

MIL-C-11029D

31 July 1987

SUPERSEDING

MIL-C-11029C

20 July 1983

MILITARY SPECIFICATION

CITRIC ACID, TECHNICAL

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

1. SCOPE

1.1 Scope. This specification covers one grade of citric acid.

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-B-601 - Boxes, Wood, Cleated-Plywood
 PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner
 PPP-B-636 - Boxes, Shipping, Fiberboard
 PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 through 12 Gallons)
 PPP-D-723 - Drums, Fiber

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MIL-B-117 - Bags, Sleeves and Tubing - Interior Packaging
 MIL-B-26701 - Bottles, Screw Cap and Carboys Polyethylene Plastic

: Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army Chemical Research, Development and Engineering Center, ATTN: SMCCR-SPT-S, Aberdeen Proving Ground, MD 21010-5423 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

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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STANDARDS

FEDERAL

Fed. Std. No. 313 - Material Safety Data Sheets Preparation and the Submission Of

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage
MIL-STD-147 - Palletized Unit Loads
MIL-STD-1190 - Minimum Guidelines for Level C Preservation, Packing and Marking

2.1.2 Other Government documents. The following other Government documents 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 (CFR)

29 CFR 1910.1200 - Occupational Safety and Health Standard on Hazard Communication

(The Code of Federal Regulations is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Orders for the above publication should cite "29 CFR 1910.1200".)

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are indicated as DOD adopted shall be the issue listed in the current 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 current on the date of the solicitation.

ASTM STANDARDS

D 1193 - Reagent Water
E 11 - Wire-Cloth Sieves for Testing Purposes

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

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(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a 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.

3. REQUIREMENTS

3.1 Purity. Citric acid shall contain no less than 99.5 percent by weight anhydrous citric acid ($C_6H_8O_7$) when tested as specified in 4.2.4.1.

3.2 Oxalates. A solution of citric acid shall show no opalescence, turbidity, or precipitation when tested as specified in 4.2.4.2.

3.3 Particle size characteristics. No less than 95.0 percent by weight of the citric acid shall pass through a 4750-micrometer sieve and no more than 10 percent by weight shall pass through a 300-micrometer sieve when tested as specified in 4.2.4.3.

3.4 Material Safety Data Sheets. Material Safety Data Sheets for citric acid shall be prepared and submitted by the contractor in accordance with 29 CFR 1910.1200 and Fed. Std. No. 313 (see 6.7). In the event of a conflict, 29 CFR 1910.1200 shall take precedence.

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 prescribed 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.

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4.2 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the citric acid produced by one manufacturer, at one plant, from the same materials, and under essentially the same manufacturing conditions provided the operation is continuous. In the event the process is a batch operation, each batch shall constitute a lot (see 6.3).

4.2.2 Sampling.

4.2.2.1 For examination of packaging. Sampling shall be conducted in accordance with MIL-STD-105.

4.2.2.2 For citric acid test. See 6.5 for sampling and testing precautions. Sampling shall be conducted in accordance with table I. A representative specimen of approximately 150 grams (g) shall be removed from each sample container and placed in a suitable clean, dry container labeled to identify the lot and container from which it was taken.

TABLE I. Sampling for citric acid test

: Number of containers in batch or lot	: Number of sample containers :
: 2 to 25	: 2
: 26 to 150	: 3
: 151 to 1,200	: 5
: 1,201 to 7,000	: 8
: 7,001 to 20,000	: 10
: Over 20,000	: 20
: :	: :

4.2.2.3 For container leakage test. Sampling shall be conducted in accordance with MIL-STD-105.

4.2.3 Inspection procedure.

4.2.3.1 For examination of packaging. The sample unit shall be one filled unit, intermediate, or shipping container, ready for shipment. Sample containers shall be examined for the following defects using an AQL of 2.5 percent defective:

- (a) Contents per container not as specified
- (b) Container not as specified
- (c) Container closure not as specified
- (d) Container damaged or leaking
- (e) Unitization not as specified
- (f) Marking incorrect, missing, or illegible

4.2.3.2 For citric acid test. Each sample specimen taken in 4.2.2.2 shall be tested as specified in 4.2.4. Failure of any test by any specimen shall be cause for rejection of the lot represented.

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4.2.3.3 For container leakage test. The sample unit shall be one container. The sample containers selected in 4.2.2.3 shall be tested as specified in 4.2.5 using an AQL of 1.0 percent defective.

4.2.4 Citric acid tests. See 6.5 for sampling and testing precautions. Water in accordance with ASTM D1193 and reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as follows:

4.2.4.1 Purity. Weigh to the nearest 0.1 milligram approximately 0.32 g of the specimen into an Erlenmeyer flask and add 50 milliliters (mL) of water. When the specimen has dissolved, titrate the solution with 0.1N sodium hydroxide solution using phenolphthalein as indicator. Calculate the percent by weight purity as follows:

$$\text{Percent purity} = \frac{6.404AB}{W}$$

where: A = Milliliters of sodium hydroxide solution used in the titration,
B = Normality of the sodium hydroxide solution, and
W = Weight of specimen in grams.

4.2.4.2 Oxalates. Weigh 2.00 + 0.05 g of specimen into a 50-mL cylinder. Add 10 mL of water. When the specimen has dissolved, add 2 mL of 10-percent calcium acetate solution and mix thoroughly. Allow to stand for 15 minutes and then observe the solution for opalescence, turbidity, and precipitation.

4.2.4.3 Particle size characteristics. Use sieves conforming to ASTM E 11. Nest a 4750-micrometer sieve on top of a 300-micrometer sieve and place on a bottom pan. Weigh to the nearest 0.1 g approximately 100 g of the specimen and place on the top sieve. Vibrate either mechanically or by hand until no more specimen passes through either sieve. Weigh the specimen retained on each sieve and the specimen in the bottom pan and calculate the percent by weight specimen which passed through each sieve.

4.2.5 Container leakage test. Hold the container in each of the following positions and moderately shake for a minimum period of 1 minute:

- (a) Upright
- (b) Upside down
- (c) On one side
- (d) On other side

Examine the container after each period for any evidence of leakage.

5. PACKAGING

5.1 Unit packing. Citric acid shall be unit packed level A, B, or C as specified (see 6.2).

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5.1.1 Three-quarter-pound quantity.

5.1.1.1 Level A. A quantity of 12 (+1 or -0) ounces of citric acid shall be unit packed in a square or rectangular shaped wide mouth plastic bottle conforming to MIL-B-26701. The bottle shall have a capacity of 1 pint or 16 ounces and be closed with a 43 millimeter (mm) screw cap.

5.1.1.2 Level B. Citric acid shall be unit packed level B in the same manner as for level A, except that a fiber drum shall be substituted for the steel pail. The fiber drum shall conform to type II, grade A of PPP-D-723, and in addition shall be furnished with a suitable bag or liner of commercial grade polyethylene. The bag or liner shall be a minimum of 3 mils thick and of sufficient length to permit reclosure.

5.1.2 Fifty-pound quantity. A quantity of 50 (+1/2 or -0) pounds of citric acid shall be unit packed level A in a bag fitted within a nominal 5-gallon capacity steel pail. The pail shall conform to type II, class 4 of PPP-P-704, and the bag shall conform to type I, class B, style 2 of MIL-B-117 and be of a size to completely contain the citric acid when closed. Closure of the bag shall be by heat sealing, tying or knotting. The pail shall be closed securely in such a manner that there shall be no evidence of leakage when tested as specified in 4.2.5.

5.1.3 Industrial. A specified quantity of citric acid (see 6.2) shall be unit packed in accordance with MIL-STD-1190.

5.2 Intermediate pack. Citric acid shall be intermediately packed level A or C, as specified (see 6.2).

5.2.1 Three-quarter-pound quantity.

5.2.1.1 Level A. Ten 1-pint bottles, unit packed as specified in 5.1.1.1, shall be intermediately packed in a fiberboard box conforming to style RSC, grade W5c, class WR of PPP-B-636.

5.2.1.2 Level C. Citric acid, unit packed as specified in 5.1.1.1, shall be intermediately packed level C in accordance with MIL-STD-1190.

5.2.2 Fifty-pound quantity. Fifty pounds of citric acid, unit packed level A or B as specified above, requires no intermediate packing.

5.3 Packing. Citric acid shall be packed level A or C, as specified (see 6.2).

5.3.1 Three-quarter-pound quantity.

5.3.1.1 Level A. Four intermediate packs, specified as above, shall be packed level A in a wood box conforming to class 2, style 4, grade B, load type 1 of PPP-B-621, or type overseas, style optional, grade B of PPP-B-601.

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5.3.1.2 Level C. Citric acid unit and intermediately packed as specified above shall be packed in accordance with MIL-STD-1190.

5.3.2 Fifty-pound quantity. Citric acid, unit packed as specified in 5.1.2, shall require no further protection for shipment other than unitization.

5.4 Unitization. Uniform quantities of level A or B packs of citric acid shall be palletized in accordance with MIL-STD-147.

5.5 Marking. Standard interior and exterior container marking requirements, lot number and date of manufacture markings shall be applied in accordance with MIL-STD-129. In addition, each container shall be durably and legibly marked as follows:

WARNING! CAUSES EYE IRRITATION!
Avoid contact with eyes.
Wash thoroughly after handling.

FIRST AID: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Pallet loads shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. Citric acid is intended for use as a cleaning agent in distillation apparatus and water demineralization plants, and as a component in the reverse osmosis water purification unit.

6.2 Ordering data. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification,
- (b) Level of unit packing, intermediate packing, and packing required (see 5.1, 5.2, and 5.3), and
- (c) Quantity of citric acid to be unit packed.

6.3 Batch. A batch is defined as that quantity of material which has been manufactured by some unit chemical process or subjected to some physical mixing operation intended to make the final product substantially uniform.

6.4 Significant places. For the purpose of determining conformance with this specification, an observed or calculated value should be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of ASTM E 29.

6.5 Sampling and testing precautions. This specification covers inspection of chemical material which is potentially hazardous to personnel. All applicable federal, state, and local safety rules, regulations and procedures must be followed in the handling and processing of this material.

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6.6 Subject term (key word) listing.

Citric acid, technical
Cleaning agent
Water purification unit, reverse osmosis

6.7 Material Safety Data Sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with 29 CFR 1910.1200 and Fed. Std. No. 313. The pertinent government mailing addresses for submission of data are listed in appendix B of Fed. Std. No. 313.

Custodians:

Army - EA
Air Force - 68

Review activities:

Army - MD
DLA - GS

Preparing activity:

Army - EA
Project No. 6810-1021

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

MIL-C-11029D

2. DOCUMENT TITLE

CITRIC ACID, TECHNICAL

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)

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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