MIL-W-181A(OS)
18 August 1975
SUPERSEDING
JAN-W-181
31 January 1945

MILITARY SPECIFICATION

WAX, CANDELILLA

This specification is approved for use by all departments and agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers one grade of candelilla wax.

2. APPLICABLE DOCUMENTS

*2.1 The following documents of the issues in effect on the date of invitation for bids or request for proposals form a part of this specification to the extent specified herein. In the event of conflict between this specification and other documents referenced herein, requirements of this specification shall apply.

STANDARDS

Military

*MIL-STD-129 Marking for Shipment and Storage

*(Copies of specifications, standards, and drawings required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Material and workmanship. The wax shall be the naturally occurring extract, clear, and free from foreign matter.

3.2 Chemical and physical properties. Candelilla wax shall conform to the chemical and physical properties requirements specified in table I.

Table I

CHEMICAL AND PHYSICAL PROPERTIES

Property	Minimum	Maximum
Volatile matter, %	—	1.5
Solidification point, °C	63.0	70.0
Percent insoluble in carbon tetrachloride	—	1.0
Acid number	—	22.0
Saponification number	45.0	65.0
Mineral acidity	None (See 4.6.6)	None (See 4.6.6)
Ash, %	—	0.5

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 Size of lots. Unless otherwise specified in the contract or purchase order, the maximum lot size shall be 10,000 pounds.

*4.3 Sampling. A minimum of 10 percent of the containers in the lot shall be selected in such a manner as to be representative of the lot. When lots comprise less than 100 containers, either 10 containers or all containers in the lot shall be selected. Approximately one-half pound of the material shall be removed from each selected container. Each primary sample shall be labeled so that the container from which it was taken can be identified. The individual samples shall be pulverized until the material passes a U. S. Standard No. 4 (4,760 micron) sieve. An approximately 1/2-pound composite sample shall be made of equal parts of each primary sample. All samples shall be placed in airtight containers and labeled to show the name of the material, manufacturer, contract or order number, lot number, and the number of pounds in the lot. The primary samples shall be held by the procuring activity for possible future

examination should the tests of the composite sample show that the lot fails to meet the requirements of this specification. All acceptance tests shall be made on the composite sample representative of the test.

4.4 Examination of product. The wax shall be visually examined for conformance to the requirements of 3.1.

*4.5 Examination of preparation for delivery. An examination shall be made to determine that the packaging, packing, and markings conform to the requirements of section 5.

4.6 Test methods. The following test methods shall be used to determine conformance to the requirements of 3.2.

4.6.1 Volatile matter. Weigh approximately 5 grams of the sample in a tared glass-stoppered weighing bottle. Heat in an oven for 5 hours at 100° to 105° C, cool in a desiccator, and weigh. Calculate the loss of weight as percentage of volatile matter.

*4.6.2 Solidification point. Break up 40 to 50 grams of the sample in a mortar and pestle to a size fine enough to pass a U. S. Standard No. 12 (1,680 micron) screen and dry for 4 hours at 40° C. Transfer the dry sample to the inner tube of the solidification point apparatus shown in figure 1 and melt it. Place the tube in the apparatus and adjust the standardized thermometer so that the bulb is in the center of the liquid wax with a side thermometer in position for the emergent stem correction. Stir the molten material vigorously by means of the hand stirrer and carefully note the point where the temperature begins to rise when solidification begins. Record the temperature every 15 seconds until the maximum reading is obtained. Correct the maximum temperature for emergent stem by adding the value calculated from the formula:

$$N \quad (T-t) \times 0.000159$$

where:

N = degrees in the exposed mercury column
T = the uncorrected solidification point
t = average temperature of the exposed mercury column determined by means of a second thermometer suspended so that its bulb is in

the midpoint of the exposed mercury column
0.000159 = the coefficient of expansion of mercury in glass.

Record the corrected reading as the solidification point of the sample.

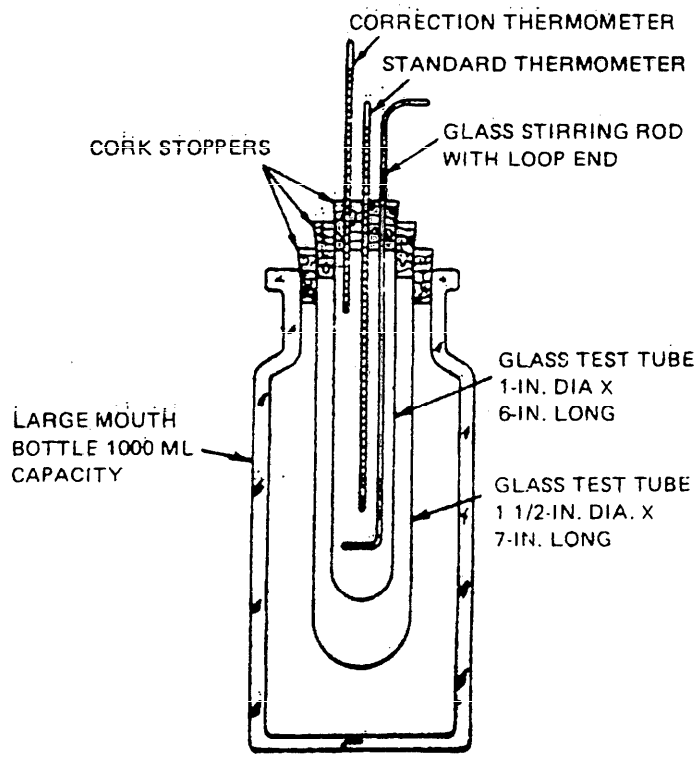

FIGURE 1. SOLIDIFICATION-POINT APPARATUS

*4.6.3 Material insoluble in carbon tetrachloride. Dissolve a weighed portion of approximately 5 grams of the finely divided sample in 100 milliliters (ml) of hot carbon tetrachloride. Filter the solution through a tared glass filtering crucible, medium porosity. Wash the crucible and residue thoroughly with two 25-ml portions of hot carbon tetrachloride. Dry 1 hour at 100° C, cool in a desiccator, and weigh. Calculate the gain in weight to percentage carbon tetrachloride insoluble matter.

*4.6.4 Acid number. Transfer approximately 2 grams of the sample, weighed to the nearest 0.001 gram, into a 250-ml acid value flask. Add 100 ml of ethanol-toluene mixture (2 volumes of USSD3A denatured ethanol

or 95 percent ethanol with 1 volume of toluene and neutralized to the phenolphthalein end point with 0.05N KOH or NaOH). Carefully warm on a hot plate or water bath to attain complete solution. Add 3 to 5 drops of a 1 percent ethanol solution of phenolphthalein as indicator and titrate the hot solution to the first persistent pink color with 0.05 N NaOH. Swirl the flask vigorously during the titration. If precipitation of wax occurs during titration, reheat the sample. The titration should be carried out as rapidly as possible.

$$\text{Acid number} = \frac{VN \times 56.1}{W}$$

where:

V = ml NaOH solution used
N = normality of NaOH solution
W = weight of sample.

*4.6.5 Saponification number. Transfer approximately 1.0 grams of the pulverized sample, weighed to the nearest 0.001 gram, to a 250-ml Erlenmeyer flask. Measure 50 ml of 0.1 N alcoholic potassium hydroxide solution into the flask containing the test sample. Add an equal amount of the potassium hydroxide solution to a 250-ml Erlenmeyer flask containing no sample for use as a blank. Connect both flasks to condensers and reflux on a hot plate for 3 hours. Remove the flasks from the condensers, add 3 to 5 drops of phenolphthalein (1 gram in 100 ml of 95 percent ethanol) and titrate both sample and blank with 0.1 N hydrochloric acid until the pink color just disappears and does not return for at least 10 seconds. If the solution congeals on cooling, or if soap separates on cooling, conduct the titration as near boiling as is feasible. Frequently swirl the contents of the flasks during titration.

$$\text{Saponification number} = \frac{(V-v)N \times 56.1}{W}$$

where:

V = ml acid required for blank
v = ml acid required for sample
N = Normality of acid used
W = weight of sample.

4.6.6 Mineral acidity. Place 5 grams of the finely divided sample in a 250-ml beaker, add 100 ml of cold distilled water, shake thoroughly, and filter through filter paper into a flask. Wash the beaker and sample with a small quantity of distilled water, and filter into the flask containing the first filtrate. Add 5 to 10 drops of methyl orange indicator solution to the filtrate and observe whether the solution gives an acidic reaction.

*4.6.7 Ash. Heat a weighed sample, accurate to the nearest 0.01 gram, of approximately 5 to 10 grams in a previously ignited and weighed evaporating dish (if not platinum, porcelain is acceptable) over a free flame until the vapors ignite. Avoid loss by spattering until all volatile combustible matter has been removed and the sample is charred. Transfer the dish and contents to a muffle furnace and ignite to constant weight at 600° C. Allow to cool in a desiccator and weigh. Calculate the increase in weight as percentage of ash in the sample.

4.6.8 Retests. If the official sample, representative of the lot, fails to meet the test prescribed in this specification, the manufacturer shall have the option of having analyses and tests made of each primary sample at his own expense. The manufacturer may then remove or replace defective portions of the lot represented by the primary samples which fail to meet the requirements and submit the lot for acceptance, provided the markings on the container are such that complete removal or replacement of the defective portions of the lot can be made to the satisfaction of the procuring activity.

5. PREPARATION FOR DELIVERY

5.1 Packing. Unless otherwise specified, candelilla wax shall be packed in substantial commercial containers so constructed as to insure acceptance and safe delivery by common or other carrier at the lowest rate to the point of delivery.

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

6. NOTES

6.1 Intended use. Candelilla wax covered by this specification is intended for use in explosives.

6.2 Ordering use. Procurement documents should specify the following:

a. Title, number, and date of this specification
b. Size of lot if other than 4.2
c. Special marking if required (see 5.2).

*6.3 The margins of this specification are marked with asterisks 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 contractors 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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(Project No. 9160-N056

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/ vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE
MIL-W-181A(OS); Wax, Candelilla

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A
☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
A. GIVE PARAGRAPH NUMBER AND WORDING.

B RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3 IS THE DOCUMENT RESTRICTIVE?
] YES [☐] NO *(If "Yes", in what way?)*

4 REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

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