LWD 1

Spacer Stack Calculations

Spacer Stack Calculations Objectives

At the completion of this presentation you should be able to:

1. Describe the purpose of the spacer stack.

2. Describe the measurements that are required.

3. Select the correct length of spacer stack within the tolerance of the system.

What's a Spacer Stack?

- **A series of washers that fill the space between the top of spring carrier and the pin of the drill collar above the tool.**

What's a Spring Carrier?

A series of springs that apply pressure to the top of the flow tube to stop it vibrating axially.

Two types of Spring Carriers

650 spacer stack

#032810 solar
(Hardmount)

#412811 standard
(Softmount)

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Two types of Bottom Rings

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Slim Spring Carriers

Slim hard   **Slim soft spring**

Slim Bottom Rings

Slim hard

Slim soft

What makes up a Spacer Stack?

Spacers

- –5 sizes
- –1, 0.5, 0.25, 0.1, 0.05 inch

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What makes up a Spacer Stack?

Spacers

2" Baffle Plate

What does it do?

- **Applies the correct compression to the top of the flow tube (1200, 650 & Slimhole only) when the collar above is installed.**
  - Too much compression will crush the flow tube
  - Too little compression allows axial movement
- **Superslim uses an adjustable spacer.**

Where does it go?

Spacer Stack

Spring Stack
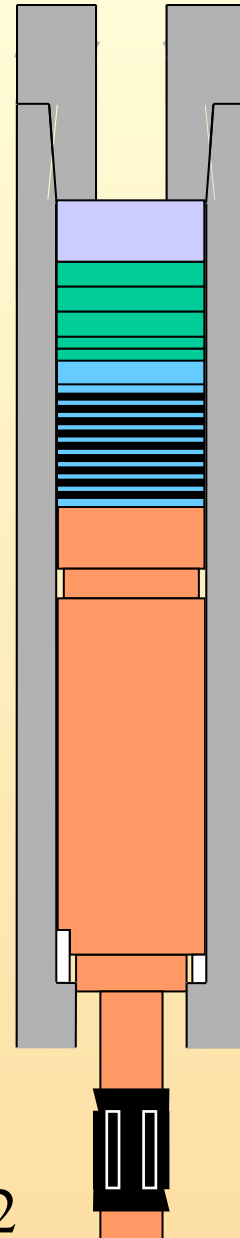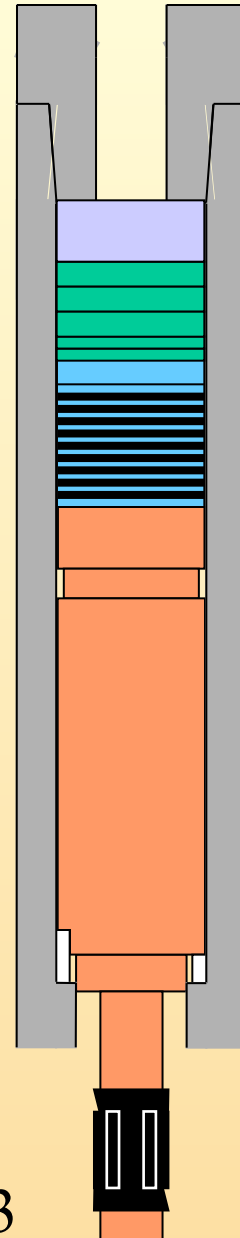
Flow Tube

HOS/HOC

What happens when it's the right length?

- **Correct compression applied to the flow tube assembly.**

Spacer Stack

Spring Stack

Flow Tube
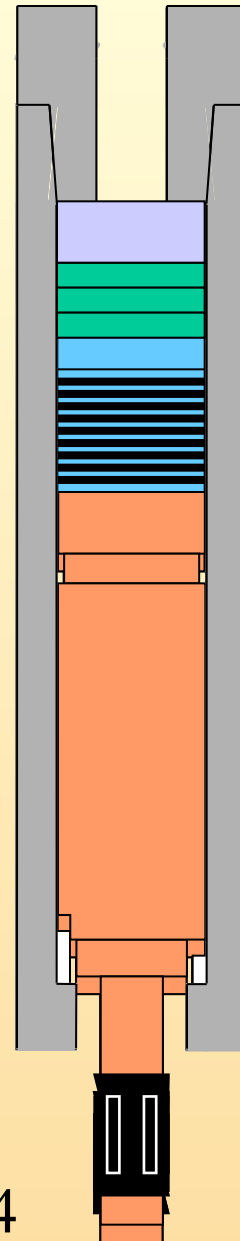
HOS/HOC

What happens if it's too short?

- **Flow tube assembly can move up and down axially**
- **Vibration damages tool**
- **Tool failure**

Spacer Stack

Spring Stack
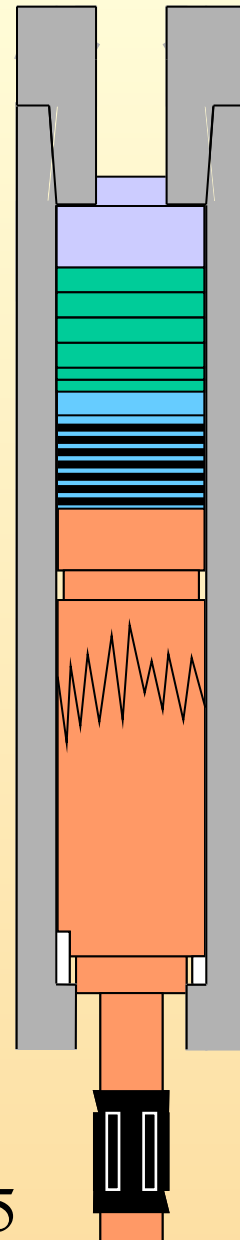
Flow Tube

HOS/HOC

What happens if it's too long?

- **Flow tube can be crushed**
- **Tool failure**

Spacer Stack

Spring Stack

Flow Tube

HOS/HOC

Measurements

- **Measure**
  - **HOS/HOC bore depth from connection face to pin ring**
  - **Flow Tube length from bottom ring shoulder to face of Fish Neck**
  - **Spring stack length and type**
  - **Drill collar pin length**

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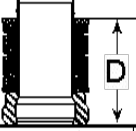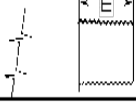# What Do I Do With The Measurements?

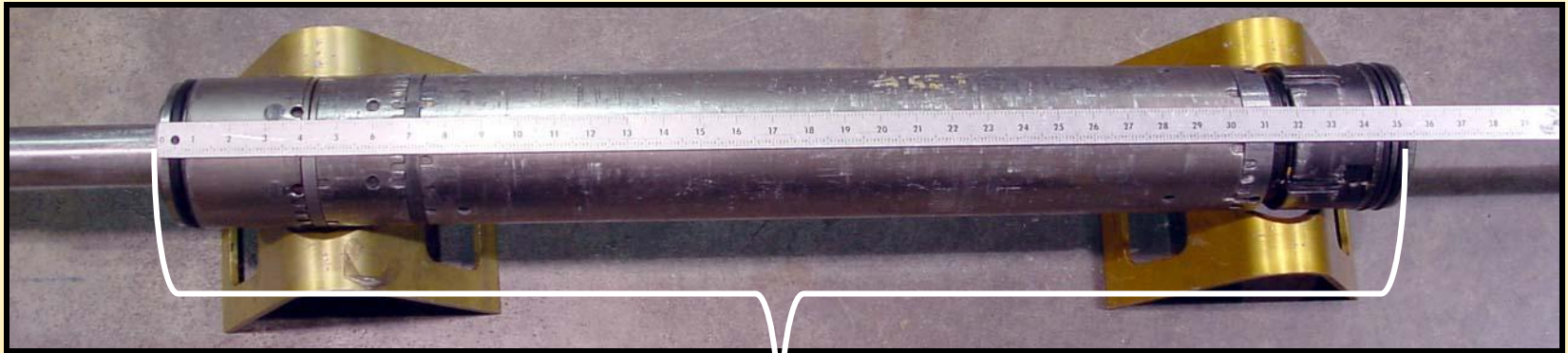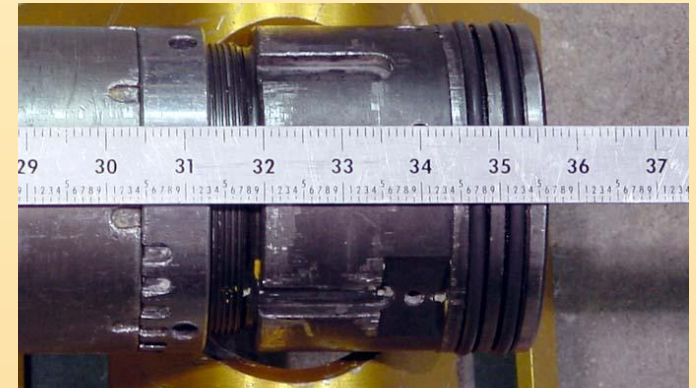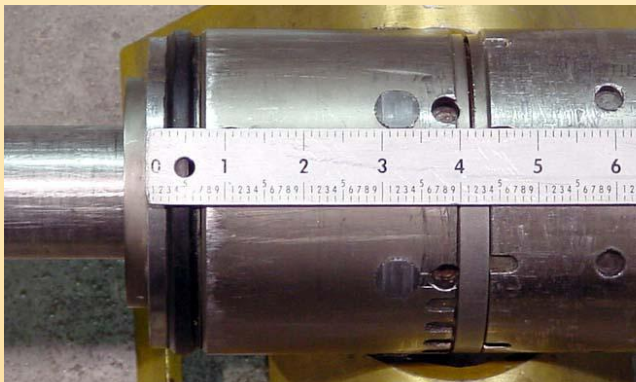- **Fill in the Spacer Stack Calculation Form (to view click link below)**

HOC/HOS Bore Depth

Ruler

Pin

Pin Ring

A

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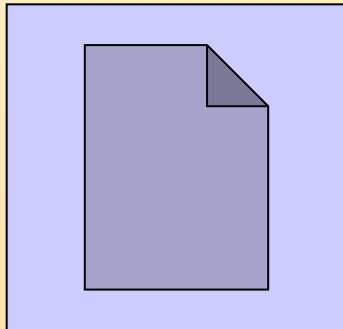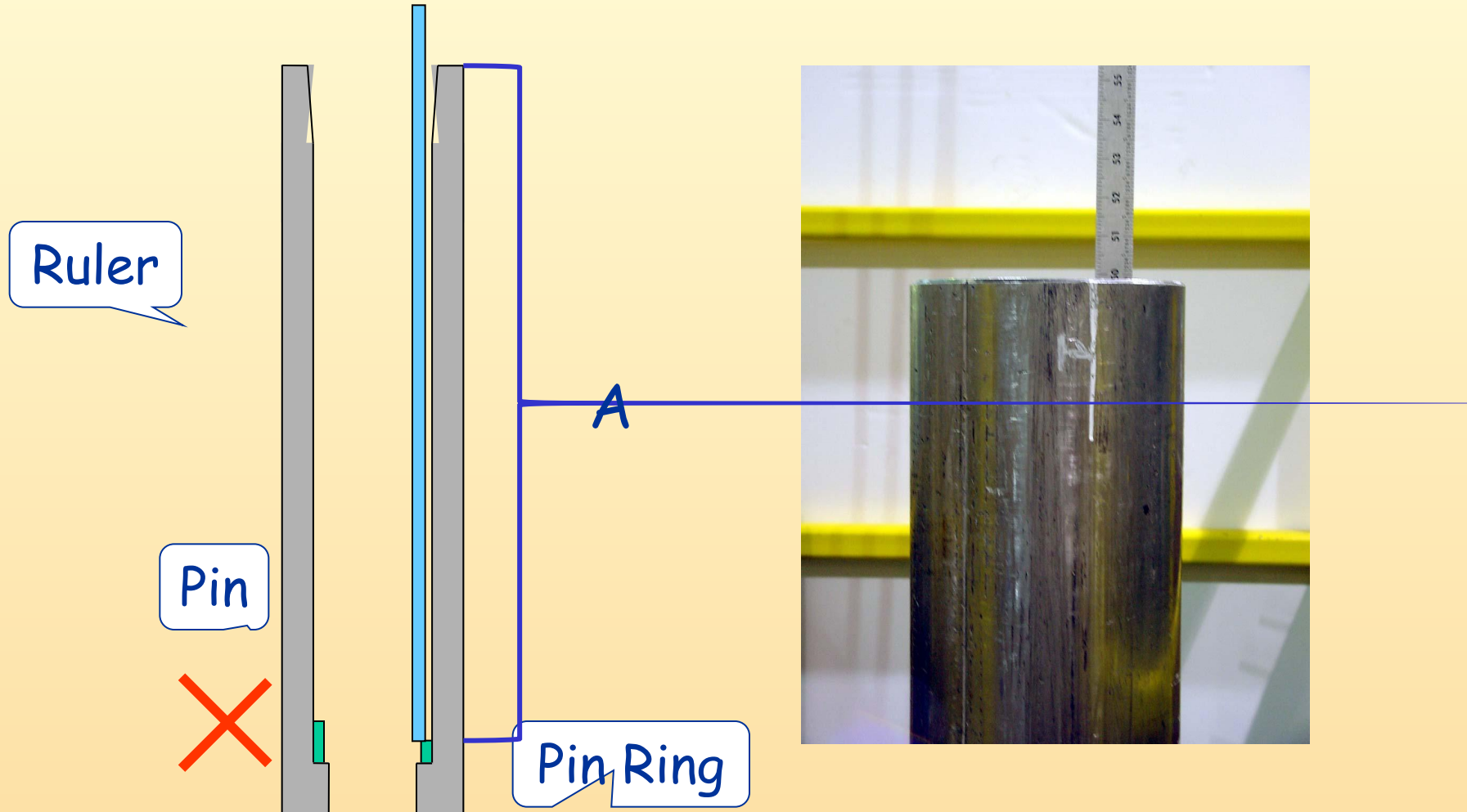
HOC/HOS Bore Depth

		Slimhole (Hard Mount)	650 System	1200 System
MWD Run No.				
HOS/HOC Serial No.				
HOS/HOC Bore Depth to Pin Ring	A		50.35	
Flow Tube Length	B	–	–	–
Check Dimension C = A – B	C	=	=	=
Spring Stack Length	D	–	–	–
Top Pin Length	E	–	–	–
Compression		+0.325"	+0.625"	+0.625"
Spacer Stack Height = C – D – E + Compression		=	=	=
Top Pin Length	E			
Compression		–0.325"	–0.625"	–0.625"
Check Dimension F = E – Compression	F	=	=	=
Installation Tolerance		±0.05"	±0.1"	±0.1"

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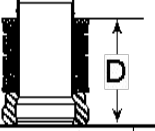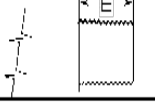
Flow Tube Length

B

Flow Tube Length

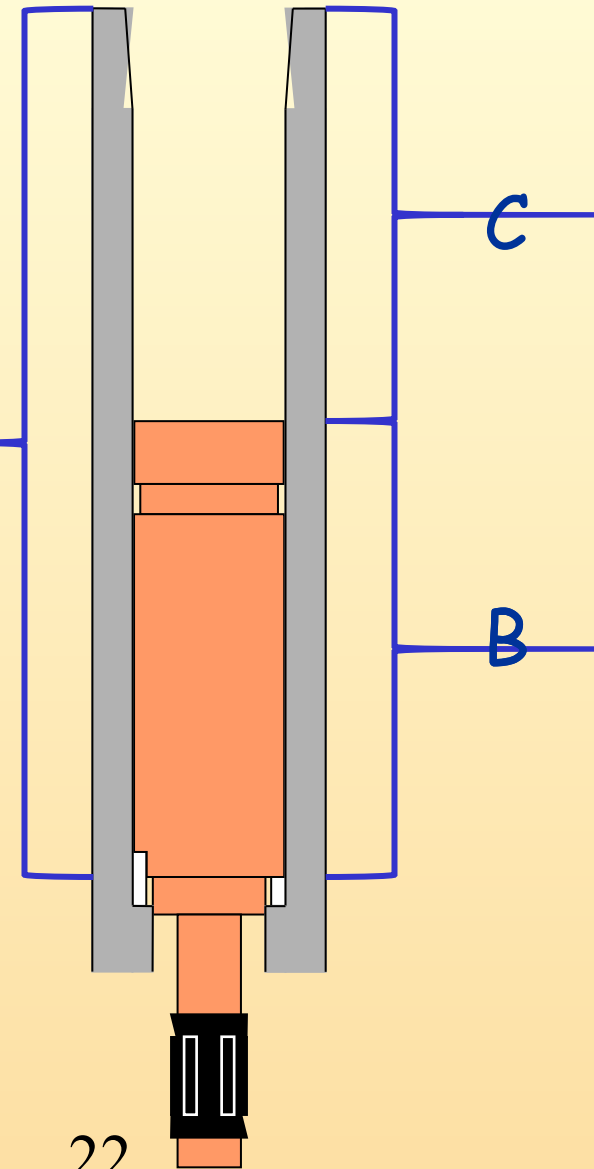|		Slimhole (Hard Mount)	650 System	1200 System
MWD Run No.				
HOS/HOC Serial No.				
HOS/HOC Bore Depth to Pin Ring	A		50.35	
Flow Tube Length	B	–	– 35.65 –	–
Check Dimension C = A – B	C	=	=	=
Spring Stack Length	D	–	–	–
Top Pin Length	E	–	–	–
Compression		+0.325"	+0.625"	+0.625"
Spacer Stack Height = C – D – E + Compression		=	=	=
Top Pin Length	E			
Compression		–0.325"	–0.625"	–0.625"
Check Dimension F = E – Compression	F	=	=	=
Installation Tolerance		±0.05"	±0.1"	±0.1"

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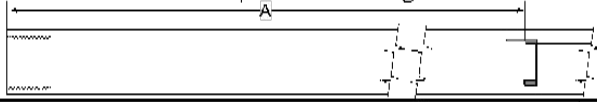
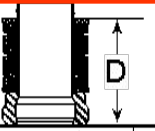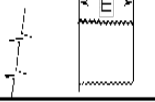# Calculations

Check Dimension C

C = A - B

After installing the flow tube assembly, measure from the face of the HOS/HOC connection to the top of the fish neck.

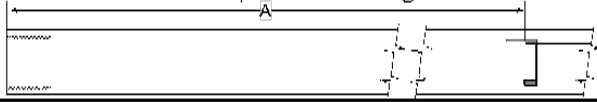**If this measurement equals C the flow tube assembly is properly seated.**
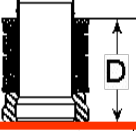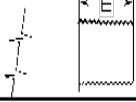
C

A

B

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Calculations

		Slimhole (Hard Mount)	650 System	1200 System
MWD Run No.				
HOS/HOC Serial No.				
HOS/HOC Bore Depth to Pin Ring	A		50.35	
Flow Tube Length	B	−	− 35.65	−
Check Dimension C = A − B	C	=	= 14.7	=
Spring Stack Length	D	−	−	−
Top Pin Length	E	−	−	−
Compression		+0.325"	+0.625"	+0.625"
Spacer Stack Height = C − D − E + Compression		=	=	=
Top Pin Length	E			
Compression		−0.325"	−0.625"	−0.625"
Check Dimension F = E − Compression	F	=	=	=
Installation Tolerance		±0.05"	±0.1"	±0.1"

Spring Stack Length and Type

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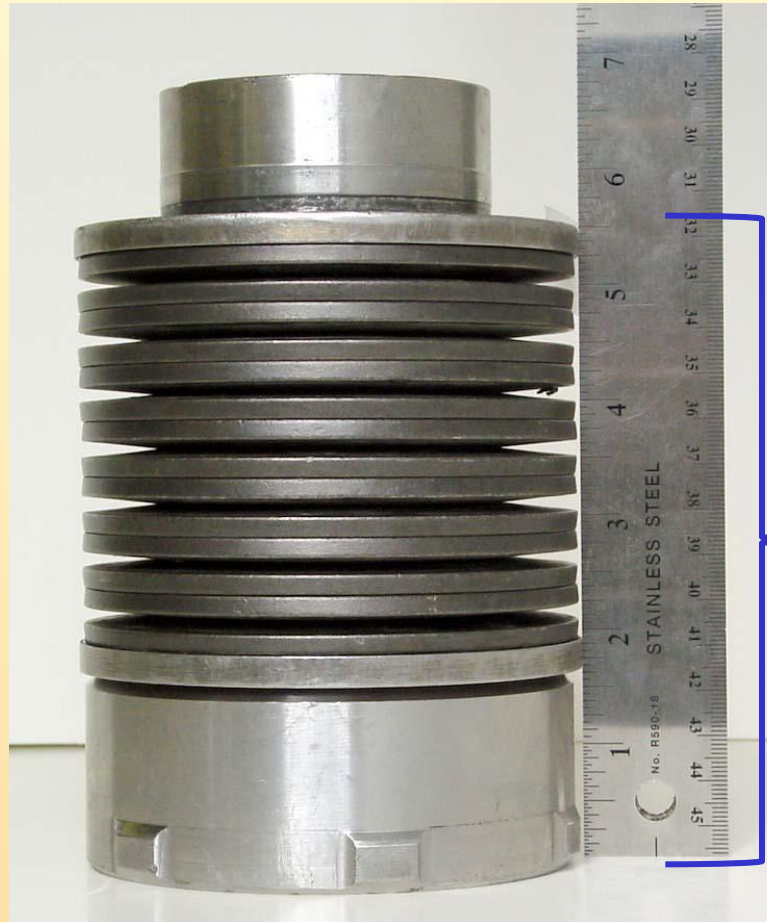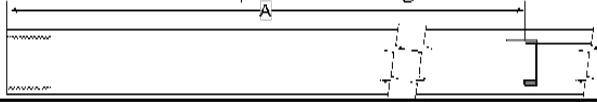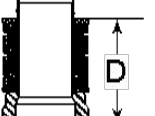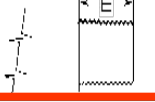
Spring Stack Length

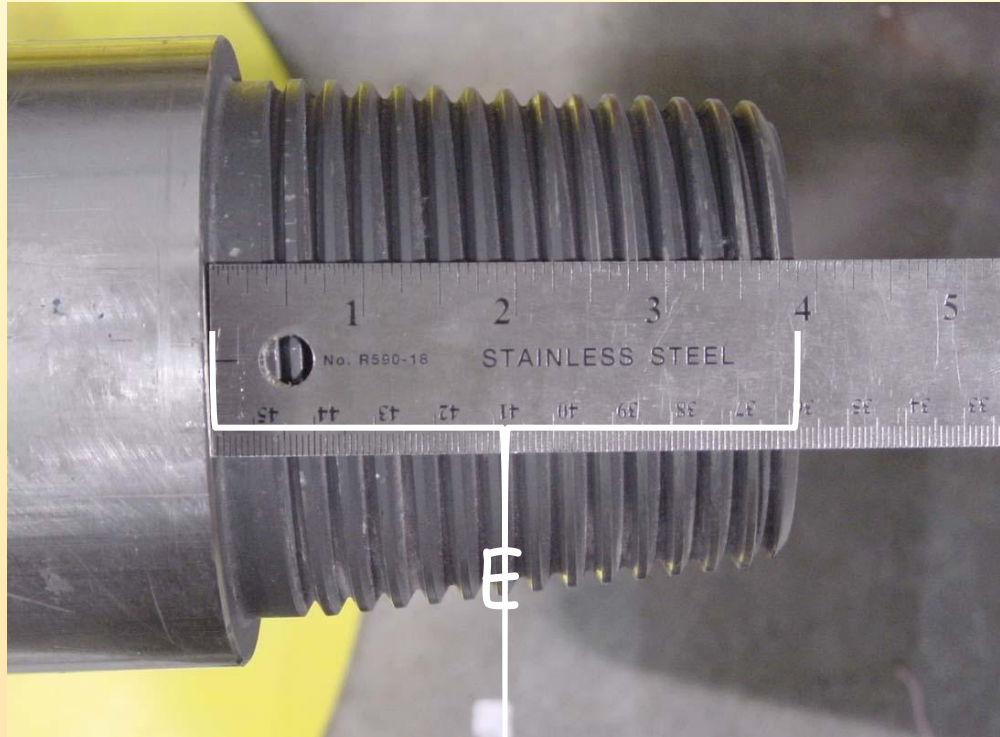|		Slimhole (Hard Mount)	650 System	1200 System
MWD Run No.				
HOS/HOC Serial No.				
HOS/HOC Bore Depth to Pin Ring	A		50.35	
Flow Tube Length	B	–	– 35.65	–
Check Dimension C = A – B	C	=	= 14.7	=
Spring Stack Length	D	–	– 5.60	–
Top Pin Length	E	–	–	–
Compression		+0.325"	+0.625"	+0.625"
Spacer Stack Height = C – D – E + Compression		=	=	=
Top Pin Length	E			
Compression		–0.325"	–0.625"	–0.625"
Check Dimension F = E – Compression	F	=	=	=
Installation Tolerance		±0.05"	±0.1"	±0.1"

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Pin Length

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Pin Length

		Slimhole (Hard Mount)	650 System	1200 System
MWD Run No.				
HOS/HOC Serial No.				
HOS/HOC Bore Depth to Pin Ring	A		50.35	
Flow Tube Length	B	–	– 35.65	–
Check Dimension C = A – B	C	=	= 14.7	=
Spring Stack Length	D	–	– 5.60	–
Top Pin Length	E	–	– 4.40	–
Compression		+0.325"	+0.625"	+0.625"
Spacer Stack Height = C – D – E + Compression		=	=	=
Top Pin Length	E			
Compression		–0.325"	–0.625"	–0.625"
Check Dimension F = E – Compression	F	=	=	=
Installation Tolerance		±0.05"	±0.1"	±0.1"

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Calculations
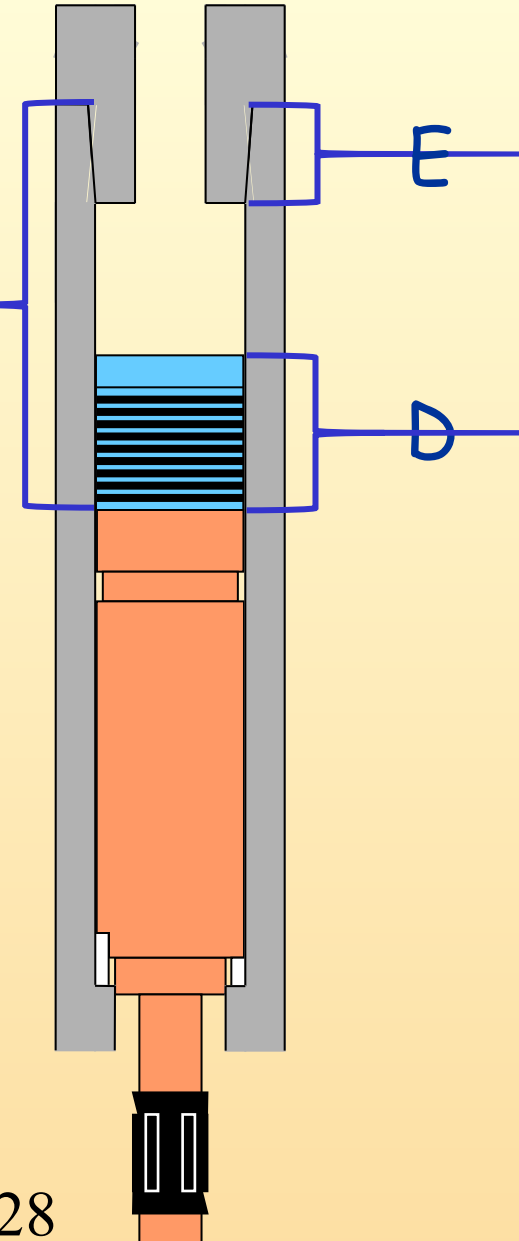
Exact Height

(No spring stack compression)

   = C - D - E

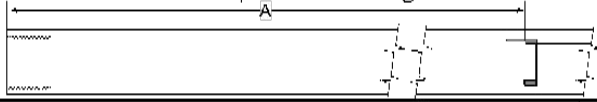**However, we must compress the spring stack. The amount of compression must be added.**
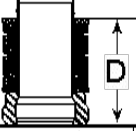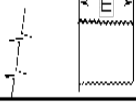
Spacer Stack Height

   = C - D - E + Compression

C

D

E

Spring Stack

Calculations

		Slimhole (Hard Mount)	650 System	1200 System
MWD Run No.				
HOS/HOC Serial No.				
HOS/HOC Bore Depth to Pin Ring	A		50.35	
Flow Tube Length	B	–	– 35.65	–
Check Dimension C = A – B	C	=	= 14.7	=
Spring Stack Length	D	–	– 5.60	–
Top Pin Length	E	–	– 4.40	–
Compression		+0.325"	+0.625"	+0.625"
Spacer Stack Height = C – D – E + Compression		=	= 5.325	=
Top Pin Length	E			
Compression		−0.325"	−0.625"	−0.625"
Check Dimension F = E – Compression	F	=	=	=
Installation Tolerance		±0.05"	±0.1"	±0.1"

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Calculations

2" Baffle Plate

Final Check Dimension F
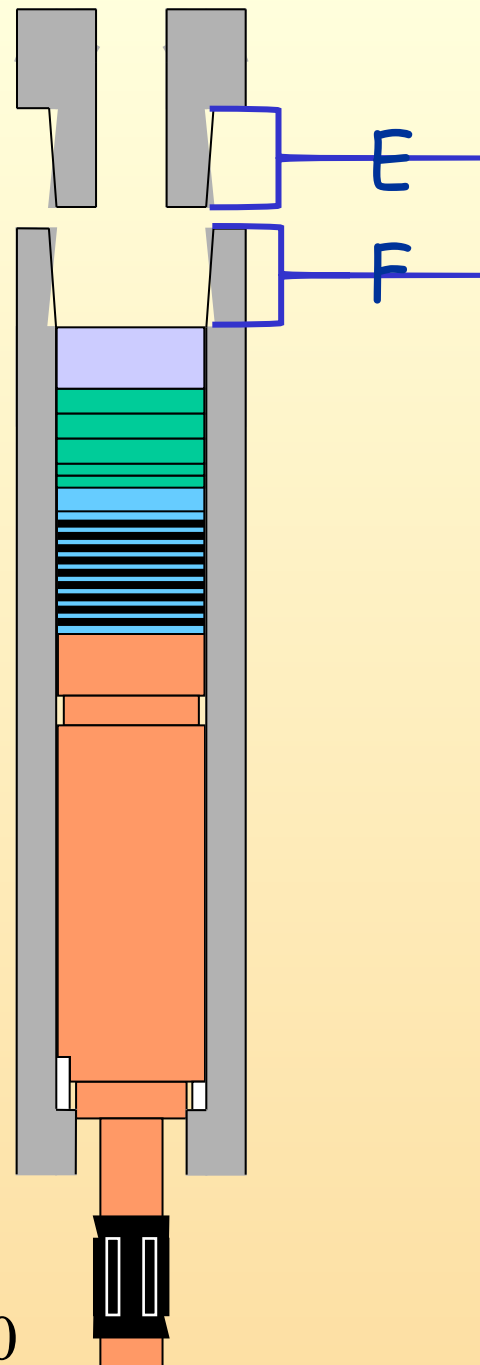
F = E - Compression

Spacers

After installing the flow tube, spring stack, and spacer stack (includes 2" baffle plate), measure from the face of the HOS/HOC connection to the top of the 2" baffle plate.
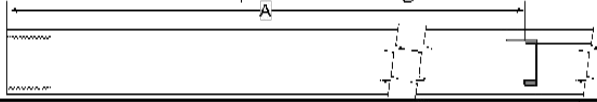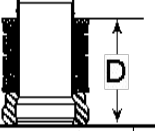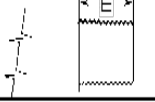
If this measurement is different from F by more than the installation tolerance

STOP.

E

F

Spring Stack

Calculations

		Slimhole (Hard Mount)	650 System	1200 System
MWD Run No.				
HOS/HOC Serial No.				
HOS/HOC Bore Depth to Pin Ring	A		50.35	
Flow Tube Length	B	–	– 35.65	–
Check Dimension C = A – B	C	=	= 14.7	=
Spring Stack Length	D	–	– 5.60	–
Top Pin Length	E	–	– 4.40	–
Compression		+0.325"	+0.625"	+0.625"
Spacer Stack Height = C – D – E + Compression		=	= 5.325	=
Top Pin Length	E		4.40	
Compression		–0.325"	–0.625"	–0.625"
Check Dimension F = E – Compression	F	=	= 3.775	=
Installation Tolerance		±0.05"	±0.1"	±0.1"

How much Compression?

- **Softmount 1200 and 650 System**
  - **0.625 inch or 16 mm**

- **Softmount Slimhole System**
  - **0.400 inch or 10 mm**

How much Compression?

- **Hardmount 1200 System**
  - **0.450 inch or 11 mm**

- **Hardmount 650 System**
  - **0.200 inch or 5 mm**

- **Hardmount Slimhole System**
  - **0.300 inch or 8 mm**

How accurate do I need to be?

- **Softmount 1200 and 650 System Installation Tolerance**

  - **+/- 0.1 inch or +/- 3.0 mm**

- **Softmount Slimhole System Installation Tolerance**
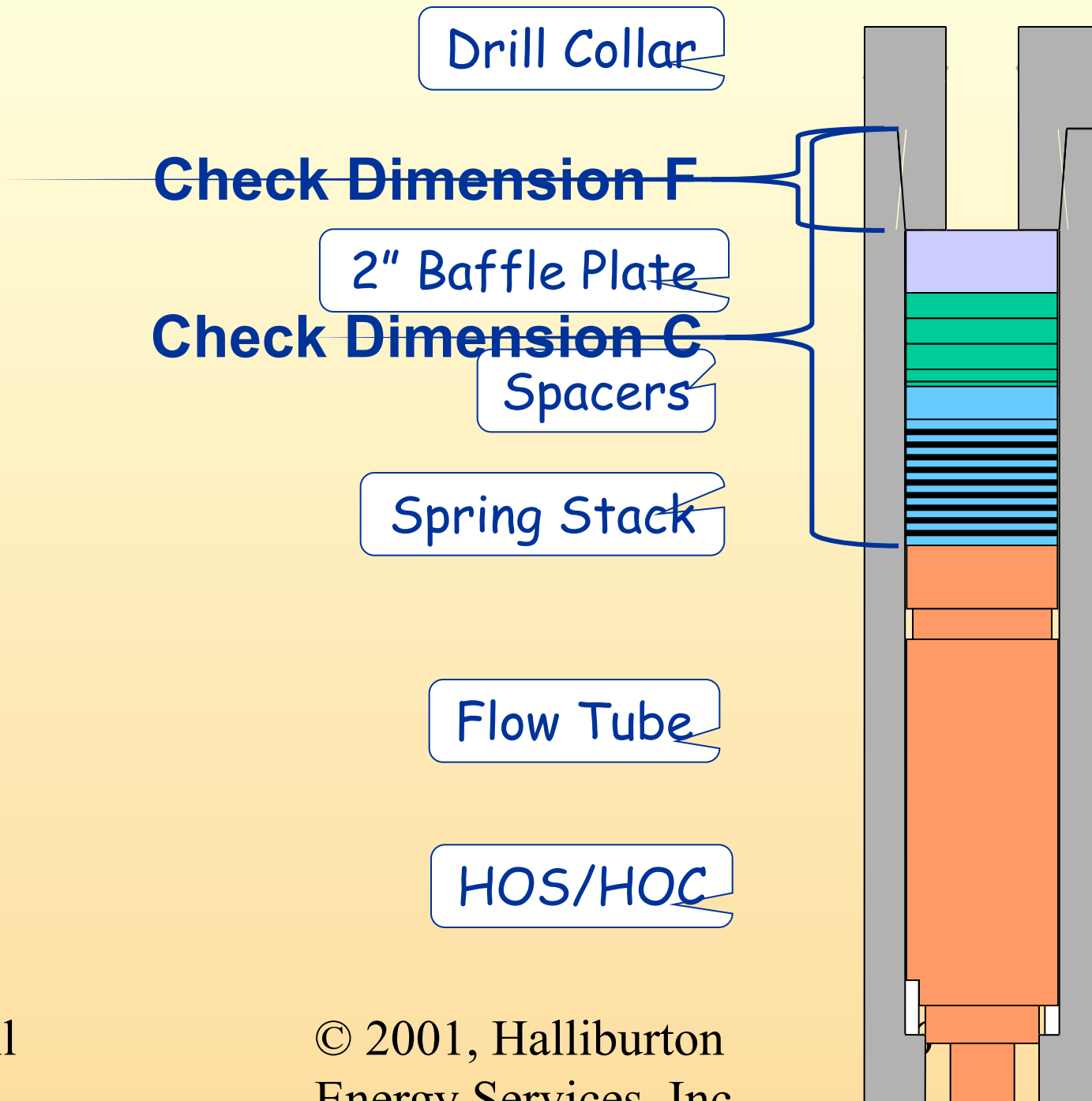
  - **+/- 0.05 inch or +/- 1.0 mm**

How accurate do I need to be?

- **Hardmount**

  Installation Tolerance

  Slimhole, 650, 1200 Systems

  – **+ 0.05 / - 0.0 inch or + 1.0 / - 0.0 mm**

Drill Collar

Check Dimension F

2" Baffle Plate

Check Dimension C

Spacers

Spring Stack

Flow Tube

HOS/HOC

Spacer Stack Calculations Objectives

At the completion of this presentation you should be able to:

1. Describe the purpose of the spacer stack.

2. Describe the measurements that are required.

3. Select the correct length of spacer stack within the tolerance of the system.

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