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C. Wayne Ranow, NASA, KSC, CEA	C Wayne Ranow	7/2/2007

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NASA
Export Control Program

KSC-SPEC-Z-0011A
JUNE 15,1982

APPLICATION OF SILICONE RUBBER ABLATIVE MATERIAL TO GROUND SUPPORT EQUIPMENT, SPECIFICATION FOR

DESIGN ENGINEERING DIRECTORATE

National Aeronautics and
Space Administration

John F. Kennedy Space Center

NASA

KSC FORM 16-13 (REV. 8/74)

KSC-SPEC-Z-0011A
JUNE 15, 1982

APPLICATION OF SILICONE RUBBER ABLATIVE MATERIAL TO GROUND SUPPORT EQUIPMENT, SPECIFICATION FOR

Approved: Henry C. Paul
for Peter A. Minderman
Director of Design Engineering

JOHN F. KENNEDY SPACE CENTER, NASA

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JOHN F. KENNEDY SPACE CENTER, NASA
APPLICATION OF SILICONE RUBBER ABLATIVE MATERIAL TO GROUND SUPPORT EQUIPMENT, SPECIFICATION FOR

This specification has been approved by the Design Engineering Directorate of the John F. Kennedy Space Center (KSC) and is mandatory for use by KSC and associated contractors.

1. SCOPE

This specification defines the procedure for applying a silicone rubber ablative material to ground support equipment other than cables. This specification is applicable only to the application of Dow Corning 1200 primer and Dow Corning Q3-6077 coating and catalyst.

2. APPLICABLE DOCUMENTS

None

3. PROCEDURE

3.1 Surface Preparation. Surfaces which are to receive an ablative coating shall be cleaned of all surface contaminants. Smooth surfaces shall be roughened with abrasive paper, by abrasive blasting or other appropriate methods. Two rinses are to be employed in the cleaning of surfaces. The first rinse shall be with a chlorinated solvent such as 1,1,1-trichloroethane or perchloroethylene. After rinsing with a chlorinated solvent, the surfaces shall be cleaned with cloths dampened with acetone, methyl isobutyl ketone, or methyl ethyl ketone (MEK). Trichlorotrifluoroethane may be used when flammability considerations preclude use of the previously listed solvents. Since trichlorotrifluoroethane evaporates very rapidly, special care shall be taken to ensure surfaces are cleaned adequately. Cleaning operations shall be completed within 2 hours of the primer application where exposure to ocean winds can result in a salt deposit on the freshly cleaned surfaces.

In all other cases where salt-laden winds are not a consideration, application of the primer shall be performed within 8 hours after cleaning or suitable precautions shall be taken to ensure that the surfaces remain clean until they are primed.

3.2 Application of Primer. Following cleaning, surfaces shall be coated with a thin coat of Dow Corning 1200 primer by spraying, brushing, or application with clean cheesecloth. When using cloths, apply primer in a well-ventilated area since solvents are flammable. Keep materials away from heat, sparks, and open flame.

Application using cheesecloth is the preferred method. For brush application, only good quality natural bristle brushes shall be used. A thin coating promotes better adhesion than a heavy film. A primer coat is considered too heavy when the surface is flooded causing the primer to run or appear chalky. The coating shall be permitted to dry for a minimum of 30 minutes before application of the Dow Corning Q3-6077. If, after drying, the primer coat becomes chalk-white in appearance, the surface shall be wiped down with a clean dry cloth. The wiping procedure shall be continued until the chalky material has been removed. No more than 8 hours shall elapse before the Dow Corning Q3-6077 coating is applied or the surfaces must be cleaned and primer re-applied. In cases where the surfaces are exposed to salt-air breezes, the time between primer application and ablative coating shall be no more than 2 hours. Primed surfaces shall be properly protected from dust, other foreign matter, and handprints. The primed surfaces shall be kept dry by any means necessary until the ablative coating is applied.

3.3 Application of Coating by Trowelling or Hand Layup.

3.3.1 Recommended Formulation and Mixing Procedure. The proper mixture is one part of Q3-6077 catalyst added to 10 parts of base. The catalyst may be dispersed by 5 minutes minimum of hand mixing or by approximately 2 minutes minimum with a mechanical mixer. Uniformity of color indicates that the tan base and blue catalyst are thoroughly mixed.

3.3.2 Application Procedure. After mixing, the material shall be applied with a trowel or spatula. The material may be re-worked to any desired configuration. Uncured excess material may be removed with xylene, toluene, or similar aromatic solvents. Trowels, or any other instruments employed in the application of the ablative coating, may be cleaned in the above solvents. If hand layup is necessary, protective gloves shall be worn.

CAUTION

No unspecified extraneous materials shall be used as nonsticking agents on hands, gloves, tools or any implement used in the application of the ablative coating. Only after completion of the job shall suitable cleaners be used to remove ablative coating compound from hands and tools.

In order to ensure the effectiveness of the ablative coating, the primed surfaces and ablative shall be kept water-free and dry throughout the entire period of application and final smoothing of the coating. No materials other than those specified shall be employed in the application of the primer and ablative. Essentially, the ablative shall be applied to the specified thickness and the ablative shall be free from contaminants that can reduce adhesion.

3.3.3 Working Time. At normal room temperature, approximately 75 degrees F, the material remains workable for 2 hours after addition of the catalyst.

3.4 Refurbishment. - After exposure to rocket engine exhaust, ablated surfaces shall be prepared to receive additional ablative material by the following procedure:

a. Roughen charred ablative surfaces with a wire brush or sandpaper to remove residual char. Clean ablative surfaces with acetone using clean rags.

b. If the ablative surface has been eroded to the bare substrate, refurbishment shall be identical to the procedure for coating new surfaces (see 3.1, 3.2, and 3.3).

c. Primer shall not be applied to silicone rubber surfaces. Apply the ablative coating in accordance with 3.3.

3.4.1 Overcoating Silicone Rubber Surfaces. Primer shall not be applied to silicone rubber surfaces when overcoating previously applied silicone rubber ablative material. When material which is to be overcoated has recently been applied, and when coated surfaces are known to be uncontaminated, additional material may be applied directly. When surfaces have become contaminated they shall be cleaned by wiping with acetone before applying additional material. Where the surface of material which has been subjected to rocket engine exhaust is noted to be gummy, the surface shall be wiped with rags dampened in acetone to remove the gummy portion before refurbishing.

3.4.2 Overcoating Ablative Materials Other Than Silicone Rubber. Where it has been determined that the adhesion between the intended overcoat ablative and the existing ablative is adequate and that the residual coating is firmly bonded to the subsurface, the overcoating ablative may be applied over the residual coating, using the procedures of 3.1, 3.2, and 3.3

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility. The contractor shall be responsible for performing inspection and tests of materials, equipment and procedures to assure conformance to the requirements of this specification. The contractor shall provide and maintain an inspection and test system which is acceptable to the Government.

4.2 Inspection. - Inspection shall include but not be limited to the following:

4.2.1 Cleanliness. Immediately prior to application of primer, surfaces shall be examined to insure they have been properly cleaned. No visible corrosion products, loose paint or other foreign matter shall be present. Adhering paint need not be removed.

4.2.2 Primed Surface Inspection. Final inspection of the primed surface shall be performed no sooner than 30 minutes after the primer application. If chalking is noted during this inspection it shall be inspected again following the wipedown procedure specified in 3.2.

4.2.3 Coating Thickness Test. Coating thickness shall be as specified on the engineering drawing. Unless otherwise specified, excessive coating thickness shall not be cause for rejection. Thickness shall be measured by inserting a pin into randomly selected places and measuring penetration. Evidence of inadequate coating thickness shall be cause for rejection.

5. SAFETY CONSIDERATIONS

Upon contact, ablative catalyst may burn skin or irritate eyes. In case of eye contact, flush with water. Skin contact areas shall be thoroughly washed with soap and water. Apply primer and coating in a well-ventilated area since the solvents are flammable. Keep away from heat, sparks and open flame. When material is applied by trowelling, flammability considerations do not apply since no solvents are used.

5.1 Primer Safety Precautions. It should be noted that the flash point of the primer is 50 degrees F and that the primer is flammable and may flash in the presence of heat, open flame, or a spark. The primer should be applied in a well-ventilated area.

5.2 Ablative Coating Safety Precautions. The ablative coating consists of two components, the catalyst and the base. The catalyst should not be allowed to contact the skin. It will burn the skin and irritate the eyes. In the case of eye irritations, flush thoroughly with water. Skin contact areas shall be thoroughly washed with soap and water. Persistent irritation shall receive medical attention. Neither the catalyst nor the base, singly or combined, shall be used in contact with food or drugs. The flash point of the prepared, uncured Q3-6077 ablative, is 200 degrees F. Proper precautions shall be taken to ensure against igniting the ablative prior to its curing.

6. NOTES

6.1 Primer.

6.1.1 Primer Shelf Life. The shelf life of the primer in a sealed container is six months when stored at temperatures below 90 degrees F. The primer should be used within six months of the date received. Containers of primer which are outdated shall be submitted to the laboratory (TG-FLD-22) for revalidation at the time of intended use.

6.1.2 Primer Maintenance. Primer cans which have been opened shall be re-sealed as quickly as possible following usage. The Dow Corning 1200 primer tends to pick up moisture from the atmosphere and its effectiveness deteriorates under these circumstances. In order to ensure against deterioration, it is suggested that only the amount of primer which is to be used be taken from the container and that the original container be resealed. Unused portions shall not be returned to the original container. Always remove the smallest amount of primer from the container that will provide the amount necessary to coat the area under consideration.

6.1.3 Primer Inspection. The primer shall be inspected for clarity prior to usage. Cloudiness shall be cause for submission of the primer to the laboratory, TG-FLD-22, for inspection and revalidation.

6.1.4 Primer Storage. All primer is to be stored in areas where the temperature will not exceed 90 degrees F at any time during the primer's shelf-life. Prolonging the shelf-life of the primer is possible by storage at temperatures as low as minus 85 degrees F.

6.2 Ablative Coating.

6.2.1 Ablative Coating Shelf Life. The Dow Corning Q3-6077 sealant should be used within six months of the manufacture date shown on the label.

6.2.2 Ablative Coating Storage. Dow Corning Q3-6077 shall be stored in an area where the highest temperature at any time during its storage will not exceed 80 degrees F. The material shall be stored in an area where the integrity of the contents of the can will be ensured. The cans shall be stored in a manner to ensure against over-heating, water intrusion, and physical damage that might open the can and expose the contents.

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Design Engineering Directorate