

LIFT® - Long Interval and Fast-hydration Technology

1. System Description and Benefits

We usually encounter serious challenges in cementing long well intervals. In order to place cement slurry properly in bottom section, enough retarder is added to provide required thickening time at bottom hole temperature, leading to slow development of the compressive strength at top section with low temperature. The long wait-on-cement makes cementing job costly. LIFT systems make it easier in cementing long intervals with great temperature variations. LIFT systems control thickening time at high temperature properly while develop compressive strength at low temperature at required operational time frame.

Characteristics	Benefits
Water soluble polymeric additives facilitate fast hydration	Simple and easy field mixing
Both liquid and solid powder are available	
Good retarding performance at high temperature	Cost-effective and superior job performance in cementing long intervals
Fast compressive strength development at low temperature	
Not sensitive to oilwell cement	Applicable in various well conditions
Not sensitive to mix water	

2. LIFT Additives

Product	Code	Form
Antifoam Agent	KCM003	Colorless liquid
Dispersant	KCM012S	Brownish powder
Polymeric Retarder	KCM057	Light yellow liquid
Fluid Loss Control Agent	KCM065S	White powder

3. Typical Properties and Field Applications

LIFT technology was commercialized in 2019 successfully and has been applied in various oil and gas fields in the world. It has been proved to be effective in cementing oil or gas wells with the following conditions and properties:

Temperature: BHST 150-325°F (65-160°C)
 Density: 12.0 ppg to 20.0 ppg (1.45 – 2.45 g/cm³)
 Mix-water: Fresh water
 Compressive strength: 7-10 MPa/100°C temperature differential*72 hrs.
 API fluid loss: ≤50 mL

Further information about field jobs is described in documented “Case History of LIFT Technology”. Typical properties and thickening curve of LIFT slurries are shown in the following Table and Figure.

Item	Specification	Results with LIFT
Density, g/cm ³	1.95	1.95
Dispersibility, cm	20-24	23
API fluid loss, ml (110°C*6.9MPa*30min)	< 50	42
Initial thickness, Bc	< 30	7
Thickening time, minutes (110°C*90MPa*50min)	240-270	270
Compressive strength, MPa (20°C*0.1MPa*48h)	> 3.5	20.1



4. Precautions and HSE Considerations

Polymeric retarder (KCM057), dispersant (KCM012S and KCM012L), and fluid loss control agent (KCM065S and KCM065L) in LIFT systems play the most important role in cementing long intervals. In addition, extenders (KCM019, KCM019R, KCM030A, KCM030B, KCM030C and KCM030D, KCM020, KCM020R, and KCM032) and expanding agents (KCM025LT, KCM025, KCM025HC, and KCM025H) are also used and compatible with major additives in LIFT systems.

The laboratory procedures, quality assurance program and guidelines for field mixing and handling of LIFT systems are described in LIFT fluid manual.

Refer to the technical sheet and SDS of the respective product for the health, safety and environmental information of each product.

Antifoam Agent KCM003

1. Introduction

Foams formed while mixing cement slurry cause many problems such as lower and wrong density reading, poor particle wetting and hydration efficiency, and pumping difficulties due to pump cavitation and loss of suction. KCM003 antifoam agent is often required in cement slurry to prevent foaming tendency and avoid problems described above.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Melting/Flash Point (°C)	Health Hazard	Physical Hazard	pH
KCM003	Colorless liquid	0.98-1.03	Soluble	>93	Eyes Irritation	None	8-9

3. Chemical Properties and Application

KCM003 is an effective antifoam agent in most cement slurries that do not have high salt concentrations. It is NOT a foam breaker therefore KCM003 should be always added into mixing water before any foam forms. Higher agitation is required in cold weather for better dispersion.

4. Treatment

KCM003 is an effective antifoam agent in most cement slurries that do not have high salt concentrations. It is NOT a foam breaker therefore KCM003 should be always added into mixing water before any foam forms. Higher agitation is required in cold weather for better dispersion.

5. Packaging

KCM003 is supplied in 5 gallons high density polyethylene (HDPE) drums or 55 gallons steel drums. Keep it away from extreme conditions such as places near flames or direct sunlight.

Dispersant KCM012S

1. Introduction

Dispersants can improve mixability of cement slurry and reduce slurry viscosity. This will reduce pumping frictions and lower the critical rate for turbulence flow. Most dispersants achieve the above objectives by separating solid particles and suspending them homogeneously in cement slurry. Many dispersing agents in cement slurry are also able to help improve fluid loss properties of the slurry.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Flash Point (°C)	Health Hazard	Physical Hazard	pH (1% solution)
KCM012S	Brownish powder	1.10-1.30	Soluble	ND	Eyes irritation	None	7.5-9.0

3. Chemical Properties and Application

As described above KCM012S provides cement slurry placement in turbulent flow easily and at minimal pumping pressure due to lower frictions, especially in applications of smaller tubulars and viscous slurry designs. The unique chemical nature of KCM012S will disperse solid particles effectively and stabilize them homogeneously in cement slurries to prevent any settling problems and reduce free water content.

4. Treatment

KCM012S is generally used at concentrations from 0.10 to 1.0%BWOC depending on the brands of cement and applications. Caution should be taken to “over-disperse” the slurry at higher KCM012S concentrations. Excess free water and particle settling will be observed if slurries are “over-dispersed”.

5. Packaging

KCM012S is supplied in plastic-lining bags with net weight of 25kg/sack. It should be stored in shaded areas with good ventilation. Keep it away from high temperature, humidity, and direct sunlight.

Polymeric Retarder KCM057

1. Introduction

It has become a trend for long section cementing in shale gas exploitation, and this kind of well became very popular all over the world, but most common retarders can't work very well for its slow strength development at big temperature differential.

KCM057 provides both long thickening time and fast compressive strength development even when the BHCT is up to 250°F and TT is long to 300min.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Melting/Flash Point (°C)	Health Hazard	Physical Hazard	pH
KCM057	Light yellow liquid	1.05-1.15	Soluble	>100	Eyes and skin	None	1.0-2.0

3. Chemical Properties and Application

KCM057 is a polymer retarding agent used to control cement thickening time but does not affect cement hydration rate. It provides rapid and better compressive strength development for cement slurry even at long thickening time (more than 5 hours). It can be used at wide temperature (65-160°C) and density (10-21lbs/gal) ranges of cement slurries.

It shows good compatibility in most cement slurries and is approved to be tolerant to many factors such as mixing water (fresh, sea, and salt), concentration, shear, and temperatures.

4. Treatment

Exact loading of KCM057 depend on additives used in cement slurry, typically 0.05-0.40gal/sack KCM057 is required for temperature range of 65-160°C.

5. Packaging

KCM057 is supplied in 5 gallons or 55 gallons high density polyethylene (HDPE) drums. Keep it away from extreme conditions such as places near flames or direct sunlight.

Fluid Loss Control Agent KCM065S

1. Introduction

Selection of fluid loss additives is very important for cementing job design. Most fluid loss control agents affect other properties of cement slurry such as rheology, retardation, and cement set strength. Comprehensive laboratory testing is generally required for selection of fluid loss control agents.

KCM065S is an effective fluid loss control agent for low-to-medium temperature cement slurry design, especially when salt cement slurries and non-retarding effect are required.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Flash Point (°C)	Health Hazard	Physical Hazard	pH
KCM065S	White powder	1.37-1.57	Partially soluble	NA	None	None	None

3. Chemical Properties and Application

KCM065S is a solid fluid loss control agent that can be used for cement slurry design at wide temperature (65-160°C) and density ranges (12-20 lbs/gal) due to its unique chemical natures. It can be mixed with freshwater, seawater, and salt water depending on application requirement.

It is approved by testing that KCM065S is not sensitive to cement brands especially for low to medium density slurry designs. However, like most polymeric fluid loss control agents, KCM065S generally increases slurry viscosity slightly especially at higher loading. This effect can be reduced by using dispersant.

Lower free water and no retarding effect are generally expected for cement slurries containing KCM065S. It is compatible with most cement additives especially in saltwater cement slurries.

4. Treatment

0.2-2.0%BWOC loading is generally required for effective fluid loss control depending on temperature, mixing water, and slurry density.

5. Packaging

Each sack of KCM065S contains 25kgs. Sacks consist of three layers with one polyethylene inner layer and two paper layers.