

MIL-D-6998D
5 October 1978
SUPERSEDING
MIL-D-6998C
8 May 1975

MILITARY SPECIFICATION
DICHLOROMETHANE, 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 two grades of technical dichloro-
methane.

1.2 Classification. Dichloromethane shall be of the following grades
as specified (see 6.2):

Grade A - 0.0005 percent maximum acidity.
Grade B - 0.010 percent maximum acidity.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. 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.

FSC 6610

: 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 :
: Command, Attn: DRDAR-TSC-S, Aberdeen Proving Ground, MD 21010 by us- :
: ing the self-addressed Standardization Document Improvement Proposal :
: (DD Form 1426) appearing at the end of this document or by letter. :
:

MIL-D-6998D

SPECIFICATIONS

FEDERAL

- PPP-B-585 - Boxes, Wood, Wirebound.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
- PPP-B-636 - Boxes, Shipping, Fiberboard.
- PPP-C-96 - Cans, Metal, 28 Gauge and Lighter.
- PPP-D-729 - Drums, Shipping and Storage, Steel, 55-Gallon (208 Liters).
- PPP-F-320 - Fiberboard: Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.
- PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons).

STANDARDS

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 for 40" x 48" Pallets.
- MIL-STD-1188 - Commercial Packaging of Supplies and Equipment.

(Copies of specifications, standards, drawings, and publications 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 publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

CODE OF FEDERAL REGULATIONS

- 49 CFR 171 to 179 - Department of Transportation Rules and Regulations for the Transportation of Explosives and Other Dangerous Articles.

(The Department of Transportation regulations are a part of the Code of Federal Regulations available from the Superintendent of Documents, US Government Printing Office, Washington, DC 20402. Orders for the above publication should cite "49 CFR 171 to 179.")

MIL-D-6998D

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS

- D1076 - Distillation Range of Volatile Organic Liquids.
 D1193 - Reagent Water.
 D1296 - Odor of Volatile Solvents and Diluents.
 D2108 - Color of Halogenated Organic Solvents and Their Admixtures
 (Platinum - Cobalt Scale).
 D2109 - Nonvolatile Matter in Halogenated Organic Solvents and Their
 Admixtures.
 D2111 - Specific Gravity of Halogenated Organic Solvents and Their
 Admixtures.
 E203 - Water Using Karl Fischer Reagent.

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

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

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

TABLE I. Physical and chemical characteristics

Characteristic	Minimum	Maximum	Test paragraph:
Color (Platinum - Cobalt)	---	No. 20	4.2.4.1
Specific gravity at 25°/25° C	1.317	1.322	4.2.4.2
Distillation range:			4.2.4.3
Initial boiling point, °C	39.0	---	
Dry point, °C	---	41.0	
Nonvolatile matter, percent by weight	---	0.002	4.2.4.4
Acidity (as hydrochloric acid):			
Grade A, percent by weight	---	0.0005	4.2.4.5
Grade B, percent by weight	---	0.010	4.2.4.5
Water content, percent by weight	---	0.020	4.2.4.6
Free halogens	---	To pass	
		test	4.2.4.7
Residual odor	---	None	4.2.4.8

MIL-D-699ED

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 specified requirements.

4.2 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the dichloromethane 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, inspection level S-2 using an AQL of 4.0 percent defective.

4.2.2.2 For dichloromethane tests. Sampling shall be conducted in accordance with table II. A representative specimen of approximately 0.5 liter 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 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

MIL-D-6998D

4.2.2.3 For drum leakage test. Sampling shall be conducted in accordance with MIL-STD-105, inspection level S-4 using an AQL of 2.5 percent defective.

4.2.3 Inspection procedure.

4.2.3.1 For examination of packaging. The sample unit shall be one filled unit or shipping container, as applicable, ready for shipment. Sample unit and shipping containers shall be examined for the following defects using inspection level S-2 and an AQL of 4.0 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) Fiberboard packing aids missing or not as specified
- (f) Marking incorrect, missing, or illegible

4.2.3.2 For dichloromethane tests. 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 drum leakage test. The sample drums selected in 4.2.2.3 shall be tested as specified in 4.2.5.

4.2.4 Dichloromethane 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 Color. Determine color in accordance with ASTM D2108.

4.2.4.2 Specific gravity. Determine specific gravity in accordance with ASTM D2111, method A or C.

4.2.4.3 Distillation range. Determine distillation range in accordance with ASTM D1078.

4.2.4.4 Nonvolatile matter. Determine percent by weight nonvolatile matter in accordance with ASTM D2109, method B.

4.2.4.5 Acidity. Weigh to the nearest milligram approximately 100 grams of the specimen into a clean, dry, 250-milliliter (ml) Erlenmeyer flask. Titrate the specimen with a 0.01N methanol solution of sodium hydroxide, using bromothymol blue as the indicator. Calculate the percent by weight hydrochloric acid as follows:

MIL-D-6996D

$$\text{Percent hydrochloric acid} = \frac{3.646 AB}{W}$$

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

4.2.4.6 Water content. Determine percent by weight water in accordance with ASTM E203.

4.2.4.7 Free halogens. Place 10 ml of the specimen in a test tube with 10 ml of water containing 2 drops of 10-percent potassium iodide solution and 15 drops of 1-percent starch solution as indicated. Shake well for 1 minute. There shall be no blue color in the aqueous layer.

4.2.4.8 Residual odor. Determine the residual odor, if any, in accordance with ASTM D1296. There shall be no residual odor.

4.2.5 Drum leakage test. Store the filled drum for at least 24 hours at a temperature of $75^{\circ} + 5^{\circ}$ F ($24^{\circ} + 3^{\circ}$ C). Then invert the drum and maintain at $75^{\circ} + 5^{\circ}$ F ($24^{\circ} + 3^{\circ}$ C) for 4 additional hours. Observe for evidence of leakage during and at the end of the 4-hour period.

5. PACKAGING

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

5.1.1 Level A.

5.1.1.1 One-pint (0.47-liter) quantity. A quantity of 22-1/2 (+1/4 or -0) ounces avoirdupois [0.638 (+ 0.007 or -0) kilograms] of dichloromethane shall be unit packed in a nominal 1-pint (0.47-liter) capacity, oblong, minimum No. 50 tinplate can with screw-cap closure and tinplate inner seal conforming to type V, class 4 of PPP-C-96. The can exterior shall be coated in accordance with plan B of PPP-C-96 with side seam striped. A resilient liner with a facing of phenolic resin or other material of equal or better resistance to dichloromethane shall be furnished with each screw cap. The screw cap shall be tightened to the neck of the can to a torque of 15 to 20 pound-inches (1.69 to 2.26 Newton-meters). The filled can shall show no evidence of leakage of contents when tested as specified in the appendix to PPP-C-96.

MIL-D-6998D

5.1.1.2 One-gallon (3.79-liter) quantity. A quantity of 1 US gallon (+1 or -0 fluid ounces) [3.79 (+0.03 or -0) liters] of dichloromethane measured at $70^{\circ} \pm 3^{\circ}$ F ($21.1^{\circ} \pm 1.7^{\circ}$ C) shall be unit packed as specified for the 1-pint quantity in 5.1.1.1 except that a nominal 1-gallon (3.79-liter) capacity can shall be used.

5.1.2 Commercial. A quantity of 22-1/2 (+1/4 or -0) ounces avoirdupois [0.638 (+0.007 or -0) kilograms] or 1 US gallon (+1 or -0 fluid ounces) [3.79 (+0.03 or -0) liters] as specified (see 6.2) of dichloromethane shall be unit packed in accordance with MIL-STD-1188 and Department of Transportation (DOT) regulations.

5.2 Packing. Dichloromethane shall be packed level A, B, or commercial as specified (see 6.2).

5.2.1 Level A.

5.2.1.1 One-pint (0.47-liter) quantity. Forty-eight 1-pint (0.47-liter) metal cans of dichloromethane unit packed as specified in 5.1.1.1 shall be packed upright in two layers in a snug-fitting box. The box shall conform to type overseas, style A, B, or I, grade A of PPP-B-601; class 2, style 4, grade A of PPP-B-621; or class 3, style optional of PPP-B-585 with wood parts preserved as specified for the wood parts of grade A of PPP-B-621. Each layer shall consist of a 4 by 6 can arrangement. A fiberboard pad shall be used to separate the two layers. Snug-fitting, can-height, half-slotted, interlocking fiberboard partitions shall separate the cans laterally. Motion of the contents within the box shall be prevented by the use of box-size fiberboard pads, where needed, on the inside faces of the box. Fiberboard pads, separators, and partitions shall be formed from material conforming to grade W6c of PPP-F-320. The box shall be closed and reinforced in accordance with the applicable requirements in the specification for the selected container.

5.2.1.2 One-gallon (3.79-liter) quantity. Six 1-gallon (3.79-liter) cans of dichloromethane unit packed as specified in 5.1.1.2 shall be packed upright in a close-fitting box as specified in 5.2.1.1. Full can-height partitions shall be inserted between the cans to form a close-fitting cell for each can. Motion of contents within the box shall be prevented by the insertion, as needed, of fiberboard pads. Partitions and pads shall be formed from material conforming to grade V2s of PPP-F-320. The box shall be closed and reinforced as specified in 5.2.1.1.

5.2.1.3 Five-gallon (18.93-liter) quantity. A quantity of 55 (+1/2 or -0) pounds [24.95 (+0.23 or -0) kilograms] of dichloromethane shall be packed in a nominal 5-gallon (18.93-liter) capacity tight-head steel pail

MIL-D-6998D

conforming to type I, class 4 of PPP-P-704. A screw-cap closure furnished with a resilient, phenolic resin-faced lining shall be required. An inner or outer closure seal and a vented, push-pull spout as specified in PPP-P-704 shall also be required. Zinc-coated wire handles or bails shall be furnished and fitted with a hand grip. The pail shall be closed as specified in the appendix to PPP-P-704 and shall not leak when tested as specified therein.

5.2.1.4 Fifty-five-gallon (208.2-liter) quantity. A quantity of 600 (+6 or -0) pounds [272 (+2.7 or -0) kilograms] of dichloromethane shall be packed in a nominal 55-gallon (208.2-liter) capacity tight-head steel drum conforming to type I, class A of PPP-D-729. The closure shall be furnished with gaskets as specified in PPP-D-729. Gaskets shall be formed from material fabricated from polyethylene or from woven blue asbestos fibers impregnated with polymerized tetrafluoroethylene. The drum shall be closed by tightening the 3/4-inch (19.05-millimeter) plug to a torque of 15 to 17 pound-feet (20.3 to 23.0 Newton-meters) and by tightening the 2-inch (50.8 millimeter) plug to a torque of 30 to 33 pound-feet (40.7 to 44.7 Newton-meters). There shall be no evidence of leakage of contents when the filled drum is tested as specified in 4.2.5.

5.2.2 Level B.

5.2.2.1 One-pint (0.47-liter) quantity. Forty-eight 1 pint (0.47-liter) metal cans of dichloromethane unit packed as specified in 5.1.1.1 shall be packed upright in a fiberboard box conforming to grade V3c of PPP-B-636. The box shall be closed and reinforced as specified for class weather-resistant boxes not intended to be overpacked.

5.2.2.2 One-gallon (3.79 liter) quantity. Six 1-gallon (3.79-liter) cans of dichloromethane unit packed as specified in 5.1.1.2 shall be packed as specified in 5.2.2.1.

5.2.2.3 Five-gallon (18.93-liter) quantity. A quantity of 55 (+1/2 or -0) pounds [24.95 (+0.23 or -0) kilograms] of dichloromethane shall be packed as specified in 5.2.1.3 except that the handle of the pail shall not be required to be zinc coated.

5.2.2.4 Fifty-five-gallon (208.2-liter) quantity. A quantity of 600 (+6 or -0) pounds [272 (+2.7 or -0) kilograms] of dichloromethane shall be packed as specified in 5.2.1.4.

MIL-D-6998D

5.2.3 Commercial. The specified unit quantity of dichloromethane (see 6.2) shall be packed in accordance with MIL-STD-1188 and DOT regulations.

5.3 Palletization. Level A and B shipping containers shall be palletized in accordance with the applicable requirements of MIL-STD-147.

5.4 Marking. Unit packs, packs, and palletized loads protected levels A and B shall be marked in accordance with MIL-STD-129. Commercial unit packs and packs shall be marked in accordance with MIL-STD-1188. All unit packs, packs, and palletized loads shall be marked to show date of manufacture and dichloromethane lot or batch number.

5.3.1 Precautionary marking. Each unit container can, pail, or drum shall also be marked to show the following precautionary information:

CAUTION!

Use with adequate ventilation.
Avoid prolonged or repeated breathing
of vapor.
Avoid prolonged or repeated contact
with skin.
Do not take internally.

6. NOTES

6.1 Intended use.

6.1.1 Grade A. Grade A dichloromethane is intended for use as a solvent in the manufacture of other chemicals.

6.1.2 Grade B. Grade B dichloromethane is intended for use in the preparation of acrylic resin plastic cement, as paint remover, and as safety solvent.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification
- (b) Grade of dichloromethane required (see 1.2)
- (c) Unit quantity required
- (d) Level of preservation required (see 5.1)
- (e) Level of packing required (see 5.2)

MIL-D-6998D

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 the Recommended Practice for Indicating Which Places of Figures Are To Be Considered Significant in Specified Limiting Values (ASTM E29).

Custodians:

Army - EA
Navy - OS
Air Force - 68

Preparing activity:

Army - EA
Project No. 6810-B109

Review activities:

Army - MI, SM
DSA - GS

User activities:

Navy - AS, MC

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 22-R255

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.

SPECIFICATION

D117 D 6971 1 207 177

ORGANIZATION

CITY AND STATE

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

 DIRECT GOVERNMENT CONTRACT SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

YES NO (If "yes", in what way?)

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)

SUBMITTED BY (Printed or typed name and activity - Optional)

DATE

DD FORM 1426
1 JAN 66

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.

FOLD

POSTAGE AND FEES PAID

DOD-314

OFFICIAL BUSINESS

Commander
US Army Armament Research and
Development Command
Attn: DRDAR-TSC-S
Aberdeen Proving Ground, MD 21010

FOLD