

performance
specialties

—
application overview



ashland.com / efficacy usability allure integrity profitability™

batteries

Ashland provides binders to the lithium ion battery (LiB) industry. **Bondwell™** aqueous polymers ensure effective anode slurry preparation and graphite binding.

Soteras™ MSi, a unique binder for high-capacity silicon-based anodes found in lithium ion batteries, is among the most recent innovations from Ashland. Able to be processed using standard industry practices, its ability to control swelling results in superior cycle performance yielding longer battery life. **Soteras™** CCS-V binder enables separator producers to meet ever more stringent safety requirements from lithium ion battery cell producers. It employs Ashland's unique 2-component cross-linking system:

1. unique polymer which promotes adhesion to separator
2. cross-linking agent to ensure thermal and mechanical stability

Soteras™ DSV dispersant is a polymer dispersant for aqueous ceramic coated separators. **Soteras™** DSV dispersant functions at low dosage to reduce the slurry viscosity.

ceramics

Our products are used in both advanced and traditional ceramics as binders and green strength additives. Our organic additives provide ceramic formulations with the plasticity required for shaping by improving the workability of the material and increasing mechanical strength.

advanced ceramics

In high-performance ceramics such as catalytic converters, diesel particulate filters and industrial environmental filters, **Culminal™** and **Benecel™** methylhydroxypropylcellulose exhibit an excellent balance between plasticity and shape retention during high-temperature extrusion. In addition, **Culminal™** methylcellulose and methylhydroxypropylcellulose polymers act as clean burnout binders with minimal residue.

traditional ceramics

Aqualon™, **Bondwell™** and **Blanose™** carboxymethylcellulose products are particularly suited for use as binder systems in traditional ceramics and glazing. They impart high green strength at relatively low addition levels while producing excellent plasticity and clean burnout upon firing. Our cellulose ethers are also extensively used as binders in glazing applications to provide excellent rheological performance, outstanding adhesive properties

and strong water retention. These functionalities produce a strong, tight bond between the glaze and the ceramic body which prevents damage to the surface prior to firing.

inks and printing

Aqualon™ EC ethylcellulose is a key ingredient in gravure printing inks as well as a thickening binder in flexographic and screen-printing inks. In this application,

Aqualon™ ethylcellulose polymers provide adhesion, enhanced pigment dispersion, fast solvent release, improved gloss and outstanding viscosity control.

V-Pyrol™ vinylpyrrolidone and **V-Cap™** vinylcaprolactam are important reactive diluents in UV curable inks. They provide strong adhesion on various substrates, fast curing and great viscosity suppression of oligomers.

Surfadone™, **Easy-Wet™** wetting agent, **Dextrol™/Strodex™** surfactants and **Drewplus™** defoamers are used in water-based inks as wetting agents and foam control agents. Polyvinylpyrrolidone and **Ganex™** polymers are acting as film formers and dispersants in inkjet inks. For Ink receptive media, polyvinylpyrrolidone and its copolymers can be used to improve the ink acceptance on difficult less polar substrates. **Klucel™** hpc, polyvinylpyrrolidone and **PVP/VA™** polymers are also used as supporting filament for 3D printing.

specialty coatings

Aqualon™ EC ethylcellulose and **Klucel™** hydroxypropyl cellulose are great binders and thickeners for solvent based coatings for glass, ceramics and other substrates.

Klucel MS™ hpc is a specially designed hydroxypropyl cellulose product for inorganic zinc-based primers (marine coatings). It has fast dissolution rate and good solution clarity.

Gafgard™ radiation-curable coatings are patented, 100% solids, vinyl lactam-polyacrylate based formulations, which may be cured using either UV-light or an e-beam energy source. The cured coating is optically clear and is used to impart hardness and a high level of abrasion, solvent and stain resistance.

Gafgard™ coatings may be applied to various substrates including, polyester, polycarbonate, acrylic, ABS and PVC. The low viscosity of these products permits their use with various types of coating equipment including, but not limited to, direct or offset gravure, or Mayer rod. Typical applications for **Gafgard™** coatings are abrasion resistant clear coatings for polycarbonate lenses, interior solar polyester films, credit card magnetic strips, etc.

Dextrol™/Strodex™, **Easy-Wet™**, **Surfadone™** surfactants and **Drewplus™** foam control agents can be used in water-based coatings [and many more...](#)

adhesives

Ashland's synthetics, cellulosic and guar-based polymers are typically employed as binders, rheology modifiers and tack enhancers in latex-based and water-soluble adhesives. In these systems, Ashland's **Natrosol™** hydroxyethyl cellulose and **Aquaflow™** water-soluble polymers deliver superior performance in thickening, improved sag resistance, increased cohesion and adhesion as well as in achieving the required viscosity. Polyvinylpyrrolidone, **PVP/VA™** and **Gantrez™** products are commonly used as binders in glue sticks, providing safe and superior adhesive performance. In addition, **Dextrol™/Strodex™**, **Easy-Wet™** and **Surfadone™** surfactants are excellent wetting agents. **Drewplus™** foam control agents are great defoamers in water-based adhesive formulations. Polyvinylpyrrolidone, PVP/VA and **Klucel™** hydroxypropylcellulose are also used on remoistenable envelop and diapers as hot melt adhesives.

cables

Aqualon™ and **Blanose™** carboxymethyl cellulose functions as a water-blocking agent and protects underground and underwater cables from water intrusion.

civil engineering

In civil engineering applications, such as special foundations, tunneling, micro tunneling and horizontal directional drilling, drilling muds are used to improve fluid loss control, maintain wall stability, enhance the ability to suspend cuttings and improve the ability to plug open formations (thixotropic properties). Our **Aqualon™** and **AquaVIS™** solid and liquid carboxymethyl cellulose polymer products are used extensively as additives in these applications to boost the performance of bentonite through water retention, stabilization of the mud suspension and increased shear thinning (improved pumpability).

electronics

Aqualon EC™ ethylcellulose polymers are organic, solvent soluble derivatives of cellulose that act as agents for rheology control and binding with very clean burnout performance in thick metal and specialty electronic pastes. These binders are used in the manufacture of multi-layer ceramic capacitors; plasma display panels and solar cells. Continual improvements in the manufacturing process quality control systems have resulted in high-quality products with excellent solubility in numerous solvent systems. Ashland's **Micropure™** N-methyl pyrrolidone is a

powerful solvent commonly used in electronics for photoresist removal, edge bead removal and wafer cleaning. Polyvinylpyrrolidone can be used in chemical-mechanical-polishing of semiconductor wafers.

explosives

Fast-dissolving **Galactasol™** guar derivatives are used as thickeners for water based ANFO explosives. Ashland guar is crosslinkable and can maintain effective thickening in salt solutions.

fire-fighting fluids

Fast-dissolving **Galactasol™** guar derivatives build fluid rheology to impart cohesion and prevent the misting of these solutions during aerial drops onto fires. The unique solubility characteristics of Ashland's guar derivatives provide the desired rheology behavior as well as stability in the presence of high concentrations of fire-fighting salts.

foundry

Aqualon™, **Blanose™** carboxymethylcellulose and **Natrosol™** hydroxyethylcellulose are used to improve green strength and shape retention in bricks and monolithics before firing. They can also be used in self-leveling concrete refractory bases to improve stability without cross-linking. These polymers are excellent dispersants in castables, aid in the extrusion process and burnout upon firing.

fuel pastes

Produced from alcohol, thickeners and water, fuel pastes are mainly used in hotels, restaurants and by caterers for warming food. These fuel pastes need to burn cleanly and completely without any physical residue. **Klucel™** hydroxypropylcellulose derivatives and **Carbomer™** polyacrylates are excellent thickeners for alcohol applications. They are compatible with and soluble in various solvent-water mixtures and demonstrate a fast response to new formulations and products.

freezer gel packs

Freezer gels are commonly used for cold therapy and cooling foods and beverages. It is flexible so that it can bend and twist to better fit around a curvature of the body or corner of a container. Its main composition is water and small amount of gellant. High molecular weight **Aqualon™** and **Blanose™** carboxymethyl cellulose products, in combination with a crosslinking agent, can produce freezer gels with great flexibility, good freeze-thaw performance and long-term stability.

lithographic printing and fountain solutions

Due to environmental concerns surrounding the volatility of alcohols in fountain solutions, there is increased demand for cleaner substitutes. **Ambergum™** 3085 water-soluble polymer, **Easy-Wet™** wetting agent and **Surfadone™** N-octyl pyrrolidone can replace IPA as effective wetting agent for a high print quality and rich, solid print color. Our **Ambergum™** 1221 and 3021 water-soluble polymers provide clean viscosity control and unique rheology in gumming and fountain solutions. They help to desensitize the non-imaging area and prevent emulsification and bleeding of the ink.

membrane filtration

In the manufacturing process of filtration membranes, polyvinylpyrrolidone and its copolymers (such as **PVP/VA™**) are often added to polysulfone or polyethersulfone as a hydrophilic component, and then removed by water to generate micro or nano pores for filtration. N-methyl pyrrolidone is also used a solvent during this process.

metal processing

Ashland products can be used in various metal processing steps. For metal cutting, **Surfadone™** N-octyl pyrrolidone and **Ganex™** polymers are used as stabilizers in oil-in-water emulsions; **Gantrez™** copolymers, **EasySpurse™** wetting agent, and **Stabileze™** QM rheology modifier serves as viscosity modifiers and dispersants. For metal quenching operation, polyvinylpyrrolidone, **Styleze™** 2000 polymer and **Viviprint™** 540 water solutions demonstrate superior performance than straight oil or water. For metal cleaning, N-methyl pyrrolidone and **BLO™** solvent are good hydrophilic solvents; **Surfadone™** N-octyl pyrrolidone, **Easywet™** wetting agent and **Dextrol™/Strodex™/Zenix™** phosphate esters are great wetting surfactants; Propargyl alcohol is a good corrosion inhibitor.

mining and mineral processing

Our cellulose ethers and guar polymers are used in numerous mining and mineral processing applications including froth flotation, iron ore pelletization, and tailings flocculation.

In gangue depressant applications, low dosages of our **Aqualon™**, **Blanose™** and **Galactosol™** water-soluble polymers can provide an increase in both the quality and quantity of the valuable mineral component by deactivating the surface of undesirable impurities. As a result, separation of the gangue from the valuable ore is greatly improved. **Tacabind™** pellet

binder provides excellent binding performance in the formation of taconite iron ore pellets, imparts both dry and wet (green) strength and, more importantly, does not contribute unwanted silica to the final product.

Aqualon™, **AquaPac™** and **Blanose™** carboxymethyl cellulose are cost-effective binders for fine mineral particles including slags, gypsum and fertilizers.

paint removers

Our products are used to thicken solvent-based paint removers and provide easier application, enhanced vertical cling and can slow rapid solvent evaporation. **Klucel™** hydroxypropylcellulose is especially suitable as the primary thickener in a variety of different flammable and non-flammable paint remover formulations due to its wide-ranging solubility in moderate to highly active solvents. **Culminal™** methylhydroxypropylcellulose can also be used in certain chlorinated solvent/alcohol mixtures with maximum thickening potential achieved through preliminary high shear dispersion of the polymer into the chlorinated solvent.

paper/towel

Ashland's **Aqualon™** and **Blanose™** carboxymethylcellulose are used to increase the wet and dry strength of specific paper products. It can be added in the pulpers or in the stock where it greatly enhances the durability and strength of the fibers. **Aqualon™** and **Blanose™** carboxymethylcellulose can also be used in food packaging for grease-proofing. **Captivates A™** technology can encapsulate fragrance, softeners and other emollients for long term control release. **Advantage™** and **Drewplus™** defoamer grades are used to control the foam in pulper or wet-end.

paper coatings

Several of our products have use in various segments of the coated paper industry. For example, Ashland provides a range of high purity carboxymethylcellulose grades for use in traditional paper coating formulations and a variety of hydroxyethylcellulose products for more specialized coatings including high quality free sheet, bleached board, ink jet and transparencies. Ashland has also developed liquid versions of selected carboxymethylcellulose and hydroxyethylcellulose products for use in those paper coatings with the highest performance objectives. In these cases, the use of **Admiral™** and **Liberty™** fluidized polymer suspensions provide unique coating properties including improved smoothness, brightness, opacity and gloss through superior water retention and unique structuring behavior with pigments. **Jaypol™** polymer and **Ambergum™** carboxymethylcellulose can be used as dispersants.

Aquaflow™ NSAT products are effective rheology modifiers. **Strodex™/Dextrol™** surfactants are beneficial in improving coating gloss and brightness, while **Drewplus™** foam control agents can help mitigate the foam in coating formulations. Polyvinylpyrrolidone polymers sometimes are also used as rheology modifiers and gloss enhancers.

pencils

A blend of finely ground graphite and clay is mixed with water and a rheology modifier. This mixture is extruded into strands, dried and dipped in wax. The strands are then fitted into grooved, wooden plank halves and covered with the other half of the pencil. The **Culminal™** methylcellulose, **Aqualon™** and **Blanose™** carboxymethylcellulose polymers act as an excellent binder, rheology modifier and lubricant in the extrusion process and also provide the pencil lead with green strength and reduce cracking.

pigment and mineral slurries stabilization

Selected Ashland polymers including **Blanose™** carboxymethylcellulose and **Natrosol™** hydroxyethylcellulose are significantly more effective than traditional low molecular weight dispersants for stabilizing dispersions of various pigments in concentrated aqueous slurries. In these cases, our polymers are designed to adsorb to the pigment surface providing a powerful dispersing effect and thereby reducing or eliminating dense-pack settling phenomena. Polyvinylpyrrolidone and **Ganex™** polymers are great dispersants for carbon black, graphite and other pigments in water, polar solvents and non-polar solvents.

reconstituted tobacco sheets

Reconstituted tobacco sheets are produced from recycled tobacco dust generated during the production of cigars and cigarettes. These sheets serve as a layer between the 'filler' layer of tobacco and the wrapper. **Culminal™** methylcellulose polymers, **Natrosol™** hydroxyethylcellulose and **Blanose™** carboxymethylcellulose are outstanding when used as a binder to minimize cracks, lumps and shrinkage of the sheets during drying. They also provide high tenacity (tearing strength), sheet elasticity and uniform appearance.

suspension polymerization

Klucel™ hydroxypropylcellulose is employed extensively as a colloidal stabilizer in the suspension polymerization of polyvinyl chloride (S-PVC), as well as **Natrosol™** hydroxyethylcellulose in polystyrene polymerization (PS). Polyvinylpyrrolidone (PVP) is used in suspension polymerization of styrene, methyl acrylate and polyurethane.

textile

Aqualon™ and **Blanose™** carboxymethylcellulose are used for thickening and rheology control for textile printing color formulations. The excellent washout and minimal dusting of these polymers ensures adhesion of the dye to the fibers and optimum print quality to secure the web integrity of nonwoven fabrics. **Dextrol™/Strodex™**, **Easy-Wei™**, **Surfadone™** surfactants are used in the cleaning steps in pre/post dyeing textiles.

washcoat

A washcoat is a carrier for the catalytic materials and is used to disperse the materials over a large surface area in a catalytic converter. **Natrosol™** hydroxyethylcellulose, **Admiral™** liquid hydroxyethylcellulose and **Aquaflow™** nonionic synthetic associative thickener (NSAT) are excellent rheology modifiers for the washcoat. They provide effective thickening at acidic pH and uniform coating layer inside the honeycomb structure of the catalytic converter.

welding rods

Welding rods are typically made from a wide variety of thermoplastic metals and alloys and are coated with a flux to assist in the formation of the welded bond. **Aqualon™**, **Blanose™** carboxymethylcellulose and **Natrosol™** hydroxyethylcellulose polymers are incorporated during the welding rod extrusion process to improve the bonding and coating uniformity of the flux to the core. The critical performance characteristics include increased viscosity, lubrication and shear thinning under pressure. After the extrusion process, the cellulose ether components immediately resume viscosity and prevent separation of inhomogeneity of the flux. Water-soluble polymers help to bond the flux to the core electrode and provide a highly plastic, smooth coating to counteract any imperfections during drying.

and many more...

For more information, please contact your Ashland sales representative or visit us at ashland.com.

always solving™

regional centers

North America

Bridgewater, NJ
Tel: +1 877 546 2782

Latin America

São Paulo, Brazil
Tel: +55 11 3649 0455
Mexico City, Mexico
Tel: +52 55 5276 6110

Asia Pacific

Singapore
Tel: +65 6775 5366
Mumbai, India
Tel: +91 22 61484646
Shanghai, P.R.China
Tel: +86 21 2402 4888

Europe

Schaffhausen, Switzerland
Tel: +41 52 560 5500

Middle East and Africa

Dubai, U.A.E.
Tel: +971 4 393 2431

ashland.com

- ® Registered trademark, Ashland or its subsidiaries, registered in various countries
- ™ Trademark, Ashland or its subsidiaries, registered in various countries
- © 2019, Ashland / IND20-101

 ashland.com / efficacy usability allure integrity profitability™

 **Ashland™**
always solving

The information contained in this brochure and the various products described are intended for use only by persons having technical skill and at their own discretion and risk after they have performed necessary technical investigations, tests and evaluations of the products and their uses. Certain end uses of these products may be regulated pursuant to rules or regulations governing medical devices, drug uses, or pesticidal or antimicrobial uses. It is the end user's responsibility to determine the applicability of such regulations to its products. All statements, information, and data presented herein are believed to be accurate and reliable, but are not to be taken as a guarantee of fitness for a particular purpose, or representation, express or implied, for which seller assumes legal responsibility. No freedom to use any patent owned by Ashland, its subsidiaries, or its suppliers is to be inferred.