MILITARY SPECIFICATION

PACKING MATERIAL, ASBESTOS, BRAIDED,

IMPREGNATED WITH TFE (POLYTRETRAFLUOROETHYLENE), SURFACE LUBRICATED

1. SCOPE

1.1 This specification covers a braided asbestos packing, impregnated with TFE (polytetrafluoroethylene), and coated with a petroleum lubricant, for general service, when the service temperature does not exceed 500°F.

2. APPLICABLE DOCUMENTS

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

SPECIFICATION

MILITARY
MIL-P-116 - Preservation, Methods of.

STANDARD
MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific 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.

UNIFORM CLASSIFICATION COMMITTEE
Uniform Freight Classification Rules.

(Application for copies should be addressed to the Uniform Classification Committee, 202 Union Station, 516 West Jackson Boulevard, Chicago, Illinois 60606.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
D 299 - Asbestos Yarns, Specification for.
D 1918 - Asbestos Content of Asbestos Textile Materials, Test for.
D 2257 - Extractable Matter in Yarns, Test for.

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

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

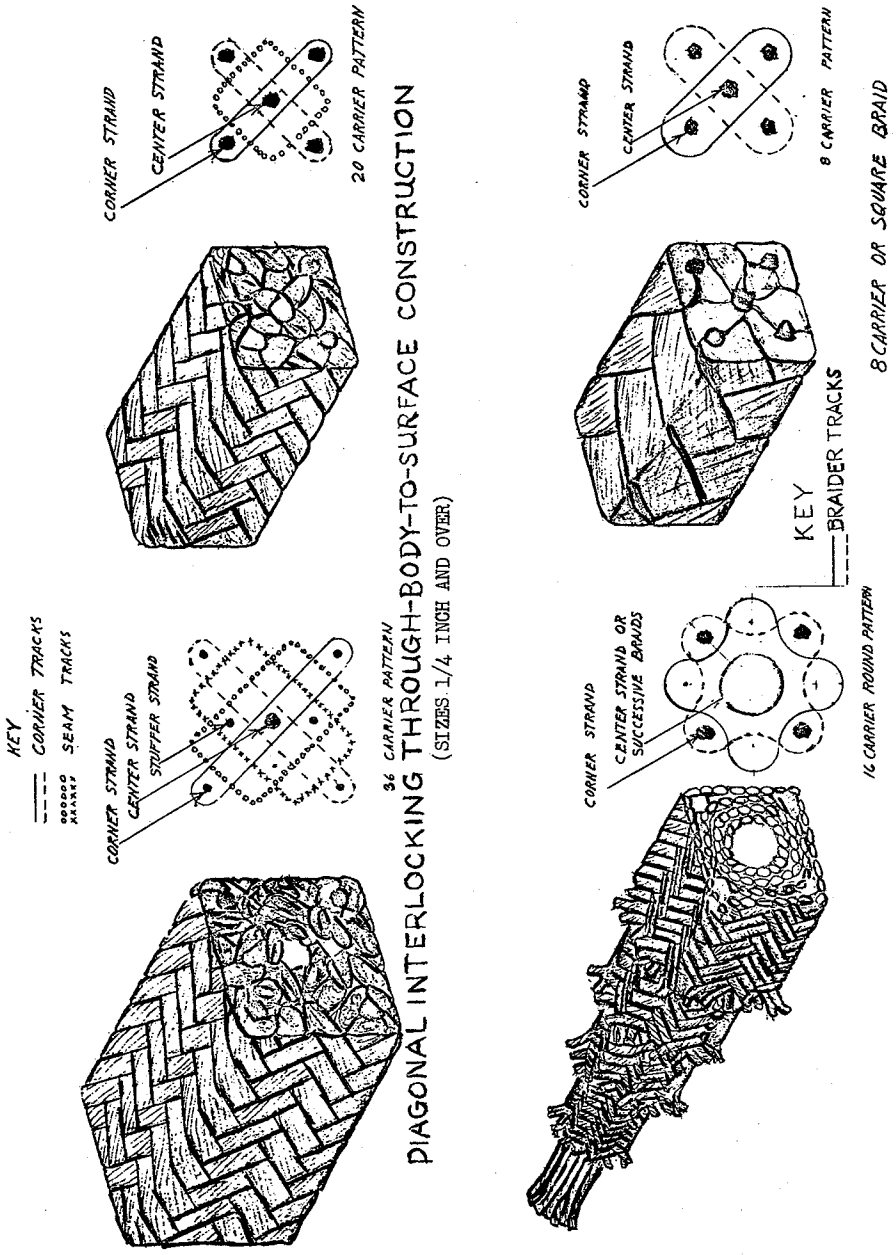
3.1 Sample for first article inspection. Prior to beginning production, a sample shall be tested as specified in 4.2 (see 6.3).

3.2 Material. The packing material shall be made of plain white asbestos yarn containing suitable reinforcing fibers, impregnated with TFE (polytetrafluoroethylene), and lubricated with petrolatum.

3.2.1 Asbestos yarn. The yarn shall be without wire insertion and have a white chrysotile asbestos fiber content of not less than 75 percent by weight, as defined by commercial grade of ASTM-D-299 (see 4.8.5).

3.2.2 Impregnation. The impregnation shall be from a dispersion of virgin TFE (polytetrafluoroethylene) deposited uniformly throughout the packing (see 4.8.4.1). Based on the weight of the dry yarns after the lubricant has been extracted, the TFE content shall be not less than 30 percent (see 4.8.4.2).

3.2.3 Lubricant. The lubrication shall be a surface treatment of a highly refined white petrolatum weighing 10 percent ± 5 percent of the finished packing (see 4.8.3).



DIAGONAL INTERLOCKING THROUGH-BODY-TO-SURFACE CONSTRUCTION
(SIZES 1/4 INCH AND OVER)

FIGURE 1 INTERLOCKING VERSUS BRAID-OVER-BRAID PATTERNS

3.3 Construction. The packing shall be braided, for sizes 1/4 inch and over, to a diagonal interlocking through-body-to-surface construction (as opposed to braid-over-braid or square-braid construction). This construction shall use either 20 diagonal strands, and center-corner-stuffer strands, as necessary, or 36 diagonal strands, and center-corner-stuffer strands, as necessary, to produce a dense square packing with good dimensional stability. Sizes 1/8 inch and 3/16 inch only shall be square braided (see 4.8.2 and figure 1).

3.4 Sizes and weights. The packing shall be calendered square in cross section and furnished in sizes shown in table I (see 6.2). The weight per linear foot shall be not less than that shown in table I.

Table I - Sizes and weights of packing.

Nominal size, inches	Minimum weight, pounds/foot	Nominal size, inches	Minimum weight, pounds/foot
1/8	0.008	7/8	0.398
3/16	0.013	15/16	0.450
1/4	0.027	1	0.500
5/16	0.050	1-1/8	0.640
3/8	0.076	1-1/4	0.800
7/16	0.107	1-3/8	1.000
1/2	0.138	1-1/2	1.250
9/16	0.172	1-5/8	1.550
5/8	0.212	1-3/4	1.800
11/16	0.255	1-7/8	2.100
3/4	0.300	2	2.350
13/16	0.345		

3.5 Spools or reels. Unless otherwise specified (see 6.2), the packing shall be uniformly coiled on spools or reels according to the following:

Packing size (inch)	Package
1/8 through 7/16	1 or 5 lb. spools
3/8 through 3/4	5 or 10 lb. spools
3/4 through 1	25, 50, or 100 lb. reels
1-1/8 through 2	50 or 100 lb. reels

3.6 Workmanship. The workmanship shall be first class in all respects, and the packing shall be free from defects which may affect its serviceability.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 First article inspection. First article inspection shall consist of the examination of 4.4 and the tests specified in 4.8.

4.2.1 First article tests. Prior to production, first article tests shall be conducted on a sample, sufficient in size to determine the conformance with all the tests and requirements of this specification (see 6.3). The test material shall be certified to be identical in composition to the material to be supplied later for quality conformance inspection. The first article sample shall comply to the requirements specified in this specification. First article tests shall be monitored by a Government representative. The contractor shall not proceed with production under the contract or order without submitting all approved test data results certified by the Government representative and without receiving final written approval from the procuring activity.

4.3 Sampling.

4.3.1 Lot. For purposes of sampling, examination and tests, a lot shall consist of packing material of the same form and dimensions, produced in one plant under essentially the same conditions and offered for delivery at one time. At all times, the number of spools or reels shall be the lot size. The sampling unit shall be one spool or reel of packing.

4.3.2 Sampling for visual and dimensional examination. For visual and dimensional inspection, a random sample shall be selected from each lot according to MIL-STD-105 at inspection level II, with an acceptable quality level (AQL) of 2.5 percent defective.

4.3.3 Sampling for quality conformance tests. For quality conformance inspection requiring tests, a random sample shall be selected from each lot according to MIL-STD-105, level S-2, with an AQL of 2.5 percent defective.

4.4 Quality conformance inspection.

4.4.1 Examination for visual and dimensional defects. Each unit selected according to 4.3.2 shall be surface examined and measured to determine conformance with the requirements which do not require tests. Any unit containing one or more visual or dimensional defects shall be rejected, and if the number of defective units in the sample exceeds the acceptance number for that sample, this shall be cause for rejection of the lot which this represents.

4.4.1.1 Examination of preparation for delivery. An examination shall be made to determine that the packaging, packing, and marking comply with the requirements of section 5. Examination of preparation for delivery shall be in accordance with the following. For examination of interior packaging, the sample unit shall be one shipping container fully prepared for delivery, selected at random just prior to the closing operations. Shipping containers fully prepared for delivery shall be examined for defects of closure listed in table II. The lot size shall be the number of shipping containers in the end item inspection lot. Sampling shall be in accordance with MIL-P-116. The AQL shall be 2.5 percent.

Table II - Examination of preparation for delivery defects.

Examine	Defects
Packaging	Not level specified; not in accordance with contract requirements. Not packaged in unit containers as specified. Mixed class, type and size in same container, containing less than indicated or specified quantity.
Packing	Not level specified; not in accordance with contract requirements. Packing material not as specified; closures not accomplished by specified or required methods or materials. Gross weight of shipping container exceeds specified limit. Any nonconforming component, component missing, damaged, or otherwise defective affecting serviceability.
Marking	Interior and exterior markings omitted, illegible, incorrect, incomplete, not in accordance with contract requirements.

4.5 Production check tests. Production check tests shall be conducted on samples from the first lot of material offered under a contract or order and one check test from every ten lots thereafter. All of the tests specified in 4.8 shall be conducted.

4.6 Quality conformance tests. Quality conformance tests shall be conducted on those lots which are not represented by 4.5. The tests specified in 4.8.1, 4.8.2, and 4.8.4.1 shall be conducted.

4.7 Rejection. If any of the samples tested in accordance with 4.5 or 4.6 is found not to be in conformance with the requirements of this specification, the lot which it represents shall be subjected to rejection. Furthermore, if the failure was a production check test, additional samples shall be taken from (or provided to represent) each subsequent lot and shall be subjected to the test or tests wherein the failure occurred. Each lot shall then be considered acceptable only after satisfactory results are obtained on the test or tests by all the samples taken to represent the lot. This additional testing shall be discontinued after four successive lots have passed the test or tests.

4.8 Test procedures.

4.8.1 Weight. The weight shall be determined after carefully weighing and measuring a specimen at least two feet long.

4.8.2 Construction. The diagonal interlocking through-body-to-surface, braid-over-braid, and square-braid patterns are shown in figure 1 for visual examination. In addition, a one to two inch length of coil being examined shall be unbraided and strands (not yarn plies or ends) counted and compared to the numbers as specified in 3.3.

4.8.3 Lubricant. The lubricant content of the finished packing shall be determined as specified in ASTM-D-2257 with the following exceptions:

(a) Extraction time shall be 16 hours, and
(b) the halogenated hydrocarbon solvent shall only be used. Duplicate specimens shall be taken from different parts of the packing. Results are calculated as $P = 100\ E/S$ where,
P = Percent halogenated hydrocarbon solvent extract on the original sample,
E = Weight of halogenated hydrocarbon solvent extract, and
S = Specimen weight before extraction.

4.8.4 Impregnant.

4.8.4.1 Visual. A sample length of material shall be visually inspected to determine if the TFE impregnant is distributed throughout the packing or is concentrated on the packing surface.

4.8.4.2 Analysis. Place a 5-gram specimen of extracted material (lubricant removed) in a crucible and heat at 220° ± 2°F. to constant weight (original dry weight) at room temperature. Heat at 600° ± 10°F. for 24 hours, cool, and weigh. Heat the same specimen at 900° ± 25°F. for three hours, cool, and weigh. Redetermine the crucible weight without the specimen after the 900°F. heating, unless a platinum crucible was used. Use this new weight of the crucible to determine the weight of the residue after heating. Heating shall be done in a ventilated hood to avoid exposure to toxic vapors. The percentage of TFE is calculated as follows, based on an average of three determinations:

W = Average original dry weight of specimens after extraction.
F = Average weight of residue in crucibles after heating at 600°F.
N = Average weight of residue in crucibles after heating at 900°F.

$$\text{Percent TFE} = \frac{100\ (F - N)}{W}$$

4.8.5 Asbestos content. The asbestos content of the yarn used to fabricate the packing shall be determined in accordance with the method specified in ASTM D 1918. The petroleum lubricant shall be extracted before the determination is made (see 4.8.3).

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements.)

5.1 Domestic shipment and early material installation.

5.1.1 TFE asbestos packing material.

5.1.1.1 Packaging. Packaging shall afford protection against corrosion, deterioration and physical damage during shipment from the supply source to the using activity and until early installation.

5.1.1.2 Packing. Packing shall be accomplished in a manner which will insure acceptance by common carrier at the lowest rate and will afford protection against physical or mechanical damage during direct shipment from the supply source to the using activity for early installation. The shipping containers or method of packing shall conform to the Uniform Freight Classification Ratings, Rules and Regulations or other carrier regulations as applicable to the mode of transportation.

5.1.1.3 Marking. Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with MIL-STD-129.

5.2 Domestic shipment and storage or overseas shipment. The requirements, and levels of packaging, packing, and marking for shipment shall be specified by the procuring activity (see 6.2).

(5.2.1 The following provides various levels for protection during domestic shipment and storage or overseas shipment, which may be required when procurement is made (see 6.2).

5.2.1.1 Level of packaging. Packaging shall be level A or C, as specified (see 6.2).

5.2.1.1.1 Level A. Unless otherwise specified (see 6.2), each unit shall be wrapped in a greaseproof barrier material conforming to grade A of MIL-B-121 or type II of MIL-F-22191 at the supplier's option, and packaged in any one of the following unit containers, at the option of the supplier:

SPECIFICATION	BOX
PPP-B-566	Folding, paperboard
PPP-B-636	Fiberboard
PPP-B-676	Set-up, paperboard

5.2.1.1.2 Level C. Packaging shall afford protection against corrosion, deterioration, and physical damage during shipment from the supply source to the using activity and until early installation.

5.2.1.2 Packing. Packing shall be level A, B, or C, as specified (see 6.2).

5.2.1.2.1 Level A. Units packaged as specified (see 6.2), shall be packed in containers conforming to class 2 of PPP-B-636 or class 2 of PPP-B-640, at the option of the supplier. All corners and edge seams and manufacturer's joints shall be waterproofed in accordance with the appendix to PPP-B-636 or PPP-B-640, as applicable.

5.2.1.2.2 Level B. Units packaged as specified (see 6.2), shall be packed in containers conforming to class domestic of PPP-B-636 or class 1 of PPP-B-640, at the option of the supplier.

5.2.1.2.3 Level C. Units shall be packed in containers in a manner which will insure acceptance for shipment by common carrier at the lowest rates and will afford protection against physical damage during direct shipment from the supply source to the first receiving activity for immediate use. This level, in general, shall conform to the Uniform Freight Classification Rules and Regulations or other carrier regulations, as applicable to the mode of transportation.

5.2.1.3 Unitized loads. Unitized loads should be used when practical and shall be commensurate with the level of packing stated in the contract or order (see 6.2). Palletization, when required, shall be in accordance with MIL-STD-147.

5.2.1.4 Marking. In addition to any special marking required (see 6.2), shipping containers shall be marked in accordance with MIL-STD-129.)

6. NOTES

6.1 Intended use. This material is intended for service on stern tubes, rudder posts, rotary shafts, and reciprocating rods on pumps in general service, low and high pressure valve stems, and miscellaneous mechanical applications (see 6.2). It is not intended for use with superheated steam or other service resulting in packing temperature over 500°F., oxygen, alkaline molten metals, or fluorochemicals. Toxic fumes from overheated TFE must be avoided. Pressure should not exceed 2,500 pounds per square inch, and rod or shaft speed should not exceed 5,000 feet per minute.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Size required (see 3.4). If necessary, also include size tolerance.
(c) If other than spools or reels are desired (see 3.5).
(d) Level of packaging and level of packing required; if other than 5.1 (see 5.2).
(e) Palletization when required (see 5.2.1.3).
(f) Special marking, if required (see 5.2.1.4).
(g) Intended use and need for appropriate installation instructions (see 6.1).

6.3 First article inspection.

6.3.1 Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously procured or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending procurement.

6.3.2 For those products requiring first article tests, bidders are required to contact their Government inspector to make arrangements for monitoring the tests (see 4.2.1).

Preparing activity:
Navy - SH
(Project 5330-N020)

☆ U. S. GOVERNMENT PRINTING OFFICE: 1969-393-064/S-763

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*.

SPECIFICATION

ORGANIZATION *(Of submitter)*

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT
$

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity)*

DATE

DD FORM 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE 0101-807-2000

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Naval Ship Engineering Center
Washington, D. C. 20360

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