MIL-D-43362B(GL)

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SUPERSEDING
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MILITARY SPECIFICATION

DETERGENT, LAUNDRY

(ANIONIC: A STANDARD FOR TESTING)

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

1. SCOPE

1.1 This specification covers one type and grade of an anionic organic synthetic detergent, of which the active ingredient consists of sodium N-methyl-N-oleoyl taurate (see 6.1).

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 this specification to the extent specified herein:

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage

(Copies of 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).

FSC 7930

LAWS AND REGULATIONS

U.S. Postal Service Manual

(Copies of the manual may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402).

* 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).

3. REQUIREMENTS

* 3.1 Detergent. The detergent covered by this specification shall conform to the requirements specified in table I when tested as specified in 4.2.3 (see 6.3).

TABLE I. Chemical and physical requirements

Requirement	Minimum	Maximum
Sodium N-methyl-N-oleoyl taurate content, percent by weight	67.0	70.0
Sodium chloride content, percent by weight	18.0	21.0
Sodium oleate content, percent by weight	——	8.0
Moisture content, percent by weight	——	3.0
pH of 5 percent (by weight) solution	6.5	8.0

* 3.2 Workmanship. The detergent shall be a clean, uniform, free-flowing powder or flake, white to light tan in color, and the quality shall conform to the levels established herein.

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 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated hereinafter.

4.2.1 Inspection of materials and components. In accordance with 4.1 above, components and materials shall be inspected and tested in accordance with all the requirements of referenced specifications and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase documents.

4.2.2 Inspection of the end item.

* 4.2.2.1 Examination of the end item. The end item shall be examined for the defects in the applicable subparagraphs at the inspection levels and acceptable quality levels (AQL's) set forth in 4.2.2.3. The lot size shall be expressed in units of filled containers for the examinations in 4.2.2.1.1 and in units of shipping containers for examination in 4.2.2.2.1.

* 4.2.2.1.1 Examination for visual defects. The sample unit for this examination shall be one filled unit container.

Examine	Defect
Contents	Not clean, presence of foreign matter
	Not uniform, segregation of individual ingredients
	Not a free-flowing powder
	Lumping or caking
	Color too dark - Not white to light tan

4.2.2.2 Examination of preparation for delivery requirements.

* 4.2.2.2.1 Examination for packing and marking. An examination shall be made to determine that packing and marking complies with the section 5 requirements. Defects shall be scored in accordance with the list below. The sample unit shall be one shipping container fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot.

Examine	Defect
Packing	Any leakage of contents
Markings (exterior)	Incorrect; incomplete; illegible; omitted; of improper size, location, sequence or method of application
Materials	Any component missing, damaged or not as specified
Workmanship	Bulged or distorted container

4.2.2.3 Inspection levels and acceptable quality levels (AQL's) for examination. The inspection levels for determining the sample size and the acceptable quality levels (AQL's) expressed in defects per 100 units shall be as follows:

Examination paragraph	Inspection level	AQL's
4.2.2.1.1	I	2.5
4.2.2.1.2	S-2	N/A
4.2.2.2.1	S-2	2.5

4.2.3 Testing of the end item. The end item shall be tested for the characteristics specified in table II. The sample unit for testing shall be a one pound composite of the finished product obtained by combining equal portions from randomly selected samples throughout the lot in the size indicated below. The composite sample shall be placed in a clean, dry glass sealed container. Care shall be exercised to prevent contamination or alteration of the composite during the sampling, weighing, storage and testing. The lot shall be unacceptable if the composite fails to meet any test requirement specified.

Lot size (pounds)	Sample size
800 or less	2
801 up to and including 22,000	3
22,001 or more	5

INSTRUCTIONS FOR TESTING OF THE END ITEM

TABLE II

CHARACTERISTIC	Specification Reference		Requirements Applicable To		Number Determinations	Results Reported As		Inspect Level	AQL
	Requirement	Test Method	Individ Unit	Lot Aver	Composite Sample	Pass or Fail	Numerically to Nearest		
Sodium N-methyl-N-oleoyl taurate	Table I	4.3.1			Average of 2		0.1 percent		
Sodium chloride	Table I	4.3.2			Average of 2		0.1 percent		
Sodium oleate	Table I	4.3.3			Average of 2		0.1 percent		
Moisture	Table I	4.3.4			Average of 2		0.1 percent		
pH of 5 percent solution	Table I	4.3.5			1		0.1 unit		

4.3 Test procedures.

4.3.1 Sodium N-methyl-N-oleoyl taurate determinations.

4.3.1.1 Apparatus.

Burette, 25 ml capacity, 0.05 ml graduations
Flasks volumetric, 100 ml, 500 ml, and 1000 ml capacities
Pipette, bulb, 10 ml capacity
Pipette, bulb, 25 ml capacity
Cylinder, graduated, glass stoppered, 100 ml capacity
Cylinder, graduated, 25 ml capacity

4.3.1.2 Reagents.

Chloroform, reagent grade
Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride 1/
Methylene blue chloride, U.S.P. grade
Potassium 2, 4, 5 - trichlorobenzenesulfonate, reagent grade 2/
Sodium sulfate, anhydrous, reagent grade
Sulfuric acid (sp gr 1.84) concentrated, reagent grade

1/ Hyamine 1622 - Rohm & Haas Company, Philadelphia, PA.

2/ General Chemical Division, Allied Chemical Corporation, Morristown, NJ.

4.3.1.3 Standardization (normality) of cationic reagent.

4.3.1.3.1 Preparation of cationic solution. Weigh 1.82 g ± 0.02 g of diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride and transfer to a 1000 ml volumetric flask with distilled water. Dissolve and dilute to the mark. This solution is approximately 0.004 M.

4.3.1.3.2 Preparation of methylene blue chloride indicator solution. Dissolve 0.030 g methylene blue chloride and 50 gms of sodium sulfate, anhydrous, in 500 mls of distilled water. Add 6.5 mls of sulfuric acid, concentrated, and dilute to 1000 mls with distilled water. Shake well.

4.3.1.3.3 Standardization procedure. Dissolve 2 gms ± 0.001 g of potassium 2, 4, 5 - trichlorobenzenesulfonate in 400 mls of distilled water. Transfer to a 500 ml volumetric flask and dilute to mark with distilled water. Pipette 10 mls of solution into a 100 ml glass stoppered graduated cylinder together with 15 mls of chloroform and 25 mls of methylene blue indicator solution. Shake well. Fill a 25 ml burette with the prepared

cationic solution and titrate the potassium 2, 4, 5- trichlorobenzene-sulfonate, chloroform, and methylene blue indicator solution mixture as follows: Add the cationic solution in increments of 1 to 2 ml, shaking the cylinder 30 seconds after each addition, inverting the cylinder, and then waiting for 60 seconds until the aqueous layer is clear. Reduce the additions to 0.5 ml when liquid separations become more rapid and when the cloudiness of the aqueous layer increases. When the water layer begins to turn blue, add the cationic solution a drop at a time, shaking for 30 seconds after each addition, and then waiting for 60 seconds until the aqueous layer is clear. The end point of the titration is reached when the aqueous and chloroform layers appear equally blue. The comparison is made by placing the cylinder in reflected light, and obstructing one's view of the interface of the two liquids with a stirring rod.

4.3.1.3.4 Calculation of normality.

$$\text{Normality of cationic solution} = \frac{(\text{g } KCl_3 \text{ benzenesulfonate}) \times 2 \times 10}{(299.6) \times \text{ml of cationic solution}}$$

4.3.1.4 Analysis of detergent. Weigh 1.0 g $\pm$ 0.0001 g of the detergent. Transfer to a 100 ml volumetric flask with distilled water, dissolve and dilute to the mark with distilled water. Pipette 10 ml aliquots of the test detergent solution into 100 ml glass-stoppered graduate cylinders each containing 15 mls of chloroform and 25 mls of methylene blue indicator solution. Shake well. Titrate the mixtures with the standardized cationic solution according to the procedure outlined in 4.3.1.3.3.

4.3.1.4.1 Calculation.

$$\text{Percent sodium N-methyl-N-oleoyl taurate} = \frac{\text{Ml cationic solution} \times \text{normality of cationic solution} \times 424.7}{\text{weight of sample in 10 ml aliquot} \times 10}$$

4.3.2 Sodium chloride.

4.3.2.1 Reagents.

Nitric acid (3:2) - 3 volumes of concentrated nitric acid (sp gr 1.42) and 2 volumes of distilled water.

Silver nitrate, standard solution - 0.1 N.

Ammonium thiocyanate, standard solution - 0.1 N.

Ferric ammonium sulfate - saturated solution.

4.3.2.2 Procedure. Weigh a 1.0 g ± 0.0001 g sample of the detergent and dissolve in 250 mls of distilled water. Add 10 mls of nitric acid (3:2) and stir well. Add 0.1 N silver nitrate solution until no further precipitation is noticeable. Then add 5 mls of silver nitrate solution in excess. Record total volume of 0.1 N silver nitrate solution. Chill the mixture in an ice bath to 0° to 5° C. Titrate the chilled mixture with 0.1 N ammonium thiocyanate solution, using 15 mls of saturated solution of ferric ammonium sulfate as an indicator, until a faint pink color is noticeable. Add a few drops of 0.1 N ammonium thiocyanate solution in excess to verify the end point. At this point, the color should deepen definitely.

4.3.2.3 Calculation.

$$\text{Percent sodium chloride} = \frac{(V_1 N_1 - V_2 N_2) \times 5.85}{W}$$

Where:

V_1 = Milliliters of $AgNO_3$ solution (total volume)

N_1 = Normality of $AgNO_3$ solution

V_2 = Milliliters of NH_4CNS solution

N_2 = Normality of NH_4CNS solution

W = Weight of detergent sample

4.3.3 Sodium oleate.

4.3.3.1 Reagents.

Sulfuric acid - 0.33 N; 9.2 ml concentrated sulfuric acid (sp gr 1.84) diluted with distilled water to 1 liter.

Ethyl alcohol, absolute, U.S.P. Formula 3A or 30 of the U.S. Bureau of Internal Revenue

Sodium hydroxide, standard solution - 0.1 N

Petroleum ether, ACS reagent grade

Phenolphthalein indicator, 1 percent solution in neutral ethyl alcohol

4.3.3.2 Apparatus.

Extraction apparatus, Stokes flask 250 ml capacity with siphon
Extraction flask, 150 ml
Graduate cylinder, 100 ml
pH meter w/glass electrode

4.3.3.3 Procedure. Weigh 5.0 g ± 0.001 g sample of the detergent and dissolve in 70 mls of distilled water. Using a pH meter, adjust the pH of the solution to 6.0 by adding 0.33 N sulfuric acid a drop at a time. Transfer the adjusted solution to a Stokes flask using neutral absolute alcohol for rinsing. Dilute with the alcohol just to the waist of the flask. Chill the contents by immersing the flask in ice water. Add 35 mls of petroleum ether, stopper and shake. Two layers will form quickly on standing. With siphon, draw off the upper ether layer, taking care not to remove any of the lower alcohol-water layer. Catch the petroleum ether solution in an extraction flask. Repeat the petroleum ether extraction operations for a total of three extractions combining the ether solutions in the extraction flask. Evaporate the petroleum ether on a steam bath directing a stream of filtered air into the flask to prevent boiling. When the odor of petroleum ether disappears, dissolve the residue in 100 mls of neutral ethyl alcohol, heat to incipient boiling, add 0.5 ml of phenolphthalein indicator and titrate to an end point using standard sodium hydroxide 0.1 N solution.

4.3.3.4 Calculation.

$$\text{Percent sodium oleate} = \frac{V_1 N_1 \times 30.45}{W}$$

Where:

V_1 = Volume of standard sodium hydroxide solution

N_1 = Normality of standard sodium hydroxide solution

W = Weight of detergent sample

4.3.4 Moisture. Weigh a 10 g ± 0.001 g sample of the detergent in a tared weighing bottle (provided with a ground stopper) about 6 to 8 cm in diameter and 2 to 4 cm deep. Dry in oven maintained at 80° to 90° C for 1 hour, cool and weigh. Replace in oven for 15 minute periods, reweighing until constant weight is obtained.

4.3.4.1 Calculation.

$$\text{Percent moisture} = \frac{\text{loss in weight X 100}}{\text{weight of detergent sample}}$$

4.3.5 pH of 5 percent solution. Dissolve 5.0 g ± 0.1 g of the detergent in 90 mls of freshly boiled and cooled distilled or deionized water. Dilute solution to 100 mls. Determine the pH of the solution adjusted to temperature of 25° ± 2° C using a pH meter equipped with a glass electrode and having a sensitivity and readability of 0.05 pH unit. The pH meter shall be standardized using a buffer solution with pH 7.0 or 8.0.

5. PREPARATION FOR DELIVERY

5.1 Packing. Packing shall be level C.

* 5.1.1 Level C (commercial packing). The detergent shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transporation rate for such supplies. The quantity per shipping container shall be the same as that normally used by the supplier for retail distribution. Containers shall comply with the U.S. Postal Service Manual, Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable.

5.2 Marking. In addition to any special marking required by the contract or order, shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The detergent covered by this specification is intended for use as a standard in Method 5556, Mobile Laundry Evaluation for Textile Materials in FED-STD-191.

6.2 Ordering data. Purchaser should exercise any desired options offered herein and procurement documents should specify the following:

(a) Title, number and date of this specification.

6.3 Commercial source. This detergent may be obtained from the GAF Corporation, 140 W. 51st Street, New York, NY 10200 under the trade name IGEPON T-77.

6.4 The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and suppliers are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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