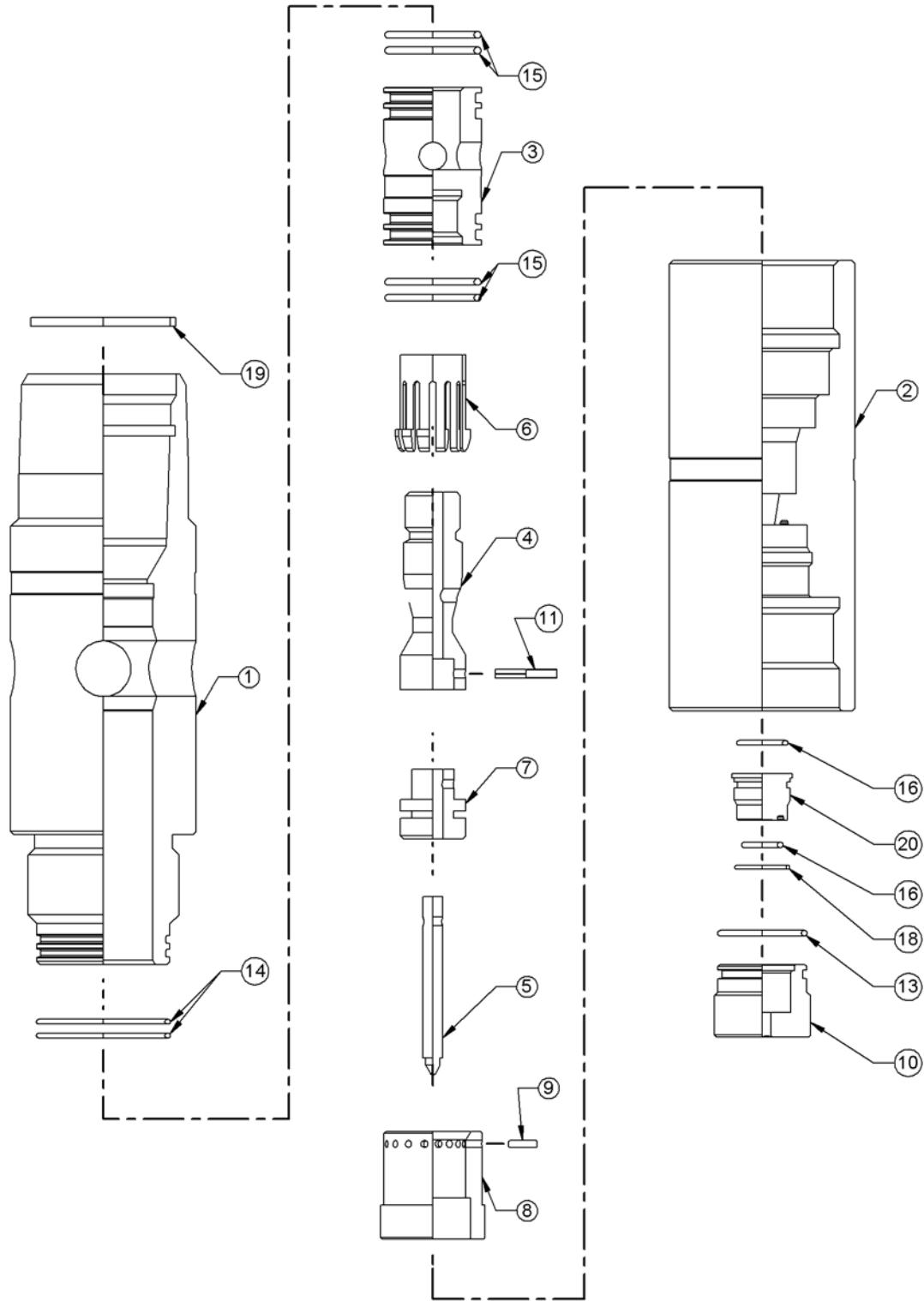
To convert from TC-324-2375-200 to TC-323-2375-200 replace Item #3 with TC-323-0002-000 and remove ST-035-1125-CHR

To convert from TC-324-2375-200 to TC-326-2375-200 replace Item #1 with TC-326-0000-000; Item #3 with TC-323-0002-000 and remove ST-035-1125-CHR

*Item 13, OOO-N569-125 is used with Initiator Retaining nut 400060-0002 which is used in the legacy Firing Head

Absolute Pressure Firing Head
with Auto Fill and Auto Vent

MAN-TC-324

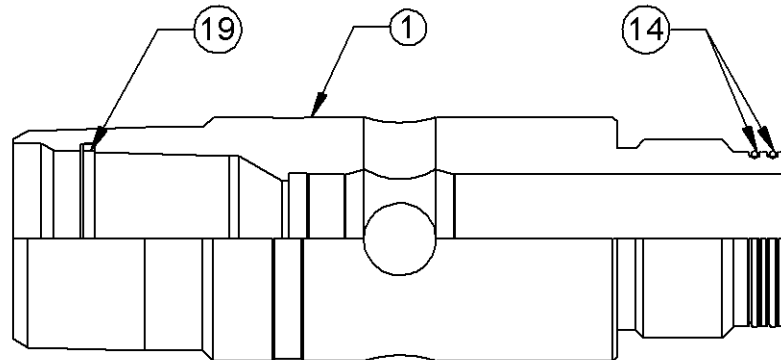




For Assembly refer to Exploded View on Page 6

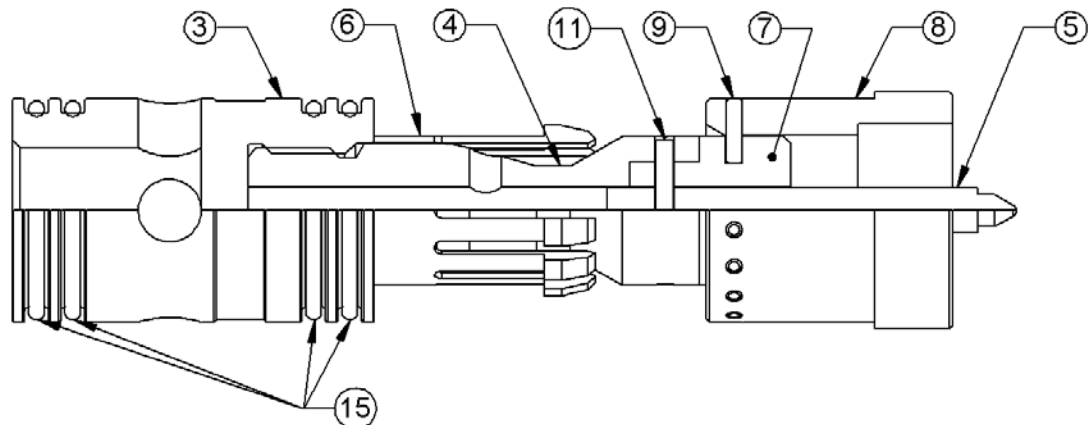
Step 1

Apply a film of grease onto the O-rings (item 14) and install onto upper housing (item 1). Install the seal ring (item 19) into the upper housing.



Step 2

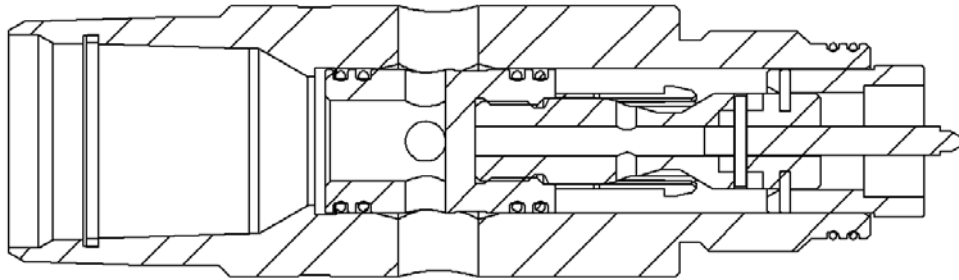
Apply a film of grease on the O-rings (item 15) and install four onto the piston (item 3). Slide catch collet (item 6) over catch collet mandrel (item 4). Thread catch collet mandrel into piston (item 3). Slide shear pin ring (item 7) into catch collet mandrel followed by firing pin (item 5) and line up holes. Insert roll pin (item 11) into hole to connect the three pieces. Slide shear pin collar (item 8) over shear pin ring, lining up holes in collar with groove in ring. Install correct number of shear pins (item 9) spacing evenly around ring.



Step 3

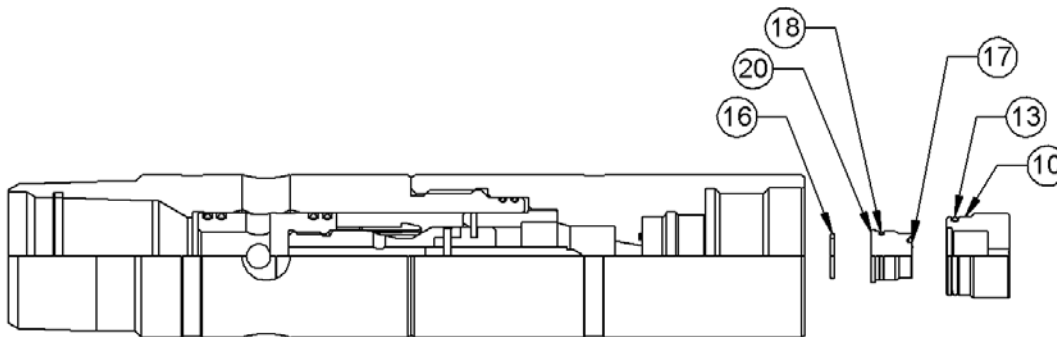
Slide shear pin collar (item 8) over the shear pin ring (item 7). Line up the grooves and the shear ring holes and install the correct number of shear pins (item 9) spaced evenly around ring. The correct number of pins are determined by well conditions.

Step 4



Install bottom sub (item 1) onto upper housing (item 2).

Installation of Initiator and Initiator Retaining Nut



Step 5

Warning

In order to Maximize Safety, it is proper practice to install the Initiator in the field just prior to running the firing head in the well. Ensure the Perforating Gun is configured so the top shot is below the rig floor when installing the firing head.

Lightly grease all O-rings (items 13, 16, 17 and 18). Install O-ring (item 16) into the bottom sub (item 1). Install O-rings (17 and 18) onto the CP Initiator (item 20). Install O-ring (item 13) onto the retainer nut (item 10). Lightly coat the outside and inside seal bore of the retainer nut with grease.

Caution

Install CP Initiator by hand with gentle pressure. DO NOT use any pointed device to push the Initiator into the retaining nut as it may cause detonation and serious injury.

Install the CP Initiator (item 20) into the retainer nut (item 10) by carefully pressing it by hand until it is flush with the retainer nut. Install the retainer nut with CP Initiator into the bottom sub (item 1) with an allen wrench until it is flush with bottom sub internal face.

The Owen Oil Tools Absolute Pressure Firing Head is now assembled and ready to install on the gun top sub. Install the correct O-rings on the top sub as well as thread lubricant and tighten the firing head onto the gun string. Once tight, lower the tubing string onto the firing head in preparation for the connection make up. Apply thread compound to pin and insert into the upper housing then make up the connection.



Pinning Procedures
Imperial Calculations

Step 1 (Data)

- A. True Vertical Depth (TVD) _____ ft
- B. Maximum fluid weight in well when tripping _____ ppg (lb/gal) (Annulus)
- C. Fluid Weight in tubing when ready to fire _____ ppg (lb/gal)

Step 2 (Calculate Pressures)

- D. Maximum Hydrostatic at depth
($0.05195 * A * B$) = _____ psi
- E. Tubing hydrostatic when ready to fire
($0.05195 * A * C$) = _____ psi
- F. Greater of D or E _____ psi
- G. Absolute Firing Pressure
($F + 2000$ psi (minimum safety factor)) = _____ psi

Step 3 (Calculate number of pins)

- H. Shear Pin Rating
(405 psi Low Pressure, 659 kPa High Pressure) _____ psi
- I. Number of Pins
(G / H) = _____
- J. Roundup I = _____

Step 4 (Calculate Nominal Absolute Firing Pressure)

- K. Activation Pressure @ Firing Head
($J * H$) = _____ psi

Step 5 (Calculate pressure tolerance)

- L. Tolerance ($K * 0.05$) = _____ psi

Step 6 (Calculate surface pressure) - Pressure applied on tubing

- M. Nominal pressure ($K - E$) = _____ psi
- N. Maximum pressure ($M + L$) = _____ psi
- O. Minimum pressure ($M - L$) = _____ psi

Pinning Procedures
Metric Calculations

Step 1 (Data)

- A. True Vertical Depth (TVD) _____ m
- B. Maximum fluid weight in well when tripping _____ kg/m³
- C. Fluid Weight in tubing when ready to fire _____ kg/m³

Step 2 (Calculate Pressures)

- D. Maximum Hydrostatic at depth
($0.0098 * A * B$) = _____ kPa
- E. Tubing hydrostatic when ready to fire
($0.0098 * A * B$) = _____ kPa
- F. Greater of D or E _____ kPa
- G. Absolute Firing Pressure
($F + 14000$ kPa (minimum safety factor)) = _____ kPa

Step 3 (Calculate number of pins)

- H. Shear Pin Rating
(2792 kPa Low Pressure, 4544 kPa High Pressure) _____ kPa
- I. Number of Pins
(G / H) = _____
- J. Roundup I = _____

Step 4 (Calculate nominal absolute firing pressure)

- K. Activation $J * H$ = _____ kPa pressure @ Firing Head

Step 5 (Calculate pressure tolerance)

- L. Tolerance ($K * 0.05$) = _____ kPa

Step 6 (Calculate surface pressure) - Pressure applied on tubing.

- M. Nominal pressure ($K - E$) = _____ kPa
- N. Maximum pressure ($M + L$) = _____ kPa
- O. Minimum pressure ($M - L$) = _____ kPa