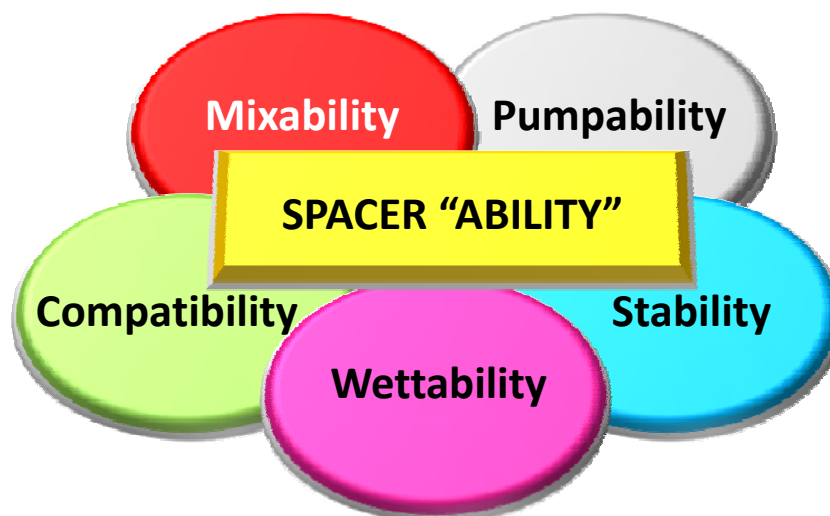


## MULTIFLOW SPACER

Does the Spacer you are using have the "Ability" to do The Job?



### The facts about Cement Spacers

To be effective, a cementing spacer must have the "Ability" to provide maximum displacement efficiency. "Ability" can be defined as the spacer properties which provide:

- Mixability
- Pumpability
- Compatibility
- Wettability
- Stability

#### ● Mixability

Field studies have shown the inherent problems associated with on-site mixing of weighted spacer fluids. These studies revealed that too often the field mixing equipment does not provide sufficient mixing energy, or not enough time is spent mixing to effectively disperse and hydrate the complex polymers present in some spacer formulations. This usually results in massive settling of the weighting agent which completely alters the density and rheological properties necessary to achieve efficient mud displacement.

Multiflow Spacer has been designed to overcome these problems. The fast hydrating, easily dispersible Multiflow Spacer mix is easily prepared in batch mixers, slugging pits, or other low shear mixers with minimal agitation. Rapid low shear "Mixability" permits spacer preparation with incrementally increasing density which helps to minimize commingling, channeling, and gravitational exchange.

#### ● Pumpability

If slugs of improperly mixed spacer are circulated down hole, erratic friction pressures, and higher ECD's may result. In addition, slugs of weighting agent can settle out rapidly at the casing shoe which can partially bridge off the annulus and restrict the flow rates necessary to achieve displacement efficiency.

## MULTIFLOW SPACER

- **Compatibility**

The spacer fluid should be totally compatible with the mud and cement system. Any mixtures of the mud: spacer or cement: spacer should not produce higher rheological properties than the individual fluids.

Multiflow Spacer has been formulated to be compatible with all common water and oil based muds. Of course, complete compatibility tests using actual mud samples are run on jobs in our state of the art API cement labs in strict accordance with API Spec 10AppendixP(investigation of preflushes and spacers for

- **Wettability**

The spacer must "Water Wet" the casing and formation to promote cement bonding. The extremely water wetting surfactants present in ensure maximum water wettability of all surfaces to be contacted by the cement slurry for good bonding.

- **Stability**

Many of the polymers used in spacer formulations are sensitive to high shear and temperature. Some hydrate rapidly and gain viscosity, while others shear thin or may completely deteriorate as temperature increases. Stability is necessary to control down hole pressures and achieve effective mud displacement.

Multiflow Spacer was designed to provide exceptional stability at high temperature conditions to maintain full suspension of the weighting agent under the toughest down hole conditions. This is considered to be one of the most critical factors for effective mud removal regardless of the Flow Regime of the Spacer.

<b>Typical Spacer Properties - Mixed at 3 min. Low Shear</b> <b>Typical Spacer Properties which have Consistently Provided Optimum</b> <b>Displacement Efficiency and Shear/Thermal Stability</b>							
Density (lbs/gal)	Plastic Viscosity (CP)		Yield Point (lbs/100 ft.²)		Fluid Loss* (mis/30 min).	Stability** Sedimentation	
	80°F	180°F	80°F	180°F	300°F	150°F	300°F
9	20	11	9	12	8.2	Nil	Nil
10	21	14	7	12	---	Nil	Nil
11	225	17	10	12	---	Nil	Nil
12	26	19	9	11	21.0	Nil	Nil
13	28	21	8	10	---	Nil	Nil
14	33	22	12	12	---	Nil	Nil
15	33	24	11	9	---	Nil	Minimum
16	46	26	16	10	33.8	Nil	Minimum
17	59	29	17	10	---	Nil	Nil
18	68	35	21	10	---	Nil	Nil <sup>2</sup>
19	82	42	26	10	44.0	Nil	Nil <sup>2</sup>

Fluid Loss\*: Measured following 4 hour "hot roll" at 150°F  
 Stability\*\*: Examiden after 4 hour "hot roll" at 150°F  
 Stability: Examined after 16 hour "hot roll" at 300°F  
 Nil<sup>2</sup> : Ph Adjusted to 11.0 and 2 lbs./bbl. Gel added