MIL-I-536C
25 April 1988
SUPERSEDING
MIL-I-536B
9 June 1975

MILITARY SPECIFICATION

INDICATOR SOLUTION, pH DETERMINATION

(FOR WATER SUPPLY TESTING)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers indicator solutions for use in the determination of pH values of colorless, clear, water supplies in the field.

1.2 Classification. The indicator solutions shall be of the following types, as specified (see 6.2):

Type I - Bromocresol green-bromocresol purple solution (pH range 4.4 to 6.0).

Type II - Cresol red-thymol blue solution (aqua-purple pH range 7.6 to 9.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research, Development, and Engineering Center, ATTN: STRBE-TSE, Fort Belvoir, VA 22060-5606 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 6810

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards 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

FEDERAL

PPP-C-2020	- Chemicals, Liquid, Dry and Paste, Packaging Of.

MILITARY

MIL-D-537	- Disks, Color Standards.
MIL-C-538	- Comparator, Color.

STANDARDS

MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-130	- Identification Marking of US Military Property.

(Copies of specifications, standards, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

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 non-Government documents which is current on the date of the solicitation.

AMERICAN CHEMICAL SOCIETY (ACS)

Reagent Chemicals, ACS Specifications

(Application for copies of ACS publications should be addressed to the American Chemical Society, 1155 16th Street, NW, Washington, DC 20036.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, 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.

3. REQUIREMENTS

3.1 Description. The indicator solutions, hereinafter referred to as "solutions", shall be suitable for use in the determination of pH values of clear waters by colorimetric comparison with colored disk standards.

3.2 First article. Unless otherwise specified (see 6.2), a sample shall be subjected to first article inspection (see 4.3 and 6.3). Any changes or deviations of solutions from the approved first article during production will be subject to the approval of the contracting officer. Approval of the first article will not relieve the contractor of his obligation to furnish solutions conforming to this specification.

3.3 Materials. Materials shall be as specified herein. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification. The reagent water and methanol used in the solutions shall be in accordance with the American Chemical Society Specifications for Reagent Chemicals.

3.4 Design.

3.4.1 Type I. The bromocresol green-bromocresol purple solution shall be a mixture of distilled water and absolute methanol (90 percent water, 10 percent methanol by volume) containing 0.140 plus 0.005 grams per liter bromocresol purple (dibromo-o-cresolsulfonphthalein) and 0.210 plus or minus 0.005 grams per liter bromocresol green (tetrabromo meta cresolsulfonphthalein). The pH of the solution shall be adjusted with a standard glass electrode-type pH meter to be not less than 4.9 and not more than 5.5 by the use of reagent-grade hydrochloric acid or sodium hydroxide. The type I solution shall be suitable for use in the detemination of pH values of waters having a pH range from 4.4 to 6.0.

3.4.2 Type II. The cresol red-thymol blue solution shall be a mixture of distilled water and absolute methanol (90 percent water, 10 percent methanol by volume) containing 0.092 plus or minus 0.0005 grams per liter of cresol red (ortho cresolsulfonphthalein) and 0.123 plus or minus 0.0005 grams per liter of thymol blue (thymolsulfonphthalein) with the pH adjusted with a standard glass electrode-type pH meter to be not less than 8.1 and not more than 8.7 by the use of reagent-grade hydrochloric acid or sodium hydroxide. The type II solution shall be suitable for use in the determination of pH values of waters having a pH range from 7.6 and 9.2.

3.5 Containers. The solutions shall be furnished in either 4-fluid-ounce or 16-fluid-ounce containers conforming to PPP-C-2020, type III, class 3, as specified (see 6.2). The 16-fluid-ounce container shall be limited to maximum dimensions of 2.8125 inches outside diameter by 7.500 inches high. Outage shall be calculated on the basis of a maximum temperature of 165 °F.

3.6 Identificaton marking. The solutions shall be identified in accordance with MIL-STD-130.

3.7 Government loaned property. Unless otherwise specified (see 6.2), the following property in the quantities indicated will be loaned by the Government (see 6.4):

Item No.	Description	Identification	Quantity
1	Disk Evaluation	-	1
2	Color Standards Disks MIL-D-537, type I, class 2.	NSN 6630-00-250-6301	1
3	Color Standards Disks MIL-D-537, type I, class 4.	NSN 6630-00-250-6302	1

3.8 Workmanship. Solution containers shall be free of foreign matter such as dirt, oil and grease; and damage such as chips, cracks, dents, deformation and other defects which would impair their serviceability. The solutions shall be free from suspended matter or other material which may affect the accuracy of the readings.

4. 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 presecribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies

submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Component and material inspection. The contractor is responsible for insuring that components and materials are manufactured, examined, and tested in accordance with referenced specifications and standards, as applicable.

4.2 Classification of inspections. Inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.3).

b. Quality conformance inspection (see 4.4).

c. Inspection of packaging (see 4.6).

4.3 First article inspection.

4.3.1 First article examination. The first article shall be examined as specified in 4.5.1. The presence of one or more defects shall be cause for rejection.

4.3.2 First article tests. The first article shall be tested as specified in 4.5.2. Failure of any test shall be cause for rejection.

4.4 Quality conformance inspection.

4.4.1 Sampling. Sampling for examination and tests shall be in accordance with MIL-STD-105.

4.4.2 Examination. Samples selected in accordance with 4.4.1 shall be examined as specified in 4.5.1. AQL shall be 1.0 percent defective.

4.4.3 Tests. Samples selected in accordance with 4.4.1 shall be tested as specified in 4.5.2. AQL shall be 1.0 percent defective.

4.5 Examination procedure.

4.5.1 Examination. The solutions shall be examined as specified herein for the following defects:

Number	Defects	Requirement paragraph
Major		
101.	Suspended matter or other foreign material in the solution.	3.8

102.	Material not as specified.	3.3
103.	Type I and II solutions pH adjustment not as specified.	3.4.1, 3.4.2
104.	Containers not as specified.	3.5
105.	Identification marking missing or illegible.	3.6
106.	Solution containers workmanship not as specified.	3.8

4.5.2 Tests.

4.5.2.1 Color reaction. Samples shall be tested for color reaction in buffer solutions prepared as specified in MIL-D-537. Each sample shall be tested in at least three buffer solutions whose pH values are spread over the range of the indicator. Comparisons shall be made with diffused daylight in a comparator conforming to MIL-C-538. Any deviation more than 0.1 pH shall constitute failure of this test.

4.6 Inspection of packaging. Preservation, packing, marking, and unitization shall be inspected for compliance with the quality assurance provisions of PPP-C-2020.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or commercial as specified (see 6.2).

5.1.1. Level A. Unit containers of the type, class and sizes specified (see 3.5 and 6.2), shall be placed in intermediate containers in accordance with the level A intermediate packing method and configuration requirements of PPP-C-2020.

5.1.2 Commercial. Unit containers of the type, class and sizes specified (see 3.5 and 6.2), shall be preserved in accordance with the commercial preservation requirements of PPP-C-2020.

5.2 Packing. Packing shall be level A or commercial, as specified (see 6.2), in accordance with the requirements of PPP-C-2020.

5.3 Marking and unitization. Marking and unitization shall be in accordance with the requirements of PPP-C-2020.

6. NOTES

6.1 Intended use. The solutions covered by this specification are not commercially standard. They are for use with the comparator specified in MIL-C-538 to determine the pH of water supplies in the field.

6.2 Ordering data. Acquisition documents should specify the following:

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

b. Type of solution required (see 1.2).

c. When a first article is not required for inspection and approval, and the number of units required (see 3.2).

d. Whether solution containers shall be 4-ounce or 16-ounce (see 3.5).

e. When Government-loaned property is required (see 3.7).

f. Degree of preservation and packing required (see 5.1 and 5.2).

6.3 First article. When a first article inspection is required, the items should be a first produced sample. The first article should consist of one or more units. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirements for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 Government-loaned property. The contracting officer should arrange to loan the property listed in 3.7.

6.5 Data requirements. The contracting officer should include requirements for such data as instructional materials and supplier's operation manual to be furnished with the indicator solution.

6.6 Subject term (key word) listing.

Bromocresol green-bromocresol purple solution
Cresol red-thymol blue solution
Indicator solution
pH

6.7 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army - Me
Air Force - 68

Review activity:
DLA-GS

Preparing activity:
Army - ME

Project 6810-B536

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-I-536C	Indicator Solution, pH Determination (for Water Supply Testing)

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5. PROBLEM AREA

a. Recommended Wording:

b. 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)*

DD FORM 82 MAR 1426

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