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SUPERSEDING
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April 13, 1972 and
MIL-C-18969B
June 16, 1960

FEDERAL SPECIFICATION

CAULKING COMPOUNDS, METAL SEAM AND WOOD SEAM

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers caulking compound for use as a caulking material on metal and wood structures, and as a sealant for applications requiring the use of putty.

1.2 Classification. Caulking compound shall be of the following types and classes, as specified (see 6.2):

Type I - Gun application (For Metal and Wood Seams).
Type II - Knife application (For Metal Seams).
Class A - Bulk form.
Class B - Extruded preformed tape.

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

TT-E-490 - Enamel, Silicone Alkyd Copolymer, Semigloss, Exterior.
PPP-B-566 - Boxes, Folding, Paperboard.
PPP-B-636 - Boxes, Shipping, Fiberboard.
PPP-B-676 - Boxes, Setup.
PPP-C-96 - Cans, Metal, 28 Gage and Lighter.
PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 through 12 Gallon).
PPP-T-76 - Pressure-sensitive Adhesive Paper (For Carton Sealing).

Federal Standards:

Fed. Std. No. 123 - Marking for Domestic Shipment (Civil Agencies).
Fed. Test Method Std. No. 141/GEN - Paint, Varnish, Lacquer, and Related Materials, Methods of Inspection, Sampling, and Testing.

Fed. Test Method 141/1011 - Inspection (General).
Fed. Test Method 141/1021 - Sampling (General).

Fed. Std. No. 595-Colors.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specifications:

MIL-L-10547 - Liner, Case, and Sheet, Overwrap, Water Vaporproof or Waterproof, Flexible.
MIL-W-18142 - Wood Preservative Solutions, Oil-Soluble, Ship and Boat Use.

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-147 - Palletized and Containerized Unit Loads 40 Inch X 48 Inch Pallets, Skids, Runners, or Pallet Type Base.

(Copies of Military Specifications and Standards 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 a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P Street, N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(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 Material. The compound shall consist of pigments thoroughly mixed and ground in a liquid vehicle. Wide latitude is permitted in the selection of raw materials provided the finished product conforms to this specification.

3.1.1 Toxicity. The compound shall have no adverse effects on the health of personnel when used for its intended purpose. Under normal application conditions and adequate ventilation, the compound shall not be considered toxic.

3.2 Storage stability. The compound shall not separate into solid and liquid phases or show evidence of hard setting after storage in the original filled container for 12 months at an ambient temperature between zero to 105°F. when tested as specified in 4.4.9. The fluid constituents of the extruded tape form calking compound shall not wick into the kraft paper strip upon which it is rolled, or the intermediate packaging container.

3.3 Resistance to bleeding. The compound shall show no evidence of bleeding through one coat of white paint when tested as specified in 4.4.2.

3.4 Resistance to flow at elevated temperature (wood and steel surfaces). The compound shall show no signs of running or sagging from its original position in the wooden and steel seams when tested at 120° ± 5°F., as specified in 4.4.3.

3.5 Type I compound (gun application).

3.5.1 Suitability for application by calking gun. The compound shall have a flow rate of 0.6 to 1.5 cubic centimeters per second when tested as specified in 4.4.4.

3.5.2 Adhesion (to steel surfaces). The adhesion of the compound to steel surfaces shall be as follows when tested as specified in 4.4.5:

PULL IN POUNDS, MINIMUM	
As Prepared	After Immersion in 10 Percent Sodium Chloride (NaCl) Solution
75	40

3.5.3 Shrinkage. The compound, when tested as specified in 4.4.7, shall not shrink more than 25.0 percent.

3.5.4 Adhesion-cohesion (wood surfaces). When tested as specified in 4.4.8, the total loss in bond area and cohesion shall be no more than 1.5 square inches.

3.6 Type II compound (knife application), classes A and B.

3.6.1 Adhesion (to steel surfaces). The adhesion of the compounds to steel surfaces shall be as follows when tested as specified in 4.4.5:

	PULL IN POUNDS, MINIMUM	
Class	As Prepared	After Immersion in 10 Percent Sodium Chloride (NaCl) Solution
A	100	40
B	100	100

3.6.2 Application characteristics, class A. The compound shall not smear, spread, or stick to the hands when tested as specified in 4.4.6.

3.6.3 Application characteristics, class B. In addition to the requirements specified in 3.6.2, the compound shall be capable of being readily applied by putty knife or calking iron to a metal seam as specified in 4.4.6.1. The compound shall not adhere to the applicator and shall fill the seam completely and smoothly.

3.7 Type I (expendable cartridges). When specified (see 6.2), calking compound shall be furnished in expendable cartridges constructed of fiberboard designed for use in standard or half barrel calking guns. The shell of the cartridges shall be of a rolled cardboard cylinder approximately 0.050 inch thick. The cartridge shall be provided with an inverted cup washer that serves as a plunger component in forcing the compound through the cartridge cylinder when the ratcheting mechanism of the gun is actuated. The same end of the cylinder shall be furnished with a cover for protection in shipment and storage. The opposite end of the cartridge shall be provided with an end cap having an opening for the discharge of the compound. The opening shall be provided with a spout (applicator tip). The cartridges shall not exhibit any signs of penetration or leakage of contents. The cartridges shall have the following dimensions and volumes as specified (see 6.2).

OUTSIDE DIAMETER	LENGTH	CARTRIDGE CAPACITY	
Inches	Inches	Rated	Approximate Cubic Inch Equivalent
2 (+0, - 1/16)	8-1/2 (+1/16, - 1/4)	1/10 gallon	23
2 (+0, -1/16)	10 (+ 1/16, - 1/4)	1 pint	29

3.8 Type II, class B (extruded preformed tape form). Extruded tape form calking compound shall be furnished in approximately 25 foot lengths and shall be approximately 1/8 inch thick and 1/2 inch wide. Each roll shall weigh not less than 1-1/4 pounds, net. The tape shall be rolled on greaseproof kraft paper strip 1 to 1-1/2 inches wide. The roll shall be wound on a substantial cardboard tube having an outside diameter of approximately 1-3/4 inches.

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 that supplies and services conform to prescribed requirements.

4.2 Sampling.

4.2.1 Sampling shall be in accordance with Method 1021 of Federal Test Method Std. No. 141 except that the following additional requirement shall apply:

4.2.1.1 Lot. Unless otherwise specified in the contract or order, all compounds of the same type and class comprising not more than 10,000 pounds, manufactured as one batch and presented at one time, shall be considered a lot for purpose of inspection.

4.2.2 Sampling for lot acceptance inspection.

4.2.2.1 Sampling for examination of filled containers at the contractor's plant. A random sample of filled containers shall be selected from each lot by the inspector in accordance with MIL-STD-105 at inspection level I, and acceptable quality level (AQL) = 2.5 percent defective to verify compliance with this specification regarding fill, closure, marking and other requirements not involving tests.

4.2.2.2 Sampling for tests.

4.2.2.2.1 Five-gallon containers. From each inspection lot the inspector shall select two containers at random. From each of the two containers 10-pound specimens shall be taken and placed in separate, clean, dry, metal or glass containers, sealed, marked and forwarded to the testing laboratory designated by the procuring agency.

4.2.2.2.2 One-gallon containers. Two containers shall be selected by the inspector at random, sealed, marked, and forwarded to the testing laboratory designated by the bureau or agency concerned.

4.2.2.2.3 Expendable cartridges. Ten (10) cartridges shall be selected at random by the inspector.

4.2.2.2.4 Extruded tape form. Eight (8) twenty-five foot length of calking compound shall be selected at random by the inspector.

4.2.2.3 When requested by the contractor, the inspector shall select the following sample specimens in addition to those selected in accordance with 4.2.2.2: Four expendable cartridges, four rolls of tape form calking compound (100 feet), two 1-gallon containers, two 5-pound samples each taken from the separate 5-gallon containers being sampled. Half of these samples shall be delivered to the contractor, and the other part shall be held by the inspector for use in case of dispute.

4.3 Inspection.

4.3.1 Unless otherwise specified, inspection shall be in accordance with Method 1011 of Fed. Test Method Std. No. 141 except that the following additional requirements shall apply:

4.3.1.1 Examination of filled containers at the contractor's plant. Each sample filled container selected as specified in 4.2.2.1 shall be examined for defects of construction of the container and the closure, for evidence of leakage, and for unsatisfactory markings. Any container in the sample having one or more defects shall be rejected; and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, the lot represented by the sample shall be rejected. Rejected lots may be resubmitted for acceptance tests provided the contractor has removed or reworked all nonconforming products.

4.3.1.2 Lot acceptance tests. The samples selected in accordance with 4.2.2.2 shall be subjected to the tests specified in 4.4 (except 4.4.9) except that the laboratory may perform complete tests on the second sample to verify that both are alike. Lots shall be accepted or rejected by the inspector on the basis of the laboratory test report on the transmitted samples.

4.4 Test procedures.

4.4.1 Test conditions. Unless otherwise specified in the contract or order, preparation of specimens and all evaluations shall be conducted in an area maintained at a temperature of 77° ± 2°F. and 50 ± 5 percent relative humidity.

4.4.2 Resistance to bleeding (type I and type II). A specimen shall be prepared by packing the calking compound into two grooves cut in a 3 by 4 by 1/2 inch thick piece of Douglas fir wood, so that the compound is flush with the top of the grooves. The grooves shall each be 1/4 inch wide by 1/4 inch deep by 4 inches long, and shall be on 2-inch centers. After the specimen has been conditioned for 96 hours at 77° ± 2°F. and 50 ± 5 percent relative humidity, it shall be given one coat of white enamel conforming to TT-E-490. After the paint has been allowed to dry for 48 hours, the specimen shall be examined for any evidence of the compound bleeding through the coating of paint.

4.4.3 Resistance to flow at elevated temperature (wood and steel surfaces) (type I and type II). Steel and Douglas fir forms having seams 1/4 inch wide and 1/4 inch deep shall be prepared. The forms and the compound (in original container) shall then be heated in a forced air oven for 24 hours at 120° ± 5°F. The seams shall be filled while in the oven with compound taken from the container while 120° ± 5°F. The forms shall then be turned over in such a manner that the exposed surfaces of the compound are unsupported. The forms shall be maintained at 120° ± 5°F. for an additional 24 hours on the same level in the oven as the base of the thermometer. The forms shall then be examined for evidence of running or sagging of the compound from its original position.

4.4.4 Suitability for application by calking gun (type I). Calking compound which has been allowed to remain at a temperature of 77° ± 2°F. and 50 ± 5 percent relative humidity for 24 hours shall be tested by means of an extrusion rheometer (see figure 3) using a pressure of 40 pounds per square inch (psi) and an orifice having an inside diameter of 0.593 centimeters minimum, 0.638 centimeters maximum, with a minimum length of 5.0 centimeters. The compounds shall be forced through the cylindrical orifice by pneumatic pressure and the volumetric flow rate determined.

4.4.5 Adhesion (to steel surfaces) (type I and type II). The compound shall be applied to the machined surfaces of two flat steel disks 4 inches in diameter, which have been cleaned and finished with No. 16 emery polishing paper. Three 1/4 inch diameter by 1/16 inch thick brass shims shall be placed in the compound 120 degrees apart along the periphery of the coated face of one disk. The disks shall then be pressed together in a vise until the faces of the disks set firmly against the shims. All excess material shall be removed and the test specimen allowed to stand for 24 hours, after which tensile stress shall be applied in a direction perpendicular to the plane of the disks, in a tensile testing machine with jaw separation at a rate of 1 inch per minute. The adhesion of the compound after immersion in 10 percent NaCl solution shall be determined as described above except that after allowing the specimen to air cure for 24 hours at 77° ± 2°F. and 50 ± 5 percent relative humidity, the specimen shall be immersed in the salt solution for 168 hours before being subjected to tensile stress.

4.4.6 Application characteristics (type II, class A) (knife application). Approximately 200 grams of the compound shall be weighed out and rolled into the shape of a ball in the palms of the hands. The compound shall then be alternately kneaded between the hands. The compound shall then be alternately kneaded between the thumbs and forefingers and rolled into the shape of a ball. The compound shall be worked in this manner continuously for a period of 2 minutes. Observation shall then be made to determine whether the hands are smeared by the compound and whether the compound spreads and sticks to the hands.

4.4.6.1 Application characteristics (type II, class B) (knife or calking iron application). In addition to being tested under 4.4.6, apply the compound to a metal seam by means of a knife, and if required, by means of a calking iron. Observe whether the compound readily fills the seam completely and smoothly, and whether the compound transfers easily from the applicator to the seam.

4.4.7 Shrinkage.

4.4.7.1 Apparatus. Apparatus and accessory materials required are (1) titrating buret marked in 0.1 ml., (2) brass ring approximately 2-5/8 inches (6.7 cm.) inside diameter and 1/2 inch (1.27 cm.) wide, with ends ground flat, (3) 2 ground glass cover plates, 3 to 3-1/2 inches (8 cm.) in diameter, (4) leveling tool for spreading compound, and (5) distilled water.

4.4.7.2 Procedure. Adhere the brass ring to one of the ground glass plates. Determine the volume of the ring by filling it with distilled water at standard temperature from a titrating buret. The water from the buret shall be slowly added so that there are no air bubbles when the glass cover plate is centered on the ring. Record the amount of water required to fill the ring, to the nearest 0.03 ml. as Vr.

Spread approximately 1/8 inch (0.32 cm.) layer of compound in the ring using a leveling tool to form good contact with ring and glass. Pour distilled water from the buret into the ring until it is exactly filled (without air bubbles), as determined by covering the other glass plate. Record how much water is required to fill the ring using the buret (reading the buret to an accuracy of 0.03 ml.) and designate the amount as V_i.

Pour the water from the ring and let the specimen set at standard conditions for a period of 14 days. At the end of this exposure period, repeat the filling of the ring using the buret and distilled water and record the volume of water as V_f. Calculate the shrinkage of the sample as follows:

$$\text{Percent Shrinkage} = \frac{V_f - V_i}{V_r - V_i} \times 100$$

Where:

V_r - Volume of ring

V_f - Volume of water required to fill the ring after 14 days exposure.

V_i - Volume of water required to fill the ring before 14 days exposure.

4.4.8 Adhesion - cohesion (wood surfaces).

4.4.8.1 Apparatus. Steel forms (figures 1 and 2) fitted with two Douglas fir planks outgaged to simulate a seam 1/4 inch wide, 3/4 inch deep, and 18 inches long shall be used. The Douglas fir should be clear, straight grained.

4.4.8.2 Preparation of test specimens. The Douglas fir planks shall be immersed as specified in MIL-W-18142, type B wood preservative for 48 hours after which they shall be conditioned in air at 77°F. and 50 percent relative humidity for 72 hours. The planks shall then be fitted to the form as indicated in 4.4.8.1 and the compound shall then be introduced into the seam.

4.4.8.3 Procedure (no extension of test assembly). The test assembly shall be permitted to cure for 72 hours at 77° ± 2°F. and 50 ± 5 percent relative humidity. After the curing period the assembly shall be conditioned for 24 hours at 120° ± 5°F. At the expiration of this period the specimens shall be examined for evidence of bond cohesion breaks and adhesion loss. The loss in adhesion-cohesion shall be estimated to the nearest 0.1 square inch.

4.4.8.4 Procedure (test assembly extended). This test shall be conducted on a test assembly described in 4.4.8.1 and prepared as described in 4.4.8.2. The test assembly shall be permitted to cure for 72 hours at 77° ± 2°F. and 50 ± 5 percent relative humidity. After the curing period the assembly shall be treated by immersion in a 10 percent NaCl solution for 168 hours. The test assembly shall then be subjected to successive separations in increments of 1/64 inch, three times daily at 4 hour intervals for 5 days after which there will be a total separation of 15/64 inch if the failure has not already occurred. The total loss in bond area and cohesion (4.4.8.3 and 4.4.8.4) shall be estimated to the nearest 0.1 square inch.

4.4.9 Storage stability (type I and type II). Upon completion of the 12 months storage stability test, the container shall be opened and examined for evidence of separation into solid and liquid phases and hard setting.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level B or C, as specified (see 6.2).

5.1.1 Level B.

5.1.1.1 Type I and type II, class A (bulk). Type I and type II, class A calking compound (bulk) shall be furnished in 1-gallon cans (see 5.1.1.1.1) or 5-gallon pails (see 5.2.1.3 and 5.2.2.3), as specified (see 6.2).

5.1.1.1.1 Cans. One-gallon cans shall conform to PPP-C-96, type 5, class 2. Exterior coating shall be plan A.

5.1.1.2 Expendable cartridges. Ten filled cartridges shall be packed in a close-fitting fiberboard box conforming to PPP-B-636, class-domestic.

5.1.1.3 Extruded tape form. Four rolls of calking compound shall be packaged in a close-fitting paperboard or fiberboard box conforming to PPP-B-566, PPP-B-676, or PPP-B-636, at the option of the supplier.

5.1.2 Level C. The compound shall be packaged to afford adequate protection against damage during shipment from the supply source to the first receiving activity.

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

5.2.1 Level A.

5.2.1.1 Cans. Four 1-gallon cans shall be packed in accordance with the level A requirements of the appendix to PPP-C-96.

5.2.1.2 Expendable cartridges and tape form. Six unit packages of expendable cartridges or eight unit packages of tape form calking compound shall be packed in a close-fitting fiberboard box conforming to PPP-B-636, class weather-resistant. Each box shall be fitted with a case liner conforming to MIL-L-10547. The case liner may be omitted provided all joints and corners of the box are sealed with minimum 1-1/2 inch wide tape conforming to PPP-T-76. Boxes shall be closed and strapped in accordance with the appendix to PPP-B-636.

5.2.1.3 Pails. Five-gallon pails shall conform to PPP-P-704, type II or III. The pail shall be coated with enamel conforming to Fed. Std. No. 595, Color No. 24087.

5.2.2 Level B.

5.2.2.1 Cans. Four 1-gallon cans shall be packed in accordance with the level B requirements of the appendix to PPP-C-96

5.2.2.2 Expendable cartridges and tape form. Six unit packages of expendable cartridges or eight unit packages of tape form shall be packed in a close-fitting fiberboard box conforming to PPP-B-636, class-domestic.

5.2.2.3 Pails. Five-gallon pails shall conform to PPP-P-704, type II or type III. Commercial exterior coating is acceptable.

5.2.3 Level C. Compound packaged as specified in 5.1 shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. Containers shall comply with the requirements of the Uniform Freight Classification Rules or National Motor Freight Classification Rules as applicable.

5.3 Palletization. When specified (see 6.2), 5-gallon pails shall be palletized in accordance with MIL-STD-147 for a type IV load.

5.4 Marking. Marking shall be in accordance with paragraphs 5.4.1 or 5.4.2, as specified (see 6.2).

5.4.1 Civil agencies. In addition to any special markings required by the contract or order, marking shall be in accordance with Fed. Std. No. 123.

5.4.2 Military agencies. In addition to any special markings required by the contract or order, marking shall be in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The calking compounds are intended for use as calking of wood or metal voids such as exterior hull seams or wooden vessels in such a manner that a watertight seam is insured above and below the waterline and as a calking material for metal seams. Compound in ribbon form is suitable for sealing joints around hatch closures, ground bolts, guy wire pads or for similar applications.

6.1.1 Type I. Type I compound is intended for use on metal and wood seams and may be applied by means of either a calking gun or knife.

6.1.2 Type II. Type II compounds are intended for use on metal seams and are suitable for application by knife or calking iron.

6.2 Ordering data. Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

(a) Title, number, and date of this specification.
(b) Type and class required (see 1.2).
(c) Size of container required (see 5.1.1.1).
(d) Size of expendable cartridge (see 3.7 and 6.4).
(e) Selection of applicable levels of packaging and packing required (see 5.1 and 5.2).
(f) Whether 5-gallon pails shall be palletized (see 5.3).

6.3 Supersession data. This specification covers the requirements of MIL-C-18969B, which was cancelled July 6, 1971.

6.4 Calking compound for gun application is available in bulk or in cartridges. The purpose of cartridges is to facilitate loading of guns.

6.5 Calking compound usually undergoes changes in consistency in the containers and should not be kept in storage for a long period before use. If possible, no more than a one year supply should be on hand at any particular time.

6.6 One gallon cans contain approximately 15 pounds and 5-gallon pails contain approximately 75 pounds.

6.7 A 25-foot length of extruded tape form calking compound approximately 1/8 inch thick and 1/2 inch wide, weighs approximately 1-1/4 pounds, net.

MILITARY INTERESTS:

Custodians:

Army - MR
Navy - SH
Air Force-11

Coordinating activity:

Army - MR

Preparing Activity:

GSA - FSS

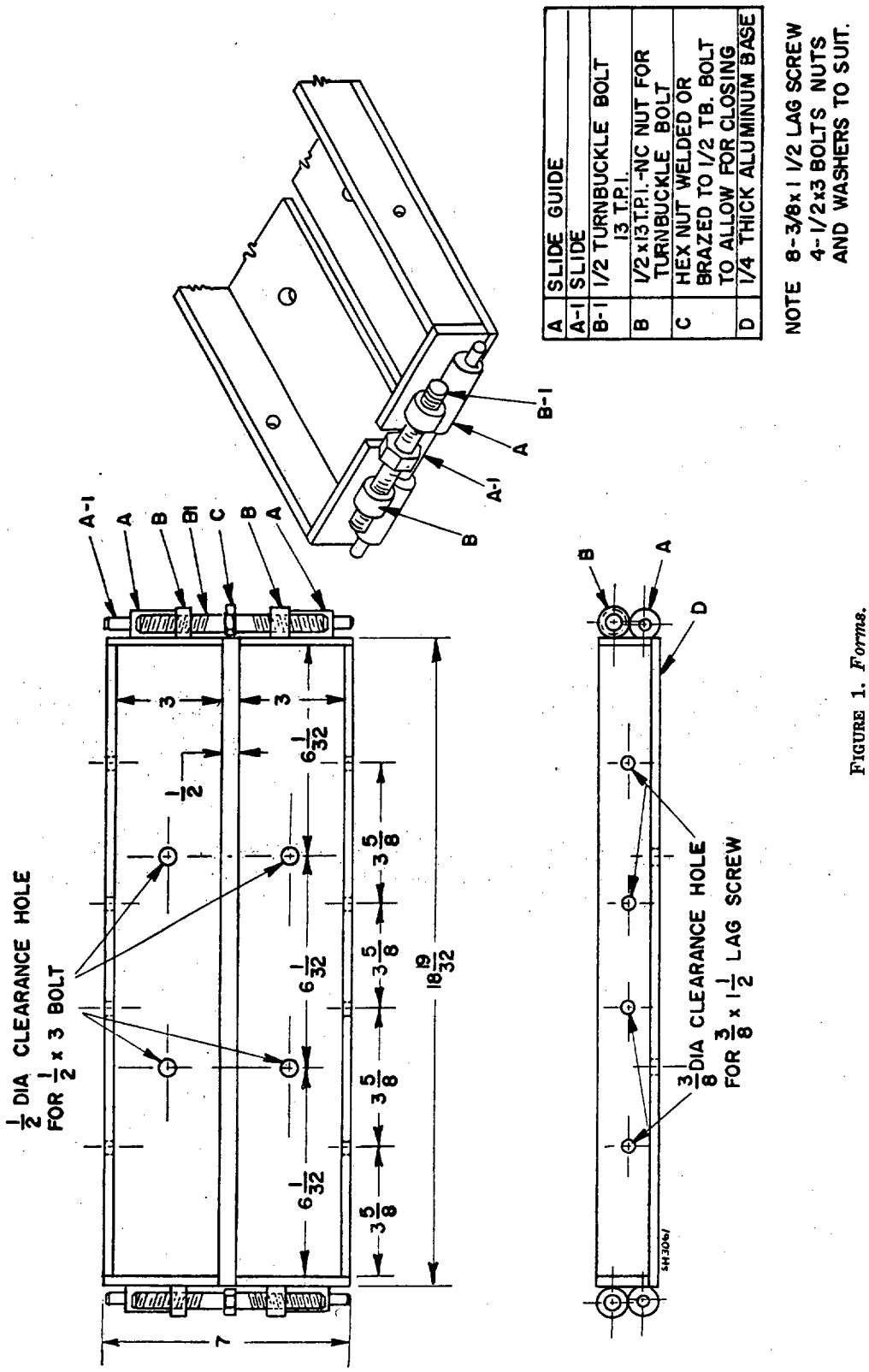

FIGURE 1. *Forms.*

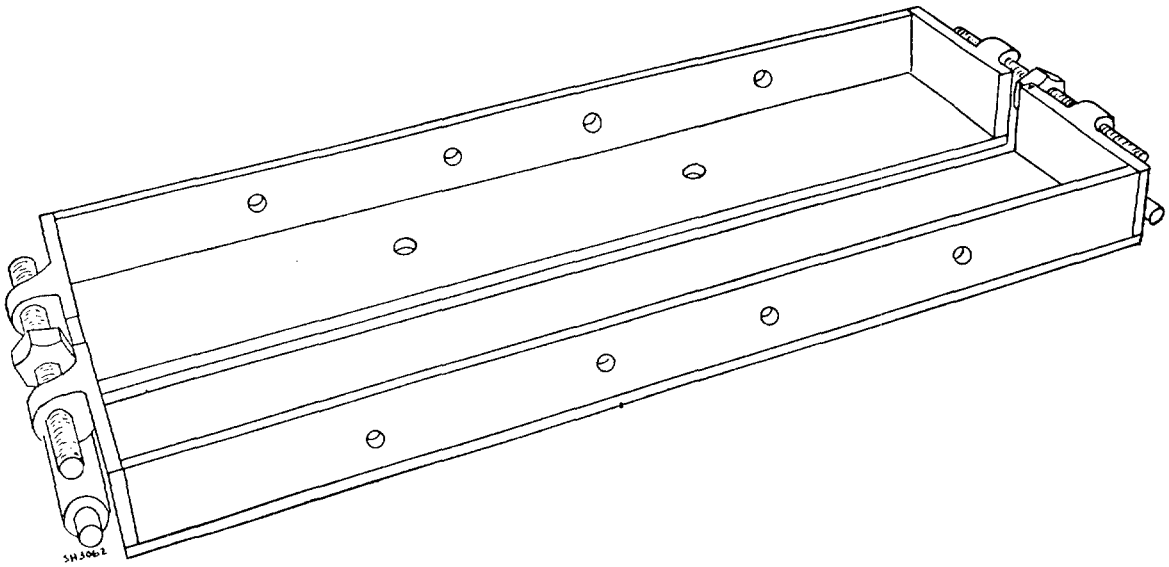

FIGURE 2. *View of wood adhesion tester.*

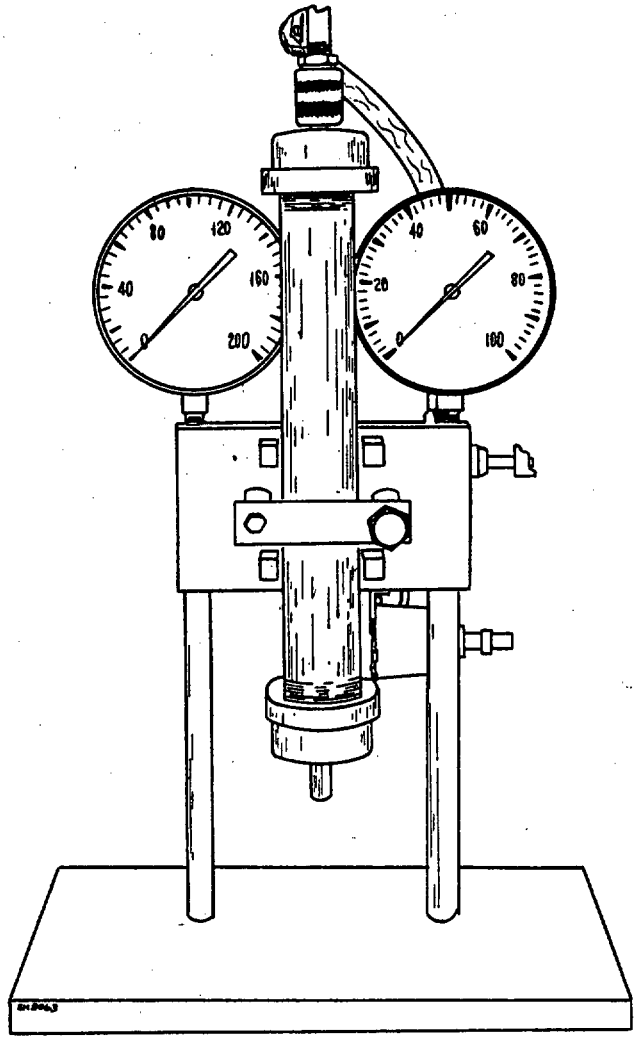

FIGURE 3. *View of extrusion rheometer.*

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