

MIL-B-20390B (MU)
20 March 1972
SUPERSEDING
MIL-B-20390A (MU)
28 May 1971

MILITARY SPECIFICATION
BOARD, AMMUNITION CONTAINER

1. SCOPE

1.1 This specification covers two types of paper board suitable for use for making spirally or convolutely wound cylinders for packaging artillery ammunition (see 6.2).

1.2 Classification

1.2.1 Types.- The material covered by this specification shall be of the following types as specified (see 6.2.1)

Type I - Virgin Kraft

Type II - Reconstituted Kraft

2. APPLICABLE 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 specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-A-2550 - Ammunition and Special Weapons, General Specification for

STANDARDS

FEDERAL

Federal Test Methods Standard No. 101 - Preservation, Packaging and Packing Materials: Test Procedures

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes (ABC-STD-105)
MIL-STD-109 - Quality Assurance Terms and Definitions
MIL-STD-129 - Marking for Shipment and Storage

FSC: 8140

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS PUBLICATIONS

- D641-49 - Conditioning Paperboard, Fiberboard and Paperboard Containers for Testing
- D646-67 - Basis Weight of Paper and Paperboard
- D685-44 - Conditioning Paper and Paper Products for Testing
- D2529-68 - Bursting Strength of Paperboard and Linerboard

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103).

3. REQUIREMENTS

3.1 Material.-The material shall be high quality paperboard, made with no liner or coating, slack sized for good glue penetration, and having a finish, density and moisture content such that the board can be formed into spirally or convolutely wound cylinders without cracking.

3.1.1 Types.-The material shall be furnished in two types:

Type I - Virgin Kraft

Type II - Reconstituted Kraft

3.2 Color.-The board shall be essentially gray to tan, but may have variations in hue and shade and may contain specks, as might be caused by making it from mixed waste papers.

3.3 Form and dimension.-The material shall be furnished in flat cut sheets or in rolls, as specified (see 6.1). Flat cut sheets shall be of the length and width specified, the tolerance on each being plus or minus (+) 1/8 inch, unless otherwise specified. Rolls shall be of the width and length (net weight or outside diameter) specified, wound on cores of the specified construction and inside diameter. Unless otherwise specified, the width tolerance shall be \pm 1/16 inch. When the material is ordered to narrow width, and unless otherwise specified, a sufficient number of strips shall be wound on a common core to produce a roll having a convenient combined width, as specified.

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3.4 Thickness, weight, and bursting strength.-For each nominal thickness specified (see 6.1), the actual thickness, basis weight, and bursting strength shall be as specified in Table I, and Table II when determined in accordance with Table III.

TABLE I - PROPERTIES RELATED TO THICKNESS
FOR TYPE I BOARD

Thickness, inches Nominal	Tolerance	Weight, pounds per 1000 sq. ft.	Bursting Strength, minimum, psi.
0.016	+ 0.002	62 + 6	48
0.017		66 - 6	51
0.018		69 7	54
0.019		73 7	57
0.020		76 8	60
0.021		80 8	62
0.022		83 8	64
0.023		86 9	66
0.024		89 9	68
0.025		93 9	70
0.026		96 10	72
0.027		100	74
0.028		103	76
0.029		107	78
0.030		110	80
0.031		114	82
0.032		117	84
0.033		120	86
0.034		124	88
0.035		127	91
0.036		130	93
0.037		133	96
0.038		136	98
0.039		139	101
0.040		142	104
0.041		144	106
0.042		147	109

NOTE: Use tolerance immediately above arrow.

TABLE II - PROPERTIES RELATED TO THICKNESS FOR TYPE II BOARD

Thickness, inches Nominal	Tolerance	Weight, pounds per 1000 sq.ft.	Bursting Strength minimum, psi
0.016	+ 0.002	62. + 6.	80.
0.025	+ 0.002	75. + 8.	108.
0.030	+ 0.002	95. + 10.	115.

In addition to the above requirements of Table II, the Type II board shall comply with the requirements of paragraphs 3.5; 3.6 and 3.7 when tested as required by Table III.

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3.5 Moisture content.-The moisture content of the board shall be between the limits of 4 percent and 7 percent, when tested as specified in Table III.

3.6 Acidity or alkalinity.-The board shall have a pH between 6.0 and 7.5, when tested in accordance with Table III.

3.7 Processability.-When specified (see 6.1), the board shall be capable of being fabricated, using the equipment and technique specified, into spirally or convolutely-wound cylindrical containers meeting the requirements of the container specification, and of passing any test(s) specified by the supplier designed to test this ability (see 4.4.1 and 6.3).

3.8 Workmanship.-The paperboard shall be free from pieces of unmacerated paper larger than 1/4 square inch in area, wax, asphalt, metallic or abrasive materials, slime, blisters, holes, tears, scuffs, wrinkles and delamination. Trimmed edges shall be clean cut. Unless otherwise specified, each roll shall be continuous and shall contain not more than two splices. Splices shall be neatly made, and shall extend the full width of the roll, and shall be flagged with colored markers.

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. Reference shall be made to Standard MIL-STD-109 in order to define terms used herein. The provisions of Specification MIL-A-2550 shall apply.

4.1.1 Submission of product.-At the time the completed lot of items deliverable under the contract is submitted to the Government for acceptance, the contractor shall supply the following information accompanied by a certificate which attests that the information provided is correct and applicable to the product being submitted:

a. A statement that the lot complies with all of the quality assurance provisions specified within this specification.

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- b. Specification number and date, together with an identification and date of changes thereto.
- c. A statement that all material purchased by the contractor meets requirements, when such material is controlled by Government or commercial specifications referenced in any of the contractual documents, and that certificates of conformance are on file and available for review.
- d. Number of items in the lot.
- e. Date submitted.
- f. Type (I or II) board submitted.

The certificate shall be signed by a responsible agent of the certifying organization. The initial certificate submitted shall be substantiated by evidence of the agent's authority to bind his principal. Substantiation of the agent's authority will not be required with subsequent certificates, unless, during the course of the contract, this authority is vested in another agent of the certifying organization.

4.2 Inspection provisions

4.2.1 Lot formation.-The term "inspection lot", as used in this specification, is defined as an essentially homogeneous collection of units of product from which a representative sample is drawn and inspected to determine conformance with applicable requirements. The sample selected shall represent only that quantity of units from which the sample was drawn and shall not be construed to represent any prior or subsequent quantities presented for inspection. Homogeneity shall be considered to exist provided the inspection lot has been produced by one manufacturer, in one unchanged process, in accordance with the same specification and same specification revision, and complies with the provisions for submission of product as specified in MIL-STD-105. Changes to the process or specification not affecting safety, performance, interchangeability, or storage, as determined by the Government, shall not be deemed to alter the homogeneity criteria specified herein, regardless of the type of sampling procedure which is being applied to determine conformance with requirements.

4.2.2 Lot size.-A lot shall consist of all the paperboard of one nominal thickness (not to exceed 20,000 pounds), which has been manufactured from the same types and proportions of ingredients by the same process, by one manufacturer, and submitted for acceptance at one time.

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4.2.3 Examination.-Random samples shall be drawn from each lot for examination of material, construction, workmanship, dimensions, count, and preparation for delivery defects, using the inspection levels and acceptable quality levels (AQLs) specified in 4.3.2.6. The lot size for purpose of determining the sample size in accordance with MIL-STD-105 shall be expressed in units of rolls or packages of sheets, as applicable, for examinations under 4.3.2.1, 4.3.2.2, 4.3.2.3, and 4.3.2.4 and in units of shipping containers for examination under 4.3.2.5. For this purpose, two or more strips slit from the same original sheet and rewound side by side onto another common core shall be considered one roll, except that for examination for slit width, each strip shall be considered a separate "narrow" roll. Unless otherwise specified, sampling by the manufacturer for inspection for the defects of 4.3.2.1 may be performed on the original material before slitting.

4.3 Inspection & Testing

4.3.1 Sampling.-Unless otherwise specified, the sampling plan for each of the following inspections and tests shall be in accordance with MIL-STD-105 (see 4.3.2.6 and 4.3.3).

Categories	Defects	Method of Inspection	Code No. (see 6.3)
Bursting Strength (see 3.4)	Major	Test	01001
Moisture Content (see 3.5)	Major	Test	01002
Acidity or Alkalinity (see 3.6)	Major	Test	01003
pH	Major	Test	01003
Weight (see 3.4)	Minor	Balance	01004
Form and Dimension (see 3.3)	Minor	Gage	01005
Thickness (see 3.4)	Minor	Gage	01006
Color (see 3.2)	Minor	Visual	01007
Workmanship (see 3.8)	Minor	Visual	01008

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4.3.2 Inspection.-The finished material shall be visually or dimensionally inspected, as applicable, for compliance with the dimensional requirements, and for workmanship. Equipment necessary for the performance of the inspections listed shall be in accordance with 4.3.4.

4.3.2.1 Appearance, workmanship and construction.-The sample unit shall be five consecutive yards of roll stock, full width of the roll, or five sheets randomly selected from a package of cut sheets. Not more than three sample units shall be taken from one roll or package of cut sheets. A sample unit shall not be taken from the first or last convolution of a roll or from the top or bottom sheet of a stack, except when sampling and inspection is performed by the manufacturer as part of the manufacturing operation. Both sides of the material shall be examined. Defects of each type shall be scored only once within each sample unit (see 4.3.1).

<u>Examine</u>	<u>Defect</u>
Form	Not in rolls or cut sheets as specified
Construction	Contains liner or coating Not slack sized
Color	Not essentially gray to tan
Workmanship	Contains piece of unmacerated paper larger than 1/4 square inch in area, wax, asphalt, metallic or abrasive material, slime, delamination, blister, hole, tear, scuff or wrinkle

4.3.2.2 Dimensional defects.-The sample unit for this examination shall be one sheet or "narrow" roll (see 4.3.1), as applicable.

<u>Examine</u>	<u>Defect</u>
Rolls	
Width	Varies from specified width by more than \pm 1/16 inch
Length (or net weight or outside diameter)	Outside specified limits
Sheets	
Length and Width	Varies from specified dimension by more than \pm 1/8 inch Not square cut

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4.3.2.3 Roll or stack formation.-The sample unit for this examination shall be one roll or one stack of cut sheets (see 4.3.1).

<u>Examine</u>	<u>Defect</u>
Assembly of roll	Not suitably restrained to prevent unwinding Material not wound evenly on roll causing wrinkles, creases or telescoping Number of slit widths on common core other than that specified
Roll core	Material or construction improper Inside diameter outside specified tolerances Extends beyond material on either end in excess of specified \pm tolerance
Unwinding of rolls	Roll not continuous More than two splices per roll Splice not evenly and neatly made; does not cover entire width of roll; not flagged
Sheets	Not evenly stacked Stack contains sheets of different nominal thicknesses

4.3.2.4 Average length per roll or average count per package of sheets.-The sample unit for this examination shall be one roll or one package of sheets, as applicable. The lot shall be unacceptable if the average length including tolerance per roll or average count per package of sheets for the samples examined is less than specified or indicated (see 4.3.1).

4.3.2.5 Preparation for delivery.-An examination shall be made to determine that marking, materials and workmanship comply with the requirements of Section 5 of this specification. The sample unit shall be one shipping container, fully packed, selected just prior to the closing operation. Closed shipping containers shall be examined for closure defects.

<u>Examine</u>	<u>Defect</u>
Markings (exterior and interior)	Incomplete; incorrect; illegible; omitted; of improper size, location, sequence or method of application (see 5.2).

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<u>Examine</u>	<u>Defect</u>
Materials	Any nonconforming component; component missing, damaged or otherwise defective
Workmanship	Inadequate application of components such as incomplete closure of container flaps, loose or inadequate sealing, strapping or stapling Bulged or distorted container

4.3.2.6 Inspection levels and acceptable quality levels (AQLs) for examinations.-The inspection levels; for determining the sample sizes, and the acceptable quality levels (AQLs) expressed in defects per 100 units, shall be as follows:

<u>Examination paragraph 1</u>	<u>Inspection Levels</u>	<u>AQLs</u>
4.3.2.1	I	2.5
4.3.2.2	S-2	2.5
4.3.2.3	S-2	2.5
4.3.2.4	S-2	N.A
4.3.2.5	S-1	2.5

- 1 The same rolls, packages of sheets, or sheets, as applicable, shall be used for examinations under 4.3.2.2 thru 4.3.2.4 inclusive and shall be within the rolls or packages of sheets randomly selected for examination under 4.3.2.1, except when the latter is made on rolls before slitting into narrower widths

4.3.3 Testing.-Samples shall consist of the quantities specified in the applicable test procedure or as indicated herein. Each sample unit shall consist of a number of full size sheets or of a length of roll stock full width of the roll sufficient to provide material for making all the tests of Table III. Unless otherwise specified, no more than one test unit shall be selected from any one roll or package of sheets. From each test unit one set of specimens shall be prepared. This set shall be representative of the full width of the sample unit as obtained either by selecting a set of specimens from locations evenly or randomly spaced along the width of the unit or by compositing material taken from those locations. The specimens shall be conditioned in accordance with ASTM Designation: D641 and D685 and shall be tested as specified in Table III. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. All test reports shall contain the individual values utilized in expressing the final result.

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TABLE III - Instructions for Testing

<u>Characteristic</u>	<u>Requirement</u>	<u>Test Method</u>	<u>For each sample unit report</u>
Thickness	3.4	Method 1003 of FED. Test Method 101	Average (Av.) of 10 measurements
Basis Weight	3.4	Method D646 of ASTM	Procedure specified (C) in ASTM D646
Bursting Strength, Mullen	3.4	Method 2007 of FED. Test Method Std. 101 or method D2529 of ASTM	Av. of 4 or more, half tested on one side and half on the other 1
Moisture Content	3.5	Method 5024 of FED. Test method Std. 101	Value obtained on three composite specimen
pH (acidity or alkalinity)	3.6	Method 6002 of FED. Test method Std. 101	Value obtained on three composite specimen
Processability, when specified	3.7	4.4.2	As specified

1 - If the average of 4 determinations is below the required minimum, additional specimens may be tested. The average of all values shall be reported.

4.3.4 Inspection equipment.-For the performance of all tests and examinations specified in 4.2 and 4.3, commercial inspection equipment should be employed (see 6.6). The contractor shall have available, and utilize correctly, this equipment and is charged with the responsibility of insuring that proper calibration procedures are followed. Government approval of all inspection equipment is required prior to its use for acceptance purposes.

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4.4 Test methods and procedures

4.4.1 General.-Unless otherwise specified, test methods and procedures shall be as specified in paragraph 4.3.2 and 4.3.3.

4.4.2 Processability.-When specified, see 6.1 and 6.3, special tests for processability shall be performed as specified.

5. PREPARATION FOR DELIVERY

(This section is applicable only to direct purchase by or shipment to the Government, See 6.4).

5.1 Packing.-Unless otherwise specified, packing shall be Level C.

5.1.1 Level C.-Paperboard shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. Containers shall be in accordance with rules or regulations of carriers applicable to the mode of transportation.

5.2 Marking.-In addition to any special marking required by the contract or orders, shipments shall be marked in accordance with MIL-STD-129. Special handling marking requirements applicable to arrows and the words "THIS SIDE UP" shall apply to wrapped or boxed rolls, and shall be applied in such a manner as to insure the rolls being handled and stored on end.

6. NOTES

6.1 Ordering data.-Purchasers should exercise any desired options offered herein and procurement documents should specify the following (see 6.5):

- a. Title, number and date of this specification
- b. Nominal thickness required (see 3.4)
- c. Length and width of cut sheets (see 3.3))
- d. Slit width of roll stock (see 3.3)
- e. No. of slit widths to be wound on common core (see 3.3)
- f. Length (or net weight or outside roll diameter) required (see 3.3)
- g. Roll core construction and dimensions required (see 3.3)
- h. Special dimensional tolerances, if required (see 3.3)
- i. Special test(s) for Processability, if required (see 3.7, 4.4.1 and 6.3)
- j. Preparation for delivery, if required (see Section 5, and 6.4)
- k. Type of board required (I or II)

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6.2 Intended use.-The paperboard covered by this specification is used in the manufacture of Containers, Ammunition, Fiber, Spirally Wound, and Cans, Fiber, Spirally Wound, which, in turn, are used for packaging artillery ammunition and other items for shipping and storage.

6.2.1 COMPOSTION: -

TYPE I

100% Virgin Kraft

TYPE II

100% Recycled waste consisting of
 75% Kraft and Corrugated
 25% Printers Mix (general waste)
 • blended to conform to the Bursting Strength requirement of Table II.

6.3 Processability.-Although the ultimate test for Processability (see 3.7) is the ability of the board to be fabricated by normal production processes into satisfactory containers (see 6.2), the supplier (the contractor who uses the container board in the fabrication of containers under direct contract with the Government, or who subcontracts the fabrication of such items) may specify other tests, such as for ability to be bent around a mandrel without cracking or for ability to be joined with a particular adhesive, which the board manufacturer can employ to test his product using simple equipment.

6.4 Preparation for delivery.-When purchased by a fabricator of containers, rolls or stacks of cut sheets often are shipped without packaging, being protected from the weather by being shipped in box cars or closed vans. When specified, the material is palletized, a pallet load usually weighing approximately one ton.

6.5 Material for use in making convolutely-wound containers usually is ordered in the form of flat cut sheets, while that for use in making spirally-wound containers usually is ordered to narrow slit widths, several such strips being wound on a common core to make a roll having a width of between 36 and 42 inches.

6.6 Inspection equipment

6.6.1 Commercial inspection equipment is defined in AMC Regulation 702-2.

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6.6.2 Contractor-designed equipment.-In the event that a contractor elects to design his own inspection equipment, details of the designs (drawings, description, materials, etc.) shall be submitted to: Commanding Officer, Picatinny Arsenal, ATTN: SMUPA-QA-A-A, Dover, New Jersey 07801, for approval prior to fabrication and use. Approval of such designs may be delegated to the contractor administration office for minor defects only.

Custodian:
ARMY-MU

Preparing Activity:
ARMY-MU

Project Number: 8140

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No 22-R255
<p>INSTRUCTIONS This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.</p>		
SPECIFICATION		
ORGANIZATION		
CITY AND STATE		CONTRACT NUMBER
<p>MATERIAL PROCURED UNDER A</p> <p><input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT</p>		
<p>1 HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?</p> <p>A GIVE PARAGRAPH NUMBER AND WORDING</p>		
<p>B RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES</p>		
<p>2 COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID</p>		
<p>3 IS THE SPECIFICATION RESTRICTIVE?</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO (If "yes", in what way?)</p>		
<p>4 REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)</p>		
SUBMITTED BY (Printed or typed name and activity - Optional)		DATE

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