

MIL-F-52252(MR)

15 OCTOBER 1962

## MILITARY SPECIFICATION

## FILLER, DENT, METAL SURFACE

## 1. SCOPE

1.1 This specification covers one type of a putty-like filler for general repair work. It is suitable for application with trowel or spatula without the addition of thinner.

## 2. APPLICABLE DOCUMENTS

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

## SPECIFICATIONS

## FEDERAL

TT-E-485	—Enamel; Semi - Gloss, Rust-Inhibiting
TT-M-261	—Methyl Ethyl Ketone (For Use in Organic Coatings)
TT-P-143	—Paint, Varnish, Lacquer, and Related Materials; Packaging, Packing and Marking of
TT-T-306	—Thinner; Synthetic—Enamel
TT-T-548	—Toluene, Technical

## MILITARY

MIL-S-3136	—Standard Test Fluids; Hydrocarbon
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## STANDARDS

## FEDERAL

Fed. Test Method Std. No. 141	—Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling and Testing
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(Copies of specifications, standards, drawings, and publications required by the contractors in connection with specific procurement functions should be ob-

tained from the procuring activity or as directed by the contracting officer.)

## 3. REQUIREMENTS

## 3.1 Composition.

3.1.1 *Pigment.* The pigment portion of the filler shall consist of ingredients in the proportions by weight specified in table I.

TABLE I. Quantitative requirements of pigment

Pigment	Percent by weight	
	Minimum	Maximum
Powdered metal (as aluminum). Extender pigments.....	30	70

3.1.2 *Vehicle.* The vehicle shall be a vinyl chloride-acetate copolymer resin dissolved in suitable ester and/or ketone and aromatic solvents. Small amounts of plasticizers and stabilizers may be used. The vehicle shall show a negative rosin, phenolic resin and nitrocellulose test. When tested as specified in 4.4.5.2, the vehicle shall exhibit the absorption band spectrum illustrated in figure 1.

3.2 *Quantitative requirements.* The filler shall conform to the quantitative requirements specified in table II when tested as in 4.4.

## 3.3 Qualitative requirements.

3.3.1 *Condition in container.* A freshly opened full container of the filler tested as in 4.4.6 shall be free from lumps, skins, abnormal thickening, or livering and show no more settling or caking than can be readily incorporated to a smooth homogeneous state.

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TABLE II. Quantitative requirements of filler

Characteristics	Requirements	
	Minimum	Maximum
Total solids, percent by weight of filler.	78	
Pigments, percent by weight of filler.		70
Vehicle solids, percent by weight of filler.	8	12

**3.3.2 Storage stability.** A full pint container of the filler shall show no skinning, livering, curdling, hard settlement or caking when tested as in 4.4.7. The filler shall remix to a smooth, homogeneous state and shall be suitable for application with a trowel or spatula.

**3.3.3 Working properties.** The filler shall show no tendency to cause gouging of an applied film when tested as in 4.4.8.

**3.3.4 Brushing properties.** The filler, tested as in 4.4.9 shall have satisfactory brushing characteristics and shall be capable of being brushed out without excessive piling up on the brush.

**3.3.5 Drying time.** A film of the filler tested as in 4.4.10 shall show no lifting or gouging and shall sand to a feather edge.

**3.3.6 Adhesion.** A film of the filler tested as in 4.4.11 shall adhere to the metal and shall not chip or peel. The filler shall not be brittle and shall ribbon when cut with a knife.

**3.3.7 Impact test.** A film of the filler tested as in 4.4.12 shall show no cracking or loss of adhesion to the test panel.

**3.3.8 Shrinkage.** The filler shall show no cracking or pulling away from the edges when tested as in 4.4.13.

**3.3.9 Under-film corrosion.** There shall be no rusting of the metal underneath the filler when tested as in 4.4.14.

**3.3.10 Water resistance.** A film of enamel applied over the filler and tested as in 4.4.15 shall show no lifting, wrinkling, or blistering

immediately upon removal of the panel from the water. After 24 hours air drying the portion that was immersed shall be almost indistinguishable from the portion that was not immersed.

**3.3.11 Hydrocarbon resistance.** A film of enamel applied over the filler and tested as in 4.4.16 shall show no lifting, wrinkling, or blistering immediately upon removal of the panel from the fluid. After 24 hours air-drying, the portion that was immersed shall be almost indistinguishable from the portion that was not immersed.

#### 4. QUALITY ASSURANCE PROVISIONS

**4.1** The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. 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, inspection and testing.** Unless otherwise specified, sampling, inspection and testing shall be in accordance with Method 1031 of Federal Standard 141.

**4.3 Testing.** Testing under this specification shall be for the purpose of acceptance of individual lots and shall consist of all tests in section 4.

#### 4.4 Test methods.

**4.4.1 Test conditions.** The routine and referee testing conditions shall be in accordance with section 7, Federal Standard 141 except as otherwise specified herein.

**4.4.2** The following tests shall be conducted in accordance with Federal Standard 141 and as hereinafter specified.

**4.4.3 Analysis of pigment.**

TABLE III. Index

Item	Test method		Paragraph of this specification giving requirements
	Applicable method in Fed. Std. 141	Section of this specification giving further reference	
Analysis of pigment		4.4.3	Table I
Total pigment		4.4.3.1	Table II
Extender pigment		4.4.3.2	Table I
Aluminum pigment		4.4.3.3	Table I
Total solids		4.4.4	Table II
Analysis of vehicle		4.4.5	3.1.2
Vehicle solids		4.4.5.1	Table II
Vinyl chloride-acetate		4.4.5.2	3.1.2
Rosin	5031	4.4.5.3	3.1.2
Phenolic resin	5141	4.4.5.4	3.1.2
Nitrocellulose	5391	4.4.5.5	3.1.2
Condition in container	3011	4.4.6	3.3.1
Storage stability	4142	4.4.7	3.3.2
Working properties		4.4.8	3.3.3
Brushing properties		4.4.9	3.3.4
Drying time		4.4.10	3.3.5
Adhesion	6304	4.4.11	3.3.6
Impact		4.4.12	3.3.7
Shrinkage		4.4.13	3.3.8
Under film corrosion		4.4.14	3.3.9
Water resistance	6011	4.4.15	3.3.10
Hydrocarbon resistance	6011	4.4.16	3.3.11

4.4.3.1 *Total pigment.* Weigh a small sample of the filler in a weighed centrifuge tube. Dilute with an excess of acetone and centrifuge at 2500 to 3000 rpm for thirty minutes. Decant the supernatant liquid and retain for use in 4.4.5.2. Repeat the extraction procedure

three times making sure the pigment is re-dispersed each time. Dry the residue in an oven at  $110^{\circ} \pm 29\text{C}$ . ( $230^{\circ} \pm 4^{\circ}\text{F}$ .) for one hour, allow to cool, and then reweigh. Calculate the total pigment as follows:

$$\% \text{ Total pigment} = \frac{W_2 \times 100}{W_1}$$

$W_1$  = Weight of sample before extraction and drying

$W_2$  = Weight of sample after extraction and drying

4.4.3.2 *Extender pigment.* Weigh accurately 0.1 to 0.2 gram of the isolated pigment and transfer to a 250 ml glass-stoppered flask. Add about 100 ml of 0.1 normal sodium hydroxide and shake the flask frequently during a one-half hour period. Release the stopper occasion-

ally to permit the escape of gas. Filter immediately through a Gooch crucible, washing with water, and dry to constant weight. Calculate the amount of extender pigment from the increase of weight in the crucible as follows:

$$\% \text{ Extender pigment} = \frac{\text{Weight of residue in crucible} \times 100}{\text{Weight of pigment sample}}$$

4.4.3.3 *Aluminum pigment.* Transfer the filtrate from the extender pigment analysis (4.4.3.2) to a 400 ml beaker, add 15 ml of 6 normal hydrochloric acid and dilute to 200 ml

volume. Add a few drops of methyl red indicator and heat just to boiling. Then add dilute ammonium hydroxide dropwise until the color just changes to yellow. Boil 2 minutes and

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filter at once through paper, washing with a hot 2% solution of either ammonium chloride or ammonium nitrate. Transfer the paper and precipitate to an ignited and tared porcelain

crucible, dry, char, and ignite to 1100° C to constant weight. Cool in a desiccator and weigh rapidly.

$$\% \text{ Aluminum powder} = \frac{\text{Weight of precipitate} \times 52.9}{\text{Weight of pigment sample}}$$

**4.4.4 Total solids.** Stir a freshly opened container of the filler to a smooth homogeneous state. Transfer a 3 to 5 gram sample from the container to a tared weighing dish and spread slightly with a spatula. Weigh as rapidly as possible keeping the sample covered. Remove the lid and allow the sample to air dry for a period of at least four hours. Then heat the sample in an oven at 110° ± 2° C. (230° ± 4° F.) for two hours. Allow to cool to room temperature and reweigh. Calculate the total solids according to the following formula:

$$\% \text{ Total solids} = \frac{W_1 \times 100}{W_2}$$

$W_1$  = Weight of sample before drying  
 $W_2$  = Weight of sample after drying

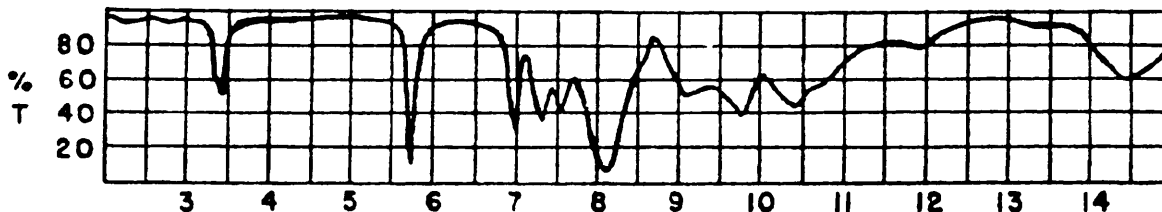


FIGURE 1

**4.4.5.3 Test for rosin.** Test for rosin content by using Method 5031 of Federal Standard 141.

**4.4.5.4 Test for phenolic resin.** Test for phenolic resin content using Method 5141 of Federal Standard 141.

**4.4.5.5 Test for nitrocellulose.** Test for nitrocellulose using Method 5391 of Federal Standard 141.

**4.4.6 Condition in container.** Determine package condition in accordance with Method 3011 of Federal Standard 141 and observe for compliance with 3.3.1.

**4.4.7 Storage stability.** In accordance with Method 4112 of Federal Standard 141 allow

#### 4.4.5 Analysis of vehicle.

**4.4.5.1 Vehicle solids.** Calculate the vehicle solids by taking the difference between the total solids as determined in 4.4.4 and the total pigment as determined in 4.4.3.1.

**4.4.5.2 Test for vinyl chloride-acetate copolymer.** Evaporate the excess solvent from the supernatant liquid in 4.4.3.1 until a slightly viscous solution is obtained. Scan the infrared spectrum of this isolated vehicle after vacuum oven drying a film of it for thirty minutes at 80° C on a rock salt plate. For compliance with 3.1.2, the spectrum should show all of the absorption bands illustrated in figure 1 below. No other strong bands should appear.

a full standard pint can of the filler to stand undisturbed for six months and then examine the contents for compliance with 3.3.2.

**4.4.8 Working properties.** Apply a film of the filler from a freshly opened container on a 3 by 6 inch solvent cleaned steel panel using a putty knife. Note any tendency toward gouging for compliance with 3.3.3.

**4.4.9 Brushing properties.** Reduce the filler with one part of a thinner consisting of two parts by volume of methyl ethyl ketone and one part toluene to one part of filler. Brush out quickly on a 4 by 12 inch steel panel and observe for compliance with 3.3.4.

**4.4.10 Drying time.** Apply a 0.032 inch wet

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film of filler using a suitable film applicator on a 4 by 12 inch steel panel solvent cleaned as in Method 2011 of Federal Standard 141 using the petroleum naphtha-ethylene glycol monoethyl ether mixture. Allow the filler to air-dry under referee conditions for one hour and then sand with a power rotary or belt sander using #80 grit paper. Examine for compliance with 3.3.5.

**4.4.11 Adhesion.** Apply a 0.032 inch wet film of filler using a suitable film applicator on a 3 by 6 inch steel panel solvent cleaned as in 4.4.10. Allow to air dry for 24 hours and then perform the knife test in accordance with Method 6304 of Federal Standard 141 and observe for compliance with 3.3.6.

**4.4.12 Impact test.** Apply a 0.050 inch wet film of filler using a suitable film applicator on a 4 by 12 inch No. 20 gage steel panel solvent cleaned as in 4.4.10. Allow to air dry for 24 hours and place on a block of wood with the coated side up. Drop a 5 pound steel ball from a height of 18 inches on the center of the applied film. Note whether area of impact shows any cracking or loss of adhesion and check for compliance with 3.3.7.

**4.4.13 Shrinkage.** Solvent clean two small shallow tin or terneplate lids approximately two inches in diameter and three-eighth inch high. Fill the lids with filler to the level of the top of the lids. Care should be taken to work out all bubbles. Allow to air dry for seven days. Subject the specimens to the following cycle:

- 16 hours at minus 40° F.
- 8 hours at plus 200° F.

Repeat this cycle four times. At the completion of the test examine the specimens for compliance with 3.3.8.

**4.4.14 Under film corrosion.** Apply a 0.032 inch wet film of the filler using a suitable film applicator on a 3 by 6 inch steel panel solvent cleaned as in 4.4.10 and allow to air dry for two hours. Sand the surface lightly with #80 grit paper and apply a coat of enamel conforming to Specification TT-E-185, Type IV to a dry film thickness between 0.0009 and 0.0011 inch. Air dry seven days and immerse the coated panel in methyl ethyl ketone until

the paint film and filler have been removed. Examine the stripped panel for compliance with 3.3.9.

**4.4.15 Water resistance.** Prepare a test panel as in 4.4.14 except air dry for 96 hours after applying the enamel. Coat all exposed surfaces with wax or other suitable coating and immerse the panel in distilled water at  $23^{\circ} \pm 1^{\circ}$  C for 18 hours in accordance with Method 6011 of Federal Standard 141. At the end of the test period remove the panel and examine for compliance with 3.3.10.

**4.4.16 Hydrocarbon resistance.** Prepare a test panel as in 4.4.14 except air dry for 96 hours after applying the enamel. Immerse for four hours in a hydrocarbon fluid conforming to Specification MIL-S-3136, Type III. At the end of the test period remove the panel and examine for compliance with 3.3.11.

**4.5 Packaging, packing and marking.** The packaging, packing and marking of the material shall be examined for conformance to the requirements of section 5.

## 5. PREPARATION FOR DELIVERY

**5.1 Packaging and packing.** The size of containers shall be specified in the invitation for bid. The filler shall be packaged level A or C; packed level A, B or C as specified (see 6.2) in accordance with Specification TT-P-143.

**5.2 Marking.** The interior and exterior containers shall be marked in accordance with Specification TT-P-143. In addition each container shall be marked with the following:

- "Contains Flammable Solvent
- Use with adequate ventilation."

## 6. NOTES

**6.1 Intended use.** The metal filler is intended primarily for filling dents and small holes in truck body and automotive repair work. It is also satisfactory for repairing blowholes, sand holes, and surface blemishes in metal castings. The filler can be applied to all types of metal surfaces and when hard, can be machined, drilled, tapped, or ground without cracking, crumbling, or loss of adhesion.

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**6.2 Ordering data.** Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Administrative provisions for inspection records (see 4.1).
- (c) Size of containers (see section 5).
- (d) Level of packaging and level of packing (see section 5).
- (e) The filler should be purchased by volume, the unit being one United States liquid gallon of 231 cubic inches at 60° F. (15.6° C.).

**6.3** A blend of two parts by volume of methyl ethyl ketone and one part by volume of toluene is an excellent solvent for this type filler. When slower drying characteristics are desired higher boiling solvents such as methyl isobutyl ketone, di-isobutyl ketone, and cyclohexanone should be used in place of methyl ethyl ketone and xylene in place of toluene.

**6.4** This filler exhibits some tendency to be unstable on prolonged storage and should be used within six months after date of manufacture for best results.

**6.5** It is believed that this specification adequately describes the characteristics necessary to secure the desired material and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

**Notice.** When Government drawings, specifications or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may be in any way related thereto.

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