

**HIGH TEMPERATURE REFRACTORY COATINGS**

Technical Bulletin A5-S5

Aremco's refractory coatings offer the ultimate protection of high temperature components and structures used in the processing of metals, glasses and plastics.

**FEATURES**

- Ultra Hi-Temp Resistance
- Non-Wetted by Molten Metals, Salts, Glass & Plastics
- High Lubricity for Easy Part Release
- Minimizes Cast Surface Defects
- Increases Mold & Die Life
- For Use in Oxidizing, Reducing & Vacuum Atmospheres

**APPLICATIONS**

- Composite Forming
- Glass Forming
- Metal Casting
- Injection Molding
- Ceramic Hot-Pressing
- Metal Powder Sintering
- Welding
- Brazing

**PRODUCT HIGHLIGHTS**

**Graphi-Coat™ 623**

This coating system, originally patented by Aremco, is a two-part, silica-bonded, titanium diboride filled, oxidation resistant coating for protecting graphite from oxidation to 2000 °F (1093 °C). Used on graphite crucibles, heat-treating fixtures, and electrodes in the metallurgical industry.

**Pyro-Paint™ 634-AS and 634-AS1**

These alumina-silica based advanced coatings are rated for continuous service temperatures up to 2300 °F. Provides excellent adhesion to ceramic fiber blankets, modules and boards and resists wetting by nonferrous molten metals, increasing the durability and erosion resistance of the underlying material. High dry film thicknesses from 10–50 mils can be achieved with this coating. Select 634-AS for thin coating applications and 634-AS1 for high build applications.

**Pyro-Paint™ 634-AL**

This high purity, alumina base compound creates a high temperature resistant coating for refractory fiber boards and shapes, providing exceptional resistance to molten metals and open flames to 3200 °F (1760 °C). Increases heat reflectivity in furnaces to improve efficiency and ramp up temperatures more rapidly.

**Pyro-Paint™ 634-ALP**

This phosphate-bonded, alumina coating system bonds exceptionally well to dense refractory ceramics, providing high abrasion and corrosion resistance for operating temperatures to 3200 °F (1760 °C).

**Pyro-Paint™ 634-BN and 634-BNSC**

These highly-filled boron nitride solutions are extremely lubricious and inert. They are non-wetted by molten salts, glasses, plastics, and most metals including aluminum and magnesium. Select 634-BN for hard coat; 634-BNSC for softer, lubricious coat.

**Pyro-Paint™ 634-GR**

This graphite based coating is formulated for parting of aluminum permanent molds, non-sticking in glass forming applications, and lubrication and stop-off in metalworking and wire drawing. Provides superior release, surface finish and mold protection.

**Pyro-Paint™ 634-SIC**

This advanced silicon carbide, water-based coating reduces significantly the oxidation of graphite and carbon components and structures at temperatures to 2550 °F (1400 °C). Provides a hard surface and withstands thermal cycling.

**Pyro-Paint™ 634-YO**

This ultra high temperature yttrium oxide coating provides exceptional protection of graphite, ceramic and metal components exposed to reactive molten metals such as titanium, uranium and their alloys. Usable in vacuum and inert atmospheres to 2732 °F (1500 °C).

**Pyro-Paint™ 634-ZO**

This highly-filled zirconium oxide-based coating produces a hard, chemically-resistant protective layer which is stable with aluminum, molybdenum, platinum, rhodium, and titanium. It is ideal for sealing porous ceramics and protecting other ceramic, graphite and metal structures up to 3270 °F. Exceptional for coating resistance wire heating elements in furnaces, protecting them from residue buildup which causes arcing and reduced element life.



**HIGH TEMPERATURE REFRACTORY COATINGS PROPERTIES**

Part Number	623	634-AL	634-ALP	634-AS	634-AS-1	634-BN	634-BNSC	634-GR	634-SIC	634-YO	634-ZO
Tradename	Graphi-Coat™	Pyro-Paint™									
Major Constituent	Titanium DiBoride	Aluminum Oxide		Alumina-Silica		Boron Nitride		Graphite	Silicon Carbide	Yttrium Oxide	Zirconium Oxide
Color	Gray	White	White	Off-White	White	White	White	Black	Gray	Off-White	Off-White
Temperature Limit, °F (°C)	2000 (1093)	3200 (1760)	3200 (1760)	2300 (1260)	2300 (1260)	1560 (850) <sup>1</sup>	1560 (850) <sup>1</sup>	2200 (1200)	2550 (1400)	2732 (1500)	3270 (1800)
No. Components	2	2	1	1	1	1	1	1	1	1	1
Mix Ratio <sup>2</sup>	60:40	75:25	NA	NA	NA	NA	NA	NA	NA	NA	NA
Viscosity, cP	200–400	100–200	5,000–7,000	500–800	10,000–20,000	500–1,500	10–100	100–250	750–2,000	200–400	1,000–2,000
Specific Gravity, g/cc	2.15	2.46	2.38	1.55	1.60	1.15	1.20	1.24	2.00	1.55	2.02
Solids by Weight, %	78.7	81.3	76.0	64.3	64.9	19.8	30.0	47.5	68.2	45.0	59.2
Solids by Volume, %	52.7	56.1	53.7	41.1	40.7	18.0	13.3	31.6	42.0	14.0	29.6
WFT, mils (microns) <sup>6</sup>	1.9 (48.2)	1.8 (45.3)	1.9 (47.3)	2.4 (61.7)	2.5 (62.4)	5.6 (141.5)	7.5 (190.7)	3.2 (80.5)	2.4 (60.5)	7.1 (180.9)	3.4 (86.0)
DFT, mils (microns) <sup>7</sup>	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)	1.0 (25.4)
Theoretical Dry Film Coverage @ 1 mil, ft <sup>2</sup> /gal (m <sup>2</sup> /liter)	845 (20.7)	899 (22.1)	861 (21.1)	660 (16.2)	653 (16.0)	288 (7.1)	214 (5.3)	506 (12.4)	674 (16.5)	225 (5.5)	474 (11.6)
Recommended Curing											
Min Air Set, hrs	1	2	1	2	2	2	2	2	1	0.5	2
Hours Cure °F/hrs <sup>3</sup>	1400/0.25	200/2	200/2, 800/1	200/2	200/2	200/2	200/2	200/2	200/2, 800/1	200/1	200/2
Application Temperature, °F	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90	50–90
Thinner <sup>4</sup>	623-T	634-AL-T	634-ALP-T	634-AS-T	634-AS-T	634-BN-T	634-BNSC-T	634-GR-T	634-SIC-T	H <sub>2</sub> O	634-ZO-T
Coating pH	8–9.5	4–5	2–3	8–9.5	8–9.5	11–12	4–5	8–9	2–3	7–8	11–12
Flash Point, °F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Weight/Gallon, lbs <sup>5</sup>	12.5	12.0	16.5	12.0	12.5	9.5	10.0	10.0	16.5	12.0	14.5
Shelf Life, months	6	6	6	6	6	6	6	6	6	6	6
Storage Temperature, °F	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90	40–90

**Reference Notes**

- <sup>1</sup> Temperature limit applies to oxidizing atmospheres only. Can be used in vacuum/inert atmospheres to 2000 °C.
- <sup>2</sup> Mix ratio is Powder : Liquid. Ratios may be altered as required to adjust viscosity.
- <sup>3</sup> A short cure is recommended, however, most of these products can be air set then ramped up to operating temperature immediately.
- <sup>4</sup> Distilled water may also be used to thin all products. Use 1–2% distilled water by weight.
- <sup>5</sup> For two-part systems, this only refers to the weight per gallon for the powder portion of the mixture.
- <sup>6</sup> Estimated Wet Film Thickness (WFT).
- <sup>7</sup> Recommended Dry Film Thickness (DFT).

**Abbreviations**

NA Not Applicable

Refer to Price List for complete order information.

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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.