
Item ID Number 00281

Author

Corporate Author Federal Supply Service, General Services Administratio

Report/Article Title Federal Specification: Insecticide, DDT (Liquid Form, 5 Percent), O-I-531c

Journal/Book Title

Year 1966

Month/Day April 21

Color

Number of Images 10

Description Notes Found in a file Labeled: "Technical Manual-Use of Herbicides + Federal Specifications for Herbicides"; supercedes O-I-531b

ATC from ATZE-1
O-I-531c

April 21, 1966

SUPERSEDING
Fed. Spec. O-I-531b
August 25, 1958

FEDERAL SPECIFICATION

INSECTICIDE, DDT (LIQUID FORM, 5 PERCENT)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 This specification covers one type and grade of solvent base, residual insecticide (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following specifications and standards, of the issues 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:

- O-I-514—Insecticide, DDT.
- VV-K-220—Kerosene, Deodorized.
- PPP-C-96—Cans, Metal, 28 Gage and Lighter.
- PPP-P-704—Pails: Shipping, Steel (1 Through 12 Gallon).

Federal Standards:

- Fed. Std. No. 123—Marking for Domestic Shipment (Civilian Agencies).
- Fed. Test Method Std. No. 791—Lubricants, Liquid Fuels, and Related Products; Methods of Testing.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are

available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D. C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, and Seattle, Wash.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards 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.

(Copies of Military Specifications and Standards 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 publication. The following document forms 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.

- Federal Insecticide, Fungicide, and Rodenticide Act.
- Regulation for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act, Part 362 of Chapter III.

(Application for copies should be addressed to the U. S. Department of Agriculture, Agricultural Research Service, Pesticides Regulation Division, Washington, D. C., 20250.)

(Technical society and technical association specifications and standards are generally available for

FSC 6840

reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Material.

3.1.1 *Dichlorodiphenyltrichloroethane (DDT)*. DDT shall conform to O-I-514.

3.1.2 *Odorless kerosene*. Kerosene shall conform to the requirements of VV-K-220.

3.1.3 *Auxiliary solvent*. The auxiliary solvent shall consist of aromatic hydrocarbons having a mild, nonobjectionable odor and shall conform to the requirements of table I.

TABLE I. *Properties of auxiliary solvents*

Characteristic	Minimum	Maximum
Flash point, Tag closed cup, °F.	105	—
Distillation range:		
Initial boiling point, °F. . .	300	—
End point, °F.	—	420
Color, Saybolt	+20	—
Organic chlorine, mg. per g.	—	0.1
Degrees A.P.I. at 60°F.	22	34
Solubility of DDT, W/W at 30°C., percent	30	—

3.2 *Composition of finished insecticide*. The finished insecticide shall be a solution conforming to the composition requirements of table II, when tested as determined in 4.3.7.

TABLE II. *Insecticide composition*

Material	Percent by weight
DDT	5 ± 0.1
Kerosene, odorless	70 ± 0.2
Auxiliary solvent	25 ± 0.2

3.3 Properties of insecticide.

3.3.1 *Appearance*. The finished insecticide shall be a clear, homogeneous solution, not darker than color Saybolt No. + 15 when tested as specified in 4.3.7.

3.3.2 *Solution stability*. The insecticide shall show no sedimentation nor separation as a solid or liquid phase when tested as specified in 4.3.7.

3.3.3 *Staining properties*. There shall be no residual stain when the insecticide is tested as specified in 4.3.7.

3.3.4 *Organic chlorine*. The finished insecticide shall contain 25 ± 0.5 milligrams (mg.) of organic chlorine per gram (g.) of solution when tested as specified in 4.3.7.

3.4 *Labeling*. Each container shall be labeled to include identification marking, precautionary marking, and directions for use. The label shall comply with the Federal Insecticide, Fungicide, and Rodenticide Act and shall be accepted by and registered with the U. S. Department of Agriculture (USDA).

3.4.1 *Identification marking*. In addition to the marking required by MIL-STD-129, the following labeling data shall be included:

**INSECTICIDES, DDT (LIQUID FORM,
5 PERCENT)**

Active ingredients	Percent
DDT	5.0
Odorless kerosene	70.0
Aromatic petroleum derivatives solvent	25.0
	100.0

3.4.2 *Precautionary marking*. One of the following caution legends shall be applied as applicable:

(For military procurement)

CAUTION

Only trained personnel should apply this spray. Toxic when taken internally or spilled on skin. In case of accidental spillage on skin, wash immediately with soap and water. Food, dishes, cooking utensils, and tabletops must be protected from spray by a suitable covering. Do not use or store near heat or open flame. Appropriate protective clothing and personal equipment will be worn to avoid inhalation of vapor and skin contact. Area treated should be well ventilated and sources of ignition prohibited for 48 hours.

(Civil agency procurements)

CAUTION

Avoid prolonged contact with skin.
 In case of prolonged contact with skin,
 wash with soap and water.
 Avoid breathing spray mist.
 Avoid contamination of feed and foodstuffs.
 Do not use or store near heat or open flame.

DIRECTIONS FOR USE*Flies and mosquitoes.*

Apply spray to the interior of tents, barracks, and other buildings, paying particular attention to sites which insects inhabit. Use a compression or a power sprayer with the nozzle adjusted for a coarse wet spray to insure that all the spray will strike the surface being treated. In an emergency, a hand sprayer can be used if the nozzle is held close to the object being sprayed. A gallon is sufficient for approximately 1,000 square feet of surface. Wetting the surface to just short of runoff will give correct dosage. One application, unless removed, will remain effective several weeks to several months depending upon the type of surface sprayed, the variety of insect to be controlled, and unless the insect strain is resistant to DDT.

Bedbugs.

For bedbugs, spray mattress and beds thoroughly. Also spray adjacent areas of floors and walls in the infested room tent, or barracks. Repeat application as necessary. Allow to dry before using.

Stored woolen clothing.

Hang clothing on a line and apply insecticide as a very fine wet spray from a fan-type nozzle. Use one fluid ounce per pound of clothing (3 to 6 ounces per suit or uniform). Hold nozzle one foot from garment and sweep spray up and down the length of the garment. All outside and inside wool surfaces should be dampened but not wet. Dry the garment before bagging or storing. Retreat garment each time before storage.

Retreat clothing in dead storage every 3 to 5 years. Dryclean before wearing.

Wool rugs and carpets.

Apply as a fine wet spray from a fan-type nozzle. Use about 6 fluid ounces per square yard (2 quarts for a 9 by 12 rug). Hold the nozzle two feet from surface and sweep spray back and forth across width of rug until entire surface is covered. Be sure to treat under every piece of furniture; in wall-to-wall carpeted rooms, spray the baseboards to just short of runoff. Thick rugs should be treated on both sides. To avoid spotting, do not disturb sprayed surface until spray is dry. Woolen pads should also be treated. Retreat rugs every 12 to 18 months. Retreat rugs in dead storage every 5 years.

Furniture, draperies, and tapestries.

Apply as a very fine wet spray from a fan-type nozzle. Use 1 to 1-1/2 ounces per square yard of woolen surface. Hold the nozzle one foot from the surface and sweep spray back and forth across all woolen surfaces of the furniture. The spray should be applied so as to dampen but not wet the surfaces. In case the upholstery will not take the amount of spray recommended, allow spray to dry and then retreat. Do not touch or disturb upholstery while wet. Test staining properties of the spray on obscure part of the furniture and allow to dry. Retreat every 12 to 18 months. Retreat articles in dead storage every 3 to 5 years.

3.5 Workmanship. The finished product shall be clean, uniform, and free from foreign matter.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Govern-

ment reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated.

4.2.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected and tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase documents.

4.2.2 Testing of components. The methods of testing specified in Fed. Test Method Std. No. 791, wherever applicable and as listed in table III, shall be followed for each lot. The lot size shall be expressed in gallons of components. The sample for testing shall be one quart composite obtained by randomly selecting and thoroughly mix-

ing equal portions from the number of sample containers specified below. Care shall be exercised to prevent contamination or alteration of the composite during the sampling and testing. The component lot shall be unacceptable if the composite sample fails to meet any of the test requirements specified. All test reports shall contain the individual values utilized in expressing the final result.

Lot size (gallons)	Sample size
800 or less	2
801 up to and including 22,000	3
22,001 or more	5

4.3 Inspection of the end item.

4.3.1 Examination of the end item. The end item shall be examined for the defects in the applicable subparagraphs at the inspection levels and acceptable quality levels (AQLs) set forth in 4.3.6. The lot size shall be expressed in units of unit containers of the same type and size containing end item of the same type for the examination in 4.3.2, 4.3.3, 4.3.4 and in units of shipping containers for examination under 4.3.5.

TABLE III. *Instructions for testing materials and components*

Characteristic	Specification reference		Requirements applicable to composite sample	Number determinations per unit	Results reported as
	Requirement	Test method			
Auxiliary solvent:					
Flash point (Tag closed cup)	3.1.3	1101	X	Average of 2	°F.
Distillation range:					
Initial boiling point	3.1.3	1001	X	Average of 2	°F.
End point	3.1.3		X	Average of 2	°F.
Color (Saybolt)	3.1.3	101	X	Average of 2	Saybolt chronometer color
A.P.I.	3.1.3	401	X	Average of 2	0.1°
Solubility of DDT	3.1.3	4.4.1.2	X	1	Pass or fail
Organic chlorine	3.1.3	4.4.1.3	X	Average of 2	0.01 mg.
Residual odor	3.1.3	4.4.1.1	X	1	Pass or fail

4.3.2 Examination of unit container. The sample unit for this examination shall be one filled unit container.

Examine	Defect
Construction	Not in container specified. Any leakage of contents. Any split, break, dent, hole, tear, puncture, or other defect.
Closure	Not type and class specified, as applicable. Not equipped with a push-pull pouring spout, as applicable. Any leakage.
Markings	Not type specified. Missing, illegible, incorrect, or incomplete. Labeling not in accordance with requirements (see 5.3). Markings not in conformance with MIL-STD-129 or Fed. Std. No. 123, as applicable.

4.3.3 Examination of contents of the unit container. The sample unit for this examination shall be the contents of one filled unit container.

Examine	Defect
Appearance	Not a liquid. Any dirt or foreign matter. Any precipitation. Not homogeneous. Not clear.

4.3.4 Examination of the end item for net contents. The sample unit for this examination shall be one filled unit container. The lot shall be unacceptable if the average net contents per container is less than specified or indicated for all sample units examined.

4.3.5 Examination of preparation for delivery. An examination shall be made to determine that markings, materials, and workmanship comply with the requirements of

section 5. The sample unit shall be one shipping container, fully packed, selected just prior to the closing operation. Closed shipping container shall be examined for closure defects. This examination shall not apply when the end item container is the shipping container.

Examine	Defect
Markings	Incorrect, incomplete, illegible; of improper size, sequence, or method of application not in accordance with contract requirements.
Materials	Any nonconforming component; component missing, damaged, or otherwise defective.
Workmanship	Any seepage. Any break or dents.

4.3.6 Inspection levels and AQLs for examinations. The inspection levels for determining the sample size and the AQLs expressed in defects per 100 units shall be as follows:

Examination paragraph	Inspection level	AQLs
4.3.2	I	1.0
4.3.3	S-2	2.5
4.3.4	S-2	—
4.3.5	S-1	2.5

4.3.7 Testing of the end item. The methods of testing specified in Fed. Test Method Std. No. 791, where applicable and as listed in table IV, shall be followed for each lot. The lot size shall be expressed in gallons of insecticide. The sample for testing shall be a one quart composite. The sample size shall be selected as specified in 4.2.2. Care shall be exercised to prevent contamination or alteration of the composite during the sampling and testing. The lot shall be unacceptable if the composite sample fails to meet any of the test requirements specified. All test reports shall contain the individual values utilized in expressing the final result.

TABLE IV. Instructions for testing of the end item

Characteristic	Specification reference		Requirements applicable to composite sample	Number determinations per unit	Results reported as
	Requirement	Test method			
Composition ¹					
Kerosene	3.2				
Auxiliary solvent	3.2				
Solution stability	3.3.2	4.4.2.1	X	1	Pass or fail
Staining properties	3.3.3	4.4.2.2	X	1	Pass or fail
Color (Saybolt)	3.3.1	101 ²	X	1	Pass or fail
Organic chlorine	3.3.4	4.4.2.3	X	2	Average of 2 determinations, to nearest 0.1 mg.

¹ Certificate of compliance will be furnished the contracting officer for composition requirements.

² Test performed in accordance to Fed. Test Method Std. No. 791.

4.4 Test procedures.

4.4.1 Auxiliary solvent.

4.4.1.1 Residual odor. Dip a filter paper into the auxiliary solvent to be tested, and allow to evaporate overnight at $75^{\circ} \pm 5^{\circ}\text{F}$. Smell the exposed test filter paper for residual odor.

4.4.1.2 Solubility of DDT in auxiliary solvent. Thirty-five grams (g.) of the auxiliary solvent and 15 g. of DDT, conforming to O-I-514, recrystallized to a melting point of 108° to 109°C . shall be placed in a 100 ml. cone-shaped centrifuge tube. The tube shall be stoppered with lead foil-covered cork and the tube tumbled in a warm water bath until all of the DDT is dissolved or equilibrium is reached. The water bath shall be maintained at $30^{\circ} \pm 2^{\circ}\text{C}$. If the solution is not clear, the tube and contents shall be centrifuged as specified in method 3003 of Fed. Test Method Std. No. 791. No undissolved DDT shall be present.

4.4.1.3 Organic chlorine content of auxiliary solvent. The method in 4.4.2.3 shall be used except that a 5 g. sample of the auxiliary solvent shall be substituted for the specified sample.

4.4.2 Insecticide.

4.4.2.1 Solution stability. One hundred g. of the finished insecticide shall be measured

into a 250 ml. Erlenmeyer flask and stored in a refrigerator maintained at $15^{\circ} \pm 0.5^{\circ}\text{F}$. for a period of 10 days. The mixture shall be seeded with a small crystal of DDT on the fifth day, and observed for sedimentation and separation.

4.4.2.2 Staining properties. Immerse a 6-inch square of bleached cotton sheeting in the finished insecticide. Thoroughly wet the sheeting, wring to remove excess liquid, and hang up to dry for 48 hours in a well ventilated room. At the end of 48 hours, the treated section of sheeting shall be examined and compared to a similar untreated piece of sheeting for staining.

4.4.2.3 Organic chlorine content. Transfer a quantity of sample containing 0.065 to 0.075 g. of DDT to a 250 to 500-ml. standard tapered Erlenmeyer flask. Add 25 ml. of 99 percent isopropanol and 2.5 g. of metallic sodium in the form of ribbon or cut in small pieces, and shake the flask to mix the sample with the alcohol. Connect to a reflux condenser and boil gently for at least 1/2 hour. Shake the flask occasionally. Eliminate all excess metallic sodium by cautiously adding about 10 ml. of 50 percent isopropanol through the condenser at the rate of 1 to 2 drops per second. Boil for an additional 10 minutes, add 60 ml. of water through the top of the condenser, and then

add 5 ml. of 30 percent hydrogen peroxide. Heat the solution to boiling and boil 15 minutes. Disconnect the flask from the condenser and boil for 15 to 30 minutes to remove alcohol. Cool, add 2 to 3 drops of phenolphthalein solution, neutralize by adding nitric acid (1:1), and then add 10 ml. in excess. Add accurately measured volume of N/10 silver nitrate (an excess of 15 to 20 ml.) and coagulate the precipitated silver chloride by digesting on a steam bath for 1/2 hour with frequent stirring. Cool, filter through a Whatman 42 or 44 filter paper, and wash thoroughly with distilled water. Add 5 ml. of saturated ferric alum solution, and determine the excess silver nitrate in the filtrate by titration with N/10 potassium thiocyanate. Subtract the quantity of silver nitrate found in the filtrate from that originally added. The difference will be that required to combine with the chlorine in the DDT. Calculate results as follows.

4.4.2.3.1 Calculation.

$$\frac{\text{mg. chlorine per g. sample} = \text{ml. N/10 AgNO}_3 \text{ used} \times 3.5457}{\text{weight of sample in g.}}$$

Alternatively, the end-point may be determined electrometrically by titration with 0.1 AgNO₃. A blank determination shall be made using 10 ml. standard 0.1 N NaCl solution.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be levels A, B, or C as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 One-gallon container. One gallon of insecticide shall be filled into a one-gallon capacity metal can conforming to type V, class 4 or 5 of PPP-C-96 with formed bridge type handle, except that 0.25-pound electrolytic tinfoil, terneplate, and blackplate, shall not be used. The exterior coating shall conform to plan B.

5.1.1.2 Five-gallon containers. Five gallons of insecticide shall be filled into a five-

gallon capacity pail, with interior and exterior coating, conforming to type I, class 3 or 8 of PPP-P-704. Closures shall be screw or snap-on type and shall be provided with a push-pull pouring spout. Each closure shall be equipped with a tamper-proof overseal with the Federal Identification Stock No. embossed on top.

5.1.2 Level B.

5.1.2.1 One-gallon containers. One gallon of the insecticide shall be filled in a metal can as specified in 5.1.1.1, except the exterior coating shall be plan A.

5.1.2.2 Five-gallon containers. Five gallons of the insecticide shall be filled in a steel pail as specified in 5.1.1.2, except that commercial exterior coating is permitted.

5.1.3 Level C. One gallon or five gallons of insecticide shall be packaged to afford adequate protection against damage during shipment from the supply source to the first receiving activity. The supplier may use his standard practice, when it meets these requirements.

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

5.2.1 Level A. Insecticide, packaged as specified in 5.1, shall be packed in accordance with the level A packing requirements in the appendix of PPP-C-96. Five-gallon containers shall require no overpacking.

5.2.2 Level B. Insecticide, packaged as specified in 5.1, shall be packed in accordance with the level B packing requirements in the appendix of PPP-C-96. Five-gallon containers shall require no overpacking.

5.2.3 Level C. Insecticide, packaged as specified in 5.1, shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. Containers shall be in accordance with rules or regulations of carriers applicable to the mode of transportation.

5.3 Marking.

5.3.1 Labeling. The label data shall be durably and legibly marked on the main panel of the body by lithographing, stenciling, or printing with a noncorrosive, weather-resistant, waterproof ink which will not smear nor rub off during handling. If all of the label data cannot be applied due to being too voluminous, that portion, such as the caution instructions and directions for use, may be placed on a label made of white paper containing not more than 15 percent unbleached or ground wood pulp and having a smooth finish. Labels shall be securely affixed in place with water-resistant label adhesive as specified in MIL-STD-129, and shall be waterproofed by coating the entire outer surface of the label with the same adhesive and shall bear the labeling data specified in 3.4.

5.3.2 Civil agencies. In addition to the labeling specified in 5.3.1 and any special marking required by the contract or order, interior packages and shipping containers shall be marked in accordance with Fed. Std. No. 123 including the batch number.

5.3.3 Military requirements. In addition to the labeling specified in 5.3.1 and any special marking required by the contract or order, interior packages and shipping containers shall be marked in accordance with MIL-STD-129 including the batch number.

6. NOTES

6.1 Intended use. The insecticide liquid covered by this specification is intended to kill flies, mosquitoes, bedbugs, and other flying and crawling insects.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Selection of applicable levels of packaging and packing (see 5.1 and 5.2).

6.3 Transportation descriptions. Transportation descriptions and minimum weights applicable to this commodity are:

Rail:

Insecticides, not otherwise indexed by name, other than agricultural.
Carload minimum weight 36,000 pounds.

Motor:

Insecticides, not otherwise indexed, other than agricultural.
Truckload minimum weight 36,000 pounds, subject to Rule 34, National Motor Freight Classification.

MILITARY CUSTODIANS:

Army—GL
Navy—SH
Air Force—68

Review activities:

Army—GL, MD, MU
Navy—SH
Air Force—68

User activities:

Army—MO
Navy—MC, MS, WP, YD

Preparing activity:

Army—GL

Review and user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD Standardization Documents.

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

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.

SPECIFICATION

Insecticide, DDT (Liquid Form, 5 percent) 0-I-531c

ORGANIZATION

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT

\$

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)

DATE

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