HIGH TEMPERATURE INORGANIC BINDERS

Technical Bulletin A11

Aremco's Ceramabind™ materials are unique inorganic, water-based binder systems used in the formulation of specialty adhesives, coatings, sealants and putties for applications to 3200 °F. The versatility of Aremco's Ceramabind™ products enables users to blend formulations using most ceramic, glass and metal-oxide powders. Specific properties such as coefficient of thermal expansion, thermal conductivity, dielectric strength, and chemical and moisture resistance can be optimized.

Cerama-Bind™ 542 seals porosity in ceramic plate.

PRODUCT HIGHLIGHTS

542 An acidic, etching solution which is ideal for use in adhesive systems for bonding non-porous ceramics and glass. Stable when mixed with copper. Reacts with bases such as carbonates, oxides and hydroxides of alkali metals.

642 A basic solution which is highly compatible with most ceramic and metal powders. Good wettability and tack, and excellent acid resistance after curing. Extremely moisture resistant after a high temperature cure. Sets up in thick cross-sections when properly formulated.

643-1 A basic solution compatible with most ceramic and metal powders. Excellent binder for producing high temperature protective coatings and refractory and chemically resistant adhesives and patching materials. Fully cures at low temperatures and sets up in thick cross-sections when properly formulated.

643-2 Similar to 643-1. Excellent for formulating thin coatings that set at room temperature and can be raised rapidly to high temperatures.

644-A An acidic, colloidal alumina binder developed for mixing with sized refractory flours and grains to produce high temperature refractory coatings for ceramic fiber boards. Used as a superior standalone system to rigidize refractory fiber shapes.

644-S A colloidal silica aqueous solution which produces high adhesive strength. Ideal for blending with all types of granular and fibrous ceramics. Excellent resistance to temperature, moisture and mechanical shock.

830 A basic solution compatible with most oxide and metal powders. Ideal for formulating high pigment-to-binder ratios to produce dense adhesives and coatings. Sets at room temperature to a moisture resistant film and does not require a heat cure. Use only for thin coating systems less than 1 mil thick.

875 An acidic powdered binder system used to formulate high strength, hydraulic-setting cements for electrical potting or molding applications. A powder blend is typically formulated by adding one part binder to four parts filler by weight. Water is then added in a ratio of 15-20 parts to 100 parts powder blend by weight.

880 High temperature, water-dispersible silicone resin for producing corrosion and moisture resistant coatings and sealing porous ceramics.

TYPICAL PRODUCT SPECIFICATIONS

Product	542	642	642A	643-1	643-2	644-A	644-S	830	875	880
pH	2.5	10.7	10.7	11.0	11.5	4.0	9.0	11.4	2.8	6.5
Specific Gravity, g/cc	1.47	1.41	1.25	1.26	1.27	1.23	1.40	1.20	1.36	1.04
Viscosity, cP	50	370	200	60	30	7	35	10	N/A	480
Solids Content, % by weight	40	40	25	30	30	30	40	25	100	50
Temperature Resistance, °F (°C)	3200 (1760)	3000 (1650)	3000 (1650)	3000 (1650)	3000 (1650)	3000 (1650)	3200 (1760)	2000 (1093)	3000 (1650)	1200 (650)

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APPLICATION GUIDELINES

Mixing & Application

1) Liquid binder-to-powder weight ratios of 4:1 to 1:1 are recommended when formulating adhesives, coatings and pastes. Powder binder (875) to filler ratio of 1:4 is recommended.
2) Blend powder slowly into binder until desired viscosity is achieved. Vacuum degas as required to reduce entrapped air.
3) Apply mixture to clean surfaces. Extremely smooth surfaces are difficult to wet and should be sandblasted, etched, or slightly oxidized wherever possible. Porous substrates tend to absorb and separate the binder from the powder; these substrates should be pre-coated with the binder only prior to applying the mixture.

Curing

Ceramabind™ 542
1) Air dry at room temperature for 1-2 hours.
2) Heat cure at 200 °F for 1-2 hours.
3) Heat cure at 500 °F for 1-2 hours.
4) Final cure at 700 °F for 1 hour for maximum adhesive strength and moisture resistance.

Ceramabind™ 642, 642A, 643-1, 643-2
1) Air dry at room temperature for 1-2 hours.
2) Heat cure at 200 °F for 2-4 hours.
3) Heat cure at 350 °F for 1-2 hours.
4) Final cure at 500 °F for 1 hour.

Ceramabind™ 644-A, 644-S
1) Air dry at room temperature for 2-4 hours.
2) No heat cure is required if substrate is ramped slowly at ~200 °F per hour to the operating temperature.

Ceramabind™ 830
1) Air dry at room temperature for 1-2 hours.
2) No heat cure is required.

Ceramabind™ 875
1) Air dry at room temperature for 1-2 hours.
2) Heat cure at 200 °F for 2-4 hours.
3) Final cure at 250 °F for 2-4 hours.
4) Note: This binder can also be set at room temperature in 16-24 hours without heat curing.

Ceramabind™ 880
1) Air dry at room temperature for 1-2 hours.
2) Final cure at 450 °F for 1 hour or 480 °F for 45 minutes.

Storage

Unopened containers have a six-month shelf life when stored at room temperature. Make sure opened containers are capped securely to prevent evaporation. Place a plastic film in between the cap and container to prevent air leakage. Store containers between 45 °F and 95 °F.

Safety

Read Material Safety Data Sheet carefully prior to use. All Ceramabind™ products are water-based materials which can be washed from the skin, in the uncured state, with mild soap and warm water. Prolonged skin contact should be avoided to prevent irritation. If any material contacts the eyes, flush continuously with water or neutralizing solutions, then consult a physician immediately.

Ceramabind™ Compatibility Chart

PRODUCT	542	642 642A	643-1 643-2	644-S	644-A	830
Aluminum	R	S	R	S	R	S
Aluminum Oxide	S	S	S	S	S	S
Aluminum Nitride	R	S	S	S	S	S
Boron Nitride	S	S	S	R	S	S
Brass	S	S	S	S	S	S
Bronze	S	S	S	S	S	S
Chromium	R	S	S	S	S	S
Cobalt	R	S	S	S	S	S
Copper	S	R	S	S	S	S
Dolomite	S	S	S	S	S	S
Inconel	S	S	S	S	S	S
Indium	S	S	S	S	S	S
Indium Oxide	S	S	S	S	S	S
Invar	S	S	S	S	S	S
Iron	R	S	S	S	S	S
Iron Oxide	R	S	S	S	S	S
Magnesium Oxide	R	S	S	R	S	S
Manganese Dioxide	S	S	S	S	S	S
Mica	S	S	S	S	S	S
Molybdenum	R	S	S	S	S	S
Mullite	S	S	S	S	S	S
Neodymium Oxide	R	S	S	S	S	S
Nickel	R	S	S	S	R	S
Nichrome	S	S	S	S	S	S
Silicon Dioxide	S	S	S	S	S	S
Silicon	S	S	S	S	S	S
Silicon Carbide	R	S	S	R	S	S
Stainless Steel	R	S	S	R	S	S
Tantalum	R	S	S	R	S	S
Titanium	R	S	S	R	S	S
Titanium Diboride	R	R	R	S	S	S
Titanium Dioxide	S	S	S	R	S	S
Zinc	S	S	S	R	S	S
Zirconium Carbide	R	S	S	S	S	S
Zirconium Diboride	R	S	S	S	S	S
Zirconium Oxide	S	S	S	S	S	S
Zirconium Silicate	S	S	S	S	S	S

Key
S = Stable
R = Reacts

Refer to Price List for complete order information.