Doc No. FAD 01 (28712)WC
September 2025

BUREAU OF INDIAN STANDARDS
DRAFT FOR COMMENTS ONLY

भारतीय मानक *मसौदा*

डीडीटी, तकनीकी — विशिष्टि

(*आइ एस 563 का तीसरा पुनरीक्षण*)

Draft ***Indian Standard***

DDT, TECHNICAL – SPECIFICATION

(*Third Revision of IS 563*)

ICS 65.100.10

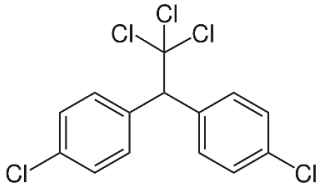
Pesticides Sectional Committee, FAD 01	Last date for Comments: 20 October 2025

FOREWORD

(*Adoption clause will be added later*)

DDT (Dichloro Diphenyl Trichloroethane), technical, is employed in large quantities in the preparation of a number of insecticidal formulations used in public health programmes. DDT, technical has a variable composition and contains several chemical components of which the *pp'*-isomer is the active principle.

DDT, the chemical name of which is 1, 1, l-trichloro-2, 2-di (*p*-chlorophenyl)-ethane has the structural and empirical formulae, and molecular weight as given below:

Empirical Formula	*Structural Formula*	*Molecular Mass*
$C_{14}H_9Cl_5$		354.5

This standard was first published in 1955 and subsequently revised in 1961. In the second revision issued in 1973, it was aligned with the WHO specification, as far as possible, and the revised packing requirements were incorporated.

In this revision, the requirement of setting point has been removed and the standard has been brought out in the latest style and format of the Indian Standards, and references to Indian Standards wherever applicable have been updated. It also incorporates one amendment issued to the previous version of this standard.

In year 2006 vide S.O. 295 (E) dated 8 March 2006, the use of DDT was banned in agriculture except public health programmes by Government of India.

In the preparation of this standard due consideration has been given to the provisions of the Insecticides Act, 1968 and the Rules framed thereunder. However, this standard is subject to the restrictions imposed under these, wherever applicable.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft ***Indian Standard***

Specification for DDT, technical

(*Third Revision*)

1 SCOPE

This standard prescribes the requirements and the methods of test for DDT, technical.

2 REFERENCE

The standards referred in the text contain provisions which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of' applying the most recent editions of the standards referred in the text:

IS No.	*Title*
IS 264 : 2005	Nitric acid — Specification (*third revision*)
IS 323 : 2009	Rectified spirit for industrial use — Specification (*second revision*)
IS 6940 : 2025	Pesticides and their formulations — Methods of test (*second revision*)
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 1260 (Part 2) : 2020	Packaging — Distribution packaging — Graphical symbols for handling and storage of packages: Part 2 General goods (*fourth revision*)
IS 8190 (Part 1) : 1988	Requirements for packing of pesticides: Part 1 Solid pesticides (*second revision*)
10946 : 1996	Methods of sampling for technical grade pesticides (*first revision*)

3 REQUIREMENTS

3.1 The material shall be in the form of granules, flakes or powder, free from extraneous impurities or added modifying agents and shall be white to creamy in colour.

3.2 The material shall also comply with the requirements given in Table 1.

Table 1 Requirements for DDT, Technical

Sl. No.	**Characteristic**	**Requirement**	**Method of Test, Ref. to**
(1)	(2)	(3)	(4)
i)	*pp'*-isomer content, percent by mass, *Min*	70.0	Annex A
ii)	Melting point of separated *pp'*- isomer, °C, Min	104	IS 6940
iii)	Total organic chlorine content, percent by mass	49.0 to 51.0	Annex B

iv)	Hydrolysable chlorine content, percent by mass	9.5 to 11.0	Annex C
v)	Matter insoluble in acetone, percent by mass, *Max*	1.0	IS 6940
vi)	Acidity (as H_2SO_4), percent by mass, *Max*	0.3	IS 6940
vii)	Moisture, percent by mass, *Max*	1.0	IS 6940

4 PACKING

The material shall be packed as per requirements given in IS 8190 (Part 1).

5 MARKING

5.1 The containers shall be securely closed and shall bear legibly and indelibly the following information:

a) Name of the material;
b) Name and address of the manufacturer;
c) Batch number;
d) Date of manufacture;
e) Date of expiry;
f) Net quantity;
g) Nominal DDT content, percent (*m*/*m*);
h) Cautionary notice as worded in the *Insecticides Act*, 1968, and Rules framed thereunder; and
j) Any other information required under the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011.

5.1.1 When hessian bags are used for packing this material, the pictorial marking for 'USE NO HOOKS. DO NOT PUNCTURE' as specified in IS 1260 (Part 2) shall be stencilled.

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the rules and regulations framed there under, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples of the material shall be drawn as prescribed in IS 10946.

7 TESTS

7.1 Tests shall be carried out by the appropriate methods referred to in col (4) of Table 1.

7.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A
[*Table* 1, *Sl No.*(i)]
DETERMINATION OF *pp'*-ISOMER CONTENT

A-1 REAGENTS

A-1.1 Ethyl Alcohol — Aqueous, 75 percent by volume.

A-1.2 Saturated, Solution of Pure *pp'*-isomer of DDT — Make a paste of 100 g of the material with 50 ml of rectified spirit (*see* IS 323), 95 percent by volume. Add to this paste 300 ml of water and mix. Filter the mixture through a Buchner funnel. Transfer the residue to a 600 ml beaker, add 250 ml of rectified spirit, 95 percent by volume, and mix the contents. Chill the contents of the beaker in a mixture of salt and ice, and filter. Wash the residue with 100 ml of cold rectified spirit, 95 percent by volume. Repeat the procedure with the residue using petroleum ether (B.P. 40 °C to 60 °C) instead of rectified spirit. Dry the residue obtained from petroleum ether extraction (expected yield 65 g). Recrystallize the dry residue from 800 ml of hot rectified spirit, 95 percent by volume, (expected yield 60 g). Repeat the extraction with petroleum ether and recrystallization, from hot rectified spirit until the final product on drying gives a melting point between 110 °C and 110.5 °C. (Usually two more extractions will be necessary and the final yield will be about 46 g).

Prepare a saturated solution of the pure *pp'*-isomer of DDT in ethyl alcohol and store this solution in a thermostatically controlled bath at (25.0 ± 0.5) °C.

A-2 PROCEDURE

A-2.1 Weigh accurately about 2 g of the material into a 250 to 300 ml Erlenmeyer flask, add to it 150 ml of saturated solution of pure *pp'*-isomer of DDT at (25.0 ± 0.5) °C and mix. Fit the flask with a reflux condenser and reflux the contents of the flask until the whole of the material is completely dissolved. Remove the reflux condenser, stopper the flask and allow it to cool slowly in the air to about 26 °C to 30 °C, when crystals of *pp'*-isomer of DDT separate out. If separation of oil occurs at this stage, redissolve the oil by refluxing the contents of the flask again and, if necessary, add a seeding crystal of pure *pp'*-isomer of DDT during cooling.

A-2.2 Place the flask and contents in the thermostatically controlled bath (25.0 ± 0.5) °C for 4 h shaking the contents of the flask intermittently. Filter the crystals with suction through a tared Gooch crucible containing a disc of filter paper, taking care that as little air as possible is sucked through the wet crystals during filtration. Dry the crucible and its contents to constant weight at 78 °C to 80 °C, cool in a desiccator, weigh and find out the mass of the dry crystals.

A-2.3 Reserve a portion of the dry crystals of *pp'*-isomer of DDT (*see* **A-2.2**) for the determination of its melting point.

A-3 CALCULATION

A-3.1 Calculate the *pp'*-isomer content in the material by the following formula adding empirical correction of 1.4 percent to give results in agreement with known mixtures:

$$pp' - \text{isomer } content \text{ of the material, percent by mass} = 1.4 + \frac{100\ m}{M}$$

Where

m = mass, in g, of the dry crystals of *pp'*-isomer (*see* **A-2.2**), and

M = mass, in g, of the material taken for the test (*see* **A-2.1**).

ANNEX B

[*Table* 1, *Sl No.* (iii)]

DETERMINATION OF TOTAL ORGANIC CHLORINE CONTENT

B-1 REAGENTS

B-1.1 Benzene — free from thiophene and chlorine.

B-1.2 Isopropyl Alcohol — of 99 and 50 percent concentration by volume.

B-1.3 Metallic Sodium — pure, in the form of ribbon or cut in small pieces.

B-1.4 Phenolphthalein Indicator Solution — one percent (*m/v*) in rectified spirit (*see* IS 323)

B-1.5 Dilute Nitric Acid — 50 percent by volume.

B-1.6 Standard Silver Nitrate Solation — 0.1 N.

B-1.7 Ferric Ammonium Sulphate Solution — saturated, aqueous, freshly prepared.

B-1.8 Standard Potassium Thiocyanate Solution — 0.1 N.

B-2 PROCEDURE

B-2.1 Determination of' Total Chlorine Content

B-2.1.1 Weigh accurately about 1 g of the material, transfer it to a 250 ml graduated flask, add 10 ml of benzene to dissolve the material and then make up the volume with 99 percent isopropyl-alcohol. Transfer a 25 ml aliquot to a 250 m1 Erlenmeyer flask.

B-2.1.2 Introduce approximately 2.5 g of metallic sodium into the Erlenmeyer flask containing the aliquot. Connect the flask to a reflux condenser and boil gently for at least half an hour, shaking the flask occasionally. Dissolve the excess metallic sodium by cautiously adding 10 ml of 50 percent isopropyl alcohol through the condenser at the-rate of one to two drops per second. Boil for an additional 10 min and then add 60 ml of distilled water.

B-2.1.3 Cool, then add 2 to 3 drops of phenolphthalein indicator solution. Neutralize by adding dilute nitric acid dropwise and add 10 ml in excess. If necessary, cool the flask to room temperature, and add a known volume of the standard silver nitrate solution in slight excess and coagulate the precipitated silver chloride by digesting on a steam-bath for half hour, with frequent stirring. Cool the flask and, if necessary, filter the contents of the flask through a fast qualitative

filter paper, wash thoroughly with distilled water, collecting the filtrate quantitatively in a conical flask. Add 5 ml of ferric ammonium sulphate solution either to the cooled unfiltered mixture or to the filtrate, as the case may be, and titrate the excess of the silver nitrate with the standard potassium thiocyanate solution. (The end point is the appearance of red ferric thiocyanate colour).

B-2.1.4 Carry out a blank determination on the reagents, using the method given under **B-2.1.1** to **B-2.1.3**.

B-2.2 Determination of Inorganic Chlorine Content

B-2.2.1 Test the material for the presence of chloride ions by the method given under **B-2.2.2**. In case free chloride ions are detected, quantitatively determine the percentage by mass of inorganic chlorine in the material by the method given under **B-2.2.3**.

B-2.2.2 *Qualitative Test for Chlorides* — Shake about 1 g of the material in the form of a fine powder with 5 ml of water and filter. To the clean filtrate, add a few drops of concentrated nitric acid (*see* IS 264) and 1 ml of silver nitrate solution (approximately two percent *m/v*). If a white turbidity or opalescence appears, quantitatively determine the inorganic chlorine in the material as given in **B-2.2.3**.

B-2.2.3 Weigh accurately about 10 g of the material in the form of a fine powder into a 250 ml beaker and stir with a small quantity of water. Add more water, allow to stand and filter by decantation through a quantitative filter paper, collecting the filtrate in another beaker. Repeat extraction with water and filtering until a few drops from the tail of the funnel do not give a test for chlorides. Add 5ml of concentrated nitric acid (*see* IS 264) to the combined filtrate contained in the beaker and heat it to about 50 °C. Add to the hot filtrate sufficient volume of silver nitrate solution (5 percent *m*/*v*). Boil to coagulate the precipitated silver chloride. Protect the precipitated silver chloride, by wrapping black paper around the container. Cool the contents of the beaker and filter through a tared Gooch crucible or sintered glass crucible (G No.4). Wash the precipitate first with dilute nitric acid (approximately 4 N) and then with cold water. Dry the crucible and its contents to constant weight at (130 ± 2) °C and find the mass of the silver chloride. Determine the percentage by mass of inorganic chlorine in the material from the formula:

$$c = \frac{24.74\, m}{M}$$

Where,

c = inorganic chlorine content of the material, percent by mass;

m = mass, in g, of the silver chloride; and

M = mass, in g, of the material taken for the test.

(Alternatively, the inorganic chlorine content of the material may be determined by a volumetric method).

B-3 CALCULATION

Total organic chlorine content of the material, percent by mass = $\frac{35.46\ (V-v)N}{M} - C$

Where,

V = volume, in ml, of the standard potassium thiocyanate solution required for the blank determination (*see* **B-2.1.4**);

v = volume, in ml, of the standard potassium thiocyanate solution required for the test with material (*see* **B-2.1.3**);

N = normality of the standard potassium thiocyanate solution;

M = mass, in g, of the material taken for the test (*see* **B-2.1.1**); and

c = inorganic chlorine content of the material, percent by mass (*see* **B-2.2**).

ANNEX C
[*Table* 1, *Sl No.* (iv)]
DETERMINATION OF HYDROLYSABLE CHLORINE CONTENT

C-1 REAGENTS

C-1.1 Acetone

C-1.2 Alcoholic Potassium Hydroxide Solution — 1 N.

C-1.3 Dilute Nitric Acid — approximately 2 N.

C-1.4 Standard Silver Nitrate Solution — 0.1 N.

C-1.5 Ferric Ammonium Sulphate Solution — saturated, aqueous, freshly prepared.

C-1.6 Standard Potassium Thiocyanate Solution — 0.1 N.

C-2 PROCEDURE

C-2.1 Weigh accurately about 0.5 g of the material into a 250 ml Erlenmeyer flask. Add to it 50 ml of acetone and 20 ml of alcoholic potassium hydroxide solution. Keep it at 20 °C to 25 °C for 15 min and then add 50 ml of water. Add to the contents of the flask 20 ml of dilute nitric acid and exactly 25 ml of the standard silver nitrate solution. Coagulate the precipitate of silver chloride by digesting on a steam-bath for half an hour, with frequent stirring. Cool the flask and, if necessary, filter the contents of the flask through a fast qualitative filter paper collecting the filtrate quantitatively in a conical flask. Add 5 ml of ferric ammonium sulphate solution either to the cooled unfiltered mixture or to the filtrate, as the case may be, and titrate the excess of the silver nitrate with the standard potassium thiocyanate solution. (The end point is the appearance of red ferric thiocyanate colour).

C-2.2 Carry out a blank determination on the reagents using the method given under **C-2.1**.

C-3 CALCULATION

Hydrolysable chlorine content of the material, percent by weight $= \frac{3.546\ (V-v)N}{M} - C$

Where,

V = volume, in ml, of the standard potassium thiocyanate solution required for the blank determination (*see* **C-2.2**);

v = volume, in ml, of the standard potassium thiocyanate solution required for the test with the material (*see* **C-2.1**);

N = normality of the standard potassium thiocyanate solution;

M = mass, in g, of the material taken for the test (*see* **C-2.1**); and

c = inorganic chlorine content of the material, percent by mass as determined under **C-2.2**.