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# Application in Ceramic Industry

LANDU GLOBAL OPERATION CENTER

# INTRODUCTION



Hydroxypropyl Methyl Cellulose (HPMC)  
20,000 MT/Year

Hydroxyethyl Methyl Cellulose (MHEC/HEMC)  
15,000 MT/Year

Hydroxyethyl Cellulose (HEC)  
5,000 MT/Year

VAE Redispersible Powder (VAE RDP)  
20,000 MT/Year

Other construction additives  
15,000 MT/Year

LANDU is a leading high-tech enterprise headquartered in Shandong Province, at the forefront of cutting-edge research, development, and manufacturing in the field of construction materials. Our core expertise lies in the production and global distribution of Cellulose Ethers (HPMC, HEMC, HEC) and Redispersible Polymer Powder. We have also strategically invested in state-of-the-art production facilities, enabling us to expand our product portfolio to encompass Polycarboxylate Superplasticizer, Gypsum Retarder, Silicone Hydrophobic Powder, and Powder Defoamer. This comprehensive range of offerings establishes us as a premier one-stop procurement partner for our clients.

Our dedication to innovation and client-centric solutions is deeply rooted in our corporate culture. We've established a pioneering R&D center and application laboratory, providing customized production and responsive services through close collaboration with our esteemed clients. Our products now reach more than 60 countries and regions, reaffirming our steadfast commitment to becoming the foremost supplier in the realm of advanced building materials additives.

## Application of Cellulose Ether in the Ceramic Industry

Cellulose ether is a semi-synthetic natural polymer material. Owing to its excellent film-forming, adhesive, and water-retention properties, it has been widely used in industries such as oil exploitation, chemicals, food, pharmaceuticals, cosmetics, construction, ceramics, and building materials. Because of its versatility and critical functionality, cellulose ether is often referred to as the "monosodium glutamate of industry."

### 01 | Physical and Chemical Properties



#### Appearance

Cellulose ether appears as a white or off-white fibrous or granular powder that is odorless and tasteless.



#### Solubility

It is nearly insoluble in anhydrous ethanol, ether, and acetone, but readily dissolves in cold water to form a clear or slightly turbid colloidal solution. It is also soluble in mixed solvents of water and low-carbon alcohols.

### 02 | Methods of Use

#### Hot-Water Dispersion and Dissolution:

Add one-third or two-thirds of the required amount of water into a container and heat it above 85 °C. Since cellulose ether is insoluble in hot water, it will disperse uniformly during the initial stage. Then, add the remaining amount of cold or ice water to the hot slurry while stirring and allow the mixture to cool. Add a defoamer and dispersant, then incorporate the fine ceramic mineral powders. Stir thoroughly to obtain the ceramic glaze or the slurry used for ceramic membrane filtration layers.

#### Solid Powder Mixing:

Mix cellulose ether powder with ceramic mineral raw material powder to achieve uniform dry dispersion. Then, spray water evenly and knead the mixture thoroughly to form a uniformly dispersed, highly plastic ceramic body.

#### Organic Solvent Moistening:

Pre-disperse or moisten cellulose ether with an organic solvent such as ethanol, ethylene glycol, or light mineral oil before adding water to dissolve it.



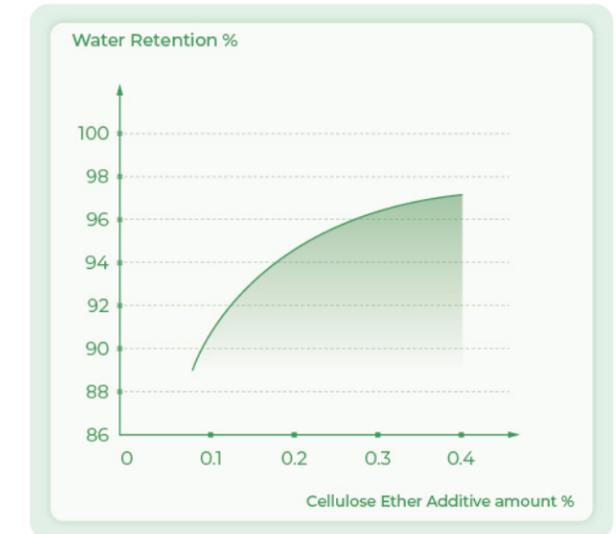
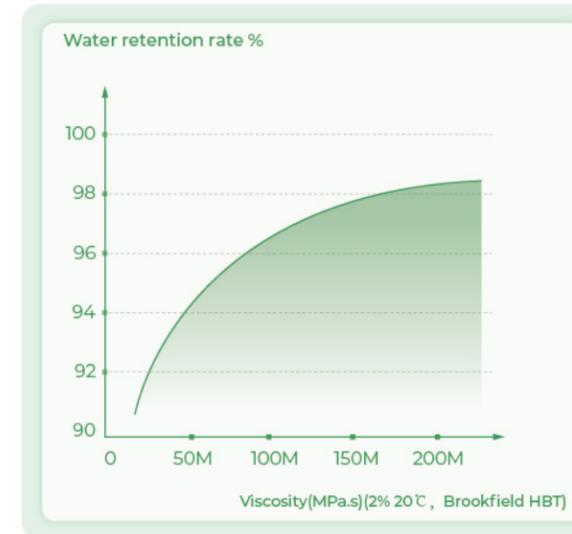
### 03 | Characteristics and Advantages



### 04 | Factors Affecting the Water Retention Performance of Cellulose Ethers

Cellulose ethers have excellent adhesion and water retention properties for ceramic mineral raw materials. Maintaining a certain level of moisture allows the ceramic body to maintain stable and good plasticity during the processing and shaping process. The level of water retention capacity affects the durability of the plasticity of the ceramic body, but an excessively high water retention can also cause excessive shrinkage of the body during the drying process.

#### Charts of the Influence of Cellulose Ether Addition and Product Viscosity on the Water Retention Rate of Ceramic Bodies



aluminum silicate mineral raw materials: clay=3:1

### 05 | Bonding Mechanism and Thermal Behavior

#### Bonding Mechanism of Cellulose Ethers

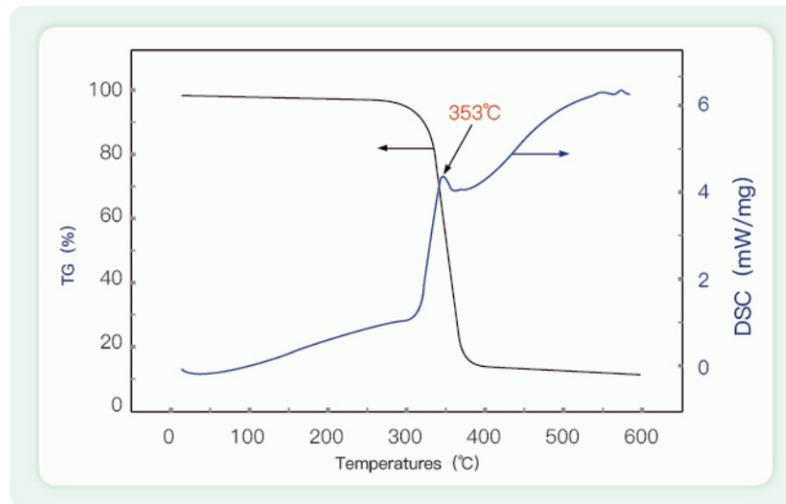
Cellulose ether can effectively reduce the surface tension of aqueous systems, improving the wettability of non-plastic ceramic powders such as silicon carbide, silicon nitride, alumina, and zirconia.

In the preparation of ceramic membrane supports, the cellulose ether solution serves as the continuous phase, while the ceramic mineral particles are the dispersed phase. The particles are completely coated by the cellulose ether sol, forming a well-plasticized ceramic matrix with enhanced formability and providing a certain degree of lubrication during extrusion molding.



**The TG-DSC (Thermogravimetric-Differential Scanning Calorimetry) Curve of Cellulose Ethers**

According to TG-DSC analysis, when cellulose ether is used as a binder in silicon carbide or alumina ceramic membrane supports, decomposition begins around 300 °C, accelerates near 350 °C, and is nearly complete by 370 °C. At this stage, the cellulose ether binder loses its binding capability, leaving behind a clean ceramic structure.



**06 Cellulose Pore Forming Materials**

	Model	Nominal Diameter	Length	Product Characteristics
Ceramic Membrane Pore-Forming Agent	NC (Nano-grade)	3-10nm	100-500nm	Suitable for nanofiltration membranes
	MC (Sub-nano-grade)	50-100nm	1-10um	Suitable for ultrafiltration membranes
	CP (Micron-grade)	300-800nm	50-500um	Suitable for ultrafiltration and microfiltration membranes

**07 Special Cellulose Ether of Ceramic Grade**

Application Field	Recommended Product	Viscosity Range		Product Features
		2%	1%	

**Daily-use Ceramics**

Glaze dispersion	HE300	200-450	Good dispersibility and suspension stability
	CM200	100-300	
Body reinforcement	CM30M	1500-2500	Great plasticity and easy molding
	MP30M	1500-2500	

**Honeycomb Ceramics**

Plasticity enhancement	MP4M	3000-5000	Excellent plasticity and forming stability; appropriate water retention; fast drying; no cracking or deformation
	MP6M	5000-7000	
	MP10M	8000-12000	
	MP20M	1000-1800	
	MP40M	35000-45000 1600-2500	

**Inorganic Ceramic Membrane**

Support body	ME4M	3000-5000	Suitable for bonding and strengthening materials such as silicon carbide, silicon nitride, and alumina
	MP10M	8000-12000	
	MPS20M	1000-1800	
Filtration layer	MP400	300-500	Excellent dispersibility and suspension stability; uniform filter layer particles
	HE300	250-400	