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NASA TECH BRIEF

Pigmented Coating Resists Thermal Shock

The problem: To provide a coating for space vehicles that will resist the effects of thermal shock and long exposure to direct sunlight.

The solution: A mixture of zinc oxide and potassium silicate calcined for 16 hours at 700°C to form the coating pigment.

How it's done: The calcined pigment materials are mixed in a pigment-to-binder ratio of 4.30:1 with a solids content of 56.9%. A typical batch consists of 100 g of zinc oxide, 50 cc of a 35% solution of potassium silicate, and 50 cc of distilled water. Ball milling follows, using porcelain balls in a dense alumina mill with a volume ratio of ball-to-material of 1:3 and a total charge of less than 50%. A milling time of 6 hours yields a satisfactory consistency for spraying.

Aluminum or plastic substrates must be abraded and thoroughly cleaned prior to spraying. A first coat is lightly applied, using purified nitrogen for pressure, until a reflection due to liquid is apparent. Following air drying, a second, heavier coat is applied until a glossy finished texture is achieved.

Notes:

1. Satisfactory physical properties are obtained by air drying but improved hardness may be obtained by heat curing at 140°C.
2. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, California, 91103
   Reference: B65-10354

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated by NASA.

Source: Harold L. Rechter and Yoshiro Harada of IIT Research Institute under contract to Jet Propulsion Laboratory (JPL-SC-083)

Category 03