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POTASSIUM HYDROGEN TARTRATE

(6810 - 001925)

APPROVAL REFERENCE	DATE OF APPROVAL	APPROVAL AUTHORITY
NO.79799/DGI(Arm-13)	14 July 77	D.I.(ARMTS)

QUALITY ASSURANCE

CONTROLLERATE OF INSPECTION (MILITARY EXPLOSIVES)

KIRKEE, PUNE - 411 003.

DEPARTMENT OF DEFENCE PRODUCTION

MINISTRY OF DEFENCE.

INC: 24775

IND/ME/746(a)

Amendment DCI NO.	Amendment Date	Authority letter from DI(Armts)	Clauses affected	Remarks
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3754-ME	12.12.02		Front page. Page-4 Top para last line clause 0.1 last line clause 0.2 last line clause 2.1 6th line	

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POTASSIUM HYDROGEN TARTRATE

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THIS SPECIFICATION OR ANY PATTERN, DRAWINGS OR ANY OTHER INFORMATION ISSUED IN CONNECTION THEREWITH MAY ONLY BE USED FOR A SPECIFIC ORDER PLACED BY THE COMPETENT AUTHORITY. IT IS NOT TO BE USED FOR ANY OTHER PURPOSE WHATSOEVER WITHOUT THE EXPRESS WRITTEN SANCTION OF THE DIRECTOR GENERAL OF ~~INSPECTION~~ QUALITY ASSURANCE, MINISTRY OF DEFENCE, NEW DELHI -110 011.

0. FOREWORD

0.1 This specification has been prepared by the ~~CONTROLLERATE OF INSPECTION~~ QUALITY ASSURANCE (MILITARY EXPLOSIVES) KIRKEE, PUNE - 411 003.

0.2 For additional copies or any other enquiry regarding this specification, reference should be made ~~to~~ the Inspecting Authority (i.e. ~~CI~~CQA(ME) KIRKEE).

1. SCOPE

1.1 This specification is meant to govern ~~supply and~~ inspection of potassium hydrogen tartrate.

1.2 The material is suitable for use in the manufacture of propellants.

2. RELATED DOCUMENTS

2.1 The related documents mentioned at clause 2.2 are those applicable at the date of publication of this specification. It is contractor's/manufacturer's responsibility to confirm their current applicability, and to obtain from the Authority Holding Sealed Particulars (i.e. CQA(ME) ~~CI(ME)~~ KIRKEE) information concerning any change that may be necessary due to cancellation, replacement or supersession of any of these documents.

2.2 Copies of the following related specifications referred to in clauses 8.1 and 9.2.3 are obtainable as follows :-

Indian Standards IS : 460 - 1962 78 IS : 138 - 1969 81	Indian Standards Institution Manak Bhavan, 9, Bahadur Shah Zafar Marg, NEW DELHI -110 002.

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3. DESCRIPTION

3.1 The material shall consist essentially of potassium hydrogen tartrate in the form of a fine, dry, white powder free from lumps foreign matter, grit and any visible impurities.

4. TENDER SAMPLE

4.1 The contractor shall submit two tender samples each of 250 g, essentially from the same batch/lot of manufacture, free of charge and conforming to this specification.

5. PRE-INSPECTION

5.1 Before tendering the store to the Inspector, the contractor shall carry out a thorough inspection of each delivery to satisfy himself that the store fully conforms to this specification and shall render a certificate to that effect to the Inspecting Officer.

6. INSPECTION

6.1 The potassium hydrogen tartrate and the packages in which it is contained shall be subject to inspection by and to the final approval of the Inspecting Officer/ Inspecting Authority.

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

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

6.4 The foregoing provisions shall apply equally to prime contractors and to sub-contractors, if any.

7. SAMPLING

7.1 Normally two representative samples, each of 250 g of the material shall be drawn from each batch/ lot. However, the number of samples to be drawn will be at the discretion of the Inspecting Officer.

8. TEST REQUIREMENTS

8.1 Samples taken from any portion of the supply shall comply with clause 3.1 above and shall also conform to the following requirements.

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Sl. No.	Characteristics	Passing standard	Test method
1	2	3	4
1.	Volatile matter (at 105°C + 2 deg C) Percent, Max.	0.10	Appendix 'A'
2.	Hydroscopicity Percent, Max.	0.15	Appendix 'B'
3.	Potassium hydrogen tartrate content ($C_4H_4O_6KH$) Percent, Min.	99.5	Appendix 'C'
4.	Uncombined tartaric acid ($C_4H_6O_6$) Percent, Max.	0.1	Appendix 'D'
5.	Chlorides calculated as potassium chloride, Percent, Max.	0.05	Appendix 'E'
6.	Sulphates calculated as potassium sulphate, Percent, Max.	0.05	Appendix 'E'
7.	Nitrates	Nil	Appendix 'F'
8.	Carbonates	Nil	
9.	Iron and iron compounds calculated as iron, Percent, Max.	0.05	
10.	Copper and copper compounds calculated as copper Percent, Max.	0.05	Appendix 'G'
11.	pH of saturated aqueous solution Min.	3.5	Appendix 'H'
	Max.	4.5	

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1	2	3	4
12.	Sieving i) Retained on 150 μm I.S. Sieve	Nil	Appendix 'J'
	ii) Retained on 75 μm I.S. Sieve Percent, Max.	15	
	Particulars of I.S. Sieve referred to will be found in I.S. 460 - 1962.		

9. PACKING AND MARKING

9.1 Packing

9.1.1 Potassium hydrogen tartrate shall be packed in polythene bags made out of polythene film of thickness 0.13 mm . The bags shall be placed inside suitable wooden cases/boxes internally lined with packing paper and closed securely with wooden lids. Quantity in each package shall not exceed 20 kg .

9.1.2 Material offered in any other packages shall have the prior approval of the Inspecting Officer.

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

9.2 Marking

9.2.1 All packages constituting a consignment shall be legibly and durably marked with the following details as applicable :-

i) Nomenclature and specification number of the material.

ii) Name and address of the consignee.

iii) A/T or S.O. No. and date.

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iv) Consignment number.

v) Lot number/Batch No. and date of manufacture.

vi) Gross and net mass.

vii) Consecutive No. of package and total No. of packages.

viii) Date of supply.

ix) Contractor's initials or recognised Trade mark.

9.2.2 In addition to above, the Inspecting Officer may suggest some more markings/identification at the time of inspection.

9.2.3 The paint used for marking should be of good quality conforming to IS :138-1969 and to the satisfaction of the Inspecting Officer.

Surjit Singh

(Dr. SURJIT SINGH)
DIRECTOR
CONTROLLER OF INSPECTION (MILITARY EXPLOSIVES)
for DIRECTOR OF INSPECTION (ARMAMENTS)

10. APPENDICES

APPENDIX 'A'

DETERMINATION OF VOLATILE MATTER

Transfer about 5 g of the well mixed material to a clean, dry and tared moisture dish (M1) and weigh accurately (M2). Keep the dish in an oven maintained at a temperature of 105°C ± 1 deg C for 3 hours (or until

constant mass is reached) cool to room temperature in a desiccator and weigh (M3).

$$\% \text{ Volatile matter} = \frac{M2 - M3}{M2 - M1} \times 100$$

APPENDIX 'B'

DETERMINATION OF HYGROSCOPICITY

Transfer about 5 g of the well mixed material previously dried to constant mass in to a clean, dry and tared moisture dish (M4) and weigh accurately (M5). Keep the dish with dry material exposed inside a closed humidity vessel maintained at a temperature of 20°C ± 1 deg C and 95 percent relative humidity for a period of 48 hours and weigh (M6).

$$\% \text{ hygroscopicity} = \frac{M6 - M5}{M5 - M4} \times 100$$

APPENDIX 'C'

DETERMINATION OF POTASSIUM HYDROGEN TARTRATE CONTENT

Dry about 1 g of well crushed sample at a temperature of 105°C ± 2 deg C for 2 hours, cool and transfer accurately weighed 0.7 g to 0.8 g of the dried material to a conical flask; dissolve in 50 ml of hot distilled water and titrate with 0.1 N sodium hydroxide using phenolphthalein as indicator (titre t1).

Calculate the percentage of potassium hydrogen tartrate ($KHC_4H_4O_6$) using the factor,

1 ml of 0.1 N NaOH ≡ 0.01881 g $KHC_4H_4O_6$

$$\% \text{ Potassium hydrogen tartrate} = \frac{t1 \times f \times 0.01881}{\text{mass of sample.}} \times 100$$

Where f = factor of 0.1 N sodium hydroxide.

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APPENDIX 'D'

DETERMINATION OF UNCOMBINED TARTARIC ACID

Transfer accurately weighed about 2 g of well crushed dry sample to a conical flask and add 20 ml of previously distilled ethyl alcohol. Shake well for 5 minutes and then allow to stand for 30 minutes. Again shake, filter through a dry filter paper and wash with 20 ml portion of ethyl alcohol. Transfer the filtrate to a clean, dry, tared evaporating dish (M1) evaporate the whole filtrate to dryness on a water bath and finally in an air even at a temperature of 105 C ± 2 deg C, cool to room temperature in a desiccator and weigh (M2).

$$\% \text{ uncombined tartaric acid} = \frac{M2 - M1}{\text{mass of sample.}} \times 100$$

APPENDIX 'E'

DETERMINATION OF CHLORIDES AND SULPHATES

Digest about 5 g of material, accurately weighed, with about 200 ml of warm distilled water. Filter through a washed, wet, fine filter paper. Make up the volume of the filtrate to 250 ml and retain this filtrate (A) for the estimation of chlorides and sulphates.

(i) Chlorides calculated as potassium chloride

Transfer 100 ml of the filtrate (A) from above to a conical flask, add 2 ml dilute (1 :1) nitric acid and 10 ml of 0.02 N - silver nitrate. If any turbidity/precipitate is observed, shake well add 5 drops of ferric alum indicator solution and titrate the excess silver nitrate against 0.02 N ammonium thiocyanate solution until a permanent faint red colour develops (titre t1). Carry out a blank on the reagents used (titre t2).

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$$\% \text{ chlorides as potassium chloride} = \frac{(t2 - t1) \times f \times 0.00149}{\text{mass of sample}} \times 250$$

where f = factor of 0.02 N ammonium thiocyanate solution.

ii) Sulphates

Transfer 100 ml of the filtrate (A) from above to a clean and dry conical flask. Add 2 ml of dilute 10 % solution of hydrochloric acid and boil. Add 5 ml of 5% hot barium chloride and continue boiling for further 5 minutes. Allow the solution to stand overnight. Filter through a prepared dry and clean gooch crucible (M1) wash with distilled water till the filtrate is free from chlorides. Dry the contents of the crucible in an oven at a temperature of 105°C ± 2 deg C and then incinerate in a muffle furnace at a temperature of 800°C ± 25 deg C. Cool outside to a temperature when it is safe to be transferred to a desiccator, further cool in a desiccator to room temperature and reweigh to constant mass (M2).

$$\% \text{ sulphates as potassium sulphate} = \frac{(M2 - M1) \times 0.7414}{\text{mass of sample}} \times 250$$

APPENDIX 'F'

DETECTION OF NITRATES AND CARBONATES

1) Nitrates :

To a few ml of saturated solution of potassium hydrogen tartrate, add 2 - 3 drops of diphenyl amine reagent. Development of blue colour indicates presence of nitrates, if any.

2) Carbonates :

Take 1 g of solid material, treat it with 10 % hydrochloric acid, effervescence of CO_2 indicates presence of carbonate, if any.

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APPENDIX 'G'

DETERMINATION OF IRON AND COPPER SALTS

1) Iron and Iron salts

Transfer 10 g ± 0.5 g of the sample to a clean and dry conical flask and digest with 50 ml of dilute 10 % sulphuric acid on a sand bath for about 15 minutes, cool, dilute to 150 ml, filter and make up the volume of the filtrate to 200 ml (B). Transfer 100 ml of the filtrate (B) from above to Nessler tube, add 10 ml of 10 % potassium or ammonium thiocyanate and mix well. Compare the colour immediately with that produced under the same conditions by 100 ml of standard solutions containing ferric alum equivalent to 0.001 g , 0.0015 g, 0.0025 g etc. of metallic iron. Express the iron content as lying between two of the following percentages corresponding to the above standards :-

0.02 %, 0.03 % , 0.04 % , 0.05 % , etc.

2) Copper and copper salts :

Transfer 100 ml of the filtrate (B) from above to a Nessler tube, add 10 ml of dilute ammonia solution and mix well. Compare the colour with that produced under the same conditions by 100 ml of standard solutions containing copper sulphate equivalent to 0.001 g, 0.0015 g, 0.002 g, 0.0025 g, etc. of metallic copper. Express the copper content as lying between two of the following percentages, corresponding to the above standards 0.02 %, 0.03 %, 0.04% , 0.05 % etc.

APPENDIX 'H'

DETERMINATION OF pH OF WATER EXTRACT

Shake 1 g ± 0.05 g of the material with 100 ml of freshly boiled and cooled distilled water (pH 6.5 to 7.0).Allow to settle. Determine pH of the clear solution with a standard pH meter or alternatively using universal indicator solution.

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APPENDIX 'J'

SIEVING

Prepare a nest of sieves, 150 μm and 75 μm I.S. sieve over a receiver. Transfer about 10 g of the material, accurately weighed, to the top sieve (150 μm I.S. sieve) and brush it gently using a camel hair brush. Carry out the brushing for 15 minutes or until no further material passes through the sieve. Express the mass of the material retained on the sieve as a percentage of the original material.

Remove the top sieve (i.e. 150 μm I.S. sieve) and continue brushing on the bottom sieve (75 μm I.S. sieve) until no further material passes through the sieve. Express the cumulative total of mass of the material retained on 150 μm I.S. sieve + that on 75 μm I.S. sieve as a percentage (material retained) of the original material.

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