

Windchill No.:	00795674
Legacy No.:	572-4500-000-034
Revision / Date:	F / 18-07-08
ECN No.:	55221

## ***4-1/2" Axial Compliant Expander Tool, 4.75" O.D.***

The Axial Compliant Expansion (ACE™) System offers single trip, compliant EST® expansion, with low axial force requirements.

The expansion tool consists of two sections, a fixed roller nose to initiate expansion and compliant rollers to finish off the process.

The tool is compliant in that the pistons can extend/retract if an increased/decreased hole diameter is encountered. This allows the EST® to expand fully to give improved wellbore contact, thus providing improved hole support and eliminating any micro-annulus.

Activation of the compliant roller / travelling piston assemblies is achieved by generation of a backpressure within the ACE tool. This backpressure is a result of flow through an integral drill-bit jetting nozzle directly at the bottom of the tool nose section.

### ***Features***

- Compliant expansion system
- Top down expansion
- Retrievable system
- Field Redressable tool
- Low axial expansion force

### ***Benefits***

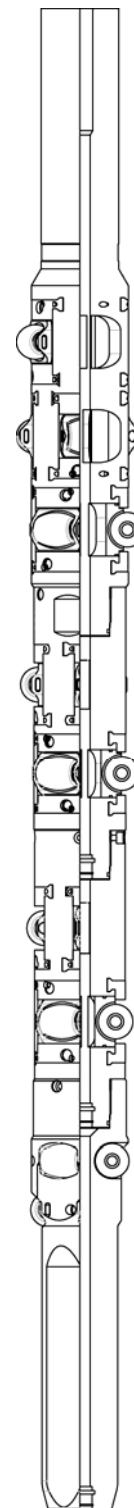
- Compliant EST® expansion for improved wellbore contact
- Single trip system
- Allows access through restricted I.D.'s

### ***Applications***

For use with 4-1/2" EST® products in both cased and open hole applications. The Tools compliant nature compensates for borehole irregularities and as such is well suited to non-uniform hole sections. Low force requirements allow operation in highly deviated/tortuous/horizontal applications.

***See Applications Matrix on following page***

EST <sup>®</sup> Size	Min. Tool O.D.	Max. Operating Tool O.D.	Operating Pressures	Expansion Speed
4-1/2"	4.75"	6.15"	1500 psi	10 ft/min (max)



Prepared By :	watsonkx
Approved By :	clarkmx

## Applications Matrix

The table below provides guidelines for applications which the 4-1/2" ESS ACE tools are suitable for. Reference should be made to this prior to running any variation of the tool.

Application			Current 4-1/2" ACE (Pt No. 572-4500-000-033) (4.5" Body OD / 6.5" Exp OD)			Current 4-1/2" ACE (Pt No. 572-4500-000-034) (4.75" Body OD / 6.775" Exp OD)		
OH / CH	ID (Inches)	Drift (Inches)	Expansion Clearance (Inches)	Over Range Compliance (Inches)	Suitable	Expansion Clearance (Inches)	Over Range Compliance (Inches)	Suitable
CH 7" 23#	6.366	6.241	0.511	0.134	Y	0.261	0.409	Y
CH 7" 26#	6.276	6.151	0.421	0.224	Y	0.171	0.499	Y
CH 7" 29#	6.184	6.059	0.329	0.316	Y	0.079	0.591	B
CH 7" 32#	6.094	5.969	0.239	0.406	Y	-0.011	0.681	N
CH 7 5/8" 29.7#	6.875	6.750	1.020	-0.375	N *	0.770	-0.100	B *
CH 7 5/8" 33.7#	6.765	6.640	0.910	-0.265	N	0.660	0.010	Y
CH 7 5/8" 39#	6.625	6.500	0.770	-0.125	N	0.520	0.150	Y
CH 7 5/8" 47#	6.375	6.250	0.520	0.125	Y	0.270	0.400	Y
OH 6"	6.000		1.270	0.500	Y	0.020	0.775	N
OH 6-1/8"	6.125		1.395	0.375	Y	0.145	0.650	B
OH 6-1/2"	6.500		1.770	0.000	B	0.520	0.275	Y

**Key**

Y=Yes

N=No

B=Borderline (Not preferred)

\* Where a requirement has been identified, or exists, for 4-1/2" ESS inside 7-5/8" 29.7# Casing, the Expandable Completions Product Line should be contacted for advice.

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### *Technical Introduction*

<b>Assembly Number:</b>	572-4500-000-034
<b>Body Material:</b>	AISI 4145 / AISI 4140
<b>Expansion Rollers Material:</b>	S7 Tool Steel
<b>Body Coatings:</b>	Q.P.Q.
<b>Make-up Connection:</b>	2-7/8" API REG Box-up
<b>Make-up Torque (ft-lb.):</b>	Min. / Opt. / Max.;
	6,000                      6,500
<b>Body Interface Connection:</b>	3" 8TPI Stub Acme

### *Associated Parts*

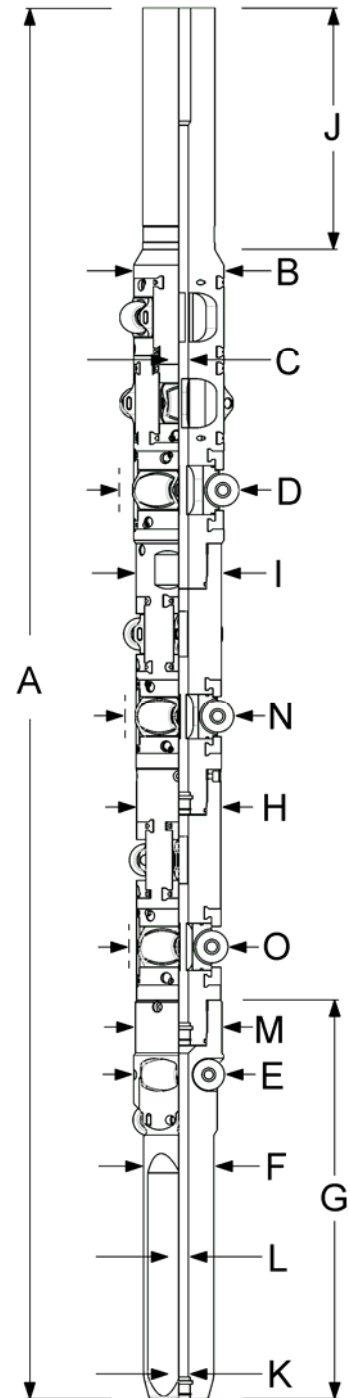
<b>Redress Kit:</b>	572-4500-090-033 / 00795796
<b>Conversion Kit:</b>	572-4500-000-030 / 00380520 (Note: Converts this 4.75" OD Tool to 4.50" OD Tool)
	572-4500-000-031 / 00410082 (Note: Converts the 4.5" OD Tool to this 4.75" OD Tool)

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**Technical Illustration & Dimensional Data**

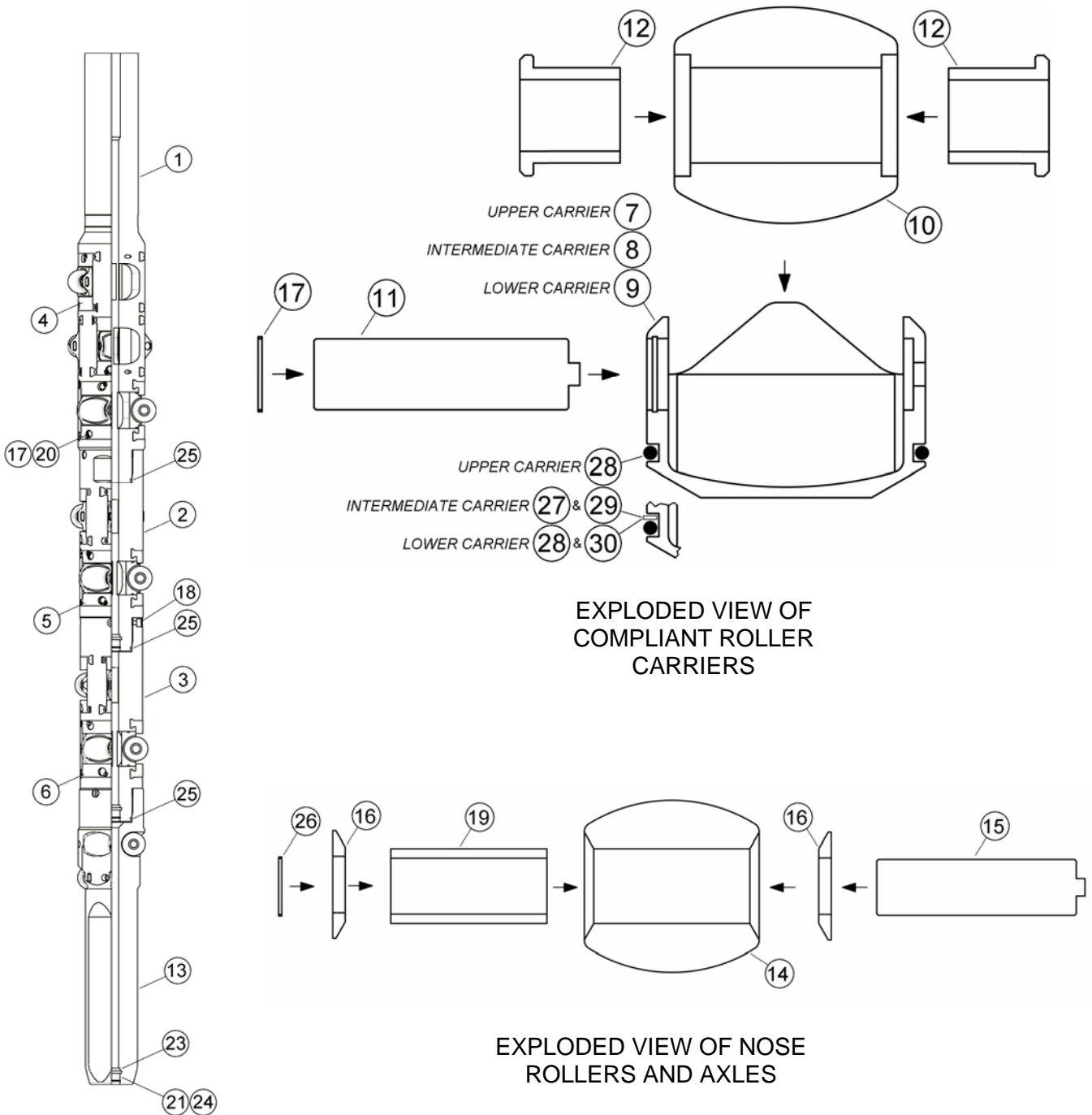
Dimension	Description	Size	
		mm	Inches
A	Overall Length	1841.5	72.500
B	Body O.D.	119.1	4.689
C	Min Body I.D.	25.4	1.000
D	Rear Rollers O.D. (Out)	156.2	6.150
E	Max Nose Rollers O.D.	120.6	4.748
F	Nose O.D.	93.0	3.661
G	Nose Length	525.0	20.669
H	Mid Body O.D. (Lower)	111.1	4.374
I	Mid Body O.D. (Upper)	112.8	4.441
J	Tong Area Length	320.0	12.598
K	Nozzle I.D.	8.7	0.344
L	Nose I.D.	25.4	1.000
M	Roller Nose Body O.D.	119.1	4.689
N	Upper Mid Roller OD (Out)	145.3	5.720
O	Lower Mid Roller OD (Out)	130.2	5.125



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*Assembly Drawing*



OVERALL ASSEMBLY

Expandable Sand Screens

Prepared By :	watsonkx
Approved By :	clarkmx

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## Assembly List

Item	Qty	Description	Legacy P/No.	Windchill P/No.	Materials	Part of Redress Kit
1	1	UPPER COMPLIANT BODY	572-4500-064-412	00323416	AISI 4145	
2	1	INTERMEDIATE COMPLIANT BODY	572-4500-065-412	00344188	AISI 4145	
3	1	LOWER COMPLIANT BODY	572-4500-095-412	00455488	AISI 4145	
4	18	UPPER RETAINER PLATE	572-4500-100-412	00410084	AISI 4145	
5	12	INTERMEDIATE RETAINER PLATE	572-4500-093-412	00455486	AISI 4145	
6	12	LOWER RETAINER PLATE	572-4500-092-412	00438346	AISI 4145	
7	9	UPPER ROLLER CARRIER	572-4500-109-412	00795185	AISI 4145	
8	6	INTERMEDIATE ROLLER CARRIER	572-4500-112-412	00795583	AISI 4145	
9	6	LOWER ROLLER CARRIER	572-4500-113-412	00795584	AISI 4145	
10	21	COMPLIANT ROLLER	572-4500-114-811	00871808	S7 Tool Steel	
11	21	AXLE F/ COMPLIANT SECTION	572-4500-107-831	00783106	Maraging St.	
12	42	TOUGHMET SUPPORT WASHER	572-4500-117-135	00872263	Toughmet	
13	1	ROLLER NOSE BODY	572-4500-099-412	00410083	AISI 4145	
14	6	NOSE ROLLERS	572-4500-052-079	00344184	S7 Tool Steel	
15	6	ROLLER NOSE AXLE	572-4500-108-831	00783104	Maraging St.	
16	12	TOUGHMET SUPPORT WASHER	572-4500-102-135	00381039	Toughmet	
17	75	BASIC INTERNAL CIRCLIP (SIZE 014)	MC-564	00323025	-	✓
18	12	M8x1.25mm PITCH Skt Head Cap Screw	MC-744	00383056		✓
19	6	ONE PIECE TOUGHMET BEARING	572-4500-085-135	00414934	Toughmet	
20	42	1/4" UNC SHOULDER Scw	572-0000-009-461	00745029		✓
21	1	1 1/32" JET NOZZLE	MC-451	00177640	-	✓
22	1	7/8" BALL	SB-030	00455543	Steel	✓
23	1	O-RING 217 (V75)	OV-217-075	00177598	Viton 75	✓
24	1	CIRCLIP F/NOZZLE	572-0000-003-XXX	00323338	-	✓
25	3	O-RING 231 (V75)	OV-231-075	00323161	Viton 75	✓
26	6	CIRCLIP F/12mm AXLE	572-0000-002-XXX	00344104	-	✓
27	6	O-RING 229	768836	00768836	HNBR 90	✓
28	15	O-RING 230	768871	00768871	HNBR 90	✓
29	6	Parpak Ring 229 WE-122	PB-229-N90	00323225	NBR 90	✓
30	6	Parpak Ring 230 WE-122	PB-230-N90	00323226	NBR 90	✓
31	1	JetLube Grease (not shown)	797126	00797126	-	✓

Item 22, Ball, Loose item for Pre-Expansion Pressure Test.

## **Redress Kit Assembly No.: 572-4500-090-033 / 00795796**

Expandable Sand Screens

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Approved By :	clarkmx

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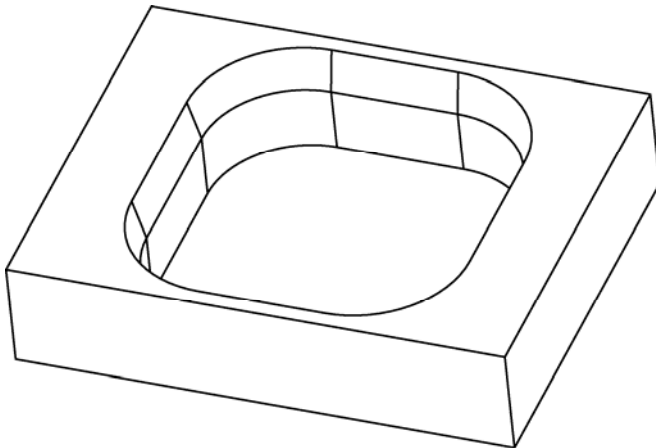
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*Carrier Assembly Guide Plates*



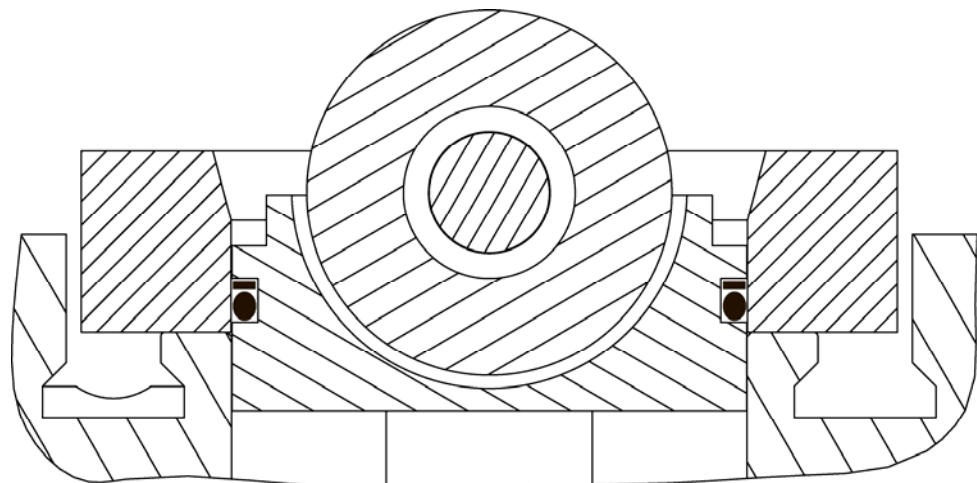
Typical Carrier Assembly Guide

4.5" ACE Tool

Upper Body Guide P/No.; 572-4500-103-412 / 00725691

Intermediate Body Guide P/No.; 572-4500-104-412 / 00725697

Lower Body Guide P/No.; 572-4500-105-412 / 00725698



Typical Cross-Section through  
Tool Body, Carrier Sub-Assy and Carrier Assembly Guide

Expandable Sand Screens

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## *Assembly Instructions*

### Tool Assembly

ACE Tools must be assembled using the recommended Grease on both Carriers and Pockets. Refer to PLB ESS-061. The Grease is Jet Lube Alco EP 73 Plus (JDE p/no. 00797126) and is part of the Redress Kit.

### Tools Required

Internal Circlip Pliers  
 6mm Allen Key  
 5/32" Allen Key  
 Soft Mallet (Hide or similar)  
 Hammer  
 Small punch (< 6mm dia.)  
 Medium punch (13mm – 17mm dia.)  
 Light Emery paper

- 1) Apply a thin smear of grease to I.D. of Roller (*Item 10*). Insert Toughmet bearing (*Item 12*) into Roller, one each side, as shown on Assembly Drawing.
- 2) Install Roller Assembly into Upper Roller Carrier (*Item 7*).
- 3) Lightly grease Axle (*Item 11*) and insert through Carrier and Roller Assembly. Line up rectangular spigot on Axle with mating hole in Carrier and secure in place with Circlip (*Item 17*).
- 4) Lightly grease O-ring groove and install O-ring 230 (*Item 28*) around Carrier.
- 5) Repeat steps (1) to (5) for remaining eight Upper Roller Carriers.
- 6) Secure Upper Body (*Item 1*) in vice and rub down all pockets and pocket edges with light emery paper to ensure all surfaces are smooth and clean.
- 7) Ensuring all debris is clear, lightly grease all pockets in the Main Body.
- 8) Using the Assembly Plate, as shown on Page 7, install the Roller Carrier Assemblies into the Body by light tapping with soft Mallet (hide or similar). Observe pocket area carefully after Carrier has been installed to ensure no signs of O-ring damage are visible.
- 9) Lightly grease lower sides of Upper Retainer Plate (*Item 4*), and slide into retainer slot on body.
- 10) Thread Retainer screw (*Item 20*) into Retainer hole using 5/32" Allen Key to secure plate, and insert Circlip (*Item 17*) into groove in plate to secure Retainer screw.
- 11) Repeat steps (10) and (11) for second Upper Retainer Plate.
- 12) Repeat steps (9) to (12) for remaining eight pockets in Upper Body.
- 13) Lightly grease O-ring groove and install O-ring (*Item 25*) onto the Upper Body.
- 14) Apply Copaslip onto threads and thread Intermediate Body (*Item 2*) onto Upper Body.
- 15) Insert four Socket Head Cap Screws (*Item 18*) into Intermediate Body using 6mm Allen Key and retain them with Circlips (*Item 17*).
- 16) The Intermediate Carrier assemblies are built as per steps (1) to (6), except for the use of Intermediate Carriers (*Item 8*) instead of Upper Carriers (*Item 7*) and O-ring 229 (*Item 27*) and Back-Up Ring (*Item 29*) instead of O-ring 230 (*Item 28*). Ensure Back-Up Ring is fitted at top of Groove.
- 17) The Intermediate Carrier assemblies are installed into the Intermediate Body as per steps (7) to (13), except for the use of Intermediate Retainer Plates (*Item 5*) instead of Upper Retainer Plates (*Item 4*).
- 18) Lightly grease O-ring groove and install O-ring (*Item 25*) onto the Intermediate Body.
- 19) Apply Copaslip onto threads and thread Lower Body (*Item 3*) onto Intermediate Body.

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Approved By :	clarkmx



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## Assembly Instructions – Cont’d


- 20) Insert four Socket Head Cap Screws (*Item 18*) into Lower Body using 6mm Allen Key and retain them with Circlips (*Item 17*).
- 21) The Lower Carrier assemblies are built as per steps (1) to (6), except for the use of Lower Carriers (*Item 9*) instead of Upper Carriers (*Item 7*) and both O-ring 230 (*Item 28*) and Back-Up Ring (*Item 30*) instead of just the O-ring 230 (*Item 28*). Ensure Back-Up Ring is fitted at top of Groove.
- 22) The Lower Carrier assemblies are installed into the Lower Body as per steps (7) to (13), except for the use of Lower Retainer Plates (*Item 6*) instead of Upper Retainer Plates (*Item 4*).
- 23) Lightly grease O-ring groove and install O-ring (*Item 25*) onto the Lower Body.
- 24) Apply Copaslip onto threads and thread Roller-Nose Body (*Item 13*) onto Lower Body.
- 25) Insert four Socket Head Cap Screws (*Item 18*) into Roller-Nose Body using 6mm Allen Key and retain them with Circlips (*Item 17*).
- 26) Apply a thin smear of grease to I.D. of Nose Roller (*Item 14*). Using medium punch and hammer, gently insert Toughmet bearing (*Item 19*) into roller, as shown on Assembly Drawing. It may be preferable to use a bearing-press for this task if one is available.
- 27) Install Support Washers (*Item 16*) using grease to retain them against Roller (*Item 14*).
- 28) Install Roller Assembly into one of the Nose Body pockets.
- 29) Lightly grease Axle (*Item 15*) and insert through Nose Body and Roller Assembly. Line up rectangular spigot on axle with mating hole in Nose Body and secure in place with Circlip (*Item 26*).
- 30) Repeat steps (27) to (30) for remaining five Roller Assemblies.
- 31) Lightly grease Nozzle O-ring groove in Nose Body and install O-ring 217 (*Item 23*).
- 32) Insert 11/32" Nozzle (*Item 21*) in Nose Body and secure with Circlip (*Item 24*).
- 33) Pressure test completed ACE Tool as per Test Procedure TP-ACE/4500/999-P

### Prior to Running in Hole

- \* Ensure 11/32" Nozzle is installed

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 <b>Weatherford</b>	<b>Test Procedure</b>
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<b>Subject: Pre-Expansion Pressure Test Of 4.5" ACE Tool</b>				<b>No: TP- ACE/4500/999P</b>
<b>Prepared By:</b> Iain Cruickshank	<b>Eng. Approval:</b> Mike Clark	<b>Test Lab. Approval:</b> N/A	<b>HSE Approval:</b> N/A	<b>Pg. 1 of 2</b>
<b>Date:</b> 03/06/08	<b>Date:</b> 03/06/08	<b>Date:</b>	<b>Date:</b>	<b>Rev.:</b> H

<p><b><u>Objective</u></b></p> <p>This procedure details the preparation and pressure testing of the Axial Compliant Expansion tool (ACE™) before service application. The purpose of this test is to verify the capability of the carrier o-rings to retain a required pressure for a specified time (2,200psi/10mins).</p> <p><b><u>Test Equipment</u></b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">4.5" Axial Compliant Expansion (ACE) Tool – 4.50" OD:</td> <td style="width: 20%;">572-4500-000-033</td> <td style="width: 30%;">(00795673)</td> </tr> <tr> <td>4.5" Axial Compliant Expansion (ACE) Tool – 4.75" OD:</td> <td>572-4500-000-034</td> <td>(00795674)</td> </tr> <tr> <td></td> <td>572-4500-000-036</td> <td>(01153032)</td> </tr> <tr> <td>Steel Ball 7/8" Diameter: SB-030 (supplied as part of tool assembly and in redress kit)</td> <td>SB-030</td> <td>(00455543)</td> </tr> <tr> <td>OR</td> <td></td> <td></td> </tr> <tr> <td>Pressure Test Assembly kit:</td> <td>572-5500-000-044</td> <td>(01163240)</td> </tr> </table> <p><b>NOTE:</b> The Pressure Test Assembly kit can be used as an ALTERNATIVE to the Steel Ball. The Steel Ball may still be used when desired.</p> <p><b><u>Pressure Test</u></b></p> <p><b><u>Steel Ball procedure</u></b></p> <ol style="list-style-type: none"> <li>1. From the nose section of the tool and depending on type of nozzle fitment, remove Circlip and (a) Nozzle or (b) Nozzle assembly.</li> <li>2. Using a 7/8" diameter ball (SB-030) and with the use of any fine grinding paste, dope, grease, tape, etc... lap the ball into the nozzle seat as close to the centre of the nozzle as possible. Next, re-fit the (a) nozzle back into the tool or (b) nozzle back into the nozzle assembly and screw the nozzle assembly (complete with o-rings) back into the tool, and then fix circlip to nozzle / nozzle assembly.</li> <li>3. Insert steel ball (SB-030) inside tool and locate into the nozzle seat.</li> <li>4. Attach all fittings required for pressure application, and pick up the tool assembly using a suitable crane or apparatus, and orient the tool so it is vertical, with box end up, and nose end down. This will ensure that the ball is seated against the nozzle.</li> <li>5. SAFETY PRECAUTIONS: - All personnel should be removed from the test area.</li> <li>6. Slowly build pressure up to 100psi to ensure ball is seated correctly. If any leak is noted, bleed-off pressure and inspect tool for signs of where leak is occurring. Repair if required. Set-up to re-test.</li> <li>7. If no leakage is observed, gradually increase pressure to 2,200psi, and hold for 10 minutes.</li> </ol> <p><b>NOTE:</b> Maximum allowable pressure drop over 10 minutes = 5% (110psi)</p>	4.5" Axial Compliant Expansion (ACE) Tool – 4.50" OD:	572-4500-000-033	(00795673)	4.5" Axial Compliant Expansion (ACE) Tool – 4.75" OD:	572-4500-000-034	(00795674)		572-4500-000-036	(01153032)	Steel Ball 7/8" Diameter: SB-030 (supplied as part of tool assembly and in redress kit)	SB-030	(00455543)	OR			Pressure Test Assembly kit:	572-5500-000-044	(01163240)
4.5" Axial Compliant Expansion (ACE) Tool – 4.50" OD:	572-4500-000-033	(00795673)																
4.5" Axial Compliant Expansion (ACE) Tool – 4.75" OD:	572-4500-000-034	(00795674)																
	572-4500-000-036	(01153032)																
Steel Ball 7/8" Diameter: SB-030 (supplied as part of tool assembly and in redress kit)	SB-030	(00455543)																
OR																		
Pressure Test Assembly kit:	572-5500-000-044	(01163240)																

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Approved By :	clarkmx

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 <b>Weatherford</b>	<b>Test Procedure</b>
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<b>Subject: Pre-Expansion Pressure Test Of 4.5" ACE Tool</b>				<b>No: TP- ACE/4500/999P</b>
<b>Prepared By:</b> Iain Cruickshank	<b>Eng. Approval:</b> Mike Clark	<b>Test Lab. Approval:</b> N/A	<b>HSE Approval:</b> N/A	<b>Pg. 2 of 2</b>
<b>Date:</b> 03/06/08	<b>Date:</b> 03/06/08	<b>Date:</b>	<b>Date:</b>	<b>Rev.: H</b>

8. On completion of test, gradually release pressure from the tool, lower tool to horizontal and remove all test fittings.

9. Without breaking any other connections, remove steel ball from the tool.

10. The ACE Tool is now ready to be used for expansion runs. The circlip or the nozzle should not be removed until the expansion run is complete.

**Pressure Test Assembly kit procedure (alternative to Steel ball)**

1. Refer to Drawing 572-5500-000-044 for Test Kit assembly instructions.

2. Attach entire cable access kit (01163316) to the Pressure Test assembly and feed the end of the cable access kit down the box end of the expansion tool until the cable emerges from the nose end of the tool.

**NOTE:** The carriers on the tool must be at the "out" position to allow the ball to travel up the body.

3. Begin to pull the cable access kit through the tool from the nose end until the ball locates itself at the ball seat.

4. Detach the cable access kit from the Pressure Test assembly, slide the adjustment nut (01128234) over the end of the pressure test assembly until it meets with the threaded section of the assembly rod.

5. Tighten the adjustment rod onto the assembly until it is almost hand tight.

**NOTE:** Do NOT over tighten the adjustment nut as this could result in the ball becoming detached from the rest of the assembly fixture.

6. Attach all other fittings required for pressure application.

7. SAFETY PRECAUTIONS:  
- All personnel should be removed from the test area.

8. Slowly build pressure up to 100psi to ensure ball is seated correctly. If any leak is noted, bleed-off pressure and inspect tool for signs of where leak is occurring. Repair if required. Set-up to re-test.

9. If no leakage is observed, gradually increase pressure to 2,200psi, and hold for 10 minutes.

**NOTE:** Maximum allowable pressure drop over 10 minutes = 5% (110psi)

10. On completion of test, gradually release pressure from the tool, lower tool to horizontal and remove all test fittings.

11. Without breaking any other connections, remove steel ball from the tool.

12. The ACE Tool is now ready to be used for expansion runs. The circlip or the nozzle should not be removed until the expansion run is complete.

Tested By; ..... Date; .....

Witnessed By; ..... Date; .....

**EED-005 Rev: 1**

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Approved By :	clarkmx

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## *Disassembly Instructions*

### Tools Required

Internal Circlip Pliers  
 6mm Allen Key  
 5/32" Allen Key  
 Hammer  
 Small punch (< 6mm dia.)  
 Medium punch (13mm – 17mm dia.)  
 Large punch (15mm – 19mm dia.)

### Compliant Section Disassembly (N.B. common for all sections)

- 1) Pressure test ACE Tool as per **TP-ACE/4500/999-P**  
**Leave rollers out after pressure test**
- 2) Using Circlip Pliers, remove Circlip (*Item 17*) from Retainer Plate (*Item 4/5/6*). Ensure safety glasses are worn during this operation. Discard circlips after removal.
- 3) Remove Retainer pin (*Item 20*) from plate using 5/32" Allen Key and discard.
- 4) Using hammer and small punch, gently tap disassembly flats on the Retainer plate to remove from Body.
- 5) Repeat steps (2) to (4) for second Retainer on pocket.
- 6) Remove carrier assembly from Compliant body using the hammer and punch to evenly tap the sides of the Carrier lugs in an upwards direction.
- 7) Using Circlip pliers, remove Circlip (*Item 17*) from Carrier (*Item 7/8/9*). Ensure safety glasses are worn during this operation. Discard Circlips. Using small punch and hammer, tap axle (*Item 11*) to remove from Carrier.
- 8) Remove Roller (*Item 10*) from Carrier. Discard O-rings.
- 9) Remove Toughmet Bearing (*Item 12*) from Roller.
- 10) Repeat steps (2) to (9) for all remaining compliant roller assemblies.

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Approved By :	clarkmx

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## ***Disassembly Instructions – Cont’d***

### **Roller Nose Disassembly**

- 1) Remove Circlip (*Item 26*) from Nose Body (*Item 13*) using circlip pliers. Ensure safety glasses are worn during this operation. Remove Axle (*Item 15*) by tapping out using hammer and small punch. Discard circlip after removal.
- 2) Remove Roller (*Item 14*) and Support Washers (*Item 16*) from Nose body. Discard washers.
- 3) Remove Toughmet Bearing (*Item 19*) from Roller using hammer and medium punch. It may be preferable to use a bearing press for this task if one is available.
- 4) Repeat steps (1) to (3) for all remaining Nose Rollers.
- 5) Remove Nozzle Circlip (*Item 24*) from end of Roller Nose and discard. Ensure safety glasses are worn during this operation.
- 6) Remove Nozzle (*Item 21*) and Nozzle O-ring (*Item 23*) from Nose Body. Discard O-ring.

### **Body Sections Disassembly**

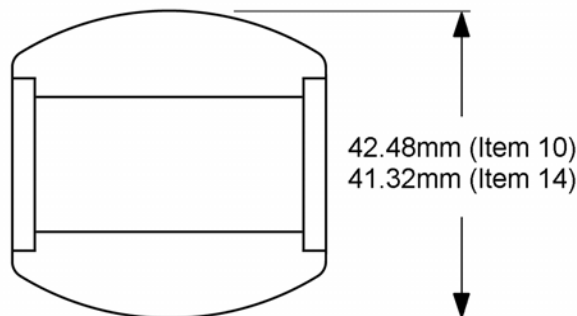
- 1) Remove Nose body Circlips (*Item 17*) using circlip pliers. Ensure safety glasses are worn during this operation. Remove Socket Head Cap Screws (*Item 18*) using 6mm Allen key. Discard Circlips and Cap screws.
- 2) Using chain tong or similar, thread off the Roller Nose Body (*Item 13*) from the Lower Body (*Item 3*).
- 3) Remove O-ring 231 (*Item 25*) from Lower Body. Discard O-ring.
- 4) Repeat steps (1) to (3) for Lower Body (*Item 3*) and Intermediate Body (*Item 2*).

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## *Inspection of Tool*

- 1) All tools to be fully inspected after each job.
- 2) Visually inspect complete tool noting any signs of wear, pay particular attention to the following;
  - Main Bodies (Items 1,2,3) – Ensure Premium Connection is fit for purpose and no wear bands are present on any of the Piston Seal Bores.
  - Roller Assemblies (Items 7/8/9,10,11,12,17,27,28,29,30) – Replace Items 27,28,29,30  
Check Items 10, 11 & 12 for wear.  
Ensure no large amount of wear has occurred on the Carrier (Item 7/8/9), particularly at the top of the lugs.
  - Nose Roller Assembly (Items 14,15,16,19,26) – Replace Item 26.  
Check Items 14, 15, 16 & 19 for wear.
- 3) Using a fluorescent MPI method inspect the Carrier (Items 7,8,9) and Rollers (Items 10 & 14). Report and record findings.
- 4) Dimensionally check any components that have obvious wear on them and ensure that they are still within the engineering tolerances.



The above shows the minimum acceptable dimensions on these parts and should be used as a guide only.

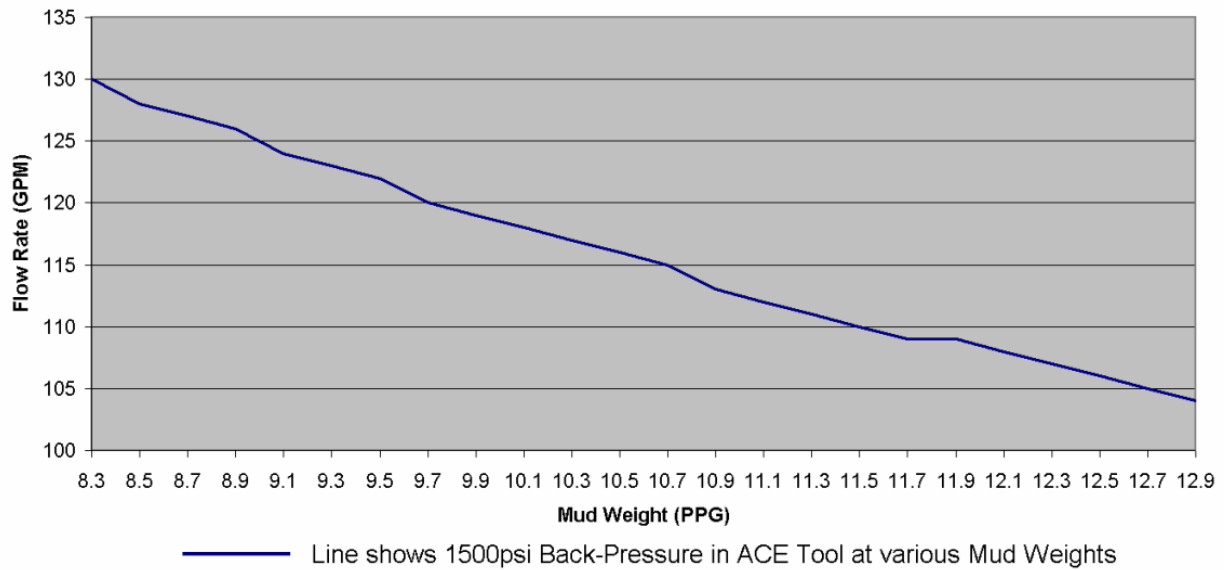
**If in doubt contact an appropriate Weatherford Region Engineer**

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## Optimum Operational Parameters

**Optimum Operational Parameters F/ ACE Tool at 1500psi W/ 11/32" Nozzle**



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