

MIL-STD-652D (AR)  
NOTICE 5  
29 August 1984

MILITARY STANDARD

PROPELLANTS, SOLID FOR CANNONS  
REQUIREMENTS AND PACKING

TO ALL HOLDERS OF MIL-STD-652D (AR):

1. THE FOLLOWING PAGES OF MIL-STD-652D (AR) HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
1	29 Aug 84	1	13 Mar 81
2	29 Aug 84	2	13 Mar 81
5	29 Aug 84	5	13 Mar 81
6	29 Aug 84	6	27 Oct 82
7	29 Aug 84	7	27 Oct 82
8	29 Aug 84	8	27 Oct 82
9	29 Aug 84	9	21 Nov 83

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-652D (AR) will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the Military Standard is completely revised or canceled.

Custodian:  
Army-AR

Preparing Activity:  
Army-AR

(Project 1376-A256)

## MIL-STD-652D (AR)

## 1. SCOPE

1.1 This Standard covers the chemical, physical and packing requirements for cannon propellants. The ballistic requirements for the detailed propellants are covered in their detailed specifications.

1.2 Purpose. The purpose of this Standard is to provide a single publication as a Military Standard containing requirements and tests pertinent to the propellants.

1.3 Classification. The propellant shall be of the following forms and types as specified:

FORM A	FLAKE
FORM B	SHEET
FORM C	GRAIN

Cylindrical multiple-perforated grain (MP) (Type I)  
Cylindrical single-perforated grain (SP) (Type II)

## 2. REFERENCED 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 Standard to the extent specified herein.

## SPECIFICATIONS

## MILITARY

MIL-D-98	Diphenylamine
MIL-G-155	Graphite
MIL-P-156	Potassium Nitrate
MIL-B-162	Barium Nitrate
JAN-W-181	Wax, Candelilla
MIL-P-193	Potassium Sulfate (For Ordnance Use)
MIL-D-204	Dinitrotoluene (For Use in Explosives)
MIL-D-218	Dibutylphthalate (Technical)
JAN-D-242	Diethylphthalate (For Use in Explosives)
MIL-N-244	Nitrocellulose
MIL-N-246	Nitroglycerin
MIL-E-255	Ethyl Centralite (Carbamite)
MIL-N-494	Nitroguanidine (Picrite)
MIL-R-3065	Rubber, Fabricated Products
MIL-N-3399	2-Nitrodiphenylamine
MIL-L-18618	Lead Carbonate, Basic Dry (For Ordnance Use)
MIL-C-70469	Container, Steel
MIL-C-70470	Container, Fiber

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## STANDARDS

## MILITARY

MIL-STD-105 Sampling Procedures and Tables for  
Inspection by Attributes  
MIL-STD-286 Propellants, Solid: Sampling,  
Examination and Testing  
MIL-STD-1235 Single and Multilevel Continuous  
Sampling Procedures and Tables for  
Inspection by Attributes

## DRAWINGS

76-4-53 Box, Steel, M2 for Smokeless Powder,  
Assembly  
76-4-55 Box, Steel, M2 for Smokeless Powder,  
Detail  
9282946 Marking Diagram and Sealing of Steel  
Packing Boxes for Shipment of  
Propellants  
138439 Packing Box, MARK 7  
138441 Packing Box, MARK 7 Cover Details  
9342857 Container, Fiber  
9345265 Container, Steel  
9381476 Packing and Marking for Container, Steel  
for Bulk Propellants  
9381477 Packing and Marking for Container, Fiber  
for Bulk Propellants

(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.

CODE OF FEDERAL REGULATIONS, Title 49, Transportation  
Parts 100-199

American Society for Testing and Material ASTM-D2000-Elastomeric  
Materials for Automotive Applications Classification System.

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(The Code of Federal Regulations is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Orders should specify "49 CFR 100-199 (latest revision). (ASTM from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103).

### 3. DEFINITIONS

#### 3.1 Not applicable

### 4. GENERAL REQUIREMENTS

4.1 Constituent material. -The constituent materials shall comply with the requirements of the applicable specification as follows.

#### Constituent Material

#### Conforming to Specification

Wax, Candelilla	JAN-W-181
Barium Nitrate	MIL-B-161, Class 3
Dibutylphthalate	MIL-D-218
Diethylphthalate	JAN-D-242
Dinitrotoluene	MIL-D-204
Diphenylamine	MIL-D-98
Ethyl Centralite	MIL-E-255, Class 2 or Class 3 (see note)
Graphite	MIL-G-155, Grade III or IV
Nitrocellulose	MIL-N-244, (See Table III)
Nitroglycerin	MIL-N-246, Type I
Nitroguanidine	MIL-N-494, Class to be specified in contract
Potassium Nitrate	MIL-P-156, Class 2 or 3
Potassium Sulfate	MIL-P-193, Type I
2-Nitrodiphenylamine	MIL-N-3399
Lead Carbonate	MIL-L-18618
Cryolite (Technical) sodium aluminum fluoride.)	COMMERCIAL GRADE

NOTE: Any class permitted when added in solution (1)

#### 4.2 Form and dimension

4.2.1 Flake propellant shall conform to the requirements listed in the detail propellant specification or drawings (see 4.2.5.2.

4.2.2 Sheet propellant shall conform to the requirements listed in the detail propellant specification or drawing.

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#### 4.2.3 Grain

4.2.3.1 Type I. -The grain shall be cylindrical with 7 longitudinal perforations, one in the center of the grain and six at the vertices of a symmetrical hexagon.

4.2.3.2 Type II. -The grain shall be cylindrical with a single longitudinal perforation through the center of the grain.

4.2.3.3 The following requirements regarding grain dimensions shall govern unless authorization for departure is given by the procuring activity concerned prior to manufacture of the propellant.

##### 4.2.3.3.1 Length: Diameter Ratio.

4.2.3.3.1.1 Type I. The average grain length (L) shall be from 2.10 to 2.50 times the average grain diameter (D).

4.2.3.3.1.2 Type II. -The average grain length (L) shall be from 3.0 to 6.0 times the average grain diameter (D).

4.2.3.3.1.3 The length and diameter of grain shall comply with either the mean variation or the standard deviation uniformity requirements shown in Table I.

TABLE I

Mean variation and standard deviation of individual dimensions expressed as a percentage of the mean dimension.

<u>Acceptance Criterion Dimensions</u>	<u>Percent Mean Variation</u>	<u>Standard Deviation</u>
	Maximum	
Length	6.25	6.25
Diameter (grains 0.2 inch or more in diameter)	3.125	4.75
Diameter (grains less than 0.2 inch in diameter)	6.25	6.25

##### 4.2.3.3.2 Grain diameter. -perforation diameter ratio.

4.2.3.3.2.1 Type I. -The average grain diameter (D) shall be from 5.0 to 15 times the average diameter of the perforation (d).

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4.2.3.3.2.2 Type II. The average grain diameter (D) shall be approximately three times the average diameter of the perforation (d).

4.2.3.3.2.3 Web measurements.

4.2.3.3.2.3.1 Type I. The difference between the average outer web thickness ( $W_o$ ) and the average inner web thickness ( $W_i$ ) shall not exceed 15 percent of the average web thickness ( $W_a$ ).

4.2.3.3.2.3.2 Type II. The standard deviation of the web measurements, expressed as a percent of the average web measurement, shall not be greater than 20 percent.

4.2.4 Form. Determination of the form of the propellant shall be by visual examination.

4.2.5 Dimensions.

4.2.5.1 Thirty normal grains of propellant shall be selected at random and tested as specified in paragraph 5. If the sample fails to comply with the requirements, the lot shall be rejected.

4.2.5.2 Flakes. Sixty flakes shall be examined as specified in method 504.5 of MIL-STD-286 for length or thickness and diameter.

4.2.5.3 Sheets. The dimensions of the sheets shall be tested as specified in the applicable drawing or item specification.

4.2.6 Total graphite content, when applicable. The total graphite content shall not exceed 0.55 percent.

4.3 Packing

4.3.1 Level A. The propellant shall be packed in containers conforming to Drawings 76-4-53, 138439 or 9345265. Each container shall be marked, sealed and tested in accordance with Drawings 9282946 or 9381476 as applicable. The net weight of propellant in the container shall not exceed 160 pounds provided the propellant surface is one (1) inch minimum below top surface of the container. The tolerance for the established net weight of any given propellant or propellant lot shall be plus or minus one pound.

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4.3.1.1 Immediately prior to filling all containers listed in 4.3.1 shall withstand a 1/2 to 1 psi air pressure test for a minimum of 15 seconds without leakage. The containers shall be tested by a method satisfactory to the contracting officer's representative.

4.3.1.2 When replacing cover gaskets for the M2 Steel Box, Dwg. 76-4-55, solid rubber gaskets as described on Dwg. 138441 for the MK7 Packing Box (Navy) may be used in lieu of Gasket Part No. 76-4-55H. Solid rubber gaskets shall comply with Specification MIL-R-3065 and RN-715 or RS-715 of Standard MIL-STD-417.

4.3.1.3 Calibration. The amount of propellant selected for use as Master Calibration Lot or Reference Calibration Lot in accordance with TECOM Regulation 702-1 shall be packed in Level A containers (see 4.3.1).

4.3.1.4 Level A packing. The propellant M2, M5, M9, M10, M26 and M26E1 shall be packed in Level A containers, unless otherwise specified by the Contracting Office (see 4.3.1).

4.3.2 Level B. The propellant shall be packed as specified in 4.3.1 except that containers conforming to 9342857 may also be used. If a 9342857 fiber container is used, marking and sealing shall be in accordance with Dwg. 9381477 and storage not to exceed five years.

4.3.3. Level C. Level C shall be the same as Level B, paragraph 4.3.2 above.

4.3.3.1 Marking. In addition to marking required by applicable drawings, any other marking which may be required in Code of Federal Regulations, Title 49, paragraph 100-199 shall be added.

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4.4 Sampling for testing.

4.4.1 Sampling plans and procedures for the following classifications of defects shall be in accordance with Standard MIL-STD-105. Standard MIL-STD-1235 may be used if approved by the procuring activity. Also, at the option of the procuring activity, AQL's and sampling plans may be applied to the activity, AQL's and sampling plans may be applied to the individual characteristics listed using an AQL of 0.40 percent for each major defect and an AQL of 0.65 percent for each minor defect.

4.4.1.1 Container prior to filling (as applicable) (see Drawings 76-4-53, 138439, and 9345265.)

	Categories	Defects	Method of Inspection
Critical:	None Defined		
Major:	Class AQL 1.00 percent		
101	Foreign material, propellant or corrosion		Visual
102	Gasket missing or damaged		Visual
103	Holes in cover or end		Visual
104	Locking device damaged		Visual
105	Bare areas on exterior coating of metal container, the sum of which is in excess of 1/2 square inch		Visual
Minor:	Class AQL 6.50 Percent		
201	Protective finish incomplete		Visual
202	Large dents or damaged seam		Visual

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4.4.1.2 Fiber container before filling (see dwg 9342857).

Categories	Defect	Method of Inspection
Critical: None defined		
Major: Class AQL 1.00 percent		
101	Foreign material	Visual
102	Gasket missing or damaged	Visual
103	Holes in cover or end	Visual
104	Locking device damaged	Visual
105	Bare area on exterior coating of the chime. The sum of which is in excess of 1 1/2 square inch	Visual

Minor: AQL 0.65 percent

201	Poor workmanship, such as: nicks, dents, body bulged or scratches	Visual
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4.4.1.3 Applicable to reusable fiber containers before filling.

Critical: None defined

Major: 100% Inspection

101	Top chime bent, deformed or cut	Visual
102	Bottom chimes collapsed (annular groove closed or partially closed) or deformed	Visual
103	Body bulged, cut or dented	Visual
104	Gasket in cover missing or damaged	Visual
105	Cover bent, creased or deformed in gasket area or around edge	Visual
106	Locking ring damaged so as to prevent closing	Visual
107	Foreign material, propellant or corrosion	Visual

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Minor: None defined.

4.4.1.4 Sealed container (as applicable) (see drawings 138439, 76-4-53, and 9345265).

Categories	Defects	Method of Inspection
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Critical: None defined

Major:	AQL 0.65 percent	
101	Holes in container . . . . .	Visual
102	Damaged seams . . . . .	Visual
103	Damaged locking devices . . . . .	Visual
104	Gasket missing or incomplete . . . . .	Visual

Minor:	AQL 1.50 percent	
201	Metallic seal missing, unsealed or improperly positioned . . . . .	Visual
202	Hardware improperly engaged . . . . .	Visual
203	Marking misleading or unidentifiable . . . . .	Visual
204	Excess dents . . . . .	Visual

4.4.1.5 Sealed fiber containers.

Categories	Defects	Method of Inspection
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Major:	AQL 0.65 percent	
101	Locking device damaged or improperly closed . . . . .	Visual
102	Holes or breaks in cover or body . . . . .	Visual
103	Damage to coating or cover . . . . .	Visual

Minor:	AQL 1.00 percent	
201	Marking misleading or unidentifiable . . . . .	Visual
202	Exterior torn or delaminated . . . . .	Visual
203	Metallic seal missing, unsealed or improperly positioned . . . . .	Visual

4.4.2 Sampling for chemical and physical testing. Ten (10) containers shall be selected at random from each lot of propellant (or less quantity as determined for actual need). One and one half (1 1/2) pounds of propellant shall be removed from each container and mixed to form a composite sample of 15 pounds. Five (5) pounds of the sample shall be forwarded to Commander, AMCCOM, ATTN: SMCAR-LCE-MP(D), Dover, NJ 07801-5001, for the 65.5 degrees centigrade (°C) surveillance test. The remaining ten pounds shall be used for the chemical and physical test. All samples shall be packed in air tight containers and shall be marked to

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