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INSTRUCTIONS
PILOT TEST KIT
Part No. 163-00

Pilot testing is routinely used for the analysis and treatment of problem drilling fluids. Pilot testing enables the operator to predict in advance how a drilling fluid will respond to a specific fluid additive or to a combination of additives. As drilling progresses, it becomes vitally important to be able to predict how various fluids and additives will behave under changing conditions that are encountered during the drilling operation.

Components:

#110-20	Measuring cup, 100 ml, plastic
#140-60	Filter Press, half area, complete
#153-18	Cylinder, Graduated, 10 ml x 2/10 ml, glass
#153-20	Cylinder, Graduated, 5 ml x 1/10 ml, glass
#153-26	Titration dish, polyethylene
#153-28	Stirring Rod, polyethylene
#153-34	Pipette, 1 ml x 1/100 ml, glass
#153-38	Pipette, 5 ml x 1/10 ml, glass
#153-40	Pipette, 10 ml x 1/10 ml, glass
#154-50	Spatula, 4-inch blade
#155-10	Timer, Interval, 30-minute
#163-20	Mixer, for measuring cup, 115 volt
#166-01	Balance, portable prescription, 50 x .01 gram
#166-02	Weight Set, 50 gm – 10 mg
#206-00	Distilled Water
#297-01	*Bottles, glass, with cap, French square, 2 oz 20 each, supplied, empty
#163-02	Case, stainless steel, Pilot Testing

*The fluid engineer should supply the chosen assortment of dry chemicals. Where feasible actual well-site chemicals should be used whenever possible.

Accessories:

#Specify	Roller Oven, portable, or laboratory model, for usage with high temperature wells
#Specify	High Temperature High Pressure Filter Press, for usage on high temperature wells and on all operations where oil muds are used.

Procedure:

Pilot testing uses equivalent volumes for analysis where a small liquid volume is considered equal to an actual volume of liquid used in the field. A 1 ml (1 cm^3) of liquid volume is approximately equivalent to 1 gram. The 5 ml graduated cylinder may be used for this determination. For greater accuracy, the actual weight of the fluid inside the cylinder may be measured. Using the balance, first weigh the empty graduate cylinder and then determine the weight of the cylinder with 1 ml of fluid. The difference in the two weights will determine the weight of the fluid.

A convenient liquid volume used for each "response to additive" evaluation is 350 mls (350 cm^3). For pilot testing, one (1) gram per 350 mls of liquid is equivalent to one (1) pound per barrel, with a barrel equaling 42 gallons.

. $1\ gm / 350\ mls = 1\ lb_m / bbl$ (Where 1 bbl = 42 gal.)

lbm/bbl x 2.853 = kg/m3

This is normally an adequate volume to run pilot testing after the sample has been prepared. The sample should be thoroughly mixed before removing each 350 ml portion from the larger sample. Separation of the components of a fluid sample between tests will cause erroneous test results.

The sample to be evaluated should be taken from the suction pit before any chemical additions are added. A one gallon sample will normally be sufficient for a comprehensive fluid analysis, as several tests are usually required in order to determine the most economical and effective treatment. It is important to use the same fluid as the base when a group of tests are being run and the results of various additives are being compared.

Pilot Testing Liquid Volumes

1 gal. = 8.33 lb_m

1 lb_m = 1 gm

1 gm = 1 cm^3

8.33 cm^3 = 8.33 gm = 1 gal.

Pilot Testing Conversion Factors (1 g/350 mls = 1 b_m/bbl)

lb_m/bbl	g in 100 mls	g in 500 mls
1.0	0.286	1.428
2.0	0.571	2.857
3.0	0.857	4.286
3.5	1.000	5.000
4.0	1.143	5.714
5.0	1.428	7.140
6.0	1.714	8.571
7.0	2.000	10.000
8.0	2.286	11.428
9.0	2.571	12.856
10.0	2.857	14.286

Pilot Testing Treating Solutions

1 ml of 10% solution in 175 mls fluid = 0.2 lb_m/bbl (0.57 kg/m3)
1 ml of 10% solution in 350 mls fluid = 0.1 lb_m/bbl (0.28 kg/m3)
1 ml of 5% solution in 175 mls fluid = 0.1 lb_m/bbl (0.28 kg/m3)
1 ml of 5% solution in 350 mls fluid = 0.05 lb_m/bbl (0.14 kg/m3)

Procedure:

In order to produce results that will reveal changes to the fluid in only one variable, several procedures must be strictly adhered to. The most important ones are as follows.

1. Time and Shear:
   - A. The mixing device should be operated at the same speed for the entire set of tests. This is especially important for variable speed mixers.
   - B. The mixing time should remain constant throughout the test.
   - C. The base fluid (or blank) should be subjected to the same shear and mixing time prior to the test. This will eliminate any confusion about whether the results are due to shear or to treatment.
   - D. In some cases the evaluation of a combination of products is needed. When this occurs, always use another sample of the base fluid. Sequential product additions to the same sample can lead to erroneous results because of extended mixing times and volume depletions.

2 Additives:
   - A. All additives (solids or liquids) should be carefully weighed or measured (liquids) prior to using them in the respective fluid samples. Number the samples and record the quantity of additions in each. To improve the homogeneity of the test samples, any additions should be made while the fluid is being stirred.
   - B. Care should be taken in testing polymers, thinners or filtration control agents to evaluate only at temperatures that have thermal stability at or below estimated bottom hole temperature conditions.
   - C. Whenever possible, use additives that are stocked on location for pilot testing.

3 Sample Dilution:
   - E. If water or oil dilution is necessary in a weighted fluid, the sample should be restored to its original density prior to testing. This will more accurately reflect the true effects of dilution. 8.3 mls is the equivalent of 1 gallon of dilution per barrel of fluid.

4 Time and Temperature:
   - F. Measure the test sample properties as soon as possible after stirring. A time delay between mixing and testing can affect the rheological and filtration properties of the fluid. If a time delay cannot be avoided try to maintain the same time lapse for each sample.
   - G. The test temperature can also affect fluid properties, therefore it is important to maintain the temperature as constant as possible for all samples. Thermal heat cups should be used when testing for viscosity under elevated temperature conditions.
   - H. More accurate results may be obtained if the samples can be hot-rolled at 150ºF for approximately 3 or more hours prior to testing, if time permits and a roller oven is available.