



उत्पाद मैनुअल
फास्फोरस ट्राइक्लोराइड, शुद्ध और
विश्लेषणात्मक अभिकर्मक – विशिष्ट
IS 4581 : 2021 के अनुसार

**PRODUCT MANUAL FOR
PHOSPHORUS TRICHLORIDE,
PURE AND ANALYTICAL REAGENT-SPECIFICATION
ACCORDING TO IS 4581 : 2021**

भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम 2018 की स्कीम-I के तहत यह उत्पाद मैनुअल प्रमाणीकरण की संचालन रीति में सुसंगतता और पारदर्शिता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेन्स धारियों द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस लाइसेन्स/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	उत्पाद Product	:	IS : 4581 : 2021
	शीर्षक Title	:	फास्फोरस ट्राइक्लोराइड, शुद्ध और विश्लेषणात्मक अभिकर्मक – विशिष्ट PHOSPHORUS TRICHLORIDE, PURE AND ANALYTICAL REAGENT-SPECIFICATION
	संशोधन संख्या No. of Amendments	:	0 Nil
2.	नमूनाकरण दिशा निर्देश / Sampling Guidelines:		
a)	कच्चा माल Raw material	:	No specific requirement
b)	समूहिकरण दिशा निर्देश Grouping guidelines	:	Each Grade to be tested separately

c)	नमूने का परिमाण Sample Size	:	500 ml
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	कृ पया Annex-A देखें Please refer ANNEX -A
4.	निरीक्षण व परीक्षण स्कीम Scheme of Inspection and Testing	:	कृ पया Annex-B देखें Please refer ANNEX -B
5.	एक दिन में संभावित परीक्षण Possible tests in a day :		
	Description (Clause 4.1) Phosphorus Trichloride (Table 1, Sl. No. i) Relative Density (Table 1, Sl No. iii) Evaporation Residue (Table 1, Sl. No. iv) Sulphate (Table 1, Sl. No. v) Heavy Metals (Table 1, Sl. No. vi) Iron (by colorimetric method, Table 1, Sl. No. vii) Arsenic (Table 1, Sl.No.viii)		
6.	लाइसेन्स का कार्यक्षेत्र / Scope of the Licence:		
	IS 4581 : 2021 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेन्स निम्नलिखित कार्यक्षेत्रके लिए प्रदान किया जाता है Licence is granted to use Standard Mark as per IS 4581 : 2021 with the following scope:		
	Name of the product	Phosphorus Trichloride, Pure and Analytical Reagent	
	Grade	Grade 1 - Analytical Reagent; and/or Grade 2 - Pure;	

ANNEX A
LIST OF TEST EQUIPMENTS
PHOSPHORUS TRICHLORIDE, PURE AND ANALYTICAL REAGENT - SPECIFICATION
ACCORDING TO IS 4581 : 2021

Major Test Equipment required to test as per Indian Standard

Sl. No.	Tests used in with Clause Reference	Test Equipment
1.	Phosphorus Trichloride, as PCl_3 (Clause 4.2, Table 1, Sl. No. - i)	Method-A Electronic Weighing Balance (L.C. 0.1 mg) Chemicals- Boric Acid powder, Ammonia Solution, Ammonium Borate Solution, Dil. HCl, Iodine Solution, Standard Sodium thiosulphate Solution, Starch Indicator Solution. Glasswares - Volumetric Flask (1000 ml), Weighing Bottle, Lunge-Rey Pipette, Graduated Flask (500 ml), Conical flask (300 ml), Pipettes OR Method-B Electronic Weighing Balance (L.C. 0.1 mg) Chemicals - Sodium Bicarbonate (A.R. Grade), Iodine Solution, Standard Sodium thiosulphate Solution, Starch Indicator Solution, Cold Water. Glasswares - Volumetric Flask (1000 ml), Ice Bath, Iodine Flask (500 ml), Pipettes.
2.	Boiling Range (Clause 4.2, Table 1, Sl. No. - ii)	- Distillation Apparatus (Manual or Automated) as per fig. 1 and fig. 2 of IS 1448 (Part 18) consisting of distillation flasks (Cl. 6.2), Condenser Tube and Cooling Bath (Cl. 6.3), Metal Shield or Enclosure for Flask (For manual apparatus only) (Cl. 6.4), Heat source (Cl. 6.5), Flask Support (Cl. 6.6), Graduated Cylinders (Cl 6.7), Temperature Measurement System (Cl. 6.8), Centering Device (Cl. 6.9) and Barometer (Cl. 6.10)
3.	Relative Density (Clause 4.2, Table 1, Sl. No. - iii)	Relative Density Hydrometer Hydrometer Cylinders, Thermometer Constant Temperature Bath Fume Hood
4.	Evaporation Residue (Clause 4.2, Table 1, Sl. No. - iv)	Platinum or Silica Dish Lunge-Rey Pipette Steam Bath or other heating device Fume hood Drying Oven and Desiccator
5.	Sulphate (Clause 4.2, Table 1, Sl. No. - v)	Ammonium Hydroxide Solution, Conc. HCl, Barium Chloride Solution, Congo Red Indicator, Rectified spirit Hot plate/Oven, Pipettes, Beakers, Nessler Cylinders <u>Alternate Procedure (Spectrophotometric) for Analytical Reagent Grade</u> Standard Sulphate Solution, Glycerine, Concentrated HCl, Sodium Chloride, Barium Chloride, General Glasswares, Titration Assembly, Spectrophotometer

6.	Heavy Metals (Clause 4.2, Table 1, Sl. No. - vi)	Method A Concentrated Nitric Acid, Dilute HCl, Sodium Acetate, Potassium Cyanide Solution, Hydrogen Sulphide Solution, Lead Nitrate. Beaker (1000 ml), Pipettes, Lunge-Rey Pipette, Small beaker, Hot plate/oven, Volumetric flask, Nessler cylinder. Method B 1.0 µg Pb/10 ml dithizone solution (extract), Spectrophotometer, for use at 510 nm with a path length of 1 cm or longer, pH meter, Standard volumetric glasswares, TEF beaker, 100 ml for acid digestion, TEF beaker, 100 ml for acid digestion, lead nitrate, concentrated HNO₃, Nitric acid – Concentrated (18 N), Nitric acid – Dilute –20 percent, v/v, Ammonium hydroxide – Concentrated (14 N), Ammonium hydroxide – Dilute 10 percent, v/v and 1 percent, v/v, anhydrous ammonium citrate [(NH₄)₂HC₆H₅O₇], anhydrous sodium sulphite (Na₂SO₃), hydroxylamine hydrochloride, potassium cyanide (KCN), concentrated NH₄OH, dithizone, chloroform, Whatman No. 42 (or equivalent) filter paper, filter paper (Whatman No. 41 or equivalent) Alternate Method (ICP-OES) Inductively Coupled Plasma- Optical Emission Spectrometer, Nitric Acid (65Percent) Suprapure, Standard Lead Stock Solution, Standard Lead Solution, Polyphosphoric acid, Analytical Balance, General Glasswares, HDPE, PP or PTFE Containers
7.	Iron (Clause 4.2, Table 1, Sl. No. - vii)	Spectrophotometric Method Spectrophotometer Ferrous Ammonium Sulphate, Conc. Sulphuric Acid, Hydroxylamine Hydrochloride, O-phenanthroline, ethyl alcohol, Glacial acetic acid, Sodium acetate, Dil. Sulphuric Acid, Dil. Ammonium Hydroxide. Dark Bottle with ground glass stopper, Beakers, pH meter, Pipettes, Conical flask, volumetric flask, Weighing Balance. Colorimetric Method:- Nessler Cylinders, Pipettes, Burettes, Weighing Balance. Conc. HCl, Ammonium Persulphate, Potassium thiocyanate, n-butanol, Ferrous ammonium sulphate, Sulphuric acid. Alternate Method (ICP-OES) Inductively Coupled Plasma- Optical Emission Spectrometer, Nitric Acid (65Percent) Suprapure, Standard Lead Stock Solution, Standard Lead Solution, Polyphosphoric acid, Analytical Balance, General Glasswares, HDPE, PP or PTFE Containers

8.	Arsenic , percent by mass, cl.4 2, Table 1	Concentrated Hydrochloric Acid, Hydrazine Sulphate, Sodium Bromide, Analytical Balance, General Glasswares, Condenser, Distillation Apparatus <u>Modified Gutzeit Method</u> Gutzeit Apparatus, Lead Acetate Solution, Lead Acetate Paper Strips, Absorbent Cotton Wool Impregnated with Lead Acetate, Mercuric Bromide Solution, Sensitized Mercuric Bromide Paper Strips, Dilute Sulphuric Acid, Conc. Hydrochloric Acid, Potassium Iodide Solution, Stannous Chloride Solution, Zinc, Standard Arsenic Stock Solution, Rubber Stopper , General Glasswares <u>Silver Diethyldithiocarbamate Method</u> Evolution and Absorption Apparatus, Silver Diethyl Dithiocarbamate, Pyridine, Stoppered Glass Bottles, Conical Flasks, Conc.HCl, Potassium Iodide, Stannous Chloride Solution, Absorbent Cotton Wool Impregnated with Lead Acetate, Absorption Tubes, Zinc Granules, Spectrophotometer or Photoelectric Absorptiometer. <u>Alternate Method (ICP-OES)</u> Inductively Coupled Plasma- Optical Emission Spectrometer, Nitric Acid (65Percent) Suprapure, Standard Lead Stock Solution, Standard Lead Solution, Polyphosphoric acid, Analytical Balance, General Glasswares, HDPE, PP or PTFE Containers
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The above list is indicative only and may not be treated as exhaustive.

ANNEX B
SCHEME OF INSPECTION AND TESTING
PHOSPHORUS TRICHLORIDE, PURE AND ANALYTICAL REAGENT- SPECIFICATION
ACCORDING TO IS 4581 : 2021

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

The manufacturer shall prepare and implement a calibration plan for the test equipments.

2. TEST RECORDS - The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. PACKING AND MARKING - The Standard Mark, as given in the Schedule of the licence, shall be marked on each packing, provided always that the product thus marked conforms to every requirements of the specification.

3.1. Packing and marking shall be done as per clause 5 of the Indian Standard. In addition, the following details shall be marked on each packing :-

BIS Licence No. CM/L--.

BIS website details i.e. - "For details of BIS certification please visit www.bis.gov.in."

3.2 The word ' Poisonous ' together with symbol as given in Fig. 15 of IS : 1260 (Part I) -1973 shall also be given on the label. The label shall have a note as follows :

CAUTION : Phosphorus trichloride is highly corrosive. When mixed with water, it decomposes with evolution of heat.

4. CONTROL UNIT - For the purpose of this scheme, a control-unit is defined as the entire quantity of Phosphorus Trichloride, of same grade manufactured under similar conditions in a single day.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

All the production which conforms to the Indian Standard and covered by the licence should be marked with Standard Mark.

6. REJECTIONS - Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1 : LEVELS OF CONTROL
(Para 5.0 of the Scheme of Inspection and Testing)

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub- contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
4.1	Description	4.1	IS 4581	R	Two	Each Control Unit	
4.2, Table 1, SI No i	Phosphorus Trichloride	A-2	IS 4581	R	Two	Each Control Unit	
4.2, Table 1, SI No ii	Boiling Range	IS 1448 (Part 18)	IS 1448 (Part 18)	R	Two	Each Control Unit	
4.2, Table 1, SI No iii	Relative Density at 27oC	A-3	IS 4581	R	Two	Each Control Unit	
4.2, Table 1, SI No iv	Evaporation residue, including PCL5	A-4	IS 4581	R	One	Each Control Unit	
4.2, Table 1, SI No v	Sulphate	A-5	IS 4581	R	One	Each Control Unit	Applicable only for Analytical Reagent Grade
4.2, Table 1, SI No vi	Heavy Metals	A-6 & A-9	IS 4581	S	One	Once in a month	Applicable only for Analytical Reagent Grade
4.2, Table 1, SI No vii	Iron	A-7 & A-9	IS 4581	S	One	Once in a month	Applicable only for Analytical Reagent Grade
4.2, Table 1, SI.No. viii	Arsenic	A-8 & A-9	IS 4581 IS 2088	S	One	Once in a month	Applicable only for Analytical Reagent Grade

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub- contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval to BO head.