

INCH-POUND

**MIL-STD-1819**  
**15 September 1992**

**MILITARY STANDARD**

**PERFORMANCE EVALUATION FOR**  
**PLASMA SPRAY MASKING TAPE**



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**MIL-STD-1819**

**DEPARTMENT OF DEFENSE  
WASHINGTON DC 20301-8000**

**PERFORMANCE EVALUATION FOR PLASMA SPRAY MASKING TAPE**

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### **FOREWORD**

The variety of grit blasting and thermal spray processes prevents one tape from being the ideal tape for all applications. This standard has been developed to establish the requirements and performance evaluation process for plasma spray masking tapes used for thermal spray applications.

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### 1. SCOPE

**1.1 Scope.** This standard establishes the requirements for evaluating thermal spray masking tapes subject to grit blasting and plasma spraying operations.

#### 1.2 Classification

**1.2.1** The thermal spray masking tapes covered by this standard include the composite tapes listed below:

- 1.2.1.1 Layup No. 1.** Silicone adhesive  
Glass cloth backing  
Silicone adhesive
- 1.2.1.2 Layup No. 2.** Metallic foil  
Glass cloth backing  
Silicone adhesive
- 1.2.1.3 Layup No. 3.** Silicone rubber topcoat  
Glass cloth backing  
Silicone adhesive
- 1.2.1.4 Layup No. 4.** Glass cloth backing  
Silicone adhesive
- 1.2.1.5 Layup No. 5** Synthetic rubber topcoat  
Glass cloth backing  
Synthetic rubber adhesive

**1.2.2** Other tape configurations may be evaluated under this standard, if specified by the acquisition activity (see 6.2.3).

### 2. APPLICABLE DOCUMENTS

#### 2.1 Government documents

**2.1.1 Specifications, standards, and handbooks.** The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

### SPECIFICATIONS

#### Federal

PPP-T-680                      Tape, Pressure-Sensitive Adhesive: Packaging and Packing of

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia PA 19111-5094.)

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**2.2 Non-Government publications.** The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D3330	Standard Test Methods for Peel Adhesion of Pressure-Sensitive Tape at 180 Degree Angle
ASTM D3652	Standard Test Method for Thickness of Pressure-Sensitive and Gummed Tapes (DoD adopted)
ASTM D3715	Standard Practice for Quality Assurance of Pressure-Sensitive Tapes (DoD adopted)
ASTM D3759	Standard Test Method for Tensile Strength and Elongation of Pressure-Sensitive Tapes (DoD adopted)
ASTM D3811	Standard Test Method for Unwind Force of Pressure-Sensitive Tapes

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia PA 19103-1187.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other information services.)

**2.3 Order of Precedence.** In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3.0 DEFINITIONS

**3.1 Grit blasting.** Forceful direction of abrasive particles against the surface of a workpiece, to remove the surface layer and produce an absolutely clean surface.

**3.2 Overspray.** The excess spray material that is not deposited on the part being sprayed.

**3.3 Plasma.** An electrically neutral, high temperature ionized gas composed of ions, electrons, and neutral particles.

**3.4 Plasma spraying.** Producing a coating by passing a material in powder form through a plasma flame and depositing the subsequently heat-softened particles onto a base material or substrate.

**3.5 Substrate.** The material, workpiece, or substance on which the coating is deposited.

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**3.6 Thermal spray.** Any coating process in which particles are heated to a molten or plastic state and propelled onto a substrate to form a coating. Thermal spray includes combustion spray, plasma spray, and electric arc spray. Feed stock may be wire, powder, or rod.

### 4.0 GENERAL REQUIREMENTS

**4.1 Tape.** The tape furnished shall be a product which meets the requirements specified in 4.1.1 through 4.1.11, and the Quality Assurance requirements of ASTM D3715. The tape shall be tested and meet the requirements specified in section 5.

**4.1.1 Materials.** The materials used in the manufacturing of the tape shall ensure performance of the tape, in accordance with the requirements of this standard.

**4.1.2 Adhesive.** The tape adhesive shall be able to withstand the rigors of both grit blasting and plasma spraying.

**4.1.3 Rolls.** The tape shall be evenly and uniformly wound, adhesive side on cores made of paper or plastic. The core shall have a rigidity which prevents distortion of the roll under normal conditions of transportation, storage, or use. A release liner should be used with tapes requiring excessive unwind force, or if specified by the acquisition activity (see 6.2.4).

**4.1.4 Width.** The width of the tape shall be 0.25, 0.50, 0.75, 1.00, 1.50, 2.00, or 3.00 inches, or other commercially available widths, as specified by the acquisition activity (see 6.2.5). A tolerance of  $\pm 0.03$  inches shall be acceptable.

**4.1.5 Thickness.** The tape thickness shall be measured in accordance with ASTM D3652.

**4.1.6 Peel adhesion.** The tape's adhesion shall be measured in accordance with ASTM D3330.

**4.1.7 Tensile strength.** The tape's tensile strength shall be measured in accordance with ASTM D3759.

**4.1.8 Marking of rolls.** The rolls shall be marked with the following information on the inside of the core:

**4.1.8.1** Manufacturer's name.

**4.1.8.2** Manufacturer's stock number.

**4.1.8.3** Tape width and length.

**4.1.8.4** Date of manufacture.

**4.1.8.5** Date of expiration.

**4.1.9 Packaging.** The tape, upon manufacture, shall be packaged in plastic as specified in PPP-T-680.

**4.1.10 Shelf life.** Shelf life shall be a minimum of 12 months. Shelf life is defined as being the span of time from the date of manufacture to the date of expiration.

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**4.1.11 Storage requirements.** The tape shall be stored in the original packaging, in a cool location. The tape shall not be stored close to heat sources, such as steam pipes, radiators, and furnaces. Storage conditions of approximately seventy degrees Fahrenheit and forty to fifty percent relative humidity are considered optimum.

### 5.0 DETAILED REQUIREMENTS

**5.1 Tape application.** Two layers of the tape shall be applied to the test substrate.

**5.1.1 Unwind force.** If a tape does not include a release liner, the tape shall peel off the roll readily, requiring an unwind force of less than 3 lbf/in. Unwind force shall be determined in accordance with ASTM D3811.

**5.1.2 Release liner.** If a release liner is included in the tape packaging, it shall readily separate from the tape during application.

**5.1.3 Adherence.** The tape shall readily adhere to the test specimen and conform to curves and sharp corners.

**5.1.4 Rejection criteria.** Failure to meet any of the above criteria shall be cause for rejection.

**5.2 Test substrate.** The test substrate shall be a piece of steel angle, with equal angles as shown on figure 1.

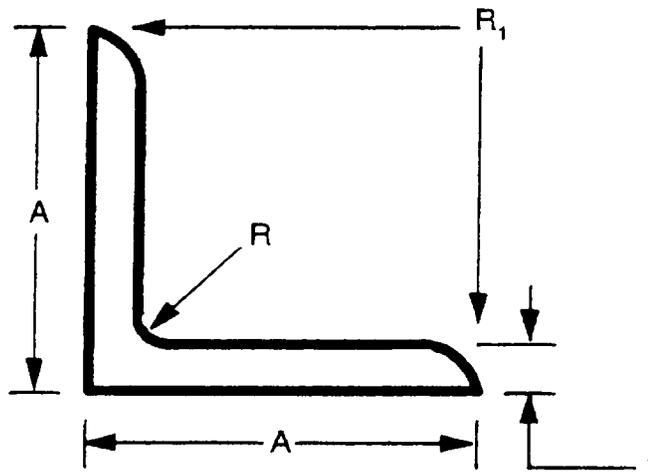


FIGURE 1. Test substrate.

NOTE: The angles (A) shall measure 2 inches long with a thickness (t) of 0.25 inches.

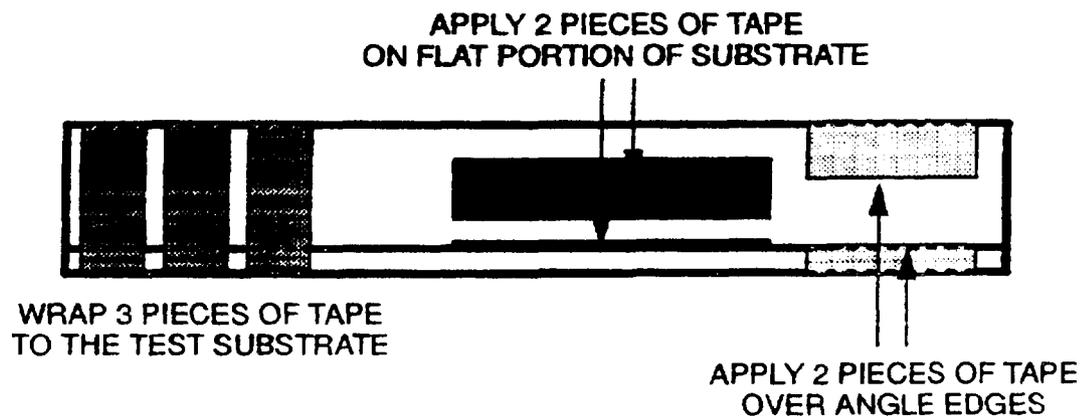
The interior radius (R) shall be 0.25 inches.

The end radius (R<sub>1</sub>) shall be 0.25 inches.

The substrate shall be at least 12 inches long.

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**5.2.1** Within one hour after completing degreasing operations, the sample tape shall be applied onto the substrate as shown on figure 2. Tape shall be burnished (rubbed down) with a squeegee, spatula, or other device to insure maximum adhesion of the adhesive.



**FIGURE 2.** Sample tape application.

**5.2.2** Within one hour after applying the tape to the substrate, the taped substrate shall be subjected to grit blasting and to plasma spraying operations as specified in sections 5.3 and 5.4.

**5.3 Grit blasting.** The tape applied to the test substrate shall be subjected to the following parameters.

**5.3.1** Virgin 20 to 30 aluminum oxide grit shall be used.

**5.3.2** Nozzle pressure of 80 pounds per square inch shall be used.

**5.3.3** Nozzle to part stand off distance shall be 5 inches.

**5.3.4** All exposed areas of the substrate shall be blasted to clean white metal.

**5.3.5** Failure to completely protect the covered area from grit blasting shall be cause for rejection. Failure shall include tearing of the tape, loss of tape adhesion, grit blast media penetration, abrasion of edges, and separation of laminations.

**5.4 Plasma spray operations**

**5.4.1** After passing the previous steps, the tape shall be subjected to the following plasma spraying conditions (see figure 3).

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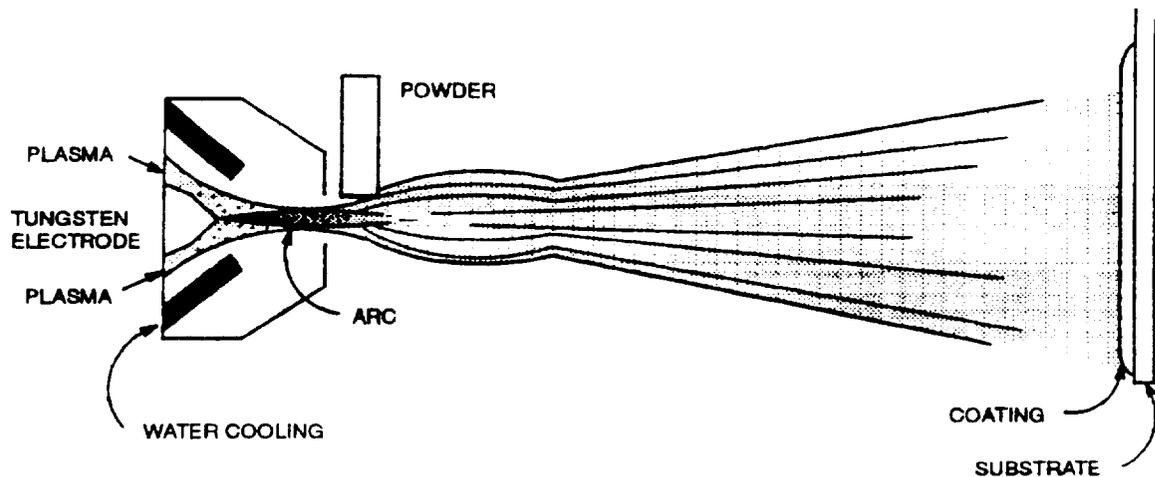


FIGURE 3. Plasma arc spray gun.

5.4.1.1 Composite nickel aluminum powder conforming to GEB50TF56, PWA 1337, METCO 450, or equivalent (see 6.4), shall be used.

5.4.1.2 The nozzle to part standoff distance shall be 5 inches.

5.4.1.3 The taped substrate shall be exposed for 30 seconds or for a deposition thickness of 0.050 inches, whichever is the longest. Edges, inside and outside diameters, and flat sections of the test substrate shall be exposed.

5.4.2 Failure to completely protect the part from plasma spraying shall be cause for rejection. Failure shall include exposure of the test specimen due to tape tearing, burning, lifting, shrinkage, edge loss, or separation of laminates.

## 5.5 Tape removal operations

5.5.1 The tape exposed to the above grit blasting and plasma spray operations shall readily be removed from the test specimen without tearing, with no adhesive residue remaining.

5.5.2 Edges shall be sharp, uniform, with no overspray.

5.5.3 Failure to meet the above criteria shall be cause for rejection.

5.6 **Tape disposal.** The used tape shall not create a hazardous waste disposal problem. If the tape is deemed inert, yet the plasma spray coating overspray is deemed hazardous, the agency contaminating the tape shall dispose of the tape in accordance with federal, state, and local environmental regulations.

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### 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

**6.1 Intended use.** The performance evaluation requirements for plasma spray masking tape covered by this standard is intended for use by tape manufacturers, and government or industry thermal spray tape evaluators.

**6.2 Acquisition requirements.** Acquisition documents shall specify the following:

**6.2.1** Title, number, and date of the standard.

**6.2.2** Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).

**6.2.3** Whether other tape configurations are to be evaluated (see 1.2.2).

**6.2.4** Whether a release liner is required (see 4.1.3).

**6.2.5** The width of the tape (see 4.1.4).

**6.3 Subject term (key word) listing.**

plasma spray  
tape evaluation  
thermal spray

Custodian:  
Army -MR  
Air Force - 11  
Navy - SH

Review activities:  
Air Force - 71, 82

Preparing activity:  
Air Force - 11

Project No. MFFP-0506

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, not to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

### 1. RECOMMEND A CHANGE:

1. DOCUMENT NUMBER  
MIL-STD-1819

2. DOCUMENT DATE (YYMMDD)  
920915

### 3. DOCUMENT TITLE

Performance Evaluation for Plasma Spray Masking Tape

### 4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

### 5. REASON FOR RECOMMENDATION

### 6. SUBMITTER

A. NAME (Last, First, Middle Initial)

B. ORGANIZATION

C. ADDRESS (Include Zip Code)

D. TELEPHONE (Include Area Code)  
(1) Commercial

E. DATE SUBMITTED  
(YYMMDD)

(2) AUTOVON  
(If applicable)

### 8. PREPARING ACTIVITY

A. NAME

ASCENES (AF Code 11)

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(1) Commercial 513-255-6281 (2) AUTOVON (If applicable) 785-6281

C. ADDRESS (Include Zip Code)

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