



# APTEK LABORATORIES, INC.

ISO 9001 / AS9100 Certified

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## TECHNICAL DATA & INFORMATION

### APTEK® 2711-1

Inorganic, thermally radiative, ESD paint

### PRODUCT DESCRIPTION

**APTEK 2711-1** is a white, mineral oxide filled, one-component, room temperature curing, inorganic coating/paint designed for very high temperature space applications requiring low solar absorptance and ESD capability. **APTEK 2711-1** was developed for use as a thermally conductive coating where excellent resistance to high temperature and intense UV light exposure is required.

### KEY FEATURES AND BENEFITS

- Inorganic silicate binder provides coating with a service temperature  $\geq 700^{\circ}\text{C}$  ( $1300^{\circ}\text{F}$ ).
- Passes NASA outgassing per ASTM-E 595 for space hardware.
- Inherently has sufficient surface resistivity for ESD applications on both conductive and non-conductive surfaces.
- High pigment content allows for more economical usage. Typically, 2 wet coats yield a cured thickness of ~3-5 mils depending on travel speed of the spray gun.
- Water-based formulation for safety. Formulated to sprayable viscosity for convenience.
- Packaged in high-quality, Nalgene, polypropylene containers to protect the paint from possible corrosion due to alkalinity of the silicate resin.
- Ceramic mixer beads are included in the container to assist with rehomogenization of the settled pigment when the container is vigorously shaken prior to use.

### HANDLING INFORMATION

1. **APTEK 2711-1** is a one component, ready-to-spray system; however, it may be thinned further with distilled water, if needed.
2. Shelf-life studies of viscosity vs. time have shown that cooler storage temperatures minimize viscosity increase during storage. It has been determined that the best storage temperature for this product is  $22^{\circ}\text{C}$  or below. It is better if stored cooler but must not be frozen.
3. SURFACE PREPARATION
  - a. Substrate surface to be sprayed should be clean and dry and free from silicone, mineral, petroleum oils/greases, etc.
  - b. For best adhesion, it is recommended that substrates be sanded with 150-220 grit sandpaper and then wiped clean. Then scrub with an abrasive oxygen-bleach cleaner and maroon Scotchbrite and DI water and then rinse with DI water to a water-break condition where a uniform "sheet" of water flows smoothly over the surface without the presence of beads of water (like a waxed car) or fisheyes. Rinse with anhydrous IPA and allow to air dry for 15 minutes.

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#### 4. SURFACE PRIMING

- a. Priming of some surfaces may not be required. User to determine if needed.
- b. Specimens should be cleaned/prepared by above procedure (or equivalent) within 2 hours prior to priming.
- c. The best primer to use is **APTEK 2711-1** itself. Apply a thin coat ( $\leq 0.5$  mil) by rubbing **APTEK 2711-1** into the cleaned surface using a clean, dry, lint-free cloth. This rubbed in coating shall air dry until the water has evaporated and surface looks dry. This should occur within a few minutes but not more than 15 minutes.

#### 5. PAINT PREPARATION

- a. **Important Note:** Aptek filters the paint prior to packaging to remove any FOD; therefore, no further filtration of the paint is required as to not remove any critical pigment from the paint formulation.
- b. The filler will, however, settle upon storage and must be rehomogenized prior to use. Vigorously shake the sealed container until the ceramic stirrer beads, which are embedded in the filler layer, are loosened to aid in the re-dispersion and homogenization of the paint. Continue to shake vigorously until fully homogenized.
- c. If the user decides to perform a filtration step prior to loading the gun reservoir, it is critical that the filter media used is no smaller than a 300 micron or 50 mesh screen so that the user is not in jeopardy of filtering out the pigment which is critical to achieving the ESD, solar, and emittance properties desired.  
**Note:** If any agglomerations of pigment are collected on this size filter media, gently wipe agglomerations against the filter media with a smooth, rubber or plastic spatula to aid in the breaking up of the agglomerates and pushing them through the filter media back into the paint.
- d. Once uniform, pour freshly agitated **APTEK 2711-1** into spray gun reservoir. For best results, keep mixture in spray reservoir stirred or shaken during spraying procedure.
- e. Paint has been formulated to a sprayable viscosity as received in factory-sealed containers; however, if a thinner viscosity is required, simply add DI water to formulation to thin coating down and shake well to homogenize. Please note that additional water added may slow the drying time down somewhat.

#### 6. PAINT APPLICATION

- a. Use dry air, free of oils, as pneumatic spraying medium at a suggested pressure setting of 18-22 psi. Adjust pressure as needed to achieve a fine mist.
- b. Recommended spray equipment is HVLP (high-volume, low-pressure) spray guns, such as a Devilbiss SRIPRO 65-35G-10 spot repair gun for lab and small volume use ([www.devilbiss.com](http://www.devilbiss.com)). The canister for this gun is 265ml. For larger production scale use, the Anest Iwata LPH400-164LV Gravity Gun ([www.anestiwata.com](http://www.anestiwata.com)) is preferred. The canister for this gun is 600ml.
- c. Important: Paint should be sprayed in a well-ventilated spray booth with laminar airflow to aid in the drying of sprayed coats. Since water is the solvent, sufficient air movement over the sprayed coating is required for the water/solvent to evaporate. If airflow is less than adequate, each sprayed coat will take longer to dry.
- d. The ambient temperature also affects the rate at which the water solvent evaporates. Ideally, the spray temperature range should be within 72°F – 90°F (22°C - 32°C) for this paint.
- e. For best results, spray multiple thin coats to freshly primed surfaces to achieve a cured thickness of ~3-5 mils. It is recommended to wait for each coat to air-dry ~7-10 minutes prior to spraying subsequent coats in order to not trap large amounts of water between coats.
- f. A uniform thickness draw-down blade applicator may be used to screed down the coating in lieu of a spray application for small specimen sizes.
- g. Estimated surface area coverage per quart is approx. 25 sq. ft. at 3-4 mils cured thickness.

**CURE SCHEDULE**

7 days at @ RT

**Notes:**

1. The paint air dries to a tack-free surface and parts can be handled within 16-24 hours at RT.
2. Cure schedule is a guideline. User to determine actual cure for application.
3. Lower % RH and higher ambient temperature will speed up dry rate; and higher % RH and lower ambient temperature will tend to slow dry rate.

**TYPICAL PROPERTIES**

(values not to be used for specification purposes)

<b><u>CHARACTERISTICS</u></b>	<b><u>2711-1</u></b>	<b><u>TEST METHOD</u></b>
Color	White	Visual
Specific Gravity	1.57	ASTM D-1475
Viscosity @ 25°C,cps	100	ASTM-D-1824
Flash point, °C	N/A	
Shelf life, months @ 22°C or cooler, (may refrigerate but do not freeze) in factory sealed containers	6	
<b><u>CURED PHYSICAL PROPERTIES</u></b>	<b><u>2711-1</u></b>	<b><u>TEST METHOD</u></b>
Solar absorption, $\alpha_{\text{s}}$ vs thickness	<u><math>\alpha_{\text{s}}</math>/mils</u> 0.18/3 0.17/4 0.16/5	ASTM E-903
Outgassing @ 10 <sup>-6</sup> torr, TML, % CVCM, %	0.50 0.02	ASTM E-595
Surface resistivity, on conductive surfaces ohms/sq, on 100 volts bias meter	10 <sup>7</sup> to 10 <sup>9</sup>	ETS-872A
Total normal emittance	0.94	ASTM E-408

**SAFETY AND FIRST AID**

**APTEK 2711-1** is a water-based, mineral-filled, low viscosity coating which is safe to handle when used properly. In case of eye contact, flush with fresh clean water for at least 15 minutes; for skin contact wash thoroughly with soap and water. If swallowed, drink at least one pint of water and call a physician. Refer to MSDS for more details.

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