WALOCEL C™ CMC
Carboxymethyl Cellulose for Industrial Applications
WHAT IS WALOCEL™ CMC?

WALOCEL C™ Carboxymethyl Cellulose (CMC) Water-Soluble Polymers are cellulose ethers that are derived from natural wood or other cellulosic materials. To obtain WALOCEL C™ CMC, wood pulp is treated with sodium hydroxide to form alkali cellulose. The alkali cellulose is then treated with monochloroacetic acid to obtain carboxymethyl cellulose.

DUPONT IS THE WORLD LEADER IN CELLULOSIC DERIVATIVES

WALOCEL C™ CMC offers an exceptional range of properties that can be fine-tuned to create customizable solutions. A key component of many consumer products, industrial products and intermediates, WALOCEL C™ CMC is backed by a world-class Research & Development team, regional Technical Application teams and regional laboratories. It is widely used in food, pharmaceutical, energy storage, pulp and paper, agriculture and many other industries.
WALOCEL C™ CMC OFFERS A UNIQUE RANGE OF FUNCTIONAL PROPERTIES

WALOCEL C™ CMC is our most widely used polymer for industrial applications. It provides a vast number of functional properties and is cost-effective.

- Water solubility
- Thickening: clear viscous solutions, range of viscosities (30 to 60,000 mPas in 2% solution)
- Rheology modification
- Pseudoplastic / shear thinning or Newtonian
- Anionic
- Low surface tension: less foam formation compared to other cellulose ethers
- Lubricant
- Excellent water-binding properties (150 g water / 1 g)
- Stable in a wide pH-range (pH 3.5 – 12)
- Stable with monovalent, unstable with bi- or trivalent cations
- Compatible with most other formulation components
- No odor, no taste
- Inhibits crystallization
- Film-forming
- Compatible with minor amounts of selected solvents in the presence of water
- Approved food additive, suitable for food contact
A RANGE OF FUNCTIONAL PROPERTIES

Rheology Modification

Enables the customization of required viscosity and rheology modification properties.

Water Solubility

Exhibits excellent solubility in water; compatible with minor amounts of selected solvents in the presence of water.

Low Toxicity – Food Contact

Approved food additive; used in specialty packaging for food contact and other consumer applications; not absorbed in the gastrointestinal tract due to high molecular weight.

Viscosity

Forms transparent, odorless and tasteless solutions; a wide range of viscosities can be reached, from 30 to 60,000 mPas in a 2% solution; an excellent economic option for basic thickening properties.

Film Forming

Cost-effective film-former for a wide range of applications.

Pseudo-Plastic

Solutions of WALOCEL C™ CMC exhibit shear-thinning behavior.

Binding

Exhibits excellent water-binding capabilities; used as a carrier in hydrophilic solutions, binding other chemicals and particles.

pH Stability

Stable in a wide pH range from 3.5 to 12.
WALOCEL C™ CMC is a versatile water-soluble polymer. Because it is highly effective at low concentrations, it is an excellent economic option for a wide range of industrial applications.

**Coatings & Inks**
- Used in water-based coatings and inks formulations for their thickening and rheology modification properties; extremely versatile and economical, offering a natural alternative to synthetic polymers.

**Household Products**
- Used in consumer and industrial cleaning products such as multi-purpose detergents, shower and toilet cleaners, mildew and lime removal products, etc.

**Adhesives**
- Used as adhesives to control the viscosity, migration and other essential performance characteristics.

**Batteries & Energy Storage**
- Used in Li-Ion batteries as an anode binder; combined with Styrene Butadiene Rubber to coat graphite onto copper; provides the slurry a suitable viscosity, suspension properties and coating ability; binds the graphite solid particles together; can be used in the cathode and other battery and energy storage devices/applications.

**Agriculture**
- Used in crop treatment as a stabilizer and rheology modifier; acts as an emulsion stabilizer and promotes good spray homogeneity; products considered inert adjuvants by the EPA and allowed in crop protection products.

**Specialty Paper**
- Used in specialty paper applications; used as a coating to improve processing and printing capabilities; used to create an oil-barrier on packaging when a food-contact polymer is necessary.
HOW TO PREPARE AQUEOUS SOLUTIONS OF WALOCHEL C™ CMC

WALOCHEL C™ CMC polymers are water-soluble; the particles will swell and hydrate to solubilize. To obtain a WALOCHEL C™ CMC solution, use the right WALOCHEL C™ CMC concentration with the right rate of addition and shear.

Depending on the WALOCHEL C™ CMC grade, concentrations in water can reach two to five percent.

In order to prevent lumping at higher concentration levels, we recommend pre-blending WALOCHEL C™ CMC with other formulation components.

Please contact a DuPont representative for details.

COMMONLY USED WALOCHEL C™ PRODUCTS

WALOCHEL C™ CMC comes in a wide range of molecular weights and viscosities to meet your specific needs.

<table>
<thead>
<tr>
<th>WALOCHEL C™ CMC</th>
<th>Viscosity in 2% solution</th>
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</thead>
<tbody>
<tr>
<td>WALOCHEL C™ CRT 30 GA Granular</td>
<td>30 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 30 PA</td>
<td>30 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 100 GA Granular</td>
<td>100 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 100 PA</td>
<td>100 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 1000 GA Granular</td>
<td>1000 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 2000 GA 07</td>
<td>2000 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 2000 PA</td>
<td>2000 cps.</td>
</tr>
<tr>
<td>WALOCHEL C™ CRT 20000 GA Granular</td>
<td>20000 cps.</td>
</tr>
<tr>
<td>WALOCHEL C™ CRT 20000 PA 07</td>
<td>20000 cps.</td>
</tr>
<tr>
<td>WALOCHEL C™ CRT 30000 GA Granular</td>
<td>30000 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 40000 GA Granular</td>
<td>40000 cps.</td>
</tr>
<tr>
<td>WALOCHEL C™ CRT 45000 PA</td>
<td>45000 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 60000 GA Granular</td>
<td>60000 cps.</td>
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<tr>
<td>WALOCHEL C™ CRT 60000 PPA 07</td>
<td>60000 cps.</td>
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<tr>
<td>WALOCHEL C™ XM 3000 PV</td>
<td>3000 cps.</td>
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Applications

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<tr>
<th>WALOCHEL™ CMC</th>
<th>Ceramic glazes</th>
<th>Energy storage</th>
<th>Agriculture, crop protection</th>
<th>Pulp and paper</th>
<th>Mining</th>
<th>Water drilling</th>
<th>Other industrial app.</th>
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● Occasionally used  ● Often used - Reference material
WHAT WE DO

WALOCEL™ CMC for industrial applications, is available only from DuPont Global Specialty Solutions and its distributors. Global Specialty Solutions, a business unit of DuPont Nutrition & Health (N&H), manufactures cellulosic polymers alongside other N&H portfolio products. The dedicated Global Specialty Solutions team commercializes DuPont products into various global markets.

GLOBAL SPECIALTY SOLUTIONS MANUFACTURING & RESEARCH SITES
5 production sites, 3 R&D/Technical Support and Development (TS&D) centers

- MICHIGAN MIDLAND
- GERMANY STADE, BOMLITZ
- CHINA SHANGHAI
- LOUISIANA PLAQUEMINE
- WEST VIRGINIA INSTITUTE
- BOMLITZ
- MIDLAND, MI, U.S.A.
- SHANGHAI, China

OUR CORE VALUES

More than just goals, our core values reflect the way we work every day with our customers and partners in communities around the globe:
- Safety & Health
- Environmental Stewardship
- Respect for People
- Highest Ethical Behavior

WHO WE ARE

We are innovative problem solvers, drawing on deep application understanding and market insight to help our customers turn challenges into high-value business opportunities.

Learn more at dupontspecialtysolutions.com
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Contact Our Key Offices

Connect with DuPont sales and application experts to further explore integrating WALOCEL C® CMC in your application.

dupontspecialtysolutions.com

When considering the use of any DuPont products in a particular application, please review our latest Material Safety Data Sheets first to ensure that your intended use can be accomplished safely. For Material Safety Data Sheets and other product safety information, contact our DuPont experts. Before handling any other products mentioned in the text, obtain available product safety information and take necessary steps to ensure safety of use.