

EZCem[®] - Mid-to-high Temperature Cementing Technology

1. System Description and Benefits

Synergistic interaction between high temperature fluid loss agent and retarder makes EZCem to become one of the most advanced technologies in cementing high temperature and long-interval oilwells. EZCem is applicable in wide temperature and density range. Its insensitivity to temperature, density, cement brand and mix water minimizes operational risks and improves cementing job quality.

Characteristics	Benefits
Less and simple additives	Simple field operations and job design
Insensitive to temperature	
Predictable slurry and set cement properties	
Wide applicable temperature and density range	Easy and durable technology in cementing high temperature oil and gas wells
Usable in various cement brands and mix-water	
Tolerant to contaminations	
Superior fluid loss control, proper rheology, expected compressive strength development and predictable thickening time	Good job quality
Compatible with laminar flow viscous spacer	
Applicable in cementing long-interval oil and gas wells	

2. EZCem Additives

Product	Code	Form
High Temperature Retarder	KCM007L	Clear colorless liquid
High Temperature Fluid Loss Control Agent	KCM008L	Light brown liquid
High Temperature Fluid Loss Control Agent	KCM008S	White or light-yellow solid particles
Dispersant	KCM002S	Yellow powder
Dispersant	KCM002L	Brownish liquid
Antifoam Agent	KCM003	Colorless liquid

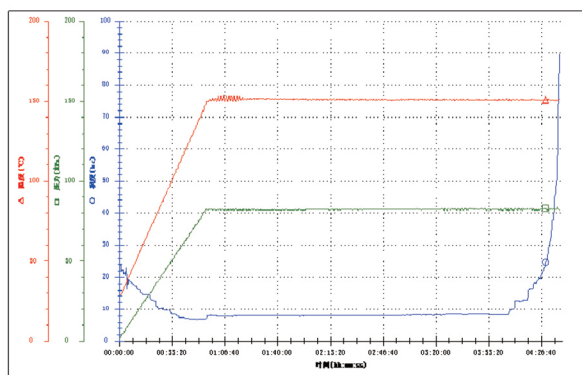
3. Typical Properties and Field Applications

EZCem technology was commercialized in 2009 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 150-392°F (65-200°C)
 Density: 12.0 ppg to 20.0 ppg (1.45 – 2.45 g/cm³)
 Mix-water: Fresh water, seawater and brines
 Compressive strength: 45 MPa/175°C *24 hrs.
 API fluid loss: ≤50 mL (160°C)

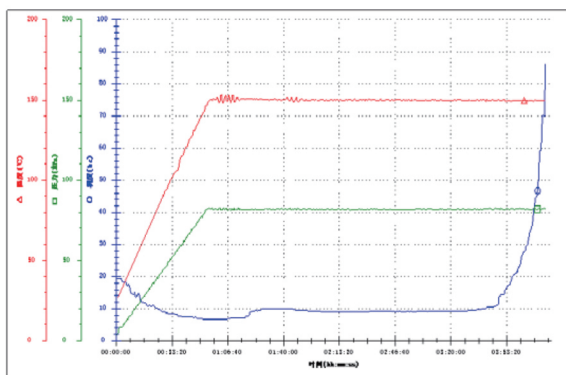
Further information about field jobs is described in documented “Case History of EZCem Technology”. Typical thickening time curves of EZCem slurries are shown in the following Figures.

实验编号: 永固-579-4548路-2002-8
 永固-579-4548路-2002-8
 开始时间: 2009年7月30日 11:32:27
 设备类型: 永固-579-4548路-2002-8
 温度(°C): 150
 实验结束: 2009年7月30日 15:30:36
 井号:
 添加剂: 永: 238.35+002.4; 12+000.45; 68+007.37; 30+000.00; 1.74+002.2;
 厚度(英寸): 30
 厚度(英寸): 30



Lab Sample: 4:38hrs

实验编号: 永固-579-4548路-2002-8
 永固-579-4548路-2002-8
 开始时间: 2009年7月30日 0:33:52
 设备类型: 永固-579-4548路-2002-8
 温度(°C): 150
 实验结束: 2009年7月30日 4:31:17
 井号:
 添加剂: 永: 238.35+002.4; 12+000.45; 68+007.37; 30+000.00; 1.74+002.2;
 厚度(英寸): 30
 厚度(英寸): 30



Field Sample: 4:38hrs

4. Precautions and HSE Considerations

High temperature retarder (KCM007L), dispersant (KCM012S and KCM012L), and fluid loss control agent (KCM008S and KCM008L) in EZCem system play the most important role in EZCem cementing job design. KCM003 is generally used to eliminate gas trapped in EZCem slurries.

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

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

Dispersant KCM002L

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 above objectives by separating solid particles and suspend 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	Melting/Flash Point (°C)	Health Hazard	Physical Hazard	pH
KCM002L	Brownish liquid	1.16-1.21	Soluble	>93	Eyes	None	7-9

3. Chemical Properties and Application

As described above KCM002L 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. Unique chemical nature of KCM002L will disperse solid particles effectively and stabilize them homogeneously in cement slurries to prevent any settling problems and reduce free water content.

Liquid form of KCM002L provides operations with great flexibilities in offshore where spaces are limited and other areas where dry-blending facilities are not available.

KCM002L is also effective in fluid loss control if used together with most polymeric fluid loss control agents.

4. Treatment

KCM002L is generally used at concentrations from 0.025 to 0.5 gal/sack depending on the brands of cement and applications. Caution should be taken to “over-disperse” the slurry at higher KCM002L concentrations. Excess free water and particle settling will be observed if slurries are “over-dispersed”.

5. Packaging

This product 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 KCM002S

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 above objectives by separating solid particles and suspend 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	Melting/Flash Point (°C)	Health Hazard	Physical Hazard	pH
KCM002S	Yellow powder	1.21-1.41	Soluble	>93	Eyes	None	7-9

3. Chemical Properties and Application

As described above, KCM002S provides cement slurry placement in turbulent flow easily and at minimal pumping pressure due to lower frictions, especially in applications of smaller tubular and viscous slurry designs. Unique chemical nature of KCM002S will disperse solid particles effectively and stabilize them homogeneously in cement slurries to prevent any settling problems and reduce free water content.

KCM002S is compatible with most of cement additives, it can be in salt solution up to salt saturation, but higher concentration is required than in fresh water. KCM002S is also effective in fluid loss control if used together with most polymeric fluid loss control agents.

4. Treatment

KCM002S is generally used at concentrations from 0.025 to 2.0%BWOC depending on the brands of cement and applications. Caution should be taken to “over-disperse” the slurry at higher KCM002S concentrations. Excess free water and particle settling will be observed if slurries are “over-dispersed”.

5. Packaging

KCM002S 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.

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.

High Temperature Retarder KCM007L

1. Introduction

Hydration time and cement set period are critical for well cementing design. Retarders are generally utilized in cement slurry to control cement thickening time to reduce job risks especially at medium to high temperature applications.

KCM007L provide accurate thickening time for medium to high temperature applications without affecting other properties of the cement slurry.

2. Physical Properties and Hazards

Additive	Form	S.G.	Water Solubility	Melting/Flash Point (°C)	Health Hazard	Physical Hazard	pH
KCM007L	Clear colorless liquid	0.98-1.13	Soluble	>100	Eyes	None	7.0-8.5

3. Chemical Properties and Application

KCM007L is an inorganic 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 (190-392°F) and density (14-20lbs/gal) ranges of cement slurries.

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

Synergistic effect was observed when KCM007L is used together with KCM008L. Fluid loss, thickening time, and additive sensitivity properties are improved by using both KCM007L and KCM008L.

4. Treatment

Exact loading of KCM007L depends on additives used in cement slurry, typically 0.1-2.5 gal/sack KCM007 L is required for temperature range of 180-392°F.

5. Packaging

KCM007L 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.

HighTemperature Fluid Loss Control Agent KCM008L

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 especially at high temperature.

KCM008L is an effective fluid loss control agent for high-temperature cement slurry design. It has synergistic effect with KCM007L retarder so that both additives are used together to provide superior slurry performance especially for high temperature applications.

2. Physical Properties and Hazards

Additive	Form	S.G.	Water Solubility	Melting/Flash Point (°C)	Health Hazard	Physical Hazard	pH
KCM008L	Light brown liquid	0.98-1.13	Soluble	None	None	None	6.0-7.0

3. Chemical Properties and Application

KCM008L is a liquid fluid loss control agent that can be used for cement slurry design at wide temperature (100-400°F) and density ranges (12-20lbs/gal) due to its unique chemical natures. It can be mixed with freshwater, seawater, and salt water depend on application requirement.

It is approved by testing that KCM008L is not sensitive to cement brands especially for freshwater low to medium density slurry designs. However, like most polymeric fluid loss control agents, KCM008L generally increases slurry viscosity especially at higher loading. This effect can be reduced by using dispersant.

Lower free water and no retarding effect on are generally expected for cement slurries containing KCM008L. It is compatible with most cement additives and has synergistic effect with KCM007L retarder for high temperature applications.

4. Treatment

0.1-0.8 gal/sack loading of KCM008L is generally required for effective fluid loss control depending on temperature, mixing water, and slurry density.

5. Packaging

This product 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.

High Temperature Fluid Loss Control Agent KCM008S

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 especially at high temperature. KCM008S is an effective fluid loss control agent for multi-temperature cement slurry design. It has synergistic effect with KCM007 retarder so that both additives are used together to provide superior slurry performance especially for high temperature applications.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Melting/Flash Point (°C)	Health Hazard	Physical Hazard	pH
KCM008S	White or light-yellow solid particles	1.40-1.60	Soluble	None	None	Water Slick	N/A

3. Chemical Properties and Application

KCM008S is a solid fluid loss control agent that can be used for cement slurry design at wide temperature (90-400-degF) and density ranges (12-20lbs/gal) due to its unique chemical natures. It can be mixed with freshwater, seawater, and saltwater depend on application requirement.

It is approved by testing that KCM008S is not sensitive to cement brands especially for freshwater at low to medium density slurry designs. However, like most polymeric fluid loss control agents, KCM008S generally increases slurry viscosity 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 KCM008S. It is compatible with most cement additives and has synergistic effect with KCM007 retarder for high temperature applications.

4. Treatment

0.5-2% by the weight of cement is generally required for effective fluid loss control depending on temperature, mixing water, and slurry density.

5. Packaging

KCM008S 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.