

INFORMATION

CA-GC2

GYPSUM CEMENT

DESCRIPTION

CA-GC2 is a specially formulated gypsum cement for use in a wide variety of well cementations. CA-GC2 is a fine-ground, off-white powder that is used either neat or in combination with Portland cement to create blended cements with the unique properties listed below:

- Blowout control
- Shut off of high pressure water flows
- Plugging lost circulation zones
- Thixotropic cements
- Expansive cements
- Permafrost cements

APPLICATION

Blowout Control, High Pressure Water Flows, and Plugging of Lost Circulation Zones

CA-GC2 is mixed and pumped neat to produce a temporary cement that sets within 60 minutes at 60-180° F BHST and produces over 2300 psi compressive strength within 3 hours of set time.

CA-GC2 can also be blended with Portland cement to produce a quick setting, expansive cement system for use in primary or squeeze applications. A 50:50 blend of these two cements generally produces maximum acceleration and the ratio is varied to produce the desired thickening time and final strength.

A CA-GC2:Portland cement blend preceded by CA-FC1 reactive preflush provides the ultimate in high pressure brine shut-off flow. The blended cements are very tolerant to contamination by formation water and produce a lasting, permanent cement. Neat CAGC2 is subject to leaching by formation water and partial dissolution.

Thixotropic and Expansive Cements

Portland cement, plus 6-12% CA-GC2 (BWOC) provides both a thixotropic and expansive cement. This blend of cement is useable up to 125° F (52° C) BHCT neat or with accelerators and can be utilized at BHCT's up to 200° F (93° C) with the addition of special retarder CA-RTX3. Additional expansive properties are available with the inclusion of 18-37% (BWOW) CA-A5 (NaCl).

Thixotropic-expansive cements are recommended for cementing through weak, shallow formations where lost circulation and cement fall-back present placement problems. The positive expansion inherent to these cements prevents the formation of a micro-annulus and provide excellent CBL results.

Permafrost Cements

CA-GC2 is one of the few materials that will set at sub-freezing temperatures. Because of this CA-GC2: cement blends are highly recommended for cementing through sub-freezing formations. CA-GC2's low heat of hydration is of special importance in permafrost cements for reduction of hole enlargement due to melting of the permafrost. Special freeze point depressants, retarders and lost circulation materials are also required for these special cementing conditions.

RECOMMENDED TREATMENT

Blowout Control, Plugging of Lost Circulation and Water Shut-off

CA-GC2 has a water requirement of 40%, eg. 100 lb CA-GC2 x 40% = 40 lb water, and an absolute volume of 0.594 ft³/100 lb.

When using CA-GC2 either neat or in combination with Portland cement for conditions requiring maximum strength and minimum pumping time, the 40% water requirement for the CA-GC2 portion of the mixture should be observed.

Thixotropic and Expansive Cements

CA-GC2 is blended with API Class A, G, and H cements to create thixotropic cements with excellent expansive properties. The optimum concentration of CA-GC2 must be determined by pilot testing since performance can vary due to difference in the composition of the Portland cement. Recommended concentrations and slurry designs are listed below.

API Class A + 6-8% CA-GC2 + 0-3% CA-A1 (CaCl₂)

Density: 14.5 ppg

API Class G + 10% CA-GC2 + 0-3% CA-A1

Density: 14.5 ppg

API Class H + 12% CA-GC2 + 0-3% CA-A1

Density: 14.5 ppg

All three designs are mixed at 14.5 ppg to reduce slurry density, further minimizing lost circulation and improving slurry thixotropy. CA-GC2:Portland cements (thixotropic, expanding cements) can be extended to densities as low as 12.8 ppg using 1- 2% CA-EX2.

During laboratory testing the concentration of CA-GC2 is varied to achieve the low-high-low viscosity characteristic that denotes a thixotropic cement. If the slurry fails to gel in 5 minutes, the CA-GC2 is increased and if the slurry fails to thin-back when stirred, after remaining static for 10 minutes, the CA- GC2 is reduced.

The addition of 18-37% CA-A5 (by weight of water) will agument the expansive properties of these thixotropic cement mixtures.

As the concentration of CA-A5 (NaCl) is increased - so will the slurry pumping time. CA-RTX3 is available to retard pumping time for circulating temperatures <200° F (93° C).

Permafrost Cements

Contact Messina Dallas R&D Laboratory for recommendation on Permafrost designs.

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