

O-C-291B
May 24, 1983

SUPERSEDING
Fed. Spec. O-C-291a
March 14, 1961

FEDERAL SPECIFICATION
CHLOROFORM, TECHNICAL

This specification was approved by the Assistant Administrator, Office of Federal Supply And Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE

1.1 Scope. This specification covers one grade of chloroform (CHCl₃).

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:

Federal Specifications:

NN-P-71 - Pallets, Material Handling, Wood, Stringer Construction,
2-Way and 4-Way (Partial)
PPP-C-2020 - Chemicals, Liquid, Dry, and Paste: Packaging Of
PPP-D-729 - Drums, Shipping and Storage, Steel, 55-Gallon (208 Liters)
PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons)

Federal Standards:

Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

(Single copies of this specification, other Federal specifications, and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Washington, DC; Philadelphia, PA; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

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(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards and Commercial Item Descriptions from established distribution points in their agencies.)

Military Standards:

- 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

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

Code of Federal Regulations (CFR)

- 49 CFR 171 to 179 - Hazardous Materials Regulations

(The Code of Federal Regulations and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

Uniform Classification Committee, Agent:

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, NW, Washington, DC 20036.)

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ASTM Standards:

- D941 - Density and Relative Density (Specific Gravity) of Liquids by
Lipkin Bicapillary Pycnometer
D1078 - Distillation Range of Volatile Organic Liquids
D1193 - Reagent Water

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

3. REQUIREMENTS

3.1 Physical and chemical characteristics. Chloroform shall conform to the physical and chemical characteristics of table I when tested as specified therein.

TABLE I. Physical and chemical characteristics

Characteristic	Requirement	Test paragraph
Appearance	No evidence of suspended matter or sediment and no darker than 10 on the platinum-cobalt scale	4.2.4.1
Specific gravity at 25°/25°C	1.474 to 1.485	4.2.4.2
Residue at 105°C	0.002 g per 100 mL	4.2.4.3
Boiling range corrected to 760 mm of Hg pressure	95 percent minimum distilling between 60°C and 62°C	4.2.4.4
Odor	To pass test	4.2.4.5
Acidity (as HCl)	0.002 percent maximum	4.2.4.6
Free chlorine	To pass test	4.2.4.7
Phosgene	None	4.2.4.8

3.2 Stabilizer. A suitable stabilizer shall be added to the chloroform by the contractor, but the amount added shall not exceed 1 percent by weight. Each bidder shall furnish a statement giving the name and percent by weight of the stabilizer to be added.

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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.

4.2 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the chloroform 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 chloroform test. See 6.5 for sampling and testing precautions. Sampling shall be conducted in accordance with table II. A representative specimen of approximately 500 milliliters (mL) 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 II. Sampling for chloroform 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 container, ready for shipment. Sample unit containers shall be examined for the following defects using an AQL of 1.5 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) Marking incorrect, missing or illegible
- (f) Unitization not as specified

4.2.3.2 For chloroform 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.

4.2.3.3 For container leakage test. See 6.5 for sampling and testing precautions. 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 1.5 percent defective.

4.2.4 Chloroform tests. 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 Appearance. Examine the specimen in accordance with ASTM D1209 for color. Pour some of the specimen into a test tube, stopper, and allow to stand for at least 10 minutes at room temperature (20° to 30°C). Examine by transmitted light for suspended matter and sediment.

4.2.4.2 Specific gravity. Determine the specific gravity of the specimen at 25°/25°C in accordance with ASTM D941.

4.2.4.3 Residue at 105°C. Place 100 mL of the specimen in a tared porcelain dish. Evaporate over a steam bath practically to dryness, then heat in an oven at 105° to 110°C to constant weight. Report the weight of the residue as grams (g) per 100 mL of specimen.

4.2.4.4 Boiling range. Determine the distillation range in accordance with ASTM D1078.

4.2.4.5 Odor. Dip uniform strips of double acid-washed filter paper into the specimen, remove, and allow to dry for 2 hours in a well-ventilated room at 20° to 30°C. There shall be no foreign odor during evaporation and no residual odor at the end of the drying period.

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4.2.4.6 Acidity. Pipet 25 mL of the specimen into a 250-mL glass-stoppered Erlenmeyer flask and add 25 mL of carbon dioxide-free water. Place the glass stopper in the flask and shake for 5 minutes. Titrate with 0.01N sodium hydroxide, using phenolphthalein as indicator. Calculate the acidity as follows:

$$\text{Acidity as percent HCl} = \frac{3.65 V N}{W}$$

where: V = Volume of sodium hydroxide solution used, in milliliters,
 N = Normality of sodium hydroxide solution, and
 W = Weight of specimen used (milliliters of specimen multiplied by the specific gravity determined in 4.2.4.2), in grams.

4.2.4.7 Free chlorine.

(a) Starch indicator solution. Mix about 2 g of soluble starch with sufficient cold water to form a thin paste. Transfer to 1 liter of boiling water, add 1 g of salicylic acid, and boil until the solution is clear. Cool and transfer to a glass-stoppered bottle.

(b) Procedure. Place 25 mL of the specimen in a 250-mL flask. Add 25 mL of a 10-percent aqueous solution of potassium iodide and 0.25 mL of starch indicator solution from (a). Shake for 30 seconds. The aqueous layer shall be no darker than a similar quantity of untreated starch-potassium iodide solution.

4.2.4.8 Phosgene. Overlay 10 mL of the specimen with a sufficient volume of clear saturated barium hydroxide solution to form a layer about 6 millimeters deep. The formation of a white film at the junction of the liquids indicates the presence of phosgene.

4.2.5 Container leakage test. Place the container in each of the following positions, and leave it in each for a period of 15 minutes.

- (a) Upright
- (b) Upside down
- (c) On one side (or one quadrant)
- (d) On one end (or second quadrant)
- (e) On other side (or fourth quadrant)

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

5. PACKAGING

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

5.1.1 Unit packing, level A. Chloroform shall be unit packed in a 61-1/2 or 675 pound (1b) quantity as specified (see 6.2).

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5.1.1.1 Quantity of 61-1/2 pounds. A quantity of 61-1/2 (+3/4 or -0) lbs of chloroform shall be unit packed in accordance with the applicable requirements of PPP-C-2020 in a nominal 5-gallon (gal) capacity steel pail conforming to type I, class 4 of PPP-P-704, and furnished with a tamper-resistant inner seal. The pail shall be closed to a torque within a range as specified by the pail manufacturer. There shall be no evidence of leakage when the pail is tested as specified in 4.2.5.

5.1.1.2 Quantity of 675 pounds. A quantity of 675 (+7 or -0) lbs of chloroform shall be unit packed level A in a clean, dry, rust-free steel drum conforming to Department of Transportation (DOT) Specification 17C. In addition, the drum shall be finished as specified for the drums conforming to PPP-D-729. Unless otherwise specified, the interior of the drum shall be fog-sprayed as specified in PPP-D-729 (see 6.2).

5.1.2 Unit packing, level C. A quantity of 61-1/2 (+3/4 or -0) lbs, or 675 (+7 or -0) lbs as specified (see 6.2) of chloroform, shall be unit packed level C in a manner to assure maintenance of the specified purity for a minimum duration of six months, acceptance by common carrier, and safe delivery at destination. The container shall comply with DOT and any other regulatory requirements, and shall meet the Uniform Freight Classification Rules, National Motor Freight Classification Rules and the rules of any other intended applicable mode of transportation.

5.2 Packing. Chloroform, unit packed as specified in 5.1, shall require no further protection for shipment, except that the 61-1/2 lb quantity shall require unitization if specified (see 6.2).

5.3 Unitization. When specified (see 6.2), 24 nominal 5-gal capacity pails prepared as specified in 5.1.1.1 shall be palletized in accordance with applicable requirements for load type III of MIL-STD-147, using a soft wood pallet conforming to type IV of NN-P-71.

5.4 Marking.

5.4.1 Civil agencies. Marking shall be in accordance with Fed. Std. No. 123 and DOT regulations, and shall include the name of the stabilizer used.

5.4.2 Military activities. Containers shall be marked in accordance with MIL-STD-129, DOT regulations, and any other applicable regulations. Each container shall be marked to show date of manufacture and lot or batch number of the chloroform, name of stabilizer used, and the following precautionary marking:

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DANGER:
SUSPECTED CARCINOGEN
HARMFUL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN
MAY CAUSE EMBRYO-FETAL INJURY

WARNING! HARMFUL IS SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.

Avoid breathing vapor.
Avoid contact with eyes, skin, and clothing.
Keep container closed.
Use only with adequate ventilation or respiratory protection.
Wash thoroughly after handling.
Poisonous and irritating gases are produced when heated.
FIRST AID: If swallowed, induce vomiting by sticking finger down throat or by giving soapy or strong salty water to drink. Repeat until vomit is clear. Call a physician. Never give anything by mouth to an unconscious person.
If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth or mouth. If breathing is difficult, give oxygen. Call a physician.
In case of contact, immediately flush eyes and skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician. Wash clothing before reuse (discard contaminated shoes).

6. NOTES

6.1 Intended use. Chloroform is intended for use in the manufacture of chemicals and for solvent purposes.

6.2 Ordering data. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification,
- (b) Level of preservation required (see 5.1),
- (c) Unit quantity required (see 5.1.1 and 5.1.2),
- (d) If fog-spray is not required (see 5.1.1.2), and
- (e) If unitization is required (see 5.2 and 5.3).

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 E29.

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

MILITARY INTERESTS:Custodians:

Army - EA
Air Force - 68

Review activities:

Army - MD
DLA - GS

Preparing activity:

Army - EA

Project No. 6810-B382

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA-FSS
VA-OSS

Preparing activity:

Army - EA

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Orders for this publication are to be placed with the General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain copies and other documents referenced herein.

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for 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 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.

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