[METRIC]

MIL-A-202C
14 October 1981
SUPERSEDING
MIL-A-202B
18 June 1969

MILITARY SPECIFICATION

ANTHRACENE, TECHNICAL (METRIC)

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

1. SCOPE

1.1 Scope. This specification covers two classes of technical grade anthracene ($C_{14}H_{10}$).

1.2 Classification. Anthracene shall be of the following classes as specified (see 6.2):

Class 1 - Fine
Class 2 - Extra fine

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. 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.

FSC 6810

: Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed: to: Commander, US Army Armament Research and Development Command, ATTN: DRDAR-TSC-S, Aberdeen Proving Ground, MD 21010 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

SPECIFICATIONS

FEDERAL

NN-P-71 - Pallets, Material Handling, Wood, Stringer Construction, 2-Way and 4-Way (Partial)
PPP-D-705 - Drum, Shipping and Storage: Steel, 16 and 30 Gallon Capacity
PPP-D-723 - Drums, Fiber

MILITARY

MIL-B-117 - Bags, Sleeve and Tubing - Interior Packaging

STANDARDS

FEDERAL

Fed. Std. No. 123 - Marking for Shipment (Civil Agencies)

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage
MIL-STD-147 - Palletized Unit Loads

(Copies of specifications, standards, drawings and publications required by contractors 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 otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

ASTM STANDARDS

D1193 - Reagent Water
E11 - Wire-Cloth Sieves for Testing Purposes

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

(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 Assay. Anthracene shall have an assay of no less than 80 percent by weight when tested as specified in 4.2.4.1.

3.2 Granulation characteristics. Anthracene shall conform to the applicable granulation characteristics of table I when tested as specified in 4.2.4.2.

TABLE I. Granulation characteristics

Sieve size	Percent by weight passing through			
	Class 1		Class 2	
	Minimum	Maximum	Minimum	Maximum
US Sieve No. 20	99.0	----	----	----
US Sieve No. 40	----	----	99.9	----
US Sieve No. 50	80.0	94.0	----	----
US Sieve No. 60	----	----	80.0	----
US Sieve No. 80	50.0	75.0	----	----

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor 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 specified requirements.

4.2 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the anthracene produced by one manufacturer, at one plant, from the same materials, and under essentially the same manufacturing conditions provided the operation is continuous. In the event the process is a batch operation, each batch shall constitute a lot (see 6.3).

4.2.2 Sampling.

4.2.2.1 For examination of level A packaging. Sampling shall be conducted in accordance with MIL-STD-105.

4.2.2.2 For anthracene test (see 6.5). Sampling shall be conducted in accordance with table II. A representative specimen of approximately 450 grams (g) shall be removed from each sample container and placed in a suitable clean, dry container labeled to identify the lot and container from which it was taken.

TABLE II. Sampling for test

Number of containers in batch or lot	Number of sample containers
2 to 25	2
26 to 150	3
151 to 1,200	5
1,201 to 7,000	8
7,001 to 20,000	10
Over 20,000	20

4.2.2.3 For level A packaging container leakage test. Sampling shall be conducted in accordance with MIL-STD-105.

4.2.3 Inspection procedure.

4.2.3.1 For examination of level A packaging. The sample unit shall be one filled shipping container ready for shipment. Sample shipping containers shall be examined for the following defects grouped collectively using an AQL of 2.5 percent defective:

(a) Contents per container not as specified
(b) Container not as specified
(c) Container closure not as specified
(d) Container damaged or leaking
(e) Marking incorrect, missing, or illegible
(f) Bag liner incorrect or missing
(g) Unitization not as specified

4.2.3.2 For anthracene test. Each sample specimen taken in 4.2.2.2 shall be tested as specified in 4.2.4. Failure of any test by any specimen shall be cause for rejection of the lot represented.

4.2.3.3 For level A packaging container leakage test. The sample unit shall be one container. The sample containers selected in 4.2.2.3 shall be tested as specified in 4.2.5 using an AQL of 2.5 percent defective.

4.2.4 Anthracene tests (see 6.5). Water in accordance with ASTM D1193 and reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as follows:

4.2.4.1 Assay. Weigh to the nearest 0.1 milligram (mg) approximately 1 g of the specimen into a 500-milliliter (ml) flask equipped with a reflux condenser. Add 45 ml of glacial acetic acid and reflux for 2 hours. During the 2 hours, add slowly and at approximately equal intervals, a solution of 15 g of chromic oxide (Cr_2O_3) in a mixture of 10 ml of water and 10 ml of glacial acetic acid. After the oxidizing solution has been added, reflux for another 2 hours. Allow

to cool and let stand at room temperature for 12 hours. Add 400 ml of water and let the resulting suspension stand for 2 hours. Filter the precipitate and wash first with cold water, then with a boiling 1-percent sodium hydroxide solution, and finally with 300 ml of boiling water. Wash the residue from the filter into a large evaporating dish and evaporate to dryness on a steam bath. Dissolve the residue in ten times its weight of concentrated sulfuric acid. Heat on a water bath for 10 minutes and then let stand at room temperature for 12 hours. Carefully add 200 ml of water and then filter the resulting suspension. Wash with cold water, then with a boiling 1-percent sodium hydroxide solution, and finally with 400 ml of boiling water. Wash the residue from the filter into a small evaporating dish and evaporate to dryness on a steam bath. Cool to room temperature in a desiccator and weigh to the nearest 0.1 mg. Carefully heat the dish until the anthraquinone has sublimed (anthraquinone begins to sublime at approximately 286°C), cool to room temperature in a desiccator, and weigh to the nearest 0.1 mg. Calculate the percent anthracene on a wet basis as follows:

$$\text{Percent anthracene} = \frac{85.6(A - B)}{W}$$

where: A = Weight of dish and contents prior to sublimation of the anthraquinone in grams,
B = Weight of dish and contents after the sublimation of the anthraquinone in grams, and
W = Weight of specimen in grams.

4.2.4.2 Granulation characteristics. Nest the applicable sieves specified in table I and conforming to ASTM E11 in order of increasing fineness with the coarsest sieve on top. Place the nest of sieves on a bottom pan. Weigh to the nearest 0.01 g approximately 100 g of the specimen and transfer to the top sieve. Cover the top sieve and shake the sieve assembly for 3 minutes by means of a mechanical shaker geared to produce 300 ± 15 gyrations and 150 ± 10 taps of the striker per minute. Weigh the portions retained on each sieve and calculate the percent passing through each sieve.

4.2.5 Container leakage test. Place the drum on its side and roll it a distance of approximately 2 meters forwards and 2 meters backwards. Open the drum and inspect the bag liner for evidence of leakage (sifting of contents from the bag).

5. PACKAGING

5.1 Unit packing. Anthracene shall be unit packed level A or for interplant shipment as specified (see 6.2).

5.1.1 Level A. A quantity of 91 (+1 or -0) kilograms (kg) of anthracene shall be unit packed in a fiber drum furnished with a bag liner. The drum shall conform to type II, grade A, class 3 of PPP-D-723 except that the plies of the sidewall shall be continuously bonded together by water-resistant,

hot-melt adhesive. Alternately, a steel drum conforming to type V of PPP-D-705 shall be used. The bag liner shall be sized to fit the drum and shall conform to type I, class C, style optional of MIL-B-117. The bag shall be closed by tying, knotting, or heat sealing. The drum shall be tightly closed in accordance with the drum manufacturer's instructions. The drum shall not leak when tested as specified in 4.2.5.

5.1.2 Interplant shipment. A quantity of 91 (+1 or -0) kg of anthracene shall be unit packed to prevent damage in shipment from the supply source to the first receiving activity for immediate use or further processing. Containers shall be in accordance with the rules and regulations applicable to the mode of transportation.

5.2 Packing. Anthracene unit packed level A and for interplant shipment as specified in 5.1 shall require no further protection, aside from unitization, for shipment.

5.3 Unitization. Level A packs of anthracene shall be palletized in accordance with MIL-STD-147 using the softwood pallet conforming to type IV of NN-P-71. Interplant shipments shall be palletized to assure carrier acceptance and safe delivery to destination.

5.4 Marking. Level A containers and pallet loads shall be marked in accordance with MIL-STD-129. Interplant shipments shall be marked in accordance with Fed. Std. No. 123 and shall include the contract or purchase order number. All containers shall be marked to show the date of manufacture of contents and lot or batch number. In addition, each container shall be marked to show the following precautionary information:

WARNING!
COAL TAR PRODUCTS (ANTHRACENE)
HARMFUL TO THE SKIN, OR IF INHALED OR SWALLOWED
CAUSES BURNS OF EYES, SKIN, OR OTHER TISSUES AND MAY CAUSE CANCER

Do not breathe dust, fume, or vapor.
Do not get in eyes, on skin, or on clothing.
Do not take internally.
Use only with adequate ventilation.
Wear goggles, face shield, gloves, and protective clothing when handling.

6. NOTES

6.1 Intended use. The anthracene covered by this specification is intended for use in the manufacture of pyrotechnic mixtures.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number and date of this specification
(b) Class of anthracene required (see 1.2)
(c) Level of packing required (see 5.1)

6.3 Batch. A batch is defined as that quantity of material which has been manufactured by some unit chemical process or subjected to some physical mixing operation intended to make the final product substantially uniform.

6.4 Significant places. For the purpose of determining conformance with this specification, an observed or calculated value shall be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of ASTM E29.

6.5 Sampling and testing precautions. Caution. Several of the coal tar pitch volatiles other than anthracene are recognized carcinogens. Because this product may contain other coal tar products as impurities, caution must be taken in its handling. The following procedures should be developed to control worker exposure during sampling, quality assurance, and testing procedures:

(a) Provide engineering controls (local exhaust ventilation, fume hoods) so that exposure to anthracene is below the recommended Threshold Limit Value (TLV) of 0.2 mg per cubic meter for coal tar pitch volatiles.

(b) A respirator is required when particulate or vapor concentration exceeds 0.2 mg per cubic meter, during maintenance procedures involving short-term high exposure levels, and in emergencies. A respiratory protective program should be initiated in accordance with TB Med 223 and should include proper fitting of NIOSH or MESA approved respirators, training of personnel in the use of respirators, and maintenance of respirators.

(c) Provide protective clothing and equipment to prevent skin or eye contact with anthracene. Supply chemical safety goggles, gloves, aprons, and shoes as needed. Institute procedures for proper handling and cleaning of contaminated clothing and equipment.

(d) Initiate a sampling program to monitor worker exposure to anthracene.

(e) Inform personnel of the health hazards associated with anthracene and train personnel on the safe handling and use of anthracene, the operation and use of personal protective equipment, and emergency procedures if a spill occurs.

Custodians:

Army - EA
Navy - OS

Preparing activity:

Army - EA

Project No. 6810-B241

Review activities:

Army - AR, MD, MI
DLA - GS

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5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
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