P-TTC

TECHNICAL DATA SHEET

1/10/26

P-TTC (PETROCHEM - THIXOTROPIC CEMENT POWDER)

TECHNICAL DATA

- **P-TTC** is a powdered additive of which the distinguishing feature is thixotropy. This property enables the cement slurry to be fluid when in motion (such as being pumped) and of forming a gel when allowed to stand. This gel structure is strong enough to support the weight of the slurry column, preventing fall back. If sufficient force is applied to move the slurry the gel structure is disturbed and the slurry returns to a fluid/pump-able state. However, these systems develop considerable gel strength and become difficult to move after remaining stationary for a period of time.

- Cement slurries prepared with **P-TTC** are almost indistinguishable from those prepared with Gypsum and as such remain dimensionally stable. However, the major advantages of **P-TTC** over Gypsum slurries are, it creates higher early and ultimate compressive strength development, in many cases, slurries prepared with **P-TTC** reach full strength within 24 hrs. whereas comparable slurries prepared with Gypsum require seven days to attain.

- A limitation of gypsum is that it cannot be used with cements having Tri-Calcium Silicate content (C3A) less than 5% while the **P-TTC** can be used with any Portland cement, since the C3A content is not a limiting factor. Also, **P-TTC** can be used with either fresh or seawater.

- The fact that the use of **P-TTC** does not depend on the C3A content is a major advantage, especially when local cement producers may exhibit poor quality control or low C3A content in their cement, also laboratory tests will show that **P-TTC** provides uniform gel strength and superior thixotropic properties when used with a wide variety of cement brands.

RECOMMENDED TREATMENT

- The normal concentration range of **P-TTC** is ~ 3 - 5% BWOC.
- Confirmation tests should be performed in the laboratory prior to the job.

PROPERTIES

- Appearance: Off White (Powder)
- Specific Gravity: 1.72
- Temperature Range: < 185°F

PACKAGING

- **P-TTC** is packaged in 40 x 50 lb. Sacks / Pallet.

SAFETY

- Read the SDS before use.

SLURRY TEST DATA

- The Thickening Time & Compressive Strength test data below represents a system designed with **P-TTC** & **P-SRL** (Synthetic Retarder Liquid) mixed with Fresh Water & Class G Cement mixed @ 14.8 PPG.

TABLE I : THICKENING TIME & COMPRESSIVE STRENGTH SLURRY DATA (UNDER API CONDITIONS)					
P-TTC (% BWOC)	**P-SRL (GAL/SK)**	**DEPTH (FT)**	**SETTING TIME (MINS/HRS)**	**COMPRESSIVE STRENGTH (HRS)**	
				12 HRS	**24 HRS**
4.20	0.02	2700	3:00	650	1000
4.20	0.13	4600	4:00	750	1250
4.20	0.14	6100	3:25	750	1275

SLURRY TEST DATA

- The tables below represent systems designed with the following additives:
  - **SLURRY 1** is designed with **P-TTC** & **P-CCL** (Calcium Chloride Liquid) mixed with Class G Cement.
  - **SLURRY 2 & 3** are designed with **P-TTC** & **P-SRL** (Synthetic Retarder Liquid) mixed with Class G Cement.

TABLE II : SLURRY PROPERTIES			
SYSTEM	**SLURRY 1**	**SLURRY 2**	**SLURRY 3**
P-TTC (% BWOC)	4.20	4.20	4.20
P-SRL (GAL/SK)	**0.00**	0.04	0.08
P-CCL (GAL/SK)	0.57	**0.00**	**0.00**
WATER (GAL/SK)	5.40	7.06	7.02
SLURRY DENSITY (PPG)	14.8	14.1	14.1

TABLE III : THICKENING TIME			
SYSTEM	**SLURRY 1**	**SLURRY 2**	**SLURRY 3**
BHCT (°F)	80	100	165
BHST (°F)	80	140	210
TT. (HR: MIN) @ BHCT	4:15	4:10	3:10

TABLE IV : COMPRESSIVE STRENGTH (PSI) @ BHST			
HRS	**SLURRY 1**	**SLURRY 2**	**SLURRY 3**
8	490	470	700
24	1000	1300	1400
72	1900	2000	1800
168	2400	2400	2000

METHOD FOR EVALUATION OF THIXOTROPIC SLURRIES IN TERMS OF GEL STRENGTH

INTRODUCTION

Due to the special rheological behavior of thixotropic slurries, a standardized procedure to evaluate the gel strength has been developed.

RHEOLOGICAL EVALUATION OF THIXOTROPIC SLURRIES

(A) Prepare two identical slurries according to the method specified by the API. Pour one slurry into the Fann VG Meter slurry cup for immediate rheological evaluation. Place the other slurry in a consistometer for 20 minutes for later evaluation.

(B) Gradually lift the slurry cup to measurement position with the motor running at 600 RPM. Continue stirring at 600 RPM for one minute or until viscosity reading stabilizes. Stop the motor and allow slurry to remain undisturbed for the indicated rest period. Restart the motor at 3 RPM. Note the maximum reading the meter reaches before the gel breaks. Also note the minimum value to which the meter falls to after the gel breaks. Change the speed back to 600 RPM and allow slurry to become thoroughly dispersed. Note the change in viscosity value indicated by the meter. Some agitation with a stirring rod may be necessary to accomplish this. Continue the 600 RPM speed for one minute and then stop for the next rest period. Continue with this procedure until all rest periods have been covered. Recommended rest periods are: 1, 3, 5, 10, 20, and 30 minutes.

(C) Evaluate the rheology of the slurry that has been stirred for 20 minutes. The procedure described in Step 2 is to be follow with this slurry also. The data collected from this slurry is very important because it better approximates a field application and will relate to the durability of the thixotropic nature of the cement slurry.

INTERPRETATION OF DATA

(1) GEL STRENGTH

It has been determined that a gel strength between 100 to 200 Lbs. /100 ft^2 is sufficient for the slurry to be selfsupporting. A value within this range should be attained after the 5 minute rest period. The maximum gel strength, above which pumping problems would occur has yet to be determined. It is known that gel strengths running into the thousands of pounds per hundred square feet are problematic because pumps at the well sites cannot exert sufficient force to break such a gel. A tentative estimate of the maximum permissible gel strength for a thixotropic slurry is about 500 Lbs. /100 ft^2.

(2) DEGREE OF THIXOTROPIC

After the gel breaks it is important that the viscosity fall back to a level that would permit easy pumping. In general, the meter reading should fall to a level below 50 Lbs. /100 ft^2 after the gel is broken. Thus, an ideal case would be for the slurry to maintain a gel strength of about 150 to 200 Lbs. /100 ft^2 and then fall back to 40 or so. The difference between the high and low values relates to the degree of thixotropy the system is exhibiting. The greater the difference is, the better the performance as a thixotropic slurry.

(3) 600 RPM READING

This value is important because it indicates the viscosity that the pumps would have to contend with during placement of the slurry. In general, the 600 RPM value should not exceed 300 Lbs./100 ft^2 (spring 1, bob: 1). Most thixotropic slurries will give reading between 200 and 270 Lbs./100 ft^2 at this speed.

CONCLUSION

The method of evaluation and interpretation described here should be of value. It is important that it be realized that the criteria specified here are not absolute. These measurements are heavily dependent upon the composition of the slurry, the peculiarities of the Fann instrument, and many other factors. The trend of the measured data is what is important here.