भारत सरकार
GOVERNMENT OF INDIA
रक्षा मंत्रालय
MINISTRY OF DEFENCE

संयुक्त सेवा विनिर्देश
JOINT SERVICES SPECIFICATION

ON

PHOSPHORUS WHITE

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मानकीकरण निदेशालय
रक्षा उत्पादन विभाग
रक्षा मंत्रालय
'एच' – ब्लाक, निर्माण भवन डाकघर
नई दिल्ली–११००११

DIRECTORATE OF STANDARDISATION
DEPARTMENT OF DEFENCE PRODUCTION
MINISTRY OF DEFENCE
'H' BLOCK, NIRMAN BHAWAN PO
NEW DELHI-110011

LIST OF MEMBERS ASSOCIATED WITH REVISION OF THIS SPECIFICATION

1. This Third Revision of the Joint Services Specification 6810-72 has been approved by Shri Ajay Sharma, Sc 'G' Associate Director, Office of the DG (ACE); Chairman, Armament Standardisation Sub-Committee by circulation.

2. The following members were consulted in approving the document:

S. No.	Name & Designation	Organisation
1.	Shri Ajay Sharma, Sc 'G'	DG (ACE)/DRDO, New Delhi
2.	Col JBS Sidhu, Director, WE-2/3	ADGWE/GS (WE-2/3), New Delhi
3.	Rep (Dte Arty-5)	Dte of Arty (GS/Artillary-5), New Delhi
4.	Sh Prashant Shekhar Singh, AD (DGONA)	Dte Gen of Naval Armt, Naval HQ, New Delhi
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7.	Cdr Virendra, S Kanwal, JD/API	DGNAI, Naval HQ, New Delhi
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9.	Shri S.M Wankhede, PScO	CQA (ME), Pune
10.	PRS Balaji, PScO, Dy Controller	CQA (Amn), Pune
11.	Lt Col B J Naidu, Dy Controller	CQA (SA), Ichapur, West Bengal
12.	Shri K Yadav, PScO, Dy Controller	CQA (W), Jabalpur
13.	Dr. RB Pawar, Sc 'G'	HEMRL, DRDO, Pune
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15.	Dr. Vinay Prakash, GM	Ammunition Factory, Pune
16.	Rep DG(ACE), Pune	DG (ACE), Pune
17.	Lt Col Saurabh Modi	Secretary ASSC, New Delhi

RECORD OF AMENDMENTS

Amendment		Amendment pertains to S. No./Para No./ Column No.	Authority	Amended by	Signature & Date
No.	Date			Name & Appointment (In Block Letters)	

TABLE OF CONTENTS

TABLE OF CONTENTS (CONCLUDED)

0. FOREWORD

0.1 This Joint Services Specification has been prepared by Armament Standardization Sub Committee, on the authority of the Standardisation Committee, Ministry of Defence.

0.2 This specification has been approved by the Ministry of Defence and is mandatory for use by the Defence Services.

0.3 This JSS 6810-72 : 2020 (Third Revision):

a) was prepared in the year 1992.

b) was revised in the year 1997, 2009, and 2015.

c) is revision of 6810-72 : 2009 (Second Revision) and Reaffirmed 2015 supersedes the same.

0.4 This specification would be used for Manufacture, Supply and Quality Assurance of Phosphorus White.

0.5 Quality Assurance Authority for the item covered by this specification is The Controller, Controllerate of Quality Assurance (Military Explosives), Aundh Road, Pune-411020. (email id cqamear-dgqa@nic.in. Enquiries regarding technical parameters shall be addressed to the Quality Assurance Authority, while other enquiries shall be referred to:

The Director,
Directorate of Standardisation,
Ministry of Defence,
'H' Block, Nirman Bhawan PO,
New Delhi-110011.
Secretary ASSC, e-mail id-assc.defstand@gov.in

0.6 Non-registered users can obtain the following on payment:

a) Copies of IS from:

Bureau of Indian Standards,
Manak Bhawan,
9, Bahadur Shah Zafar Marg,
New Delhi-110002.

or

their regional/branch offices.

b) Copies of JSSs/JSGs from:

The Director,
Directorate of Standardisation,
Standardisation Documents Centre,
Ministry of Defence,
Room No. 05, 'J' Block,
Nirman Bhawan PO,
New Delhi-110011.

0.7 Indian Standard (IS) specifications are available free of cost for registered users on:

Directorate of Standardisation Website:
www.ddpdos.gov.in
For registration visit our website.

0.8 This specification holds good only for the supply order for which it is issued.

0.9 Directorate of Standardisation Website-All the approved JSSs/JSGs are available on the Directorate of Standardisation Website ***www.ddpdos.gov.in***. Defence Organisations desirous of accessing a copy of this document are requested to visit the Directorate of Standardisation website for registration obtaining user id/password to access the JSSs/JSGs.

1. SCOPE

1.1 This specification is meant to govern Manufacture, Supply and Quality Assurance of Phosphorus White.

1.2 This material is suitable for use as such or in plasticised form in smoke ammunition.

2. RELATED SPECIFICATIONS/DOCUMENTS

2.1 References are made in this specification to:

Table 1

S. No.	Specifications/ Documents No.	Nomenclature
a)	IS 138 : 2018 (Fourth Revision)	Ready Mixed Paint, Marking, for Packages and Petrol Containers-Specification
b)	IS 460 (Part 1) : 1985 (Third Revision) Amd 1 Reaffirmed 2018	Specification for Test Sieves Part 1 Wire Cloth Test Sieves
c)	Red Tariff No. 19	Labeling of Goods

2.2 Copies of Red Tariff No. 19 are obtainable on payment from:

The General Secretary
Indian Railway
Conference Association
New Delhi

3. MATERIAL/FINISH

The material shall be in the form of pale yellow translucent, solid with waxi appearance. It shall be free from visible impurities, grits, foreign matter and surface oxidation.

4. MANUFACTURE

The Phosphorus white shall be manufactured by a process which shall produce the product conforming to this specification.

5. TENDER SAMPLE

The manufacturer shall submit two tender samples each of 200 g essentially from the same batch/lot/manufacture free of all charges and conforming to this specification to the Quality Assurance Officer/Quality Assurance Authority as stated in the tender.

6. PRE-INSPECTION OF STORES/CONSIGNMENT

6.1 Manufacturers/Contractors must satisfy themselves that the stores are in accordance with the terms of the contract and fully conform to the required specification, by carrying out a thorough pre-inspection of each lot before actually tendering the same for inspection to the Quality Assurance Officer nominated under the terms of the contract. A declaration by the contractor that a necessary pre-inspection has been carried out on the stores tendered will be submitted along with the challan. The declaration will also indicate the method followed in carrying out pre-inspection showing the features checked/tested and will have the test certificate attached to the challan/declaration.

6.1 If the Quality Assurance Officer finds that the pre-inspection of the consignment as required above has not been carried out, the consignment is liable for rejection.

7. QUALITY ASSURANCE

7.1 Inspection

7.1.1 Phosphorus white and packages in which it is packed shall be subject to inspection by and to the approval of the Quality Assurance Officer/Quality Assurance Authority.

7.1.2 Samples of the material and of the packages may be taken from any portion of the batch/lot/consignment.

7.1.3 If, on examination, any sample is found not to conform to this specification, the whole batch/lot/consignment may be rejected.

7.1.4 The foregoing provisions shall equally apply to the prime contractors and sub contractors, if any.

7.2 Sampling

A representative sample each of 100 g shall be drawn from each container. Normally the number of containers to be selected at random from a batch/lot shall depend on the size of the batch/lot and shall be in accordance with the following table:

Table 2

No. of containers in a Batch/Lot	No. of Containers to be Sampled
Up to 25	3
26 to 50	4
51 to 100	5
101 to 150	6
151 to 300	7
301 to 500	8
501 and above	10

7.3 Test Requirements

Samples taken form any portion of the batch/lot/consignment of material shall conform to clause **3** and in addition shall conform to the following test requirements:

Table 3 Test Requirement of Phosphorus White

S. No.	Characteristics	Passing Standard	Test Method
a)	Setting Point, °C	43 *Min* 45 *Max*	Appx 'A'
b)	Matter insoluble in Dilute Nitric acid, % by mass	0.10 *Max*	Appx 'B'
c)	Oxides and oxy-acids of phosphorus calculated as Phosphorus, % by mass	0.20 *Max*	Appx 'C'
d)	Sulphur and compounds of sulphur calculated as sulphur, % by mass	0.10 *Max*	Appx 'D'
e)	Arsenic and compounds of arsenic calculated as arsenic, % by mass	0.05 *Max*	Appx 'E'
f)	Total impurities, % by mass	0.50 *Max*	Appx 'F

NOTE - For precautions during handling of white Phosphorus see Appx 'G'.

8. WARRANTY

The stores supplied against the contract shall deem to have been warranted against defective material and performance by the contractor for a period of 12 months from the date of receipt of the store at the consignee's end and if during this period any of the stores supplied is found defective the same shall be replaced by the supplier/contractor free of charges at the consignee's premises.

9. PACKAGING

9.1 The Phosphorus White shall be supplied in sound clean, hermetically sealed mild steel drums. The drum shall contain sufficient water to ensure that the material is completely immersed under all conditions of transit and storage. The quantity per drum shall not exceed 200 kg.

9.2 Any other form of package shall have the prior approval of the Quality Assurance Officer/Quality Assurance Authority.

9.3 The inclusion of any foreign matter or impurities in any of the packages shall render the whole batch/consignment liable to rejection.

10. MARKING

10.1 All packages containing the material shall be indelibly and legibly marked with the following details:

a) Nomenclature and Specification Number of the Material

b) Name and Addressed of the Consignee

c) AT or SO Number and Date

d) Consignment Number

e) Lot/Batch Number and Date of Manufacture

f) Gross and Net Mass

g) Consecutive Number of Package and Total Number of Packages in the Consignment

h) Date of Supply

j) Manufacturer's Name, Initials or his Recognised Trademark

10.2 Every package shall also be conspicuously marked in bold letters as "INFLAMMABLE SOLID" and shall bear the appropriate pictorial label indicating the hazards involved in the contents of the package (for details see IS 1260 (Part : 1) and Red Tariff No.19).

10.3 In addition to the above, the Quality Assurance Officer may suggest some more markings/identifications suitable at the time of inspection.

10.4 The paint used for marking shall conform to IS 138 and to the satisfaction of the Quality Assurance Officer/Quality Assurance Authority.

11. SAFETY OF OPERATIONS

Nothing in this specification shall relieve the manufacturer/contractor/user of his responsibility for the safety of his operation during manufacture, storage, transit or use of the store.

12. DEFENCE STORES CATALOGUE NUMBER/NATO STOCK NUMBER

The Defence Stores Catalogue Number allotted to this store is 6810-000 946 and Nato Stock Number allotted to this store is 6810720442686.

13. SUGGESTIONS FOR IMPROVEMENT

Any suggestion for improvement in this document may be forwarded to:

The Director,
Directorate of Standardisation,
Ministry of Defence,
'H' Block, Nirman Bhawan PO,
New Delhi-110011.

APPX 'A'
(*Clause* 7.3)

DETERMINATION OF SETTING POINT

A-1. Melt 10 g to 15 g of White Phosphorus under water (about 10ml to 15 ml) in a test tube (150 mm x 25 mm) and support the tube in a bath of water at 42°C. Insert a thermometer graduated in 1/10°C and support it so that the bulb is centrally disposed in the molten Phosphorus.

A-2. Stir the Phosphorus rapidly and continue as the temperature falls, seeding with a little solid phosphorus, if necessary, to induce crystallisation. Discontinue stirring when the temperature begins to rise and note the highest temperature reached. Record the reading as setting point.

A-3. Correct the thermometer reading for the error due to the emergent stem (which is generally given at the time of Standardising the thermometer.) and record the corrected reading as the setting point.

NOTE - If the amount of supercooling exceeds 1°C the observed setting point is likely to be perceptibly lower than the true setting point and the test should be repeated. For assembly of the apparatus, see Drawing No. Fig 383 attached to this specification.

APPX 'B'
(*Clause* 7.3)

DETERMINATION OF MATTER INSOLUBLE IN DILUTE NITRIC ACID

Transfer approximately 1 g of the sample, accurately weighed to a covered beaker containing 50 ml of distilled water. Add 50 ml of concentrated Nitric Acid. Pass Carbon-dioxide from a cylinder or Kipp's Apparatus slowly to create an inert atmosphere in the beaker. Heat the beaker in a water bath or over a small flame in fume cup board until the Phosphorus is completely dissolved and no more brown fumes are evolved. Examine visually for grit and other insoluble matter, filter if necessary. Ignite and weigh the residue, if any

APPX 'C'
(*Clause* 7.3)

OXIDES AND OXY-ACIDS

Transfer 5 g ±0.1 g of the material accurately weighed, to a beaker containing 100 ml of distilled water. Raise the temperature to about 60°C. Remove the source of heat and stir the contents of the beaker vigorously (with out splashing) until the Phosphorus granulates and solidifies. Decant the aqueous liquor and titrate with 0.1 N Sodium Hydroxide solution using Phenolphthalein as indicator. Calculate the percentage of oxides and oxy-acids as Phosphorus using the following factor:

1 ml of 0.1 N NaOH = 0.001550 g of Phosphorus.

APPX 'D'
(*Clause* 7.3)

SULPHUR OR SULPHUR COMPOUNDS

D-1. Make up the filtrate from Appx 'B' to 250 ml. Take 150 ml of this solution and evaporate on a hot plate to reduce the quantity to about 10 ml. Add 10 ml of HCl and once again evaporate the bulk to about 10 ml. Then add 100 ml of water and 10 ml of 10% solution of Barium Chloride, boil for 15 minutes and allow to settle over-night. Decant off the clear liquid through a clean, dry, tared asbestos padded gooch crucible, transfer the precipitated Barium Sulphate quantitatively to the crucible, wash with distilled water, dry at 105°C ±5°C and incinerate in muffle furnace at 700°C to 800°C. Remove from the muffle, allow it to cool outside to a temperature when it is safe to be transferred to the desiccators, further cool in a desiccators to room temperature and weigh (as $BaSO_4$).

Mass of $BaSO_4$ x 0.1373 = Mass of Sulphur

D-2. From the mass of Sulphur, calculate the percentage of Sulphur and Sulphur compounds on the original sample and express as percentage sulphur.

APPX 'E'
(*Clause* 7.3)

ARSENIC OR COMPOUNDS OF ARSENIC

Take 10 ml of filtrate from Appx 'D' add 50 ml of 80% solution of Stannous Chloride and estimate arsenic by the standard Gutzeit test comparing the stain produced on Mercuric Chloride paper with standard stains equivalent to 0.01% to 0.05% Arsenic, and express as percentage Arsenic on the original material.

APPX 'F'
(*Clause* 7.3)

TOTAL IMPURITIES

The sum of percentage of impurities determined as in Appendices B, D and E is recorded as "Total Impurities" percentage.

APPX 'G'
(*Clause* 7.3)

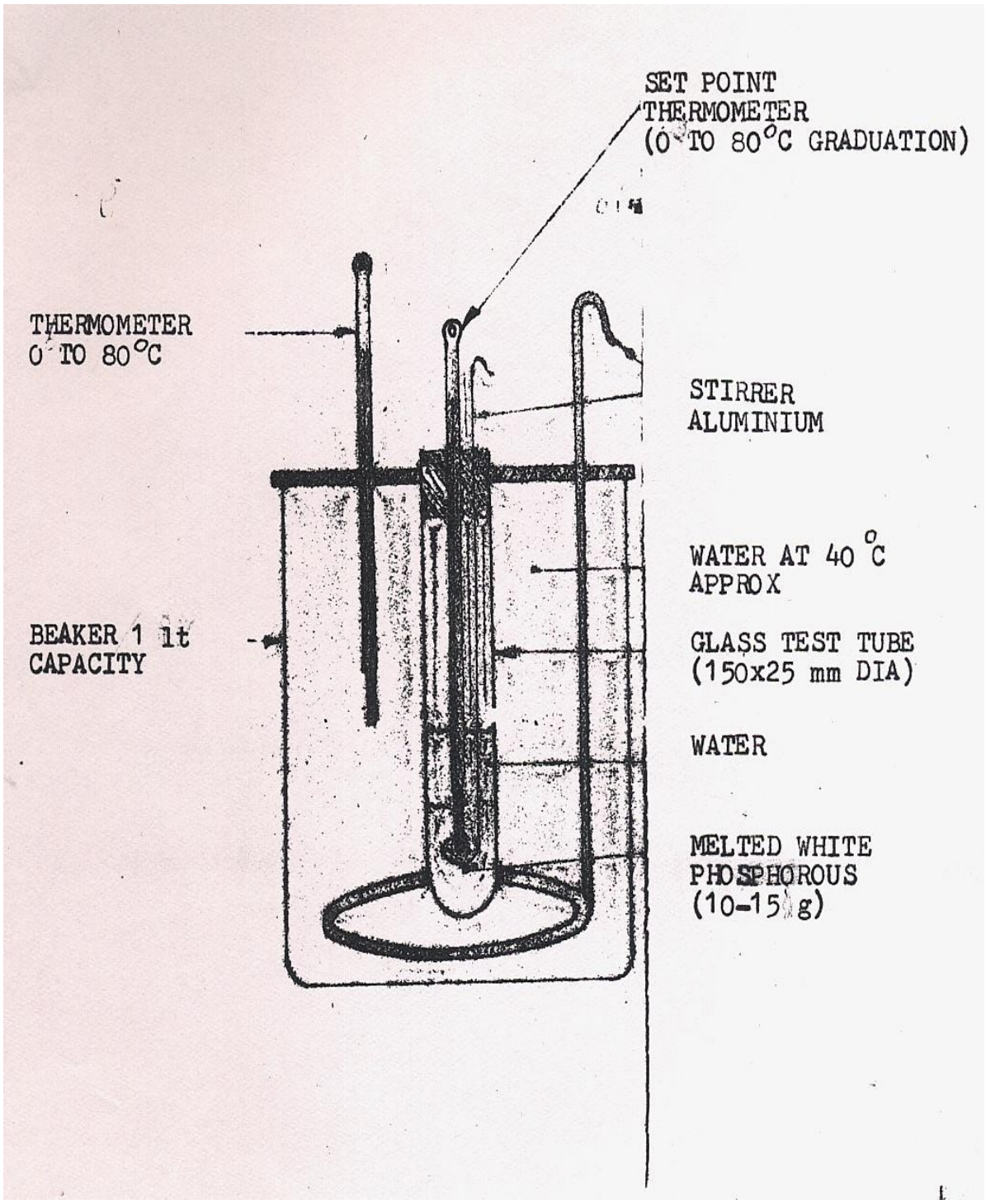
PRECAUTIONS

G-1. If exposed to air more than momentarily, the material is liable to inflame spontaneously, and dangerous burns may result from careless handling. Sampling, and all transfers of material from one vessel to another shall be carried out under water. Sample bottles shall be kept full of water and securely closed.

G-2. For preparation of sample for analysis, transfer a complete stick of the material to a porcelain basin containing sufficient water to cover the sample. Cut off small portions of the sample under water with a sharp knife, remove from the water by tweesers, transfer immediately to a tared weighing bottle containing sufficient water to cover the sample. Repeat this operation on several sticks to obtain a representative sample. Finally weigh the bottle containing the combined sample.

G-3. All waste material shall be stored under the same conditions as the original samples, i.e. in a vessel completely filled with water and securely closed. In order to avoid unnecessary "fire risk", accumulations of waste material and residues of samples shall be reduced to minimum by frequent disposal by burning. Decontamination of affected material may be carried out with about 1% to 5% Copper Sulphate solution in water.

DRAWING



SETTING POINT APPARATUS

Drawing No. Fig.383