

METRIC

DOD-M-64040A (AR)

21 NOVEMBER 1986

SUPERSEDING

DOD-M-64040 (AR)

27 JULY 1983

## MILITARY SPECIFICATION

## METHYL DIPHENYLUREA

\*This specification is approved for use within the U.S. Army Armament Munitions and Chemical Command, and is available for use by all Departments and Agencies of the Department of Defense.

## 1.0 SCOPE

1.1 Scope. - This specification establishes the requirements and quality assurance provisions for the manufacture and acceptance of one grade of methyl diphenylurea (see 3.2) for use in combustible cartridge cases and propellants for cannon ammunition (see 6.1).

## 2.0 APPLICABLE DOCUMENTS

2.1 Government documents.

\* 2.1.1 Specifications, standards, and handbooks. - The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

## SPECIFICATIONS

## MILITARY

MIL-A-48078

Ammunition, Standard Quality Assurance Provisions, General Specification for

## STANDARDS

## MILITARY

MIL-STD-105

Sampling Procedures and Tables for Inspection by Attributes

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 Center, Attn: AMSMC-QA, Dover, New Jersey 07801-5001 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC-N/A

FSC-1376

Distribution Statement A: Approved for public release; distribution unlimited.

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|              |   |
|--------------|---|
| MIL-STD-129  | Marking for Shipment and Storage                      |
| MIL-STD-286  | Propellants, Solid, Sampling, Examination and Testing |
| MIL-STD-1218 | A.C.S. Chemicals                                      |
| FEDERAL      |   |
| UU-S-48      | Sack, Shipping, Paper                                 |
| PPP-D-723    | Drum, Fiber   |

\* 2.1.2 Other Government documents, drawings and publications. - The following other Government documents, drawings and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

## CODE OF FEDERAL REGULATIONS

|          |                               |
|----------|-------------------------------|
| Title 49 | Transportation, Parts 100-199 |
|----------|-------------------------------|

(The Interstate Commerce Commission Regulations are now a part of the Code of Federal Regulations, available from the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402. Orders for the above publications should cite, "49 CFR 100-199 (latest revision).")

\* 2.2 Other publications. - The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is currently on the date of the solicitation.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS

|           |  |
|-----------|--|
| ASTM E11  | Wire-Cloth Sieves for Testing Purposes                 |
| ASTM E300 | Recommended Practice for Sampling Industrial Chemicals |

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

\* 2.3 Order of precedence. - In the event of conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

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## 3.0 REQUIREMENTS

3.1 General. - The Methyl Diphenylurea shall comply with requirements given in this detailed specification as well as applicable drawings and referenced specifications.

3.2 Material. - The material shall be N-Methyl-N',N'-diphenylurea ( $\text{CH}_3 \text{NHCON} (\text{C}_6\text{H}_5)_2$ ), meeting the requirements of this specification.

3.3 Properties. - Properties of Methyl Diphenylurea shall be as follows:

TABLE I

| Property         | Requirement       | Applicable Test Method |
|------------------|-------------------|------------------------|
| Melting Point    | 170°C to 172°C    | 4.5.1                  |
| Moisture Content | 0.2 Percent Max.  | 4.5.2                  |
| Ash Content      | 0.1 Percent Max.  | 4.5.3                  |
| Chlorine Content | 0.02 Percent Max. | 4.5.4                  |
| Particle Size    | 1.4mm Max.        | 4.5.5                  |

\* 3.4 First article. - When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.3).

\* 3.5 First article inspection. - This specification makes provision for first article inspection. Requirements for submission of first article samples by the contractor shall be as specified in the contract.

\* 3.6 Workmanship. - The best commercial practices shall be used in the formulation of the product furnished under this specification. Procedures and controls shall be employed which preclude conditions that may adversely effect the safety or reliability of the product (i.e., contaminated vessels, impurities, grit, chips, etc.), when tested in accordance with 4.5.6.

## 4.0 QUALITY ASSURANCE PROVISIONS

\* 4.1 Responsibility for inspection. - Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, 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 prescribed requirements.

4.2 Classification of inspections. - The inspection requirements specified herein are classified as follows:

- a) First article inspection (see 4.3)
- b) Quality conformance inspection (see 4.4)

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4.3 First article inspection.

4.3.1 Submission. - The contractor shall submit a first article sample as designated by the Contracting Officer for evaluation in accordance with provisions of 4.3.2. The first article sample shall be 1 kilogram of Methyl Diphenylurea. The sample shall be obtained from the first production lot which has been produced by the contractor using the same production processes, procedures and equipment as will be used in fulfilling the contract. All materials shall be obtained from the same sources of supply as will be used in regular production.

4.3.2 Inspection to be performed. - The sample will be subjected by the Government to any or all of the examinations or tests specified in this specification (see MIL-A-48078) and Table II.

4.3.3 Rejection. - See MIL-A-48078.

4.4 Quality conformance inspection.

4.4.1 Lot formation. - A lot shall consist of one or more batches of Methyl Diphenylurea produced by one manufacturer, in accordance with the same specification, or same specification revision, under one continuous set of operating conditions. Each batch shall consist of that quantity of Methyl Diphenylurea that has been subjected to the same unit chemical or physical process intended to make the final product homogeneous.

4.4.2 Examination. - See MIL-A-48078 and Table III.

a. Sampling plans. - Unless otherwise specified in the Classification of Defects and Test tables, sampling plans for major and minor defects shall be in accordance with MIL-STD-105, Inspection Level II.

4.4.3 Testing. - PRECAUTION: This specification covers sampling and testing of toxic and hazardous material. Accordingly, it is emphasized that all applicable safety rules, regulations and procedures must be followed in handling and processing the Methyl Diphenylurea.

4.4.3.1 Sampling. - Two independent representative samples shall be withdrawn from each batch or lot of methyl diphenylurea. Each sample shall be tested independently in accordance with the applicable methods given in 4.5. If either sample fails to meet any of the test requirements, the batch or lot shall be rejected. MIL-STD-105 shall apply for the defect classification given in Table III.

4.4.4 Inspection equipment. - For the performance of all tests and examinations specified in 4.4 and 4.5, commercial inspection equipment should be employed. The contractor shall have available, and utilize correctly, this equipment and is charged with the responsibility of assuring that proper calibration procedures are followed. Government approval of all inspection equipment is required prior to its use for acceptance purposes (see 6.3).

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\* 4.5. Test methods and procedures. - All tests given in this section shall be performed using prescribed procedures for replicate determinations given in standard analytical chemistry textbooks. Also, unless otherwise specified herein, all chemicals shall be Reagent Grade or ACS Grade in accordance with MIL-STD-1218. See 6.4 for use of equivalent test methods.

\* 4.5.1 Melting point. - Use Mettler melting point apparatus or equivalent and follow Manufacturer's Procedure Manual.

4.5.2 Moisture content. - The sample shall be tested for moisture content in accordance with MIL-STD-286, Method 101.5. Failure to meet the applicable requirement shall be cause for rejection.

TABLE II. First Article Inspection.

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## CLASSIFICATION OF DEFECTS AND TESTS

| PARAGRAPH | TITLE                          |                     |             | SHEET 1 OF 1          |  | DRAWING NUMBER       |
|-----------|--------------------------------|---------------------|-------------|-----------------------|--|----------------------|
|           | Methyl Diphenylurea            |                     |             |                       |  | N/A                  |
|           |                                |                     |             |                       |  | NEXT HIGHER ASSEMBLY |
| CATEGORY  | EXAMINATION OR TEST            | NO. OF SAMPLE UNITS | AQL OR 100% | REQUIREMENT PARAGRAPH | PARAGRAPH REFERENCE /INSPECTION METHOD |                      |
| *         | <u>Examination for Defects</u> |                     |             |                       |  |                      |
|           | Melting Point                  | 4.3.1               |             | 3.3                   | 4.5.1                                  |                      |
|           | Moisture Content               | 4.3.1               |             | 3.3                   | 4.5.2                                  |                      |
|           | Ash Content                    | 4.3.1               |             | 3.3                   | 4.5.3                                  |                      |
|           | Chlorine Content               | 4.3.1               |             | 3.3                   | 4.5.4                                  |                      |
|           | Particle Size                  | 4.3.1               |             | 3.3                   | 4.5.5                                  |                      |
|           | Workmanship                    | 4.3.1               |             | 3.6                   | 4.5.6                                  |                      |
| NOTES:    |                                |                     |             |                       |  |                      |

TABLE III. Quality Conformance Inspection.

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## CLASSIFICATION OF DEFECTS AND TESTS

| PARAGRAPH       | TITLE               |                     |             | SHEET 1 OF 1          |  | DRAWING NUMBER       |
|-----------------|---------------------|---------------------|-------------|-----------------------|--|----------------------|
|                 | Methyl Diphenylurea |                     |             |                       |  | N/A                  |
|                 |                     |                     |             |                       |  | NEXT HIGHER ASSEMBLY |
| CATEGORY        | EXAMINATION OR TEST | NO. OF SAMPLE UNITS | AQL OR 100% | REQUIREMENT PARAGRAPH | PARAGRAPH REFERENCE /INSPECTION METHOD |                      |
| <u>Critical</u> | None defined        |                     |             |                       |  |                      |
| <u>Major</u>    |                     |                     |             |                       |  |                      |
| 101             | Melting Point       | 4.4.3.1             |             | 3.3                   | 4.5.1                                  |                      |
| 102             | Moisture Content    | 4.4.3.1             |             | 3.3                   | 4.5.2                                  |                      |
| 103             | Ash Content         | 4.4.3.1             |             | 3.3                   | 4.5.3                                  |                      |
| 104             | Chlorine Content    | 4.4.3.1             |             | 3.3                   | 4.5.4                                  |                      |
| 105             | Particle Size       | 4.4.3.1             |             | 3.3                   | 4.5.5                                  |                      |
| <u>Minor</u>    |                     |                     |             |                       |  |                      |
| 201             | Workmanship         | 4.4.3.1             |             | 3.6                   | 4.5.6                                  |                      |
| NOTES:          |                     |                     |             |                       |  |                      |



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4.5.3 Ash Content.

4.5.3.1 Procedure. - A sample of approximately 5 grams, weighted to  $\pm 1$  mg, of the composite sample shall be transferred to a tared porcelain or silica crucible. The mixture shall be ignited with a burner, allowed to burn slowly, placed into a muffle furnace at 650°C for one hour, cooled in a desiccator and weighed. The percentage ash in the sample shall be calculated with the following formula.

$$\text{Percent Ash} = \frac{(M_f - M_i) 100}{M_s}$$

$M_f$  = mass of the crucible plus ash

$M_i$  = mass of the empty crucible

$M_s$  = mass of the Methyl Diphenylurea added to the crucible.

\* 4.5.4 Chlorine content. - The chlorine content shall be determined using a specific ion meter with chlorine specific ion electrode or equivalent. Follow the Manufacturer's Operating Procedure Manual.

4.5.5 Particle size. - A 30 gram sample of the composite shall be placed onto a U.S. Sieve, ASTM-E11, 1.4 mm, (No. 14) and shaken for a maximum of 10 minutes. If, after the elapsed time, any visible material larger than 1.4 mm is retained on the sieve, the lot shall be rejected.

\* 4.5.6 Workmanship. - The sample, when visually examined, shall be free from grit, impurities and foreign matter.

## 5.0 PACKAGING

5.1 Preservation and packaging. - Not applicable.

5.2 Packing. - Fiber carton with polyethylene liner.

5.2.1 Level A. - Unless otherwise specified in the contract or purchase order, Methyl Diphenylurea shall be packed in a fiber drum, in accordance with Specification PPP-D-723 (Type III, Grade A). Fiber drums shall be furnished with a nominal 0.004 inch thick polyethylene liner properly heat sealed or otherwise closed to afford protection to the contents equivalent to that given by a heat seal closure. (Alternatively, an equivalent degree of protection may be furnished by suitable laminations or coatings of the inner surface of the drum.) Alternately, Methyl Diphenylurea may be packed in a paper shipping sack in accordance with Construction No. 14X Specification UU-S-48. Closure of drums or sacks shall be in accordance with the applicable specification.

5.2.2 Level C. - Methyl Diphenylurea shall be packed to afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. Containers shall comply with Department of Transportation Regulations, 49CFR.



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5.3 Marking. - In addition to any special marking required by the contract or purchase order, containers shall be marked in accordance with Standard MIL-STD-129.

## 6.0 NOTES

6.1 Intended use. - Methyl Diphenylurea is intended to be used as a stabilizer in 120mm combustible cartridge cases and propellants.

6.2 Ordering data. - Procurement documents should specify the following:

a. Title, number, and date of this specification.

\* 6.3 Submission of inspection equipment designs for approval (see MIL-A-48078). - Submit equipment designs, as required, to Commander, U.S. Army Armament Research, Development and Engineering Center, ATTN: AMSMC-QAT-I-(D), Dover, NJ 07801-5001.

6.4 Equivalent test methods. - The test methods given in this specification are the official methods to be used. The contractor may request using other methods providing that the proposed method is equivalent (accuracy and precision) to the method given in this specification. Prior approval of the Contracting Officer is required for use of equivalent test methods. A description of the proposed method should be submitted through the Technical Agency to: Commander, ARDEC, ATTN: AMSMC-QAR-R, Dover, NJ 07801-5001. This description should include, but not be limited to, the procedures used, the accuracy and precision and drawings of any special equipment required (see MIL-I-45208, paragraph 3.10).

\* 6.5 Contract data requirements. - One copy of all description sheets and firing records required by this specification shall be forwarded to:

Commander  
U.S. Army Armament Research, Development and Engineering Center  
U.S. Army Armament Munitions and Chemical Command  
ATTN: AMSMC-QAR-R(D)  
          AMSMC-LCA-G(D)  
Dover, NJ 07801-5001

Commander  
U.S. Army Armament Munitions and Chemical Command  
ATTN: AMSMC-QAD(R)  
Rock Island, IL 61299.

\* 6.6 Keywords. -  
Ammunition  
Cartridge  
Cannon  
Methyl Diphenylurea  
Tank

\* 6.7 The margins of this standard are marked with asterisks to indicate where significant changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations.

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Custodian  
Army-AR

Preparing Activity  
Army-AR

Project Number: - 1376- A312

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER  
DOD-M-64040A (AR)2. DOCUMENT TITLE  
METHYL DIPHENYLUREA

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

☐ VENDOR☐ USER☐ MANUFACTURER☐ OTHER (Specify): \_\_\_\_\_

b. ADDRESS (Street, City, State, ZIP Code)

## 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

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)