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Product Description

Product Name: **Oil Pro CSE**

Chemical Name: **Cement Strength Enhancer**

Oil Pro Cement Strength Enhancer (CSE) is a synergistic blend of a binder and synthetic pozzolanic lightweight additives. The pozzolanic components of Oil Pro CSE combine with calcium hydroxide produced during the cement hydration process to form additional cementitious materials, enhancing the early-age and ultimate compressive strength of the hardened cement. Cement systems formulated with Oil Pro CSE will also have an intrinsic thixotropic behavior, improved mechanical properties, satisfactory rheological behavior, reasonable thickening and WOC times, and improved resistance to chemical attack and alkali−silica expansion. Oil Pro CSE also has a small particle size and a larger specific surface area than cement. The fine particles of Oil Pro CSE work as a packing agent between the cement grains, improving the compactness of the hardened cement and providing a different, yet simultaneous method by which Oil Pro CSE can enhance the strength of the set cement, irrespective of temperature.

Oil Pro CSE was developed to replace inorganic salts (calcium chloride, sodium chloride, etc.), calcium sulfate (Hemihydrate and Dihydrate versions), Sodium Metasilicate, and calcined clays (e.g., Metakaolinite), which have all been used as set accelerators and compressive strength enhancers in cement compositions. However, in very low temperature oilwell cementing applications, the aforementioned materials are often ineffective in providing accelerated set times and enhanced compressive strengths due to the high concentrations that have to be used to achieve the desired results. The high concentrations drastically reduce the placement or pumping times of the cement compositions which are often too short for placing the compositions in the required locations. When set retarding agents are utilized to increase the placement or pumping times of the compositions, the enhanced compressive strength development of the cement compositions is often lost. The same is true for high temperature applications where the same materials when used are too reactive and result in reduced placement or pumping times. When set retarding agents are used to increase the placement or pumping times, compressive strength enhancement is often lost. Chloride salts also have another disadvantage associated with their use; such salts can cause steel pipe or steel structural members in contact with cement compositions containing the salts to rapidly corrode.

Oil Pro CSE does not significantly affect placement or pumping times and allows cement compositions to attain early enhanced compressive strengths over a broad temperature range, including at low temperatures (40°F to about 130°F). At high temperatures (200°F to about 375°F), Oil Pro CSE does not significantly reduce placement or pumping times. However, if longer placement or pumping times are required, set retarding agents can be utilized without significantly affecting the enhanced compressive strengths attained by the compositions.

What Are the Benefits of Oil Pro CSE?

- Enhanced early-age and ultimate compressive strength in oilwell cement and concrete systems.
- Thixotropy. Reduced Transition Times in Oilwell Cement Systems.
- Improved set cement mechanical properties.
- Low Permeability. Due to the particle size range of Oil Pro CSE, and its particle packing behavior.
- Improved resistance to chemical attack and alkali−silica expansion.

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- Sulfate Resistance.
- Satisfactory effect on cement system viscosity.
- Reasonable thickening and WOC times.
- Can be used as a cement replacement or supplementary cementitious material.
- When used, results in a reduction of carbon footprint.
- Will improve the bonding of oilwell cement systems.
- Will improve the stability of oilwell cement systems.
- Has good compatibility with organic and inorganic materials.

Oil Pro CSE Versions

Oil Pro CSE is offered in two versions: **Oil Pro CSE-3** and **Oil Pro CSE-2**. Both versions offer the benefits outlined above, with the primary difference between the two being Oil Pro CSE-2 having less of an effect on placement/pumping time, and thus, is the preferred version to use in high temperature oilwell cement systems.

Product Applications

Application / Use	Oil Pro CSE-3	Oil Pro CSE-2
In oilwell cement systems to enhance early-age and ultimate compressive strength.	✓	✓
In concrete (residential, commercial, industrial) systems to enhance early-age and ultimate compressive strength.	✓	✓
Replacement for inorganic salts, calcium sulfate, Sodium Metasilicate, and calcined clays set accelerators and compressive strength enhancers.	✓	✓
Improve related performance of oilwell cement systems (Thixotropy, Mechanical Properties, Sulfate Resistance, Stability, etc.)	✓	✓
Oilwell cementing at BHCT up to 230°F.	✓	✓
Oilwell cementing at BHCT between 230°F and 375°F.		✓
High-performance concrete.	✓	✓
Masonry and masonry units.	✓	✓
Precast concrete.	✓	✓
Mass concrete.	✓	✓
Soil stabilization.	✓	✓
As a cement replacement or supplementary cementitious material.	✓	✓

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Typical Properties

Property	Oil Pro CSE-3	Oil Pro CSE-2
Appearance	Light gray to dark gray	Light gray to dark gray
pH, (5% w/w in DI water)	11.0 – 13.0	11.0 – 13.0
Density (lbs/ft^3)	81.0	82.0
Specific Gravity (g/cc)	2.70	2.74
Absolute Volume (gal/lb)	0.0445	0.0438

Storage and Handling

Storage: Make sure that partial bags are tightly sealed because the product is irritating to skin and eyes.

Handling: Use appropriate personal protective equipment when working with Oil Pro CSE. Do not get into eyes, on skin, ingest or inhale dust generated during the use of the product. Try to prevent the generation of dust during use of the product. Make sure that proper ventilation and eye washes/safety showers are present in the immediate work area. Do not flush product into the sewer system.

Product Performance

Provided in the table below are Thickening Time and Compressive Strength test results for Oil Pro CSE. The test results are specific to the slurry design, testing parameters, and testing methodology used, and should be viewed only as a performance snapshot for Oil Pro CSE. These results are provided as reference only and should not be the determining factor as to whether Oil Pro CSE can be of benefit in your slurry designs. Only actual evaluation testing by you can determine the performance advantages achievable, from the use of Oil Pro CSE. Therefore, please request samples for evaluation.

Recommended Oil Pro CSE Concentrations:

Application / Use	Concentration Range
In Oilwell Cement Systems	3% to 12%
In Concrete Systems	Up to 30%
In Precast Concrete Systems	Up to 30%
As a Cement Replacement	Up to 100%
As a Supplementary Cementitious Material	Up to 50%

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Reference Test Results:

Slurry Density (ppg)	Yield (ft^3/sk)	Water Req. (gps)	CSE Used in Slurry	Conc. Used (%BWOB)	Test Temp. (°F)	TTT, 70 Bc (hr:min)	Time to 100 psi (hr:min)	Time to 500 psi (hr:min)	24 hr Compressive Strength (psi)
11.0	2.79	17.25	Oil Pro CSE-3	8.0	157	7:06	9:58		293
11.0	2.79	17.25	Oil Pro CSE-2	8.0	157	8:25	8:19		372
11.5	2.25	13.38	Oil Pro CSE-3	6.0	179	4:47	3:19	11:02	640
11.5	2.25	13.38	Oil Pro CSE-2	6.0	179	5:40	4:02	13.30	595
13.6	1.45	6.88	*Oil Pro CSE	5.0	190	5:47	13:05	16:22	1690

*Oil Pro CSE is the precursor to Oil Pro CSE-3 and Oil Pro CSE-2. The composition of Oil Pro CSE is very similar to Oil Pro CSE-3 and Oil Pro CSE-2. Data on Oil Pro CSE in this table provided as a reference only.

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