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.**

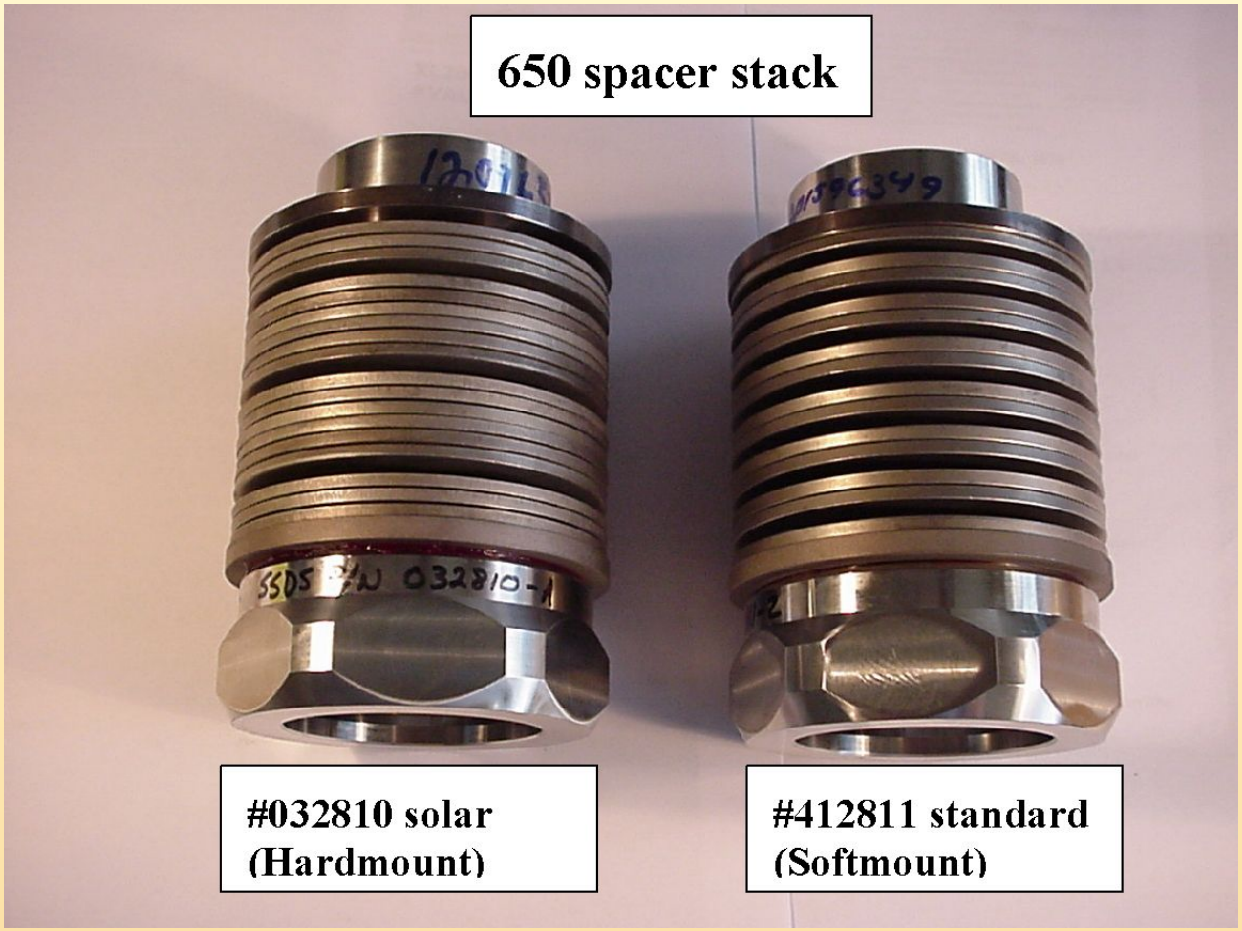
What's a Spacer Stack?

- 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



What makes up a Spacer Stack?

Spacers

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

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.

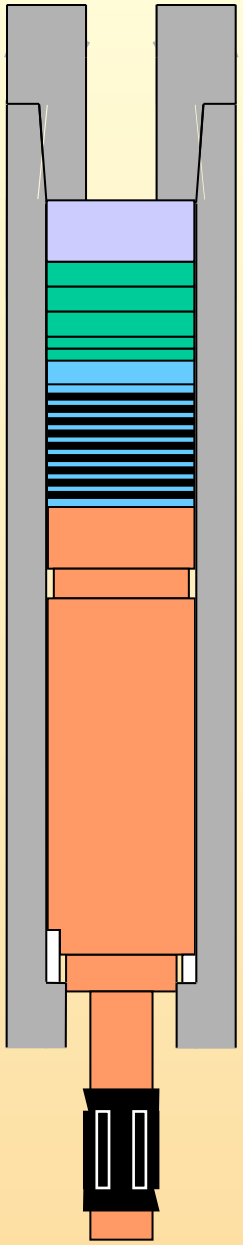
Where does it go?

Spacer Stack

Spring Stack

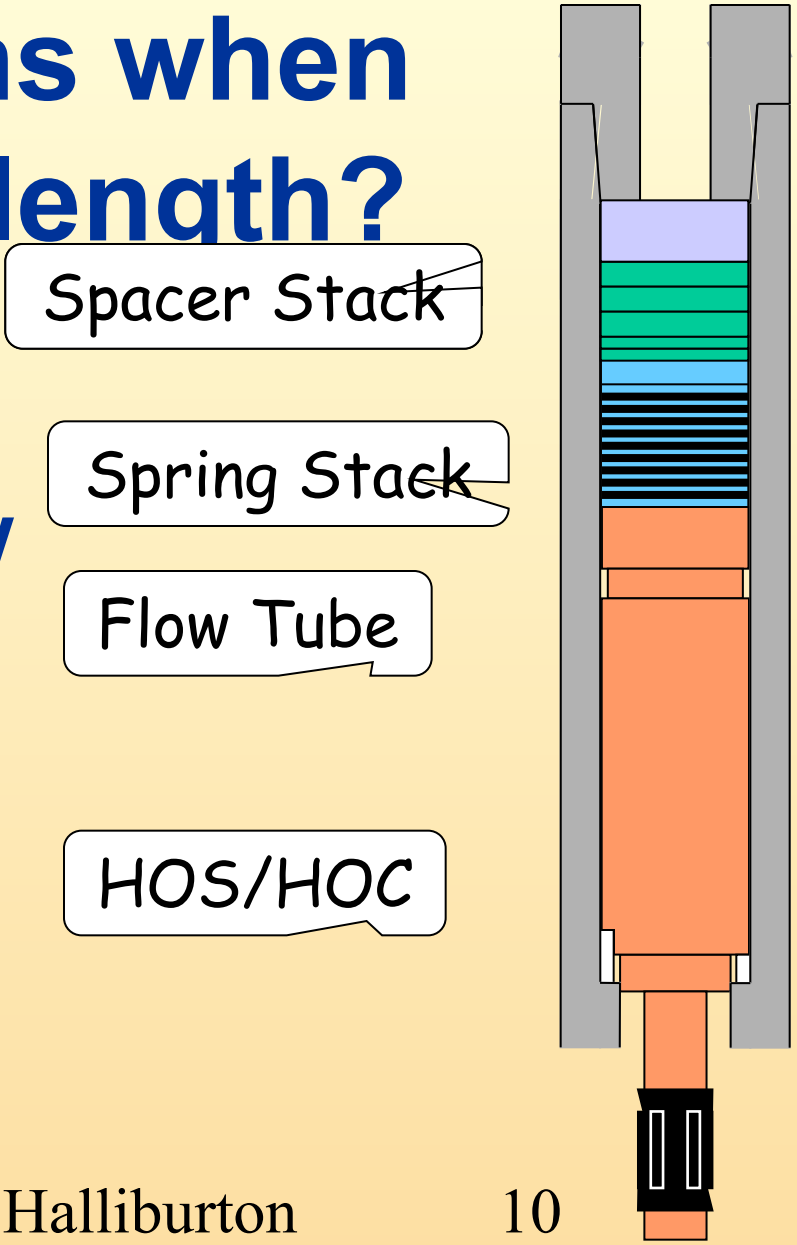
Flow Tube

HOS/HOC



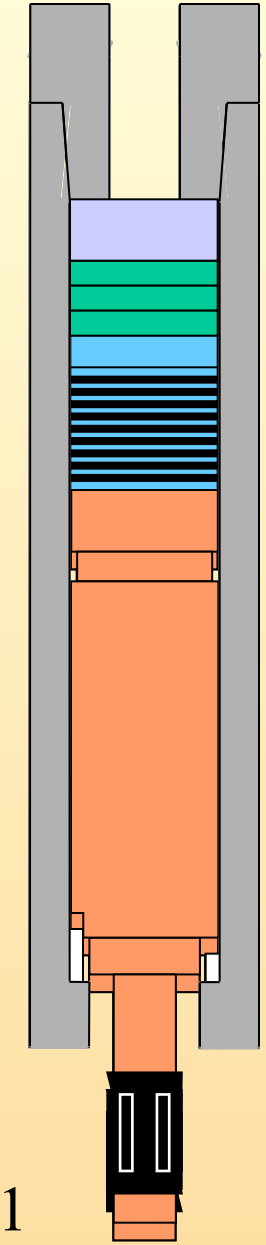
What happens when it's the right length?

- Correct compression applied to the flow tube assembly.



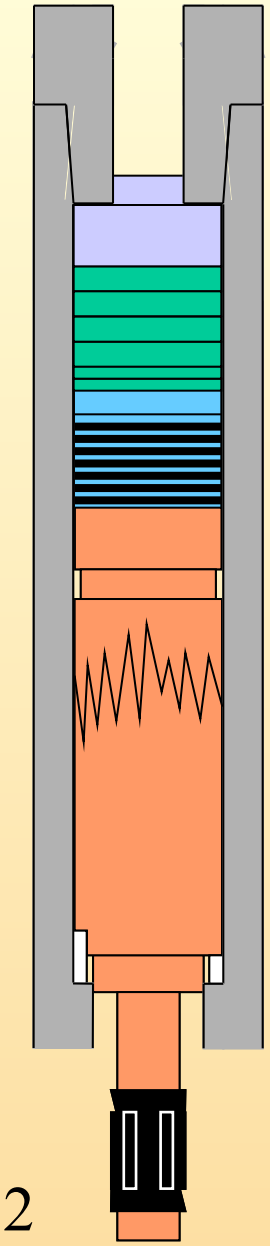
What happens if it's too short?

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



What happens if it's too long?

- Flow tube can be crushed
- Tool failure

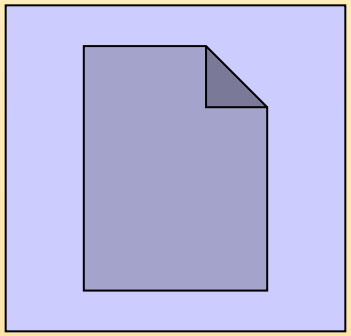


Measurements

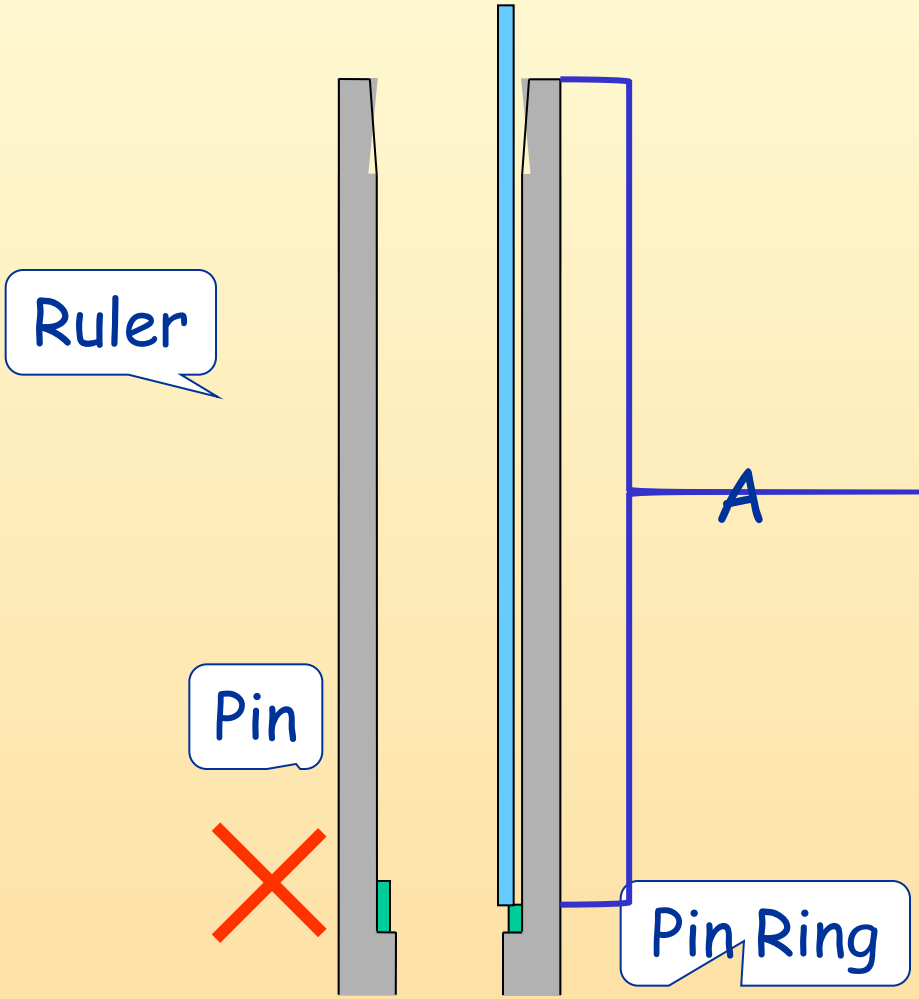
- **Measure**
  - **HOS/HOC bore depth from connection face to pin ring**
  - **Flow Tube length from bottom ring shoulder to face of Fish Neck**
  - **Spring stack length and type**
  - **Drill collar pin length**

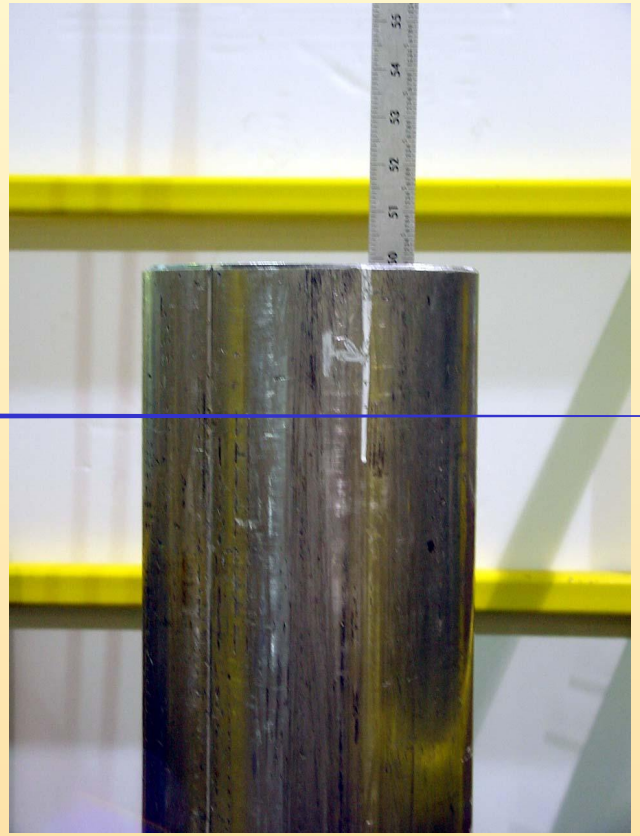
What Do I Do With The Measurements?

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

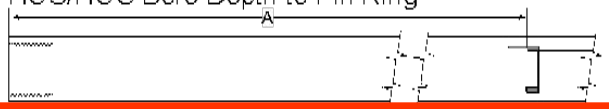
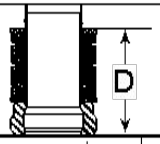
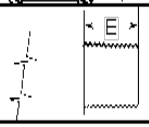


HOC/HOS Bore Depth

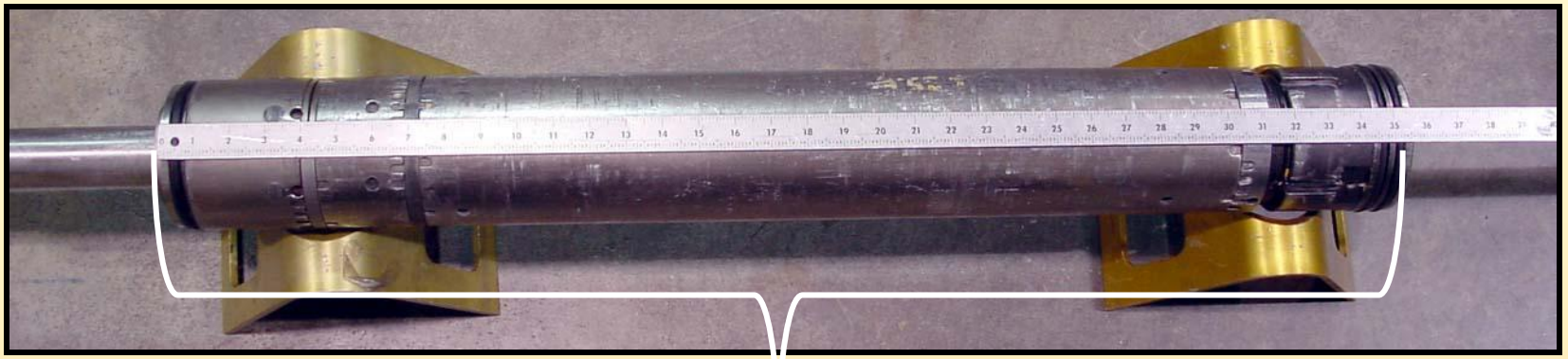




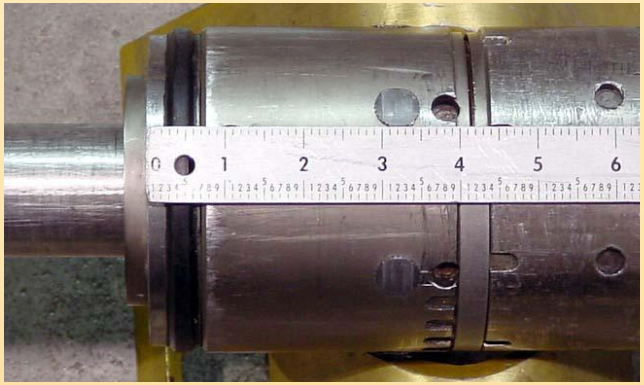
HOC/HOS Bore Depth

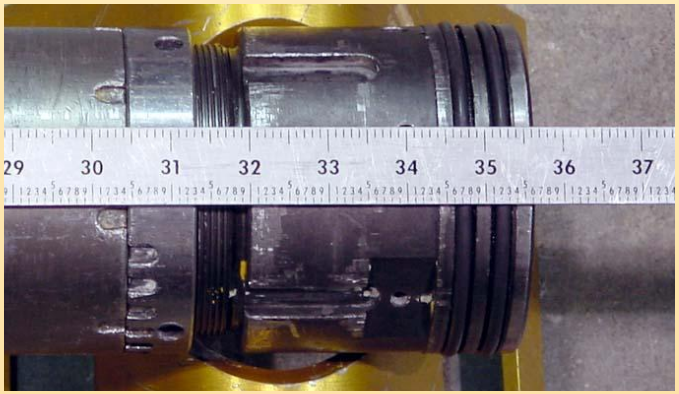
		Slimhole (Hard Mount)	650 System	1200 System
MWD Run No.				
HOS/HOC Serial No.				
HOS/HOC Bore Depth to Pin Ring 	A		50.35	
Flow Tube Length 	B	–	–	–
Check Dimension C = A – B	C	=	=	=
Spring Stack Length 	D	–	–	–
Top Pin Length 	E	–	–	–
Compression		+0.325"	+0.625"	+0.625"
Spacer Stack Height = C –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

Flow Tube Length

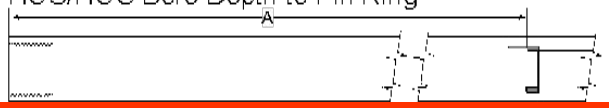
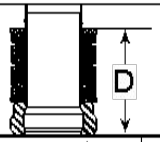
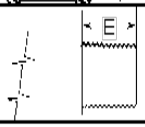


B





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"

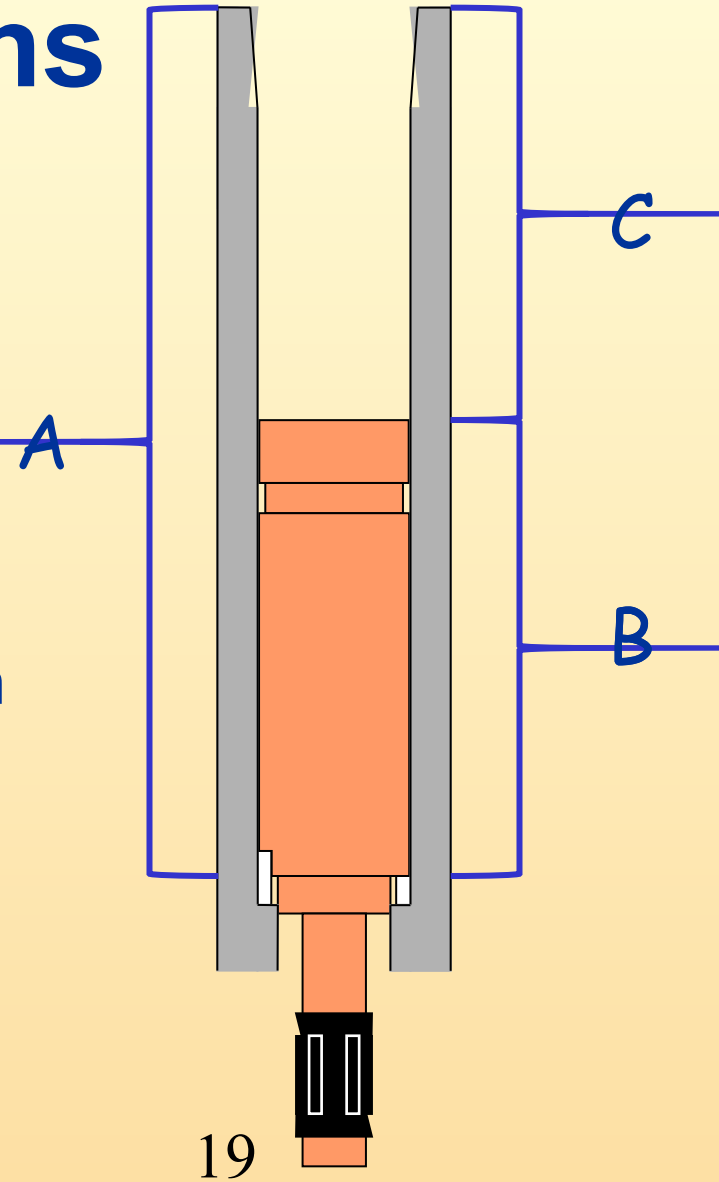
Calculations

Check Dimension C

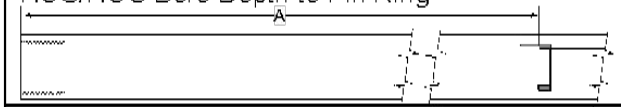
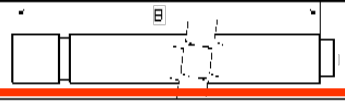
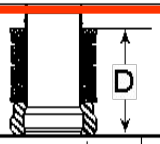
C = A - B

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

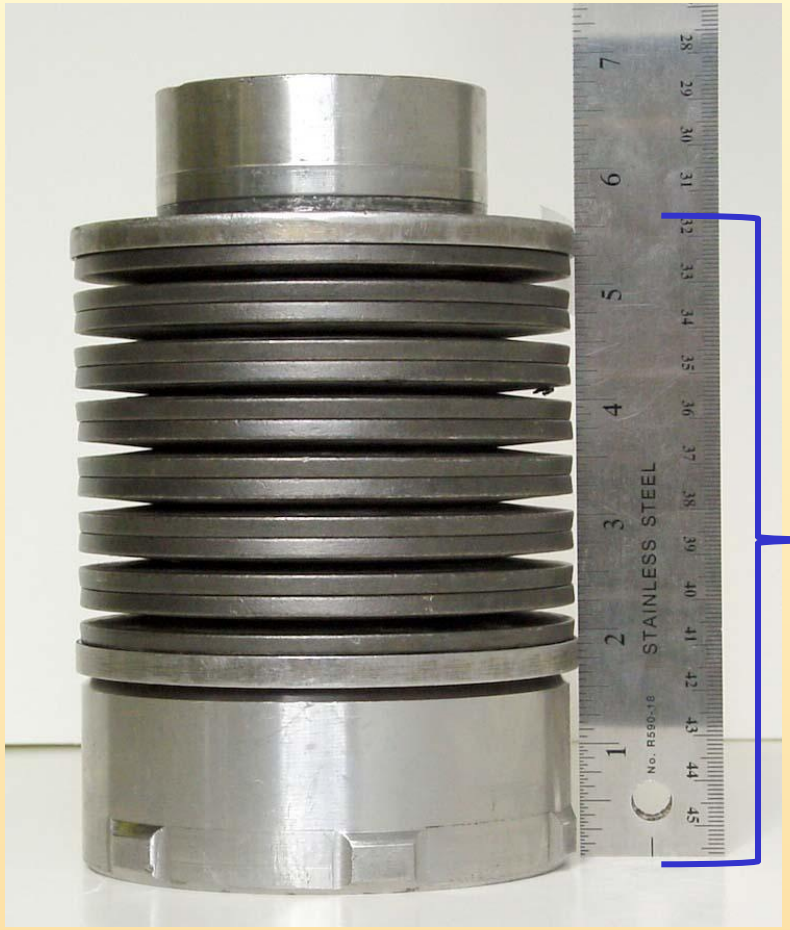
If this measurement equals C the flow tube assembly is properly seated.



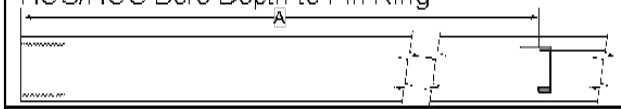
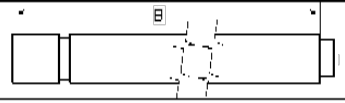
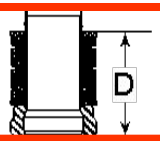
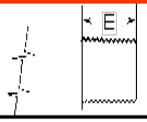
Calculations

		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"

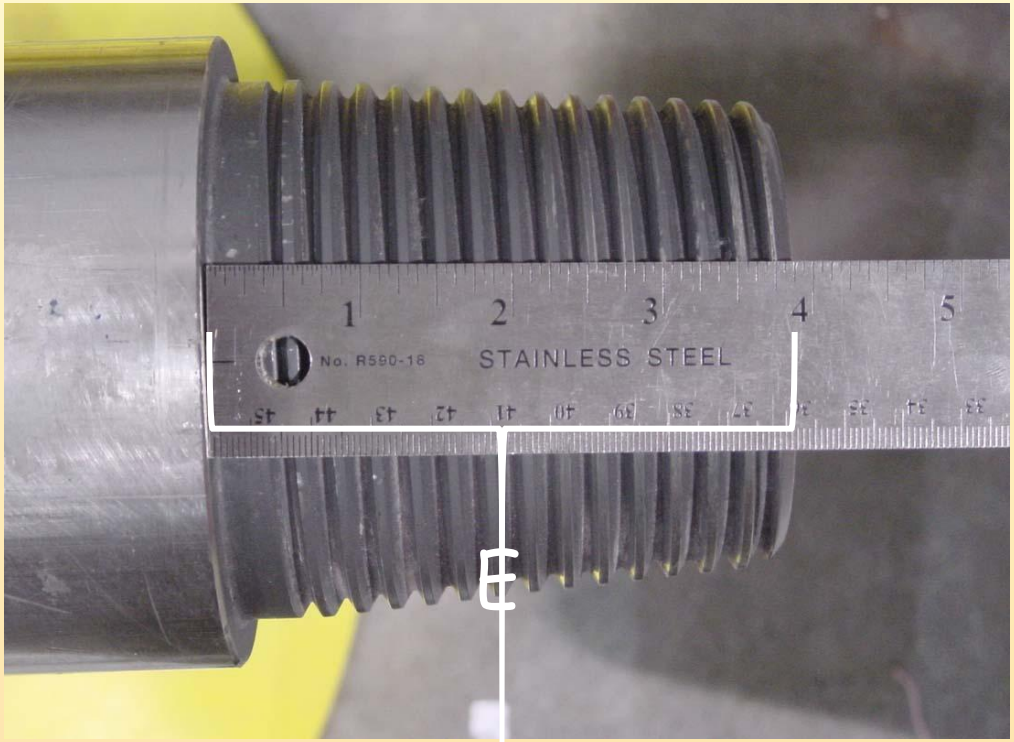
Spring Stack Length and Type



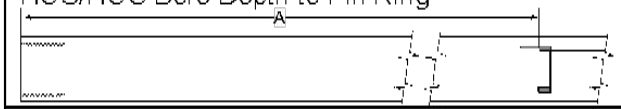
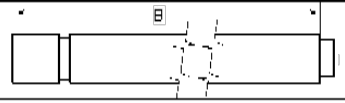
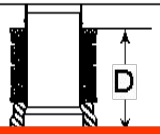
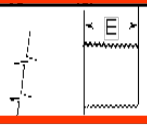
Spring Stack Length

		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"

Pin Length



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"

Calculations

Exact Height

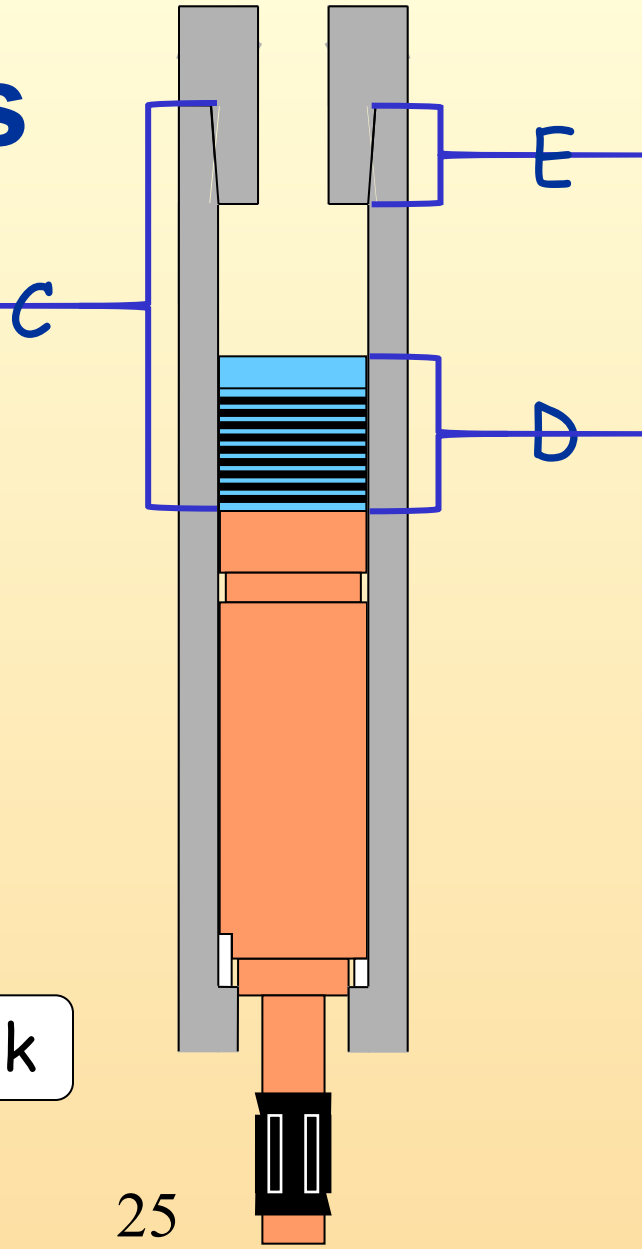
(No spring stack compression)

= C - D - E

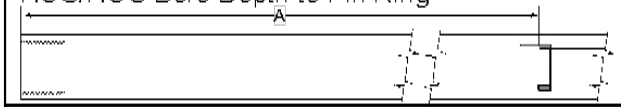
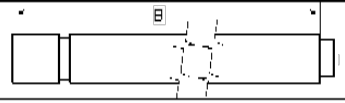
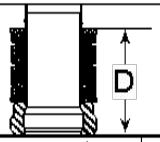
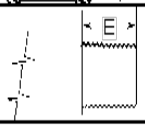
However, we must compress the spring stack. The amount of compression must be added.

Spacer Stack Height

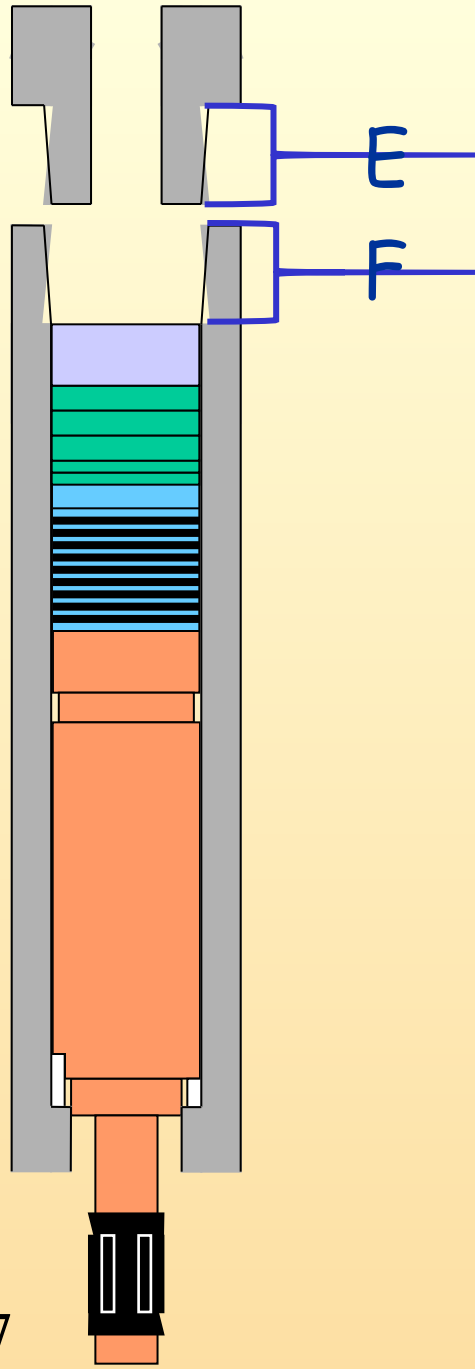
= C - D - E + Compression



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"

Calculations



Final Check Dimension F

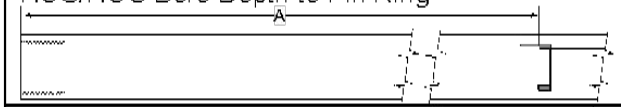
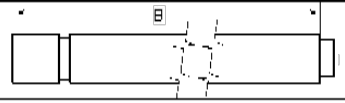
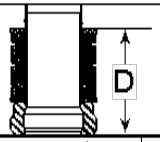
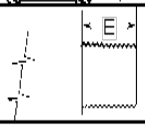
F = E - Compression

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.

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?

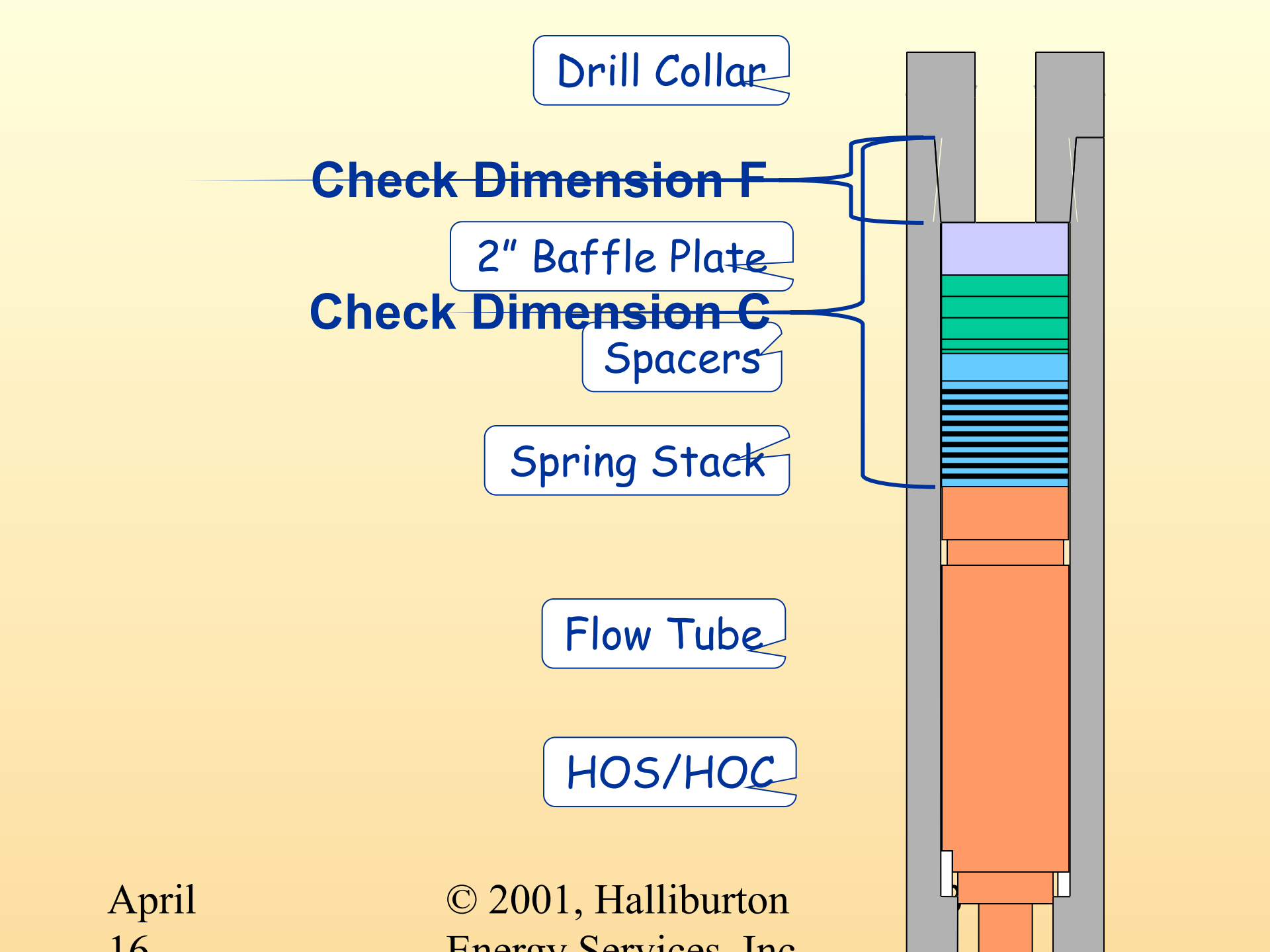
- Hardmount 1200 System
  - 0.450 inch or 11 mm
- Hardmount 650 System
  - 0.200 inch or 5 mm
- Hardmount Slimhole System
  - 0.300 inch or 8 mm

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**



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.**