MILITARY STANDARD

PROPELLANTS, SOLID FOR CANNONS
REQUIREMENT 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NEW PAGE	DATE	SUPERSEDED PAGE	DATE
2	5 Oct 79	2	4 Aug 78
3	" "	3	" "
6	" "	6	" "
7	" "	7	" "
8	" "	8	" "
9	" "	9	" "
10	" "	10	" "
12	" "	12	" "
20	" "	20	" "
21	" "	21	" "

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.

Custodians
Army-AR

Preparing Activity
Army-AR

Project 1376-A115

FSC 1376

STANDARDS

MILITARY

MIL-STD-105	-Sampling Procedures and Tables for Inspection by Attributes (ABC-STD-105)
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

76-4-46	Box, Packing with Metal Liner, M24 for Smokeless Powder, Assembly and Details
76-4-53	Box, Steel, M2 for Smokeless Powder, Assembly
76-4-55	Box, Steel M2 for Smokeless Powder, Detail
76-4-56	Box, Packing, Metal-Wood, M17 for Smokeless Powder Assembly
9282946	Marking Diagram and Sealing of Steel Packing Packing Boxes for Shipment of Propellants
7549033	Container, Metal, Universal M25 for Propellants and Explosives Assembly and Detail
8858577	Marking Diagram and Sealing of Metal Lined Wooden Packing Boxes for Shipment of Propellants
138439	Packing Box, MARK 7
138441	Packing Box, MARK 7 Cover Details
9256486	Container, Packing PA54 Wood with Metal Liner (Modified M24 Box) for Smokeless Powder

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

2.2 Other publications. The following documents form a part of this specifiction 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.

(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, Candelilia	JAN-W-181
Barium Nitrate	MIL-B-162, 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
Posassium Sulfate	MIL-P-193, Type I
2-Nitrodiphenylamine	MIL-N-3399
Lead Carbonate	MIL-L-18618
Cyrolite (Technical sodium aluminum floride.)	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.

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 AA-715 or BA-715 of ASTM 2000.

4.3.2 Level B. - The propellant shall be packed as specified in 4.3.1 or in fiber drums as described in 4.3.2.1. Fiber drums are approved for truck or trailer on flat car (TOFC) shipment only and for storage not exceeding two years.

4.3.2.1 Fiber drums. - Fiber drums shall comply with DOT Specification 21C, 250 pounds, MINIMUM, Code of Federal Regulations, Title 49, Parts 100-199, and the following additional requirements. Size shall be 15 1/2 ± 1/2 inches in diameter by 26 ± 1 inches in height, inside dimensions. The drum shall have a 23 or 24 gauge steel cover with rubber gasket, lever locking band with provision for sealing wire and wide bottom chime (2 inch minimum formed height). All metal parts shall be hot-dipped galvanized. Top and bottom chime shall be 23 or 24 gauge steel and shall be welded. The body shall be wound with a hot melt or thermoplastic adhesive. The bottom shall be a waterproof laminated fiberboard. Body and bottom disc shall also have a laminated aluminum foil barrier. The bottom crimp shall be caulked. The finished drum with closure assembled shall be moisture proof and leak tight. The fiber drums may be reused if the drums comply with the inspection requirements of 4.4.1.3.

4.3.2.2 Alternative fiber drum. - Alternatively, fiber drums shall be constructed as specified in 4.3.2.1 except that a layer of aluminum foil 0.010 thick shall be laminated to the inside of the body and the aluminum foil between the layers of Kraft paper in the body shall not be required.

4.3.2.3 Marking. - Drums shall be marked on the sidewall only with the same information as required for the side of the box Dwg. 8858848. Alternatively, marking may be placed on a commercial water resistant label, securely and completely adhered to the side wall. The label stock shall

be white, tan or kraft color. All marking shall be with black ink using letters approximately one half inch high.

4.3.3 Palletization. Level A shipments shall be palletized when specified by the procuring activity. Palletization is not required for Level B shipments.

4.3.4 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).

4.3.5 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).

4.4 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 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 76-4-46, 76-4-53, 76-4-56, 138439, 7549033, and 9256486.

Categories	Defects	Method of Inspection
Critical:	None defined.	
Major:	AQL 0.40 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:	AQL 1.50 percent	
201	Protective finish incomplete	Visual
202	Wood split terminating at edge of board	Visual

203	Board broken or piece missing	Visual
204	Loose boards	Visual
205	Nails or staples protruding or loose	Visual
206	Split boards insufficiently nailed	Visual
207	Wood rot	Visual
208	Large dents or damaged seam	Visual

4.4.1.2 Fiber drums before filling

Categories	Defect	Method of Inspection
Critical:	None defined.	
Major:	AQL 0.40 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 inch square	Visual
Minor:	AQL 0.65 percent	
201	Poor workmanship, such as: nicks, dents, body bulged or scratches	Visual

4.4.1.3 Applicable to reusable fiber drums before filling

Categories	Defect	Method of Inspection
Critical:	None defined	
Major:	100% Inspection	
101	Top chime bent, deformed or cut	Visual
102	Bottom chimes collapsed (annular grove 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

Minor: None defined.

4.4.1.4 Sealed container (as applicable) (see drawings 7549033, 138439, 76-4-46, 76-4-53, 76-4-56 and 9256486).

Cagtegories	Defect	Method of Inspection
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 drums

Categories	Defect	Method of Inspection
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

4.4.2 Sampling for chemical and physical testing. Ten (10) containers shall be selected at random from each lot of propellant (or lesser 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, ARRADCOM, ATTN: DRDAR-LCE-MP, Dover, N.J. 07801, for the 65.5 degree 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 show the propellant designation, lot number, manufacturer, date of sampling, contract number, and number of pounds in the lot. If the sample fails to comply with the requirements the lot shall be rejected.

4.4.3 Sampling for Ballistic Testing. Ten (10) containers (or as required by item specification) shall be selected for ballistic testing at each temperature specified in the applicable item specification. The total sample size at each temperature shall consist of the weight in pounds specified on the applicable assembly drawing multiplied times the sample size (10) times the factor 1.3. The samples shall be selected from individual containers, packaged separately and shipped to the Proving Ground, if specified by the basic propellant specification. Duplicate sampling of containers shall be accomplished if necessary to prepare the required number of samples.

5. TESTING and PROCEDURES

5.1 The chemical and physical properties shall be determined as specified in Table II and conform to the requirements specified in Table III.

5.2 The composition shall be calculated on total volatiles and added ingredient free basis when required.

Methods from MIL-STD-286 for the chemical and physical properties of the propellant.

TABLE II

Properties	Methods Either/or
Nitrocellulose	209.2 209.3 209.6 209.7
Nitroglycerin(1)	208.1 208.3 208.4 208.5

Graphite Content (Glaze)	308.1
Cryolite	307.1 316.1
Surveillance Test	407.1
Candelilla Wax	228.1
Dimensions of Grains	504.1 504.5 504.6
Residual or Volatile Solvent	103.4 103.5
Total Volatiles	103.1 103.3 103.5
Moisture (3)	102.1 103.1 103.5
Hygroscopicity	503.2
Compressibility	505.1
Lead Carbonate	311.1 311.5 316.1

(1) Except that pentane methylene chloride azeotrope (Two volumes of technical grade pentane to one volume of methylene chloride) shall be used as the solvent for extraction of triple base propellant.

(2) Except that pentane methylene chloride azeotrope shall be used as the solvent for extraction.

5.3 Heat tests shall be conducted in accordance with Method 404.1, Standard MIL-STD-286. For single base propellants, the test shall be conducted at 134.5 degrees Centrigrade for M1, M6 and M14, the color of the methyl violet test paper shall not change to a salmon pink color in less than 40 minutes and shall not explode in less than 5 hours. For M10, the color of the methyl violet test paper shall not change to salmon pink color in less than 60 minutes and shall not explode in less than 5 hours. For double or triple base

TABLE III (CONTINUED)
PROPELLANT COMPOSITIONS AND CHEMICAL PROPERTIES

PROPELLANT	M26	M26A1	M30	M30A1	M30A2	M31	M31A1
Nitrocellulose	67.25 ± 1.80	68.70 ± 1.80	28.00 ± 1.30	28.00 ± 1.30	27.00 ± 1.30	20.00 ± 1.30	20.00 ± 1.30
Type	I	I	I	I	I	I	I
Grade	C	C	A	A		A	A
Nitroglycerin	25.00 ± 1.00	25.00 ± 1.00	22.50 ± 1.00	22.50 ± 1.00	22.50 ± 1.00	19.00 ± 1.00	19.00 ± 1.00
Nitroguanidine	---	---	47.70 ± 1.00	47.00 ± 1.00	46.25 ± 1.00	54.70 ± 1.00	54.00 ± 1.00
Ethyl Centralite	6.00 ± 0.50	6.00 ± 0.50	1.50 ± 0.10	1.50 ± 0.10	1.50 ± 0.10	---	---
Barium Nitrate	0.75 ± 0.20	---	---	---	---	---	---
Potassium Nitrate	0.70 ± 0.25	---	---	---	2.75 ± 0.25	---	---
Potassium Sulfate	---	---	---	1.00 ± 0.30	---	---	1.00 ± 0.30
Diphenylamine	---	---	---	---	---	---	---
Dinitrotoluene	---	---	---	---	---	---	---
Dibutylphthalate	---	---	---	---	---	4.50 ± 0.30	4.50 ± 0.30

TABLE III (CONTINUED)
PROPELLANT COMPOSITIONS AND CHEMICAL PROPERTIES

PROPELLANT	M26	M26A1	M30	M30A1	M30A2	M31	M31A1
Diethylphthalate	---	---	---	---	---	---	---
2- Nitrodiphenylamine	---	---	---	---	---	1.50 ± 0.30	1.50 ± 0.30
Graphite	0.30 ± 0.10	0.30 ± 0.10	---	---	---	---	---
Cryolite	---	---	0.30 ± 0.10	---	---	0.30 ± 0.10	---
Total Volatiles, Max.	Type I - 2.00 Type II - 1.50	Type I - 2.00 Type II - 1.50	0.50 ---	0.50 ---	0.50	0.30 ---	0.30 ---
Moisture, Max.	0.70	0.50	---	---	---	---	---
Graphite, Glaze, Max.	0.15	0.15	0.2	0.15	0.15	0.15	0.15

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