

INCH-POUND

MIL-DTL-17416D

27 November 2018

SUPERSEDING

MIL-P-17416C

12 September 1983

DETAIL SPECIFICATION

PACKING MATERIAL, METALLIC, FLEXIBLE, SYMBOL 1430

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers flexible metallic packing material (symbol 1430) for use on reciprocating rods, rotary rods, valve stems, and outside packed plungers.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-1916 - DOD Preferred Methods for Acceptance of Product

(Copies of this document are available online at <https://quicksearch.dla.mil/>.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

NAVAL SEA SYSTEMS COMMAND (NAVSEA) PUBLICATIONS

S9086-CM-STM-020/078 - Gaskets and Packing

T9070-AL-DPC-020/077-2 - NAVSEA Hazardous Material Avoidance Process

Comments, suggestions, or questions on this document should be addressed to Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

AMSC N/A

FSC 5330

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2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR QUALITY (ASQ)

ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of this document are available online at www.asq.org.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, 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. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Material and construction. The material and construction of the entirety of the packing material shall be the same as that of the sample submitted for conformance inspection (see 4.3). The packing material shall be continuous strips of approximately uniform cross section. The cross section shall be square or slightly rectangular. The composition of the packing material shall be of soft, pliable metal foil, ribbon, or strands that are wrapped, crimped, twisted, or braided into a continuous strip, with or without a central core of nonmetallic material, in such a manner that the entire working surface will be metal. When a central core is used, it shall be concentric in cross section.

3.2.1 Metal.

3.2.1.1 Heat resistance. The metal shall not melt or disintegrate at or below 550 °F when tested as specified in 4.5.1.

3.2.1.2 Pliability. The metal shall be soft and pliable. It shall not chip or flake off by reason of the abrasive action of the rod when the packing material is tested as specified in 4.5.4.

3.2.1.3 Use of lead. Packings and gaskets containing lead shall not be used on nuclear-powered ships, in accordance with S9086-CM-STM-020/078.

3.2.2 Lubricant. The finished packing material shall contain not more than 10 percent of lubricating material and graphite (see 4.5.2).

3.3 Recycled, recovered, or environmentally preferable, or biobased materials. Recycled, recovered, or environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.4 Performance characteristics.

3.4.1 Flexibility. The packing material shall be sufficiently flexible to be readily formed into coils to fit a rod, the diameter of which shall be three times the thickness of the packing material (see 4.5.3).

3.4.2 Simulative performance. The packing material under initial conditions and during the progress of the simulative performance tests specified in 4.5.4 shall respond readily to gland adjustment for the control of leakages from the stuffing box. On the conclusion of the tests, the packing material shall be pliable and shall have a smooth metallic wearing surface. The rods shall not be grooved, cut, or scored.

3.5 Size. The packing material shall be furnished in the sizes specified (see 6.2).

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3.6 Form. The packing material shall be furnished in the form of spools, coils, or spirals, as specified (see 6.2).

3.7 Workmanship. The packing material shall be free from extraneous material and visible defects that may affect its serviceability (see 4.4.1).

3.8 Prohibited materials. The packing material shall not contain any chemicals categorized as “prohibited” in accordance with T9070-AL-DPC-020/077-2.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. First article inspection shall be performed on packing material when a first article sample is required (see 3.1). This inspection shall include the examination of 4.2 and the tests of 4.4 through 4.5.

4.3 Conformance inspection. Conformance inspection shall include the examination of 4.3 and the tests of 4.4 and 4.5.

4.3.1 Sampling.

4.3.1.1 Inspection lot. An inspection lot shall consist of all finished packing material of one size produced under the same conditions and offered for inspection at one time.

4.3.1.2 Sampling for lot acceptance examination and tests. Representative lengths of packing material shall be selected from each lot offered for inspection in accordance with MIL-STD-1916 and ANSI/ASQ Z1.4 at general inspection level I and the Acceptance Quality Limit (AQL) specified (see 6.2). Each sample shall be subjected to the visual examination specified in 4.4.1, the heat resistance test specified in 4.5.1, and the flexibility test specified in 4.5.3.

4.3.1.3 Sampling for comparison test. Two lengths of packing material of each size shall be selected at random from the first lot of packing material. From each sample length, a 24-inch specimen shall be cut off for the purpose of the comparison test specified in 4.4.1.1. Two such sample pieces of packing material shall be selected from one of every ten lots that have passed the examination and tests specified in 4.4.1, 4.5.1, and 4.5.3.

4.4 Conformance tests.

4.4.1 Visual examination. A visual examination shall be conducted to detect defects in workmanship and dimensions. For each length of packing material, major defects such as rips, tears, holes, voids, creases, crimps, gouges, or extraneous particulate matter on the surface shall be cause for rejection of that length. Minor surface defects not affecting the serviceability of the packing material shall not be cause for rejection.

4.4.1.1 Comparison tests. The sample specimens selected in accordance with 4.3.1.3 shall be subjected to those tests that will establish the identity of the inspection samples and to the tests specified in 4.5.1 through 4.5.4, inclusive.

4.5 Test procedures.

4.5.1 Heat resistance of metal. A specimen shall be cut from each of the samples and subjected to a dry heat temperature of 550 °F for 2 hours. Acceptance criteria for the test shall be as specified in 3.2.1.1.

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4.5.2 Lubricant. A 5-gram specimen shall be used to determine percentage total lubricant in the packing material. The specimen shall be weighed to the nearest milligram and placed in the siphon cup. An extraction flask shall be dried at a temperature of 212 to 221 °F, cooled in a desiccator, and weighed. A few milliliters of 32 percent acetone – 68 percent chloroform mixture shall be added to the cup and the cup shall be agitated gently to dislodge the bulk of the graphite, which shall be removed by decanting into the extraction flask. This procedure is necessary to prevent the siphon cup from becoming clogged. The procedure shall be repeated as many times as necessary to remove most (99 percent) of the graphite. The removed graphite shall be collected in the extraction flask along with the acetone-chloroform-soluble materials. Sufficient acetone-chloroform mixture shall be added to the flask to bring the volume up to 60 to 75 milliliters. The extraction cup containing the specimen and the flask shall be assembled. The specimen shall be extracted for 2 hours with the acetone-chloroform mixture at such a rate that 2.5 to 3.5 minutes are required to fill and empty the extraction cup. At the end of the extraction period, the extracted specimen shall be transferred to a watch glass and air dried. The dry fibers shall be carefully separated and the remaining graphite brushed off, collected on the watch glass, and then added to the extract in the flask. The acetone and chloroform shall be distilled off in a steam bath, passing a gentle current of filtered air through the flask to prevent the liquid from boiling. The flask shall be removed from the steam bath just before the last trace (99 percent) of solvent has evaporated, and the current of air continued for 10 minutes. The flask and contents shall be dried in circulating air for 1 hour at a temperature of 221 ± 3.6 °F, cooled in a desiccator, and weighed.

4.5.2.1 Results. The lubricant content of the specimen shall be calculated as follows: Total organic solvent-soluble lubricant plus graphite, percent $\frac{L}{W} = x 100$, where L is the weight of graphite and acetone-chloroform-soluble material in grams and W is the weight of the specimen before extraction in grams. Acceptance criteria for the test shall be as specified in 3.2.2.

4.5.3 Flexibility. The packing material shall be coiled by hand around a rod, the diameter of which shall be three times the thickness of the packing. Only sufficient packing to make two complete turns around the rod shall be used. Acceptance criteria shall be as specified in 3.4.1.

4.5.4 Simulative service test. The simulative service test shall be made under simulated operating conditions in a machine designed for the purpose. The following test conditions shall apply:

a. Reciprocating rod service with saturated steam at 300 pounds per square inch (lb/in²) and a rod speed of 100 feet per minute (ft/min). The test shall be concluded after 3,500 hours of operation.

b. Rotary rod service with feed water at 100 lb/in² and 250 °F and a peripheral rod speed of 4,000 ft/min. The test shall be concluded after 1,500 hours of operation.

Acceptance criteria for the test shall be as specified in 3.2.1.2 and 3.4.2.

4.6 Prohibited materials. Prohibited materials shall be verified as specified (see 3.8 and 6.2).

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. Packing material is intended for naval shipboard service in valve stems, rods, and rotary rods and shafts handling saturated steam, hot and cold water, air, refrigerant, lube oil, fuel oil, diesel oil, and gasoline. The packing material is not to be used in potable water systems. Specific applications for the packing can be found in S9086-CM-STM-020/078. Existing stock of flexible packing material manufactured to MIL-P-17416C with Amendment 1, dated 27 June 1995, is acceptable for use until depleted.

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6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. When first article inspection is required (see 3.1).
- c. Size required (see 3.5).
- d. Form required (see 3.6).
- e. AQL of 2.5 (see 4.3.1.2).
- f. Requirement for prohibited materials verification (see 3.8 and 4.6).
- e. Packaging requirements (see 5.1).

6.3 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.4 Subject term (key word) listing.

Metal packing material

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CONCLUDING MATERIAL

Custodians:

Army – AR

Navy – SH

Preparing activity:

Navy – SH

(Project 5330-2018-008)

Review activity:

DLA – IS

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.