[NOT MEASUREMENT SENSITIVE]
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COMMERCIAL ITEM DESCRIPTION

SEALING COMPOUND, THREAD AND GASKET, HYDROCARBON FLUID AND WATER RESISTANT

The General Services Administration has authorized the use of this Commercial Item Description, for all federal agencies.

1. Abstract. This description covers requirements for a thread and gasket sealing compound that is resistant to fuel, engine oils, and water. The compound is a slow-drying black paste, setting into a pliable film; best suited for non-rigid, vibrating semi-permanent and permanent assemblies. It withstands pressures to 5000 psi.

2. Salient characteristics. Salient characteristics shall be in accordance with 2.1 through 2.11. Preproduction testing for compliance with all characteristics that require testing (2.1.1.2, 2.1.2, and 2.2-2.10) shall be performed on the current formulation and every time there is a formulation change. Chemical impurities testing for compliance with 2.1.1.2 shall be performed every time the raw material source changes. Production testing shall be performed every four years. One production test sample is required. If tests are required, unless otherwise specified, the sealing compound shall be tested without treatment or preconditioning and tests shall be conducted at a temperature of 75°F ± 5°F and a relative humidity of 50 ± 5 percent.

2.1 Formulation. The sealing compound shall nominally consist of 50-55 weight percent clay, 15-20 weight percent rosin, 15-20 weight percent vegetable oil, 10-15 weight percent isopropyl alcohol, and 1-3 weight percent soybean derivative.

Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Sea Systems Command, ATTN: SEA 05Q, 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 http://assist.daps.dla.mil.

AMSC N/A FSC 8030

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2.1.1 Detrimental materials. The gasket sealant shall be chemically analyzed using the methods in paragraphs 2.1.1.3 (a), (b), and (c). As an alternative to testing for total halogens and sulfur, the high temperature leach test method of paragraph 2.1.1.3(d) may be used to determine water leachable halides and sulfur to the same limits.

2.1.1.1 Prohibited materials. During the manufacturing processes, tests, inspections, and storage, mercury or mercury compounds shall not be intentionally added to or come in contact with the product at any time.

2.1.1.2 Chemical impurities. The amount of the following materials in the sealing compound shall not exceed the limits specified below when tested in accordance with 2.1.1.3:

(a) Halogens shall not exceed 0.0750 weight percent (750 ppm) cumulative total halogens (fluorine plus chlorine plus bromine).
(b) Total sulfur shall not exceed 0.1000 weight percent 1000 ppm)(µg/g).
(c) Total lead shall not exceed 0.0250 weight percent (250 ppm)(µg/g).
(d) Total cadmium shall not exceed 0.0250 weight percent (250 ppm)(µg/g).

2.1.1.3 Chemical impurities – Test procedure.

(a) Total halogen content (consisting of fluorine, chlorine, and bromine) shall be determined by decomposing the product using Parr Bomb or Pyro hydrolysis techniques and analysis of the residue by ion chromotography, specific ion electrode, or spectrophotometric methods. Other equivalent methods may be utilized.
(b) Total sulfur content shall be determined by decomposing the product using Parr Bomb or Pyro hydrolysis techniques and analysis of the residue by gravimetric or turbidimetric methods. Other equivalent methods may be utilized.
(c) The individual concentrations of lead and cadmium shall be determined by atomic absorption, plasma emission, emission spectrographic or X-ray fluorescence methods, as appropriate. Other equivalent methods may be utilized.
(d) As an alternative to total halogen and total sulfur testing, the high temperature leach test method may be used to determine water leachable halides and sulfur to the same limits (750 ppm maximum cumulative leachable halides, and 1000 ppm maximum leachable sulfur). Test shall be performed in accordance with paragraph 4 of Appendix A of STR-4P38.

2.1.2 The sealant shall have been certified and assigned a “Limited” or “Permitted” usage category in accordance with the Nuclear Powered Submarine Atmosphere Control Manual (NAVSEA S9510-AB-ATM-010/(U)).

2.1.3 The sealant shall not contain any Class I or Class II ozone depleting substances as designated by the Environmental Protection Agency in Code of Federal Regulations 40 (CFR) Part 82.

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2.2 Solubility. The solubility of the sealing compound shall be as specified in table 1 when tested in accordance with 2.2.1 and 2.2.2. The aromatic fluid, ethylene glycol and oil immersion media shall conform to the specifications in table 1.

Table 1. Solubility

Immersion media	Temperature (°F)	% Maximum Solubility
Aromatic fluid, ASTM D 471 Reference Fuel D	74 ± 5	10
Aromatic fluid, ASTM D 471 Reference Fuel B	74 ± 5	9
Ethylene glycol, A-A-52624	158 ± 2	5
Distilled water	200 ± 5	6
ASTM D 471 IRM 901	158 ± 2	10
ASTM D 471 IRM 902	158 ± 2	10
ASTM D 471 IRM 903	158 ± 2	10

2.2.1 Solubility - Test panels. Three recessed aluminum panels, conforming to the design and measurement of figure 1, shall be used to test the solubility of each type of sealing compound in each immersion medium. The test panels shall be degreased with a suitable degreasing solvent. Care shall be exercised to avoid skin contact, inhalation, and ingestion of vapors. The panels shall then be placed in an oven at 158°F ± 2°F for 1 hour minimum, cooled in a desiccator for 1 hour minimum, and then weighed to the nearest 1 milligram.

2.2.2 Solubility - Test procedure. Each of the fluids in table 1 shall be used separately as the immersion medium at the indicated temperatures. The test panels (see 2.2.1) shall be filled to the rim of recess with the sealing compound and dried in a circulating air oven for 48 hours at 158°F ± 2°F. After removal from the oven and cooling to room temperature in a desiccator, the specimens shall be weighed to the nearest 1 milligram and then immersed for 24 hours minimum in 250 milliliter of the respective fluids. For the aromatic fluids the panels shall be placed horizontally in the containers to prevent flow of the compounds. For the boiling water container a reflux condenser is necessary to prevent loss of water. All immersion containers shall be covered to prevent loss of immersion fluid by evaporation. After ethylene glycol immersion, excess glycol shall be removed by immersing the specimen in water at 74°F ± 5°F for 15 minutes minimum. After immersion, the panels immersed in ASTM D 471 IRM 901, ASTM D 471 IRM 902, and ASTM D 471 IRM 903 shall be placed on edge on an absorbent towel for approximately 30 minutes, turned to the opposite edge for approximately 30 minutes to prevent oil residue remaining on the surface. All specimens shall be dried in a circulating air oven at 158°F ± 2°F for 24 hours minimum. After removal from the oven, the specimens shall be cooled to room temperature in a desiccator for 1 hour before weighing. Test panels shall be reweighed.

2.2.3 Solubility - Calculation. Percent change in weight shall be calculated as follows:

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$$\text{Change in weight, percent} = [(W_1 - W_2) / (W_1 - W_P)] \times 100$$

Where:

W_1 = Weight of the panel and sealing compound before immersion

W_2 = Weight of the dried panel and sealing compound after immersion

W_P = Weight of panel

2.2.4 Solubility - Report. Results shall be reported as the average of 3 calculations of percent change in weight for each type of immersion medium.

2.3 Volatile content. The volatile content shall be 13.0 ± 2.0 percent when tested in accordance with 2.3.1 and 2.3.2.

2.3.1 Volatile content - Test panels. Approximately 5 grams of the compound shall be placed in an accurately weighed to the nearest 1 milligram flat-bottom, metal dish having a diameter of about 2.5-inch and depth of 0.75-inch. The dish with the compound shall be weighed and then placed in a circulating air oven at 158°F ± 2°F for 48 hours minimum. After removal from the oven, the dish shall be cooled to room temperature in a desiccator for 1 hour minimum, and then reweighed.

2.3.2 Volatile content - Calculation. Percent of volatile content shall be calculated as follows:

$$\text{Volatile content, percent} = [(W_1 - W_2) / (W1 - W_D)] \times 100$$

Where:

W_1 = Weight of dish and sample before drying.

W_2 = Weight of dish and sample after drying.

W_D = Weight of empty dish.

2.4 Torque release. The torque release shall not be more than 70 percent increase when tested in accordance with 2.4.1.

2.4.1 Torque release - Test fittings. Three hydraulic fitting assemblies comprised of a union, an AN-817 nut, and a section ½-inch flared aluminum tubing conforming to ASTM B 210 shall be utilized for this test. The sealing compound shall be brushed on the threads of the clean union to fill the threads approximately level, and then assembled with and tubing. After assembly has been completed, excess compound, which has extruded shall be wiped from the flange. The assembly shall be tightened to 200 in-lbs. Torque and placed in a circulating air oven for 7 days minimum at 158°F ± 2°F. After removal from the oven, excess compound on the outer edge of the joint shall be removed by scraping and the assembly shall be placed in a desiccator at room temperature for 24 hours minimum. The torque required breaking the seal shall then be determined with

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the same wrench used for the assembling of the fittings. The results shall be reported as the average of the three readings.

2.5 Flow test (vertical). Flow shall not be more than ¼ inch when tested in accordance with 2.5.1.

2.5.1 Flow test (vertical) – Test procedure. Three aluminum alloy panels conforming to ASTM B 209 approximately 1 inch by 6 inches shall be coated over a 1 inch by 2 inch section with 1/8 inch coating of sealing compound. A scribe line shall be made on the uncoated surface of the metal ¼ inch below the compound. Immediately after coating, the panels shall be placed in the vertical positions with the scribe line at the bottom and allowed to stand in this position for 1 hour minimum at 158°F ± 2°F to determine the flow of the compound in reference to the scribe line. The results shall be reported as the average flow of the three readings.

2.6 Viscosity. The viscosity of the sealing compound shall be 5,000 - 12,000 poises when tested in accordance with 2.6.1.

2.6.1 Viscosity – Test procedure. The viscosity of sealing compound shall be determined in accordance with ASTM D 1084 Test Method B by using Brookfield viscosimeter with #7 spindle at 5 rpm, at a temperature of 105°F ± 2°F.

2.7 Ash content. The ash content of the sealing compound shall be 48 ± 5 percent when tested in accordance with 2.7.1.

2.7.1 Ash content – Test procedure. Weigh about 2 grams to the nearest 1 milligram of the sealing compound in a previously weighed porcelain crucible. Heat the crucible and contents to an aim temperature of 1700°F in an electric muffle furnace, or if not available, a gas burner yielding a similar temperature is also suitable. Cool in a desiccator for 1 hour minimum and reweigh. Reheat to an aim temperature of 1700°F and cool in a desiccator until a constant weight is obtained.

2.7.2 Ash content – Calculation. Calculate the percent of ash as follows:

Ash content, percent = [(A - B) / (C - B)] X 100

Where:

A = Weight of residue and crucible.

B = Weight of crucible.

C = Weight of sample and crucible.

2.8 Corrosion. The following metals (table 2) after 5 day treatment (immersion) with the compound as specified in 2.8.1, shall not exceed the maximum change in weight (loss or gain) as listed in table 2.

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Table 2. Corrosion loss or gain in weight.

Test strip	Specification	Weight loss or gain milligram/centimeter square
Tinned iron	ASTM A 623	0.7
Steel	ASTM A 109	0.7
Aluminum alloy	ASTM B 209	0.1
Cast iron	ASTM A 48	1.0
Brass	ASTM B 36	0.3
Copper	ASTM B 152	0.2

2.8.1 Corrosion – Test Procedure. Test strips for the corrosion test shall conform to the specifications in table 2. The test strips shall have dimensions of 8.8 centimeter X 1.2 centimeter X 0.3 centimeter and a surface area of approximately 22 centimeter square. The strips (with the exception of tinned iron) shall be polished to remove pit burrs and irregularities from the faces and edges and finished with a 240 grit polishing medium. The tinned iron shall be free from pit burrs and irregularities and shall be polished with a clean cloth. All specimens shall be held in a suitable holder to avoid contact with the hands. After polishing, the specimens shall be cleaned by swabbing in hot naptha and a final rinse in warm methanol. Follow this by drying in an air circulated oven at 150°F ± 2°F for 2 hours minimum. After drying, weigh the strips to the nearest 0.1 milligram. The weighed strips shall be arranged in the order of metals as in table 2. The strips shall be joined in a metal-to-metal contact by fastening with a steel bolt that passes through holes drilled near one end of each strip. The strips are so bent, that except for one small terminal area near the bolt, the strips are not in contact one with another. The strips shall then be immersed into the sealing compound for a period of 120 hours (5 days) at 150°F ± 2°F. At the end of the test period, remove the strips and wash thoroughly with isopropyl alcohol and follow with an acetone rinse. A soft brush may be used in this process. The cleaned strips shall be oven dried thoroughly at 150°F ± 2°F, cooled to room temperature in a desiccator, and weighed to the nearest 0.1 milligram. Any changes in weight shall be attributed to corrosion.

2.9 Flash point. The flash point of the sealing compound shall not be less than 50^0F when tested in accordance with ASTM D 56.

2.10 Flexibility. The flexibility of the sealing compound shall be such that the sealing compound shall not crack when flexed at (-30°F ± 2°F) when tested in accordance with 2.10.1.

2.10.1 Flexibility – Test procedure. Prepare two smooth brass panels conforming to ASTM B 36, 6 inch X 2.5 inch X 0.025 inch and clean with acetone. Apply a 0.002 inch thick coat of sealing compound across one surface of each panel, using a blade. Allow to air dry 6 days at room temperature, then 2 hours at 158°F ± 2°F. Prior to test, the panels coated with sealant compound shall be cooled at -30°F ± 2°F for 4 hours minimum. While still at the test temperature and with the coated side outward, rapidly bend the test specimens through an angle of 160 degrees over a mandrel of 1/8-inch diameter.

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2.11 Consistency. The sealant compound shall be of such consistency that it may be applied with a spatula or stiff brush.

3. Regulatory requirements. All appropriate regulatory requirements that apply to items offered on the commercial market shall apply to those offered to the Government.

4. Quality assurance provisions.

4.1 Contractor certification. The contractor shall certify and maintain substantiating evidence that the product offered meets the salient characteristics of this Commercial Item Description in accordance with the required frequency of testing specified in 2, and that the product conforms to the producer's own drawings, specifications, standards, and quality assurance practices, and is the same product offered for sale in the commercial marketplace. The Government reserves the right to require proof of such conformance prior to first delivery and thereafter as may be provided for under the provisions of the contract.

4.2 Preproduction requirements. Prior to supplying material to this Commercial Item Description, the supplier shall provide objective evidence of successful completion of preproduction testing, consisting of 2.1.1.2, 2.1.2, and 2.2 – 2.10. Preproduction testing shall be repeated if the sealant formulation is changed. Products previously tested and certified to Type II of MIL-S-45180 satisfy the preproduction requirements of this specification unless processing or formulation changes are made.

4.3 Production requirements. The supplier shall certify compliance with 2.1.1.1 and shall provide objective evidence of compliance with 2.1.1.2 (chemical impurities) in accordance with the frequency of testing specified in 2.

5. Preservation packaging, labeling and marking. The sealant shall be premixed and unit packed. Preservation, labeling, marking and other packaging requirements shall be as specified in the contract or order, except as a minimum, the following marking shall appear on the innermost container and all other containers or packaging in prominent letters:

(a) Sealing compound per CID A-A-59491; previously MIL-S-45180, Type II
(b) Store in a cool place
(c) Date of manufacture
(d) Manufacturer's instructions for use (to include thinning directions, if applicable)
(e) WARNING!

VAPOR ABOVE TLV IS IRRITATING TO EYES, NOSE AND THROAT AND CAN CAUSE HEADACHE, DIZZINESS, AND NAUSEA. AVOID PROLONGED BREATHING OF VAPORS. KEEP AWAY FROM EYES. WEAR SAFETY GLASSES OR GOGGLES. AVOID PROLONGED SKIN CONTACT. WEAR RUBBER OR PLASTIC GLOVES. VENTILATION MUST BE ADEQUATE TO AVOID EXCEEDING TLV.

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6. Notes.

6.1 Suggested source of supply.

Loctite Gasket Sealant # 2
(Manufacturer: Loctite Corporation, 1001 Trout Brook Crossing, Rocky Hill, CT 06067)

Form-A-Gasket #2
(Manufacturer: Permatex, 10 Columbus Boulevard, Hartford, CT 06106)

6.2 Sources of Reference Documents.

6.2.1 Copies of ASTM Standards are available from ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA 19428-2959 or online at www.astm.org.

6.2.2 The Code of Federal Regulations (CFR) is available from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 or online at www.gpoaccess.gov/index.html.

6.2.3 NAVSEA S9510-AB-ATM-010/(U) is available from the Naval Sea Systems Command, NAVSEA 05Z42, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160.

6.2.4 Copies of STR-4P38 are available from Bechtel Plant Machinery, Inc., 3500 Technology Drive, Monroeville, PA 15146.

6.2.5 Requests for certification of sealants not listed in Appendix A of NAVSEA S9510-AB-ATM-010/(U) can be made in writing to the Naval Sea Systems Command, NAVSEA 05Z42,1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160. Contingent upon successful completion of an evaluation, NAVSEA 05Z42 will certify the material and include the product in Appendix A. The supplier of the material will cover the cost of any needed tests.

6.3 Changes from previous issue. The outside margins of this document are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only, and the Government assumes no liability for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content regardless of the marginal notations and relationship to the last previous issue.

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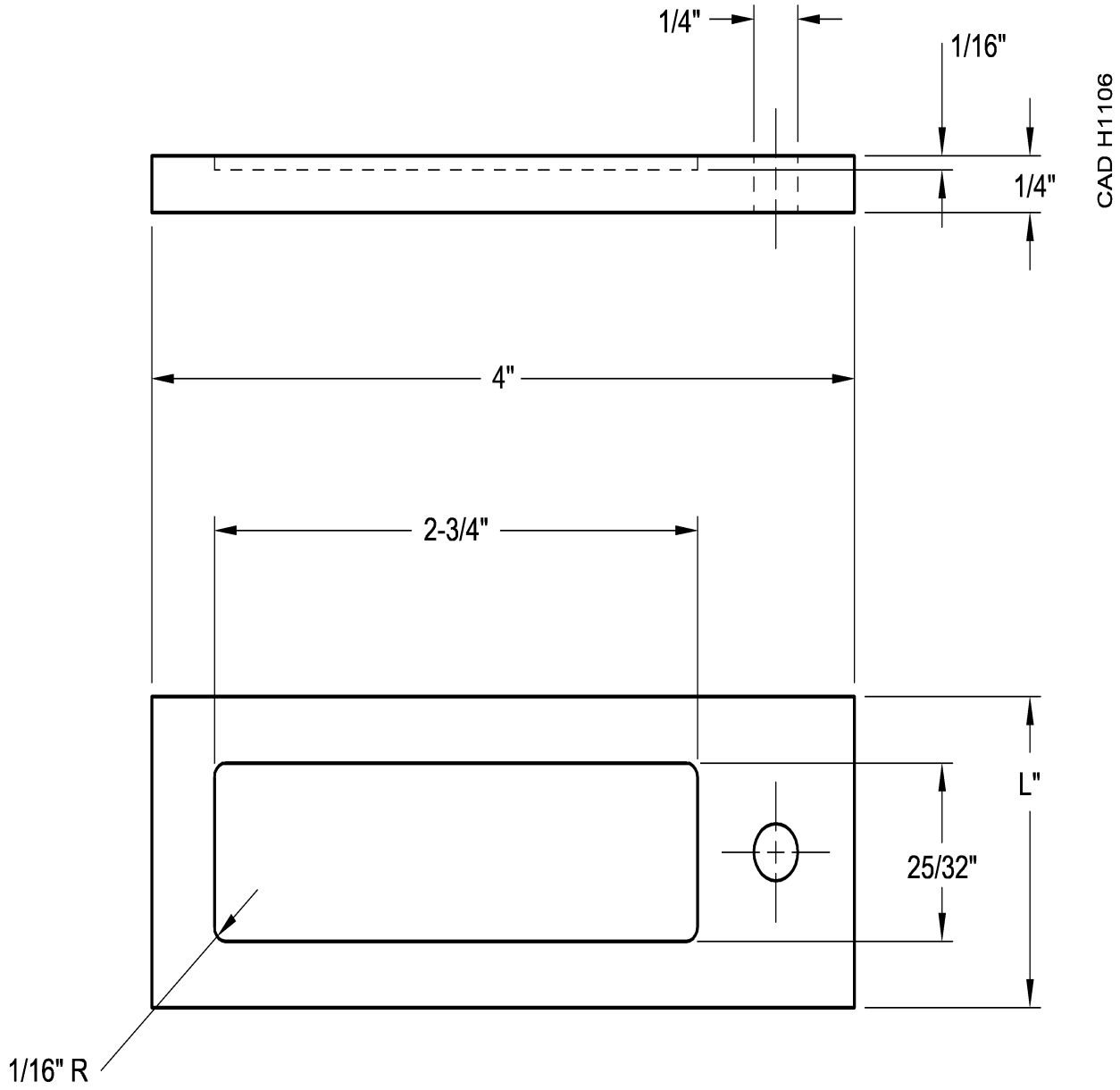


Figure 1 – Recessed test panels

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