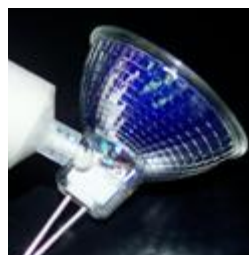


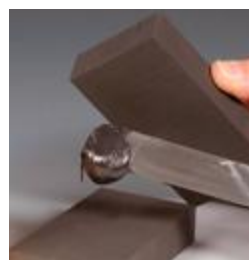
Ceramabond™ 685-N bonds infrared heater.



Ceramabond™ 835-M bonds halogen lamp.



Ceramabond™ 503 coats heater used to 1700 °C.



Graphi-Bond™ 551-RN bonds graphite blocks.



Ultra-Temp™ 516 seals heater assembly.

Aremco's high temperature ceramic and graphite adhesives are unique formulations for bonding, potting and sealing ceramics, composites, graphite, metals, quartz, and semiconductors for applications to 3200 °F (1760 °C).

TYPICAL APPLICATIONS

Electrical

- Halogen Lamps
- Heaters
- Igniters
- Fiberoptics
- Resistors
- Solid Oxide Fuel Cells

Instruments & Sensors

- Gas Chromatographs
- High Vacuum Components
- Liquid Metal Inclusion Counters
- Mass Spectrometers
- Oxygen Analyzers
- Strain Gauges
- Semiconductors
- Temperature Probes

Mechanical

- Ceramic Honeycombs
- Ceramic Textiles
- Graphite Blocks
- Refractory Insulation
- Sagger Plates
- Thread-Locking

Part No.	Filler	Bonding*	Principal Use	
503	Al ₂ O ₃	C-C	Dense Ceramics; Alumina-to-Alumina	
552		C-C, C-M	Solid Oxide Fuel Cells; Low CTE Metals	
569		C-C, C-M, Quartz	Probes, Sensors, Resistors, Igniters, Heaters	
670		C-C, C-M	Ceramic Textiles, Thread-Locking	
671		C-C, C-M, M-M	Ceramic Textiles, Thread-Locking	
835-M		C-C, C-M, Quartz	Halogen Lamps	
835-MB		C-C, C-M, Quartz	Halogen Lamps	
865		AlN	C-C, C-M	Probes & Sensors; Thermal Conductivity
600-N		Al ₂ O ₃ - SiO ₂	C-C, C-M	Refractory Repair
668			C-C, C-M	Oxygen Sensors, Heaters
551-RN	Graphite	Graphite, Carbon	Reducing/Vacuum Atmosphere	
669		Graphite	Oxidizing Atmosphere	
571	MgO	C-M, M-M	Heaters, Induction Coils, Sensors	
632	Mica	Mica	Mica Heaters	
618-N	SiO ₂	C-C, Quartz	Porous Ceramics, Quartz Tubes & Vessels	
516	ZrO ₂	C-C, C-M	Thermocouples, Semiconductor Wafers	
685-N		C-C, C-M	Gasketing, Heaters, Igniters	
835		C-C, C-M	Halogen Lamps	
885		C-C	Zirconia, Solid Oxide Fuel Cells	
890	SiC	C-C	Crucibles, Heaters, Sagger Plates	

*C-C = Ceramic-to-Ceramic C-M = Ceramic-to-Metal M-M = Metal-to-Metal

HIGH TEMPERATURE CERAMIC & GRAPHITE ADHESIVES PROPERTIES

Part Number	503	552	569	670	671	835-M	835-MB	600-N	668	865
Tradename	Ceramabond™									
Major Constituent	Al ₂ O ₃									
Color	White	White	White	White	White	White	White	Tan	White	AIN
Temperature Limit, °F (°C)	3000 (1650)	3000 (1650)	3000 (1650)	3000 (1650)	3200 (1760)	3000 (1650)	3000 (1650)	3000 (1650)	2500 (1371)	Gray
No. Components	1	1	1	1	1	1	2	1	1	1
Viscosity, cP	50,000–90,000	53,000–73,000	Paste	2,500–5,000	40,000–80,000	30,000–40,000	40,000–80,000	5,000–15,000	40,000–80,000	Paste
Specific Gravity, g/cc	2.35–2.55	1.90–2.20	2.15–2.30	1.80–1.95	2.05–2.15	2.35–2.45	2.00–2.15	2.00–2.05	2.20–2.40	1.95–2.15
CTE, in/in/°F × 10⁻⁶ (°C)	4.0 (7.2)	4.3 (7.7)	4.2 (7.6)	4.3 (7.7)	4.3 (7.7)	4.0 (7.2)	3.8 (6.8)	3.0 (5.4)	4.0 (7.2)	1.5 (2.7)
Mix Ratio, powder:liquid	NA	NA	NA	NA	NA	NA	100 : 60–80	NA	NA	NA
Thinner	503-T	552-T	569-T	670-T	671-T	835-M-T	835-MB-T	600-T	668-T	865-T
Solvent	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Application Temperature, °F	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90
Storage Temperature, °F	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90
Shelf Life, months	6	6	6	6	6	6	6	6	6	6
Air Set, hrs	≤1	1–4	1–4	1–4	1–4	1–4	1–4	1–4	1	1–4
Heat Cure, °F, hrs	200, 2 + 500, 2 + 700, 2	200, 2 + 500, 2	200, 2	200, 2	200, 2	200, 2	200, 2 + 350, 2 + 500, 2	200, 2 + 350, 1	200, 1–4	200, 2 + 350, 2 + 500, 2
Dielectric Strength, volts/mil @ RT	171	173	138	142	182	163	202	203	118	187
Torque Strength, ft-lbs¹	60	52	38	60	57	63	27	14	38	27
Moisture Resistance²	Good	Excellent	Excellent	Excellent	Excellent	Good	Good	Excellent	Excellent	Excellent
Alkali Resistance²	Fair	Good	Good	Good	Excellent	Excellent	Excellent	Good	Excellent	Good
Acid Resistance²	Excellent	Good	Excellent	Good	Good	Good	Good	Good	Good	Good

Footnotes

¹ Tested using a torque wrench after bonding a pre-oxidized 1/2"–13 nut and bolt and final curing at 1000 °F.
² Properties were evaluated after curing at 700 °F for 2 hours.

General Notes

¹ All adhesives except 551-RN contain no volatile organic compounds (VOCs).
² Special pigments available upon request.
³ Some adhesives including 503, 516, 553, 569, 571, 618-N, and 890 can be formulated using 1–5 micron ceramic powders. Add “.VFG” to the part number (eg. 503-VFG) and contact Aremco for special pricing.

Abbreviations

NA Not Applicable
 NM Not Measured

HIGH TEMPERATURE CERAMIC & GRAPHITE ADHESIVES PROPERTIES

Part Number	551-RN ^{3,4}	669	571 ⁵	632	618-N	890 ⁶	516	685-N	835	885 ⁶
Tradename	Graphi-Bond™									
Major Constituent	Graphite									
Color	Black	Black	Off-White	Mica	SiO ₂	Blue-Gray	Tan	Tan	Tan	Tan
Temperature Limit, °F (°C)	5400 (2985)	1400 (760)	3200 (1760)	2300 (1260)	3000 (1650)	3000 (1650)	3200 (1760)	3000 (1650)	3000 (1650)	3200 (1760)
No. Components	1	1	2	1	1	1	1	1	1	1
Viscosity, cP	Paste	20,000–40,000	20,000–90,000	10,000–25,000	40,000–60,000	35,000–55,000	40,000–70,000	5,000–20,000	20,000–40,000	10,000–20,000
Specific Gravity, g/cc	1.45–1.50	1.45–1.50	1.90–2.20	1.45–1.50	1.80–1.90	1.70–1.75	2.15–2.30	1.85–1.95	2.25–2.35	2.65–2.70
CTE, in/in/°F × 10 ⁻⁶ (°C)	4.1 (7.4)	4.2 (7.6)	7.0 (12.6)	4.7 (8.5)	.33 (.59)	2.4 (4.4)	4.1 (7.4)	4.5 (8.1)	4.0 (7.2)	4.0 (7.2)
Mix Ratio, powder:liquid	NA	NA	1.0:1.0, 1.5:1.0	NA	NA	NA	NA	NA	NA	NA
Thinner	Ethanol	669-T	571-T	632-T	618-N-T	890-T	516-T	685-N-T	835-T	885-T
Solvent	Ethanol	Water	Water	Water	Water	Water	Water	Water	Water	Water
Application Temperature, °F	40–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90
Storage Temperature, °F	30–75	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90
Shelf Life, months	6	6	6	6	6	6	6	6	6	6
Air Set, hrs	1–4	1–4	1–4	1–4	1–4	≤1	1–4	1–4	≤1	≤1
Heat Cure, °F, hrs	265, 4 +500, 2	200, 2	200, 2	200, 2 +500, 2	200, 2 +500, 2 +700, 2	200, 2 +500, 2 +700, 2	200, 2 +500, 2 +700, 2	200, 2	200, 2	200, 2 +500, 2 +700, 2
Dielectric Strength, volts/mil @ RT	75	105	91	150	156	73	188	176	111	105
Torque Strength, ft-lbs ¹	30	26	22	2	77	40	50	35	50	40
Moisture Resistance ²	Excellent	Excellent	Excellent	Good	Excellent	Good	Good	Excellent	Good	Good
Alkali Resistance ²	Good	Good	Good	Good	Good	Good	Excellent	Good	Good	Good
Acid Resistance ²	Good	Good	Fair	Good	Good	Good	Good	Good	Good	Good

Footnotes

- Tested using a torque wrench after bonding a pre-oxidized 1/2"-13 nut and bolt and final curing at 1000 °F.
- Properties were evaluated after curing at 700 °F for 2 hours.
- Graphi-Bond™ 551-RN is also offered in a two-part, resin and powder, system called 551-RN-X for international shipments of 1 gallon or more.
- Graphi-Bond™ 551-RN also demonstrates a lap-shear strength of 770 psi.
- Ceramabond™ 571 ranges for viscosity and specific gravity reflect a powder-to-liquid mix ratio that ranges from 1-to-1 to 1.5-to-1.
- Ceramabond™ 885 and 890 are also available in high pH, silicate-bonded systems. Part numbers are 885-K and 890-K. Contact Aremco for special pricing.

General Notes

- All adhesives except 551-RN contain no volatile organic compounds (VOCs).
- Special pigments available upon request.
- Some adhesives including 503, 516, 553, 569, 571, 618-N, and 890 can be formulated using 1–5 micron ceramic powders. Add "-VFG" to the part number (eg. 503-VFG) and contact Aremco for special pricing.

Abbreviations

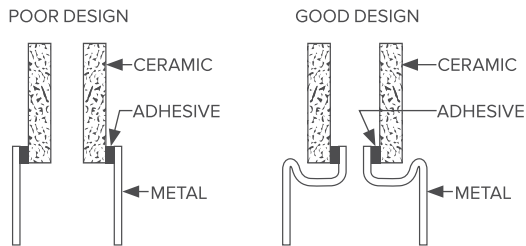
- NA Not Applicable
NM Not Measured

DESIGN GUIDELINES

General design criteria for bonding with ceramic and graphite adhesives are similar to those for epoxies and other organic adhesives. Main considerations include the coefficient of thermal expansion, joint design, glue line thickness, and operating environment.

Coefficient of Thermal Expansion

CERAMIC-TO-METAL RECOMMENDED DESIGN

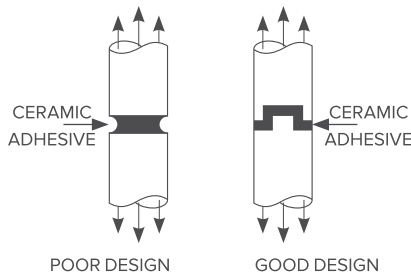


Due to the high thermal loading implicit in most ceramic adhesive applications, the joint design should account for the difference in the coefficient of thermal expansion between the adhesive and the components that are being joined. In the illustration above, note that the “poor” design loads the adhesive in tension since the metal expands faster than the ceramic. The “good” design allows for this thermal mismatch and loads the adhesion in compression, offering higher reliability.

Joint Design

Most adhesives offer relatively poor tensile-shear strength, so it is important to design a joint that will distribute the mechanical stress by maximizing the length of the glue line as shown in this illustration.

CERAMIC-TO-CERAMIC RECOMMENDED JOINT DESIGN



Glue Line Thickness

The clearance between mating parts at operating temperature should be 2–8 mils (50–200 microns). Less than 2 mils will prevent uniform adhesion; greater than 8 mils will often result in cohesive shear failure within the adhesive. A maximum depth of 0.25” is recommended when using a ceramic or graphite adhesive for a small potting application.

Operating Environment

These adhesives offer excellent chemical, electrical and ultra high thermal resistance, and do not outgas under high vacuum. The main limitations are (a) relatively low mechanical strength and (b) slight porosity after curing. Contact Aremco for suggestions about how to reduce porosity and produce gas-tight seals.

APPLICATION PROCEDURES

Surface Preparation

Smooth surfaces are difficult to bond and should be etched, abrasive blasted or oxidized, then cleaned thoroughly prior to application. Aremco’s Corr-Prep™ CPR2000 is recommended for etching metals. Porous substrates should be pre-coated with a binder to prevent separation and absorption of the adhesive binder. Add a “-T” to the part number (eg. 503-T) to designate the product thinner.

Mixing

One-part adhesives tend to settle and should be mixed thoroughly prior to use. Refer to Tech Bulletin A12 for information about Aremco’s Model 7000 Pneumatic Mixer. Mix ratios for two-part adhesives are shown in the Property Chart. Viscosity may be adjusted by thinning up to 20% by weight.

Application

Apply a thin coat of adhesive to each surface using a brush, spatula or dispenser. Using a clamp or similar tool, maintain a uniform glue line of 2–8 mils (200–500 microns) by applying even pressure across the assembly. Wipe away excess material prior to drying. Refer to Tech Bulletin A12 for optional dispensing tools.



Model 7000 Mixer

Curing

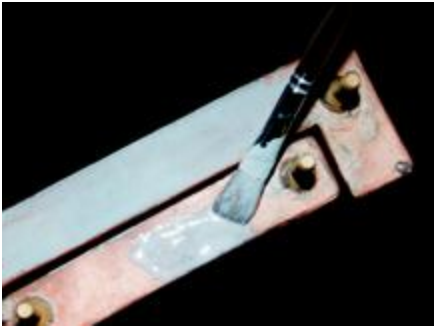
Refer to the Property Chart for specific curing instructions for each product.



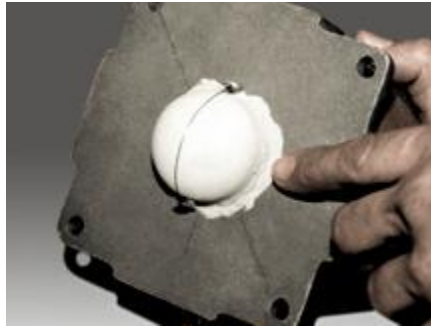
Graphi-Bond™ 551-RN seals sensor in carbon brushes.



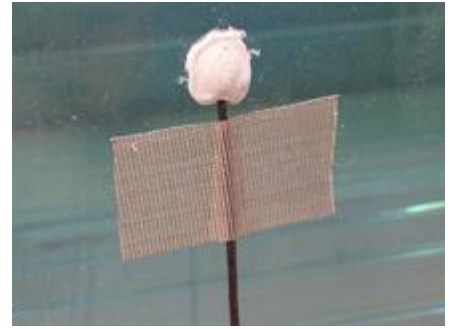
Ceramabond™ 569 bonds flex heater to quartz vessel.



Cerabond™ 571 coats copper induction heater.



Cerabond™ 571 coats oxygen sensor.



Cerabond™ 571 bonds thermocouple to glass.



Cerabond™ 618-N bonds porous ceramic filter elements.



Cerabond™ 671 used as a high temp threadlocker.



Cerabond™ 503 repairs furnace saggar plate.



Cerabond™ 685-N bonds ceramic gasket.



Ultra-Temp™ 516 bonds thermocouple to quartz tube.



Cerabond™ 835 bonds halogen lamp.



Cerabond™ 552 seals thermocouple in metal housing.



Cerabond™ 835-M bonds cover to halogen lamp.



Cerabond™ 835-M bonds halogen lamp.

CERAMIC ADHESIVE SELECTOR CHART

Material	CTE °F/(°C)	503	552	569	670	671	835-M	835-MB	600-N	600-HV	668	865	551-RN	669	571	652	618-N	890	516	685-N	835	885	
					Al ₂ O ₃				Al ₂ O ₃ - SiO ₂			AlN	Graphite	MgO	Mica	SiO ₂	SiC		ZrO ₂ - ZrSiO ₄				
Alumina	4.4 (7.9)	•	•	•	•	•	•	•	x	x				x									
Alumina-Silica	1.8 (3.2)								x														
Aluminum Nitride	1.5 (2.7)								•							x							
Beryllia	4.1 (7.4)	•	x	x	x	x	x												x	x	x	x	
Boron Carbide	2.6 (4.7)	x							x														
Boron Nitride	4.2 (7.6)	x																					
Borosilicate Glass	1.8 (3.2)	x																					
Calcium Silicate	3.0 (5.4)				•																		
Ceramic Textile	-				•	x														x			
Cordierite	1.1 (2.0)																						
Graphite	4.3 (7.7)	x											•										
Macor	5.2 (9.4)		x		x	x	x							x									
Mica	4.7 (8.5)														•								
Mullite	3.0 (5.4)	x	x	x	x				•										x	x	x	x	
Quartz	0.30 (0.54)	x		x					x														
Refractory, Dense	-	•																					
Refractory, Light Weight	-																						
Sapphire	4.2 (7.6)	•		x	x					•													
Silica	0.31 (0.56)								x														
Silicon Carbide	2.9 (5.2)	x																					
Silicon Nitride	1.8 (3.2)	x										x											
Steatite	4.0 (7.2)		x						x														
Zirconia	5.7 (10.3)																						
Zirconia Silicate	4.0 (7.2)																						
Aluminum	15.0 (27.0)																						
Brass	10.2 (18.4)																						
Cast Iron	5.9 (10.6)		x	x	x	x	x				x									x			
Copper	9.3 (16.7)																						
Inconel	6.4 (11.5)		x	x	x	x	x																
Molybdenum	2.9 (5.2)		x	•	x	x	x																
Nickel	7.2 (13.0)																						
Nickel-Iron	2.6 (4.7)		x	•	x	x	x																
Platinum	4.9 (8.8)	•																					
Silicon	1.6 (2.9)		x	x																			
Silver	10.6 (19.1)																						
Stainless (300 Series)	9.6 (17.3)																						
Stainless (400 Series)	6.2 (11.2)		x	x	x	x	x																
Steel (1010)	6.5 (11.7)		x	x	x	x	x																
Tantalum	3.9 (7.0)		x	x	x	x	x																
Titanium	5.8 (10.4)		x	x	x	x	x																
Tungsten	2.5 (4.5)		x	•	x	x	x																

• = Preferred, x = Applicable

Refer to Price List for availability of sample kits and complete order information.
Aremco Products makes no warranty express or implied concerning the use of this product.
The user assumes all risk of use or handling whether or not in accordance with directions or suggestions, or used singly or in combination with other products.

Pyro-Putty® High Temperature Pastes are used to seal joints and repair defects in cast aluminum, cast iron, steel and stainless steel. Formulated using the most advanced organic and inorganic-ceramic technologies, these materials resist temperatures to over 2000 °F. Applications for Pyro-Putty® are widespread and found typically in the aerospace, automotive, foundry, heat-treating, incineration, and power generation industries.



Pyro-Putty® 653 seals corroded burner manifold.



Pyro-Putty® 950 seals turbo.

Ceramic-Metallic Filled Inorganic Pastes

Pyro-Putty® 653

- Ceramic & Stainless Filled, One-Part, Water-Based Paste
- For Vertical Surfaces to ½" Thick
- Repairs Cast Iron, Steel & Stainless Parts to 2000 °F

Pyro-Putty® 1000

- Ceramic & Aluminum Filled, Two-Part, Water-Based System
- For Vertical Surfaces to ½" Thick
- Repairs Cast Iron, Steel & Stainless Parts to 1400 °F

Pyro-Putty® 2400

- Ceramic & Stainless Filled, One-Part, Water-Based Paste
- For Applications to ⅜" Thick
- Repairs Cast Iron, Steel & Stainless Parts to 2000 °F

Ceramic-Filled Resinous Pastes

Pyro-Putty® 950

- Ceramic Fiber Filled, Organic-Resinous Gasket Seal
- For sealing High Temperature Joints to 950 °F, 750 psi
- Cures to a Tough, Pliable, Chemically Resistant Material

Pyro-Putty® 1500

- Ceramic Fiber Filled, Organic-Resinous Gasket Seal
- Seals Boiler Doors & Molten Metal Systems
- Easy to Apply & Remove, For Uses to 2300 °F

TYPICAL APPLICATIONS

- Afterburners
- Boilers
- Castings
- Exhaust Stacks
- Headers
- Incinerators
- Manifolds
- Molds and Dies
- Heat Exchangers

TYPICAL APPLICATIONS

- Turbines
- Boilers
- Heat Exchangers
- Compressors
- Pumps
- Blowers
- Piping
- Ducting
- Furnaces
- Ovens
- Steam Valves
- Foundry Molds

PYRO-PUTTY® PROPERTIES

Type	Ceramic-Metallic Filled Inorganic Pastes			Ceramic-Filled Resinous Pastes		
Part Number	653	1000	2400	950	1500	
Filler	Stainless	Aluminum	Stainless	Ceramic Fiber	Ceramic Fiber	
Color	Metallic Gray	Light Gray	Metallic Gray	Silver Gray	Gray Brown	
Temperature Limit, °F(°C)	2000 (1093)	1400 (760)	2000 (1093)	950 (510)	2300 (1260)	
Specific Gravity, g/cc	1.90	1.80	1.50	1.09	1.27	
Viscosity, cP	Paste	Paste	Paste	Paste	Paste	
No. Components	1	2	1	1	1	
Mix Ratio, Powder:Liquid	NA	2:1	NA	NA	NA	
Curing	Air Set, hrs	2-4	2-4	5-7	NA	1-2
	Heat Cure, °F/hrs	200 / 3-4	160 / 1-2	200 / 2-4	400 / 1 or 225 / 6	200 / 1
Shelf Life, months	6	6	6	6	6	
Storage, °F	40-90	40-90	40-90	40-90	40-90	
Packaging	Pint, Quart, Gallon, 5-Gallon	Pint, Quart, Gallon, 5-Gallon	Pint, Quart, Gallon, 5-Gallon	11 oz. Tube	11 oz. Tube, Pint, Quart, Gallon, 5-Gallon	

APPLICATION PROCEDURES

Surface Preparation

All surfaces must be free of oil, grease, dirt, corrosives or other contaminants before application. Porous metal castings should be baked at high temperature to burn off embedded oils. Smooth metal surfaces should be abrasive blasted with a coarse media to a minimum SP-10 near white blast (0.001" minimum profile) for best results.

Mixing

All products should be mixed thoroughly to a uniform consistency prior to use. Product viscosities may be reduced by adding a maximum of 5–10% by weight of the appropriate thinner. Thinner may be ordered by adding a "-T" to the product number (eg. 653-T). The mix ratio for Pyro-Putty® 1000 is 2.0 parts powder to 1.0–1.5 parts liquid by weight. This ratio will produce the consistency of a thick paste. Pyro-Putty® 1000 will outgas slightly after mixing and it is recommended that the mixture be limited to the amount required for a specific application. Store mixed material at room temperature in a plastic container that is approximately twice the mixture volume. Allow to outgas for 24 hours. Remix contents thoroughly prior to use. Note that mixture will not begin to harden in a closed container for over 24 hours. Hardening will initiate when mixture is removed from container and exposed to air.

Application

Pyro-Putty® products may be applied using a spatula, putty knife or caulk gun. For cross-sections greater than 1/8"–1/4" multiple applications should be made to avoid blistering. Cross-sections for all products should not exceed 1/2"–3/4" (3/8" maximum for Pyro-Putty® 2400).

Curing

The following instructions are guidelines for curing. Alternative cure times may be appropriate depending on the size of the application.

Pyro-Putty® 653

1. Air dry for 2 hours at room temperature and up to 4 hours for thick cross-sections.
2. Heat cure at 200 °F for 3 hours.
3. For multiple applications, air set for 1–2 hours between coats, then heat cure at 200 °F for 3–4 hours after the last coat.

Pyro-Putty® 950

1. This product can be cured in service at the operating temperature of the equipment.
2. For curing before service, heat cure the joint without pressure at 400 °F for 30–60 minutes or 225 °F for 4–6 hours.

Pyro-Putty® 1000

1. A heat cure is not required for cross-sections less than 1/8" thick. Air dry at room temperature for a minimum of 2–4 hours prior to use.
2. A heat cure is recommended for cross-sections greater than 1/8" thick. Air dry at room temperature for a minimum of 2–4 hours, then heat cure at 160 °F for 1–2 hours.
3. After curing, this product can be sanded to achieve a bright aluminum appearance.



Pyro-Putty® 1000 bonds heater.



Pyro-Putty® 2400 seals high temp ducting.



Pyro-Putty® 2400 seals high temp threads.

Pyro-Putty® 1500

1. This product dries at room temperature and cures in service at the operating temperature of the equipment.

Pyro-Putty® 2400

1. Air dry at room temperature for a minimum of 5–7 hours, longer for thick cross-sections.
2. A heat cure is not required if the use temperature exceeds 400 °F. Otherwise, heat cure at 200 °F for 2–4 hours.

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. The container may be inverted periodically to minimize settling. Store container between 40 °F and 90 °F.

Safety

Read Material Safety Data Sheet carefully before using any of the above products. Prolonged skin contact should be avoided due to possible irritation. In the uncured state, materials can be washed from the skin with a mild soap and water. If any material contacts eyes, flush continuously with water or neutralizing solutions, then consult a physician immediately.

Refer to Price List for complete order information.

Aremco Products makes no warranty express or implied concerning the use of this product.

The user assumes all risk of use or handling whether or not in accordance with directions or suggestions, or used singly or in combination with other products.

Aremco's Ceramacast™ products provide the most expansive range of ceramic- and silicone-based materials for the assembly of high temperature, high power electrical devices, fixtures, molds and tooling.

PRODUCT HIGHLIGHTS

Aluminum Oxide Systems

- 510** Coarse Grain Castable for Tooling and Induction Heaters
- 515** Fine Grain, High Strength Potting Compound
- 575** Fine Grain Potting Compound for Small Devices
- 575-N** Fine Grain Castable for Potting & Tooling
- 576-N** Medium Grain Castable for Large Potting & Tooling

Aluminum Nitride System

- 675-N** Thermally Conductive Fine Grain Compound for Potting

Magnesium Oxide System

- 584** Two-Part, Fast-Set, Compound for Casting & Potting

Silicon Dioxide Systems

- 645-N** Low Thermal Conductivity, Low Expansion, Light-Weight
- 905** Moisture Resistant Silicone, Coarse Grain Compound
- 905-FG** Moisture Resistant Silicone, Fine Grain Compound

Silicon Carbide Systems

- 673** Thermally Conductive Two-Part Molding Compound
- 673-N** Thermally Conductive Adhesive & Potting Compound

Zirconium Oxide System

- 646-N** High Density, High Strength Castable & Potting Compound

Zirconium Silicate Systems

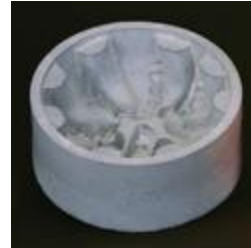
- 505-N** High Strength Compound for Molding & Potting
- 586** High Strength Dispensable Compound for Potting & Casting
- 900-N** High Density, High Strength Molding Compound



Ceramacast™ 900-N casts small, dense part.



Ceramacast™ 645-N insulates metal collar.



Ceramacast™ 673 mold for down-hole drill bit.



Ceramacast™ 673-N bonds SiC combustion nozzle.



Ceramacast™ 575-N bonds Xenon arc lamp.



Ceramacast™ 586 pots ignitor and cartridge heater.



Ceramacast™ 645-N fixture resists propane torch.



Ceramacast™ 505-N is used in high temp filter assembly.



Ceramacast™ 586 is used in high temp filter assembly.



Ceramacast™ 586 pots high power resistor.

CERAMACAST™ HIGH TEMPERATURE POTTING AND CASTING MATERIALS PROPERTIES

Product Number	510	515	575	575-N	576-N	675-N	584	645-N	905 ³	905-FG ³	673-N	646-N	505-N	586	900-N
Major Constituent															
Binder	CaO-Al ₂ O ₃		Aluminum Oxide		Aluminum Nitride		Magnesium Oxide	Silicon Dioxide		Silicon Carbide		Zirconium Oxide	Zirconium Silicate		
Temperature Limit, °F (°C)	3200 (1760)		3000 (1650)		2200 (1200)		2800 (1535)	900 (482)		2500 (1371)		3000 (1650)	2800 (1535)		2800 (1535)
CTE, in/in/°F × 10⁻⁶ (°C)	3.9 (7.0)		4.3 (7.7)		2.9 (5.2)		6.5 (11.7)	2.0 (3.8)		2.9 (5.2)		3.1 (5.6)	2.7 (4.9)		2.8 (5.0)
Volume Resistivity, ohm-cm @ RT	10 ⁹		10 ⁹		10 ¹³		10 ⁹	10 ¹¹		NA		10 ⁹	10 ⁹		10 ⁹
Dielectric Strength, volts/mil @ RT	75		150		300		100	> 250		NA		250	100		125
Compressive Strength, psi	8,000		7,500		2,000		4,500	NM		5,000		11,500	12,800		8,000
Porosity, %	< 7.0		< 6.0		< 3.0		< 6.0	< 0.5		< 4.0		< 2.0	< 2.0		< 2.0
pH	3-4		3-4		2-3		11-12	NM		2-3		2-3	10-11		2-3
Moisture Resistance	Good		Good		Good		Good	Excellent		Good		Good	Excellent		Good
Alkali Resistance	Good		Good		Good		Good	Good		Good		Good	Good		Good
Acid Resistance¹	Good		Good		Good		Good	Good		Good		Good	Good		Good
No. Components	1 + H ₂ O		1 + H ₂ O		1 + H ₂ O ²		2	2		1 + H ₂ O ²		1 + H ₂ O ²	1 + H ₂ O		1 + H ₂ O
Mix Ratio, powder:liquid	100 : 15-19		100 : 12-14		100 : 16-18		100 : 25-30	2 : 1		100 : 17-20		100 : 12-14	100 : 11-13		100 : 11-13
Mixed Viscosity, cP	12,000		16,000		15,000		18,000	Paste		12,000		9,000	10,000		15,000
Shrinkage, % at 1000 °F	< 1.0		< 1.0		< 0.3		< 4.0	< 1.0		< 0.3		< 0.3	< 0.3		< 1.0
Pot Life, hrs	2-3		2-3		1-2		< 10 mins	NA		1-2		1-2	1-2		< 45 mins
Shelf Life, months	12		12		12		1	905-L:6 905-P:12		12		12	12		12
Color	Light Gray		White		Light Gray		Off-White	Off-White		Gray		Tan	Off-White		Off-White
Approximate Powder Density, lbs/gal	15		12		10.5		12	P-9.6/L-4.8		14.5		15.5	14		13

Reference Notes

¹ All products are attacked by hydrofluoric acid.

² These products can be mixed alternatively with HLB-1 Hydrophobic Liquid Binder to achieve higher moisture resistance.

³ Ceramacast™ 905 and 905-FG moisture resistance, porosity and shrinkage were tested at 900 °F only.

Abbreviations

NA Not Applicable

NM Not Measured

APPLICATION PROCEDURES

Mixing

Blend powder thoroughly prior to adding water or liquid binder. Use the following mix ratios, adding the liquid into the powder and mixing thoroughly until smooth and uniform. Pour the mixture carefully into one side of the part. Vibrate as required to eliminate air bubbles. Agitate continuously or refrigerate to extend the pot life.

Product	Weight Ratios			
	Powder	Liquid	Min	Max
505-N	100	Water	11	13
510	100	Water	15	19
515	100	Water	12	14
575	100	Water	19	22
575-N	100	Water, HLB-1	13	15
576-N	100	Water, HLB-1	12	14
584	100	584-L	25	30
586	100	Water, HLB-1	13	15
645-N	100	Water, HLB-1	21	23
646-N	100	Water, HLB-1	12	14
673	100	673-L	17	20
673-N	100	Water, HLB-1	13	14
675-N	100	Water, HLB-1	16	18
900-N	100	Water	11	13
905*	100	905-L	45	55
905-FG*	100	905-FG-L	30	35

*Ceramacast™ 905 and 905-FG are offered primarily in two-part kits consisting of a powder and liquid binder. The kit for 905 includes the 905-P powder and 905-L liquid; the kit for 905-FG includes the 905-FG-P powder and 905-FG-L liquid.

The liquid portion of these kits can also be supplied as a powdered binder and the user would add the solvent methyl ethyl ketone in a 1:1 ratio by weight at the time of use. The powdered binder is recommended for international customers for which hazardous freight charges associated with shipping solvent-based systems can be cost prohibitive. Use part numbers 905X and 905-FGX to order powder binder kits.

Note that Ceramacast™ 905 and 905-FG are not pourable. After the powder is thoroughly wet-out by the liquid binder, load the mixture to a filter bag and squeeze out the residual liquid. Ladle the mixture into the part and cure as recommended to obtain a dense, moisture resistant part.

Curing

Ceramacast™ 505-N, 515

1. Dry for 16–24 hours at room temperature.
2. Bake at 200 °F for 1–4 hours.
3. Bake at 250 °F for 1–4 hours.
4. Bake at 350 °F for 1 hour.
5. Final cure at 500 °F for 1 hour.

Ceramacast™ 510, 575, 673

1. Dry for 16–24 hours at room temperature..
2. Bake at 200 °F for 3–4 hours.
3. Final cure at 250 °F for 1 hour.

Ceramacast™ 584

1. Material will set in approximately 10 minutes.
2. Air dry for a minimum of 2 hours.
3. Bake at 200 °F for 2 hours.
4. Final cure at 250 °F for 3 hours.

Ceramacast™ 575-N, 576-N, 586, 645-N, 646-N, 673-N, 675-N, 900-N

1. Dry for 8 hours minimum at room temperature.
2. Bake at 200 °F for 2–4 hours.
3. Final cure at 250 °F for 3 hours.
4. Final cure at 450 °F for 30–60 minutes if using HLB-1 Hydrophobic Liquid Binder.

Ceramacast™ 905, 905-FG

1. Dry for 24 hours room temperature to allow solvent to evaporate.
2. Bake at 150 °F for 1 hour.
3. Bake at 250 °F for 1 hour.
4. Bake at 350 °F for 1 hour.
5. Final cure at 450 °F for 1 hour.

Special Notes

1. Chemically absorbed water will remain in all products even after curing at 250–350 °F. TGA studies indicate that chemically-absorbed water will be fully removed after exposure to 800–1000 °F. Curing at higher temperatures than recommended in the Curing section should be performed to obtain optimal electrical resistance and mechanical strength.
2. If cracking occurs, possible causes include (a) excessive water or liquid binder was used, (b) curing occurred too rapidly, or (c) the cross-sectional thickness of the casting is too high. Contact Aremco for assistance if cracking persists.
3. Ceramacast™ products tend to react with aluminum molds. Use Aremco's **EZ-Cast™ 580-N Flexible Silicone Rubber Molding Compound** to avoid problems when casting ceramic parts.
4. Refer to Safety Data Sheet prior to use.

SILICONE MOLDING COMPOUNDS

Aremco's EZ-Cast™ 580N is an ideal compound for producing high reliability master molds. This silicone rubber compound exhibits high tear strength, very low shrinkage and high flexibility, all requirements for detailed reproduction.

PROPERTIES		
Upper Temp. Limit, °F (°C)	400 (204)	
Lower Temp. Limit, °F (°C)	-76 (-60)	
Flexibility	High	
Hardness, Durometer, Shore A	45	
Tensile Strength, psi	600 Min	
Tear Strength, Die B lb/in	110 Min	
Elongation, %	400 Min	
Linear Shrinkage, %	< 0.1	
Handling	No. of Components	2
	Mixed Viscosity, cP	30,000
	Specific Gravity, g/cc	1.3
	Mix Ratio, resin:catalyst	10:1
	Pot Life, mins	30
Shelf Life, @RT, months	6	
Color	Beige Resin; Deep Red Catalyst	
Weight/Gal	10 lbs resin, 1 lb catalyst	

Instructions For Use

1. Machine a master pattern from aluminum and secure master into an aluminum box with removable sides. If a wooden mold is used, make sure that the mold is sealed with wax and that tapers are included to facilitate removal. *Mold should allow for a cast part wall thickness of $\frac{3}{8}$ " – $\frac{1}{2}$ " minimum.*
2. Premix base and activator thoroughly before blending the components together in a ratio of 10 parts base to 1 part activator.
3. Vacuum degas at 29 in Hg. The mixture will rise to about 3–4 times its original volume, then collapse. Hold vacuum for another 1–2 minutes then release.
4. Pour slowly into a master, to fill all details and prevent air entrapment. Cure for 16–24 hours at room temperature, or 3–4 hours at 120 °F, or 1–2 hours at 150 °F. In humid atmosphere, heat cure for best results.

EZ-CAST™ FLEXIBLE MOLDS IN TWO EASY STEPS



Place the machined master, a duplicate of the finished casting, into a pan, and pour the EZ-Cast™ over the master.



Cure the EZ-Cast™ mold and peel out your finished pliable mold.

Refer to Price List for complete order information.

Aremco Products makes no warranty express or implied concerning the use of this product.

The user assumes all risk of use or handling whether or not in accordance with directions or suggestions, or used singly or in combination with other products.