

**MIL-C-13724A**

4 MAY 1960

SUPERSEDING

MIL-C-13724 (CmlC)

22 OCTOBER 1954

MIL-C-19008A (Ships)

3 MARCH 1958

**MILITARY SPECIFICATION****CHARCOAL, ACTIVATED, IMPREGNATED, ASC**

*This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.*

**1. SCOPE**

1.1 **Scope.** This specification covers one type of impregnated charcoal.

1.2 **Classification.** The charcoal shall be furnished in one of the following grades as specified (see 6.2). Grade I and grade II differ only in moisture content and particle size.

Grade I

Grade II

**2. APPLICABLE DOCUMENTS**

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

**SPECIFICATIONS****FEDERAL**

RR-S-366 — Sieves, Standard for Testing Purposes.

**MILITARY**

MIL-C-10116 — Canister, Combat, Mil.

**STANDARDS****MILITARY**

MIL-STD-105 — Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 — Marking for Shipment and Storage.

(Copies of specifications, standards, drawings, and publications 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 publication.** The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

FSC 6810

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## INTERSTATE COMMERCE COMMISSION

49 CFR 71-90 — Interstate Commerce Commission Rules and Regulations for the Transportation of Explosives and Other Dangerous Articles.

(The Interstate Commerce Commission regulations are now a part of the Code of Federal Regulations (Rev. 1956) available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Orders for the above publication should cite "49 CFR 71-90 (Rev. 1956).")

## 3. REQUIREMENTS

3.1 **Preaward sample.** Prior to consideration of bids, a supplier shall submit at no cost to the Government a preaward sample of 25 pounds of impregnated charcoal for evaluation (see 6.8).

3.1.1 *Certification.* The supplier shall certify that the activated charcoal used in the preparation of the preaward sample is representative of the activated charcoal that will be used during subsequent production of impregnated charcoal.

3.2 **Particle size.** The charcoal shall conform to the particle size requirements shown in table I when tested as specified in 4.6.1.

TABLE I. Particle size

Distribution	Percent by weight	
	Grade I	Grade II
Passing No. 8 sieve		
Retained on No. 12 sieve .....	0 to 2	...
Retained on No. 10 sieve .....	...	0
Passing No. 10 sieve .....		
Retained on No. 12 sieve .....	...	0 to 0.5
Passing No. 12 sieve		
Retained on No. 16 sieve .....	10 to 80	10 to 30
Passing No. 16 sieve		
Retained on No. 20 sieve .....	40 to 65	40 to 65
Passing No. 20 sieve .....		
Retained on No. 30 sieve .....	10 to 35	10 to 35
Passing No. 30 sieve .....	0 to 2.5	0 to 0.5

3.3 **Physical properties.** The charcoal shall conform to the requirements shown in table II when tested as specified in 4.6.2.

TABLE II. Physical properties

	Grade I		Grade II	
	Minimum	Maximum	Minimum	Maximum
Hardness .....	80	...	80	...
Loss in weight on heating (8 hours at 150° ± 5°C.) .....	...	2.0 percent	...	0.5
Ammonia (Mg. NH <sub>3</sub> /liter of air/100 ml. of charcoal)	...	0.005	...	0.005
Bulk density (gm./ml.) .....	...	0.57	...	0.57

3.4 **Gas sorption.** The charcoal shall conform to the gas sorption requirements

shown in table III when tested as specified in 4.6.3.

TABLE III. *Life in minutes (minimum)*

Agents	Unaged (average)	Aged (average)	Rough handled
Chloropicrin .....	20	...	18
Hydrocyanic acid .....	25	...	...
Phosgene .....	25	...	...
Cyanogen chloride .....	80	40% of unaged	...
Arsine .....	45	...	...

Note. Unless otherwise specified, the rough-handling test shall be performed only on the preaward sample and first production lot.

#### 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 test 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 supplies and services conform to prescribed requirements.

4.1.1 *Supplier's responsibility.* The supplier is responsible for the examination and testing as prescribed herein, except for those examinations and tests reserved for performance by the Government.

4.1.2 *Government's responsibility.* The Government shall be responsible for the tests as specified in 4.4.1 and 4.6.3.

4.2 **Objective evidence.** The supplier shall present objective evidence, as required by the Government representative, that all materials are in accordance with 3.1.1 and section 5 (see 6.3).

4.3 **Substitute inspection (including testing) procedures.** The supplier may utilize any substitute inspection procedure which will assure equal or better quality by sub-

mitting a written proposal with justification and obtaining written approval from the Government prior to its institution. In case of dispute, the procedures of this specification will govern.

#### 4.4 Preaward sample inspection.

4.4.1 *Destruction tests.* The preaward sample shall be tested as specified in 4.6.

4.4.2 *Acceptance/rejection criteria.* The preaward sample shall meet the tests specified in 4.6 to be acceptable. Failure of the preaward sample to meet the requirements of this specification will be cause for rejecting the supplier's bid.

#### 4.5 Inspection provisions for regular production.

4.5.1 *Lotting.* A lot shall consist of not more than 500 cubic feet of impregnated charcoal produced without change in materials by one manufacturer by one continuous process or in successive increments by the same intermittent process.

4.5.1.1 *Sublot.* Each lot shall be divided sequentially as drums are filled into sublots of approximately 100 cubic feet.

#### 4.5.2 Sampling.

4.5.2.1 *Nondestructive examination.* Sampling shall be conducted in accordance with Standard MIL-STD-105.

**MIL-C-13724A****4.5.2.2 Destructive testing.**

**4.5.2.2.1 Sublot.** A sample of two drums shall be taken at random from each sublot. A representative 5-pound specimen shall be removed from each drum and placed in a separate, clean, dry container. The container shall then be sealed with an airtight closure and labelled to identify the specimen with the drum and sublot represented. Each drum specimen shall be tested in accordance with 4.6.1 and 4.6.2.1.

**4.5.2.2.2 Production lot.** Equal portions of each sublot specimen which complies with the requirements for particle size (4.6.1) and loss in weight on heating (4.6.2.1) shall be combined and mixed thoroughly to form a composite lot sample of not less than 30 pounds. The composite sample shall be divided into two portions, one of which shall be not less than 20 pounds. The 20-pound portion shall be forwarded to the Government laboratory for gas-sorption tests (4.6.3) and the remaining portion shall be subjected to the tests specified in 4.6.2.2, 4.6.2.3, and 4.6.2.4.

**4.5.3 Examination.** Sample containers from the regular production lots shall be examined in accordance with the classification of defects and with Standard MIL-STD-105.

**4.5.4 Classification of defects.****4.5.4.1 Preparation for delivery (sec. 5).***Categories — Defects**Critical — None**Major — AQL 4.0 percent defective*

101. Container damaged.
102. Container closure incorrect.
103. Marking missing, incorrect, or illegible.

**4.6 Tests.** Tests shall be conducted in accordance with the following procedures:

**4.6.1 Particle size.** Nest a set of the specified sieves (3.2) conforming to Specification RR-S-366, in order of decreasing mesh size, placing the sieve with largest mesh size on top and a receiving pan at the bottom. By means of a riffle or by quartering, reduce the specimen to approximately 100 grams (gm). Weigh 100 gm of the specimen to the nearest 0.1 gm and place it in the top sieve. Cover and shake for 3 minutes using a mechanical shaker geared to produce  $300 \pm 15$  gyrations and  $150 \pm 10$  taps of the striker per minute. Weigh the portions retained or passed by the sieves, as required, and calculate the results on a percentage basis.

**4.6.2 Physical properties.**

**4.6.2.1 Loss in weight on heating.** Weigh 10 gm of the specimen to the nearest milligram (mg), in a tared flat form, weighing bottle, approximately 3 inches in diameter. Dry for 3 hours in an oven at a temperature of  $150^{\circ} \pm 5^{\circ}\text{C}$ . Cool in a desiccator and weigh. Calculate the loss in weight as follows:

$$\text{Percent loss in weight} = \frac{100 A}{W}$$

where:

- A = loss in weight on heating.  
W = weight of specimen.

**4.6.2.2 Hardness.** The composite specimen shall be sieved one or more times by the procedure outlined in 4.6.1. Weigh  $50 \pm 0.5$  gm of the charcoal which passes a 1680-micron (No. 12) sieve and is retained on 1190-micron (No. 16) sieve and place it in a hardness-testing pan (see fig. 1) with fifteen  $\frac{1}{2}$ -inch and fifteen  $\frac{3}{8}$ -inch smooth steel balls. From a nest of sieves arranged as specified in 4.6.1, remove the bottom sieve. Replace this sieve with the hardness pan and place the assembly on the mechanical shaker. Shake for  $30 \pm 1$  minutes with the tapper in operation. At the end of the  $30 \pm 1$  minutes, carefully brush all the charcoal on to an

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840-micron (No. 20) sieve and place the assembly on the mechanical shaker and shake for exactly 3 minutes with the tapper in operation. Weigh the charcoal remaining on the 840-micron sieve. The weight in grams of charcoal retained on the 840-micron sieve, multiplied by 2, is considered the hardness.

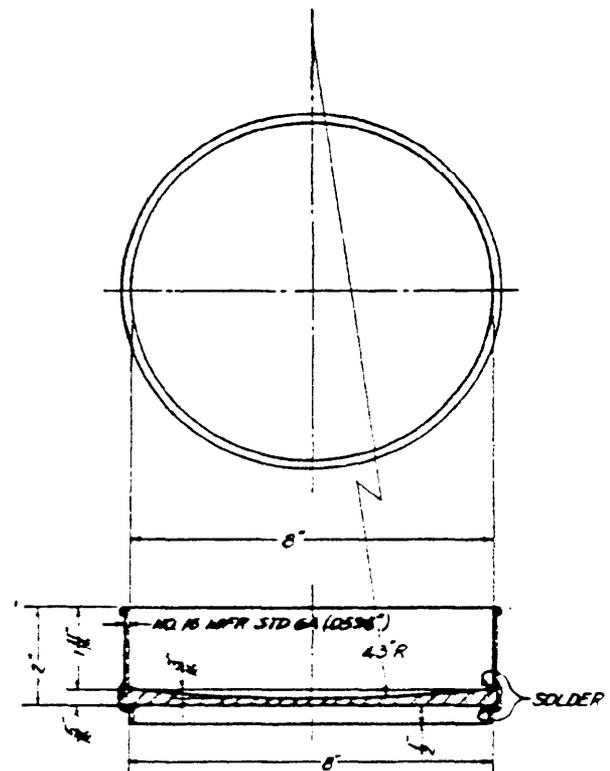
4.6.2.3 *Bulk density.* The bulk density shall be determined using Chemical Corps Inspection Apparatus, Meter, Volume, Chemical Container Q23.

4.6.2.4 *Ammonia content.* The ammonia content shall be determined using Chemical Corps Apparatus, Ammonia Content in Charcoal, Testing, Q3.

#### 4.6.3 Gas sorption.

4.6.3.1 *Test specimens.* Twenty M11 canisters, minus the filter element and bottom cover, shall be used in gas life determination. Twenty complete M11 canisters for rough handling determination and aging test shall be manufactured in accordance with Specification MIL-C-10116 except that the corrosion-resistant coating may be omitted in the manufacture of canister components. Tests on humidified canisters shall be con-

ducted within 24 hours after humidification. All canisters shall be tightly stoppered and sealed and placed in an airtight container and stored at room temperature until tested.



4.6.3.2 *Test conditions.* Test conditions for the gas sorption tests specified in 4.6.3.3 shall be as shown in table IV.

TABLE IV. Test conditions

Gas	Chloropicrin	Hydrocyanic acid	Phosgene	Cyanogen chloride	Arsine
Percent relative humidity of test gas .....	50	50	50	80	80
Concentration of test gas (mg./l.) <sup>1</sup> .....	50 ± 5%	10 ± 5%	20 ± 5%	4 ± 5%	10 ± 5%
Flow rates (l./min) .....	32 <sup>2</sup>	32 <sup>2</sup>	32 <sup>2</sup>	50 <sup>2</sup>	50 <sup>2</sup>
Moisture in charcoal .....	As received, (2.0% max.)			Humidified at 80 ± 3 percent relative humidity.	
Temperature of test room (minimum) .....	70° F.				
Equipment .....	Apparatus, All Purpose, Gas Life Testing, Q2				

<sup>1</sup> Constant flow.

<sup>2</sup> Intermittent flow.

<sup>3</sup> A variation of ± 5 percent in the concentration will be allowed in making the test. However, the gas life results of the charcoal under test shall be corrected to the concentrations tabulated above. This will be known as the corrected gas life.

**MIL-C-13724A****4.6.3.3 Procedure.**

**4.6.3.3.1 Unaged charcoal.** Test 4 canisters, prepared as specified in 4.6.3.1, against each gas under the applicable conditions specified in table IV. The corrected gas life mean shall not be less than the applicable value shown in table III for each gas. No group of 4 corrected gas life results will be used for calculating the corrected gas life mean unless the lowest value observed is not less than 85 percent of the uppermost value for cyanogen chloride and not less than 90 percent for the other gases in table III, expressed to the nearest minute. When any set of gas life test results is discarded because of deviation from the ranges prescribed above, a new set of 4 canisters will be prepared and the test repeated.

**4.6.3.3.2 Aged charcoal.** Subject 4 canisters prepared as specified in 4.6.3.1 to accelerated aging. Prior to aging the canisters shall be equilibrated at a relative humidity of  $80 \pm 3$  percent using Chemical Corps Apparatus, Canisters, Humidifiers. The canisters shall then be aged for 7 days in air at a temperature  $114^\circ \pm 2^\circ\text{F}$ . and a relative humidity of  $85 \pm 5$  percent. (Canisters should be aged lying down on their sides with inlet openings unobstructed and the outlets or nozzles stoppered or closed with a steel cap or cap closure. Weight change shall not exceed 5 gm during aging.) After aging, the canisters shall be reequilibrated at a relative humidity of  $80 \pm 3$  percent. Test the aged canisters against cyanogen chloride under the applicable conditions specified in table IV. The corrected gas life mean shall not be less than the applicable value shown in table III for cyanogen chloride. No set of corrected gas life results will be used for calculating the gas life mean unless the lowest value observed is not less than 85 percent of the uppermost value expressed to the nearest minute. When a set of gas life test results is discarded because of deviation from the range prescribed above, a new set of 4 canisters will be prepared and the test repeated.

**4.6.3.3.3 Rough handled charcoal.** Subject 16 canisters, prepared as specified in 4.6.3.1 (see 6.4), to the rough-handling test specified in Specification MIL-C-10116. Examine the canisters to ascertain that there are no visible defects which could affect gas life tests. Test the rough handled canisters against chloropicrin under the applicable conditions specified in table IV. The corrected gas life mean minus 1.1 times the gas life standard deviation shall not be less than the applicable value shown in table III for chloropicrin.

**4.7 Acceptance/rejection criteria.**

**4.7.1 Sublot.** If any specimen fails to comply with the requirements for particle size and loss in weight on heating, a retest shall be made for that test in which failure occurred. If any specimen fails on retest, the sublot shall be rejected.

**4.7.2 Lot.** If the composite specimen fails to meet the requirements of 3.3 and 3.4, the lot shall be rejected.

**5. PREPARATION FOR DELIVERY**

**5.1 Level A packing.** The charcoal shall be packed in 55-gallon fully removable head drums conforming to ICC Specification 37A.

**5.2 Marking.** In addition to any special marking required by the contract or order, shipping containers shall be marked in accordance with applicable requirements of Standard MIL-STD-129 and ICC Regulations. Also, each drum shall be numbered sequentially in order of filling for each contract.

**6. NOTES**

**6.1 Intended use.** The material covered by this specification is intended for the following uses:

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- (a) Gas mask canisters.
- (b) Gas filters.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Grade of charcoal required.
- (c) That the charcoal be purchased on a dry basis.
- (d) Laboratory to which the preaward sample should be furnished.

6.3 Objective evidence. Provisions for objective evidence and inspection records, and maintenance of inspection records will be specified by the procuring activity.

6.4 Charcoal for rough-handling test. Canisters for the rough-handling test should be filled with charcoal which complies with all other requirements of this specification.

6.5 Sample mean. The mean (average) gas life of a series of observations is their numerical sum divided by the number of observations. Example: The mean of the following series, 11-14-13-14-10-15-12-14-11-13 is their sum (127) divided by the number of observations (10) in the series or 12.7.

6.6 Suppression data. Grade II of Specification MIL-C-13724A was formerly grade IA of Specification MIL-C-19008A (Ships).

6.7 Precautions. Care should be taken to avoid unnecessary exposure of samples to the air.

6.8 Laboratory impregnation. Chemical Corps Directive 610 outlines a method that can be used to impregnate charcoal on a laboratory basis. This directive is furnished only as a suggested method of impregnation and is not mandatory for use. Regardless of the method used for impregnation, the requirements of the specification must be met.

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 in any way be related thereto.

**Custodians:**

Army—Chemical Corps  
Navy—Bureau of Ships  
Air Force

**Preparing activity:**

Army—Chemical Corps