6 October 1981

MILITARY SPECIFICATION

LINER, CASE, ROCKET MOTOR

This specification is approved for use by the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE.

1.1 Scope. This specification establishes the requirements for rocket motor case liner material.

2. APPLICABLE DOCUMENTS.

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-C-85496	Carbon Black.
MIL-I-85492	Imine Curing/Bonding Agents.
MIL-H-85497	Hydroxyl-Terminated Polybutadiene.
MIL-C-85498	Curing Agent, Dimeryl-diisocyanate and Isophorone di-isocyanate.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Air Engineering Center, Engineering Specifications and Standards Department (ESSD) Code 93, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 6810

STANDARDS

MILITARY

MIL-STD-2126	Reduced Smoke Rocket Motor Processing and Test Procedures.

(Copies of specifications, standards, drawings and publications required by contractors in connection with specified procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

STANDARDS

American Society for Testing and Materials (ASTM)

ASTM D 5	Penetration of Bituminous Materials, Test for.
ASTM D 412	Standard Methods of Tension Testing of Rubber.

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

3. REQUIREMENTS.

3.1 Formulation. Formulation of the liner shall be in accordance with Table I.

3.2 Precure time. The liner shall exhibit a penetration of 12.5 millimeters (see 4.3.1) within 12 to 48 hours of curing at 60 to 66 degrees Celsius (°C).

3.3 Tensile properties. The liner shall possess minimum tensile properties conforming to Table II when tested at 25 ±3°C.

3.4 Weighing accuracy. Each liner ingredient shall be weighed to 0.3 of one percent of the weight requirements calculated from the weight percent specified.

3.5 Toxic products and safety. Safety regulations and guidelines applicable to the use of the liner should be complied with to preclude personal injury and damage to equipment and facilities.

3.6 Workmanship. The liner shall be homogeneous, of consistent high quality, and free from visible contamination.

TABLE I. Liner formulation.

Ingredient	Specification	Nominal Weight Ratio	Weight, %
Hydroxyl-terminated polybutadiene	MIL-H-85497 Type II, Class I	78 1/	64.0 ±5.5 2/
Curing agent, diisocyanate	MIL-C-85498, Type I	22 1/	
Imine curing/ bonding agent	MIL-I-85492, Type II		6.0 ±0.5 2/
Carbon black	MIL-C-85496		30 ±5 2/

1/ The NCO:OH ratio may be adjusted from a nominal value of 1.2:1 to optimize tensile, bond, and precure time.

2/ The specified weight variation shown is allowed for viscosity control.

TABLE II. Liner tensile properties.

Property	Minimum
Maximum Stress, psi	150
Strain at break, percent	125

4. QUALITY ASSURANCE PROVISIONS.

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2.1), the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Classification of tests. Inspection and testing of the liner shall be classified as follows:

a. Standardization tests (see 4.2.1).

b. Quality conformance inspections (see 4.2.2).

4.2.1 Standardization tests. At least one subscale mix of liner shall be manufactured for each new lot of raw material except carbon black (only required when supplier of carbon black is changed). The mix shall be of sufficient size to perform standardization tests and shall be manufactured in accordance with MIL-STD-2126, Method III. Standardization tests shall consist of the following:

a. Precure time (see 4.3.1).

b. Quality conformance inspections (see 4.2.2).

4.2.2 Quality conformance inspections. Quality conformance inspections shall consist of the following for each production mix of liner.

a. Visual inspection (see 4.5).

b. Tensile properties (see 4.3.2).

4.2.3 Acceptance criteria. Failure of any sample to pass all the requirements specified herein shall cause rejection of the lot represented.

4.3 Test methods. Tests shall be performed using apparatus, reagents, and procedures specified herein. The use of alternate apparatus, reagents, or procedures shall require prior written approval of the procuring activity.

4.3.1 Precure time. A container, approximately 3 ounces in size, shall be filled to approximately 75 percent capacity with a sample of the liner and shall be placed in an oven whose temperature is 60 to 66°C. A penetration test shall be performed on the sample in accordance with ASTM D 5, except that the moving load (including needle) shall be 50 grams, the penetration time shall be 30 seconds and the specimen temperature shall be 60 to 66°C. Penetration tests shall be made a sufficient number of times to plot a curve of penetration versus cure time. From the curve, the next full hour (after 12.5 millimeters penetration is reached) shall be reported as the precure time.

4.3.2 Tensile properties.

4.3.2.1 Preparation of sample sheet. A sample of liner shall be poured into a suitable open, release coated, mold. Enough molds shall be prepared to furnish a minimum of five specimens for testing. The mold shall be cured for 168 ±24 hours at a temperature of 77 ±6°C. The sheet shall be removed from the mold, dusted with talc, and conditioned for a minimum of 4 hours at 25 ±3°C immediately prior to testing.

4.3.2.2 Apparatus.

a. Die Type C (all items shall comply with ASTM D 412).

b. Thickness gage.

4.3.2.3 Procedures.

4.3.2.3.1 Maximum stress. Maximum stress shall be determined in accordance with ASTM D 412.

Calculation:

$$\text{Maximum stress, psi} = \frac{L_b}{T \times W}$$

Where: L_b = load at break, pounds

T = thickness of necked down section, inches

W = width of necked down section, inches

Report the maximum stress to the nearest integer.

4.3.2.3.2 Strain at break. Strain at break shall be determined in accordance with ASTM D 412.

Calculation:

$$\text{Strain at break, \%} = \frac{(D - D_0) \times 100}{D_0}$$

Where: D_0 = original distance between bench marks, inches

D = distance between bench marks at break, inches

Report the strain at break to the nearest integer.

4.4 Records. Certification and test data shall be prepared as required by the procuring activity (see 6.2.2).

4.5 Visual inspection. Verification of workmanship shall be determined by visual inspection (see 3.6).

5. PACKAGING. This section is not applicable to this specification.

6. NOTES AND CONCLUDING MATERIAL.

6.1 Intended use. The intended use of the material described herein is as liner or insulation for rocket motor cases.

6.2 Ordering data.

6.2.1 Procurement requirements. Procurement documents should specify the following:

a. Title, number, and date of this specification.

b. Responsibility for inspection and inspection facilities, if different than 4.1.

6.2.2 Data requirements. When this specification is used in a procurement which incorporates a Contract Data Requirements List (DD Form 1423) and invokes the provisions of 7-104.9(n) of the Defense Acquisition Regulations (DAR), the data requirements identified below will be developed as specified by an approved Data Item Description (DID) (DD Form 1664) and delivered in accordance with the approved DD Form 1423 incorporated into the contract. When the provisions of DAR-7-104.9(n) are not invoked, the data specified below will be delivered by the contractor in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraphs:

Paragraph	Data Requirement	Applicable DID
4.4	Certification Test data	UDI-23264B DI-T-4024

(Copies of DIDs required by the contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

Preparing activity:
Navy - AS

(Project 6810-NB22)

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DOCUMENT IDENTIFIER *(Number)* AND TITLE

MIL-L-85490(AS), LINER, CASE, ROCKET MOTOR

NAME OF ORGANIZATION AND ADDRESS OF SUBMITTER

☐ VENDOR ☐ USER ☐ MANUFACTURER

1. ☐ HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? ☐ IS ANY PART OF IT TOO RIGID, RESTRICTIVE, LOOSE OR AMBIGUOUS? PLEASE EXPLAIN BELOW.

A. GIVE PARAGRAPH NUMBER AND WORDING

B. RECOMMENDED WORDING CHANGE

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2. REMARKS

SUBMITTED BY *(Printed or typed name and address — Optional)*

TELEPHONE NO.

DATE

DD FORM 1426 1 OCT 76

Replaces edition of 1 Jan 72 which may be used.

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