भारत सरकार
GOVERNMENT OF INDIA

रक्षा मंत्रालय
MINISTRY OF DEFENCE

संयुक्त सेवा विनिर्देश
JOINT SERVICES SPECIFICATION

ON

BARIUM NITRATE GRADE 1
(DS Cat. No. 6810-000 905)

Issued by

मानकीकरण निदेशालय
रक्षा उत्पादन विभाग
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NEW DELHI-110 011

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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)	

0 FOREWORD

0.1 This Joint Services Specification has been prepared by the Armament Standardisation 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 6810-59 : 2016, (Revision No. 4).

a) was revised in the year 2001.
b) is a revision of JSS 6810-59 : 2010, (Revision No. 3) and supersedes the same.

0.4 This JSS would be used for Supply and Quality Assurance of Barium nitrate Grade 1.

0.5 Quality Assurance Authority for the item covered by this specification is the Controller, Controllerate of Quality Assurance (Military Explosives), Aundh Road, Pune-411 020. 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-110 011

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-110 002
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-110 011

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 approach the Directorate of Standardisation for obtaining user id/password to access the website.

1 SCOPE

1.1 This specification is meant to govern Supply and Quality Assurance of Barium nitrate Grade 1 suitable for use in Explosives, Pyrotechnic Compositions and Incendiary Mixtures.

2 RELATED SPECIFICATIONS/DOCUMENTS

2.1 Reference is made in this specification to:

S No.	*Specification No. & Year*	*Nomenclature*
a)	IS 138 : 1992 (Third Revision) Reaffirmed 2014 AMD 1	Ready Mixed Paint, Marking, for Packages and Petrol Containers-Specification.
b)	IS 460 (Part 1) : 1985 (Third Revision) Reaffirmed 2013 AMD 1	Specification for Test Sieves : Part I Wire Cloth Test Sieves.
c)	JSG 0112 : 2015 (Revision No. 2)	General Methods of Tests and Assessment of Impurities in Chemicals/Materials used in the Manufacture of Explosives and Ammunition.

3 MATERIAL/FINISH

3.1 The material shall consist essentially of Barium nitrate Ba $(NO_3)_2$ and is to be in the form of clean, white powder. It should be free from lump/aggregates, any foreign matter and visible impurities.

3.2 The material when required in crystalline form should consist mainly of whole crystals and is not to be prepared from coarse material by grinding.

3.3 The particle size of material shall be as agreed to between purchaser and supplier.

4 MANUFACTURE

4.1 Barium nitrate Gr I shall be manufactured by a process which will produce the product conforming to this specification.

5 TENDER SAMPLE

5.1 The manufacture/supplier/contractor shall submit a tender sample of 250 g essentially from the same batch/lot of manufacture, free of all charges and conforming to this specification, when called for in the tender.

6 PRE-INSPECTION OF STORES/CONSIGNMENT

6.1 Manufactures/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.

6.2 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 Barium nitrate Gr I and the 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.

7.2 Sampling

7.2.1 A representative sample of 250 g shall be drawn from each contrainer. 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.

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 Criteria for Conformity

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

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

8 TEST REQUIREMENTS

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

Table - 1 Requirements for Barium Nitrate Gr I for use in Explosives

S No.	Characteristics	Passing Standard	Test Method
a)	*Moisture at 105°C±2°C for 3 h, % by mass	1.0 *Max*	JSG 0112 Method 1(a)
b)	Matter insoluble in water, % by mass a) Total, b) Organic,	 0.5 *Max* 0.1 *Max*	JSG 0112 Method 4
c)	Grit retained on 125 micrometre IS sieve, % by mass	0.05 *Max*	JSG 0112 Method 6 and 18
d)	pH of water extract	5.5 *Min* 7.5 *Max*	JSG 0112 Method 5 (b)
e)	Chlorides calculated as Sodium chloride, % by mass	0.25 *Max*	JSG 0112 Method 7 (b)
f)	Chlorates, % by mass	Nil	JSG 0112 Method 11
g)	Nitrites calculated as Sodium nitrite, % by mass	0.03 *Max*	JSG 0112 Method 13
h)	Ammonium compounds calculated as Ammonium nitrate, % by mass	0.05 *Max*	JSG 0112 Methods 9
j)	Sodium compounds calculated as Sodium nitrate, % by mass	0.5 *Max*	Appendix ‘A’
k)	Calcium compounds calculated as Calcium nitrate, % by mass	0.05 *Max*	Appendix ‘B’
m)	Total impurities excluding Sodium salts calculated as Sodium nitrate, % by mass	1.0 *Max*	Total amount of values obtained at S No. 5, 7, 9 & 10.
n)	Barium nitrate content, % by mass	99.0 *Min*	Appendix ‘C’
p)	+ Hygroscopicity, % by mass	0.15 *Max*	Appendix ‘D’
q)	Sieving requirement: % by mass		JSG 0112 Method 18 and IS 460 (Part 1)
	i) Size 250 micrometre Retained on 250 Micrometer IS Sieve	Nil	

S No.	Characteristics	Passing Standard	Test Method
	ii) Size 250/125 micrometre		JSG 0112 Method 18 and IS 460 (Part 1)
	aa) Retained on 250 micrometre IS Sieve	Nil	
	ab) Retained on 125 micrometre IS Sieve	90.0 *Min*	
	iii) Size 150 micrometre Retained on 150 micrometre IS Sieve	Nil	
	iv) Size 125 micrometre Retained on 125 micrometre IS Sieve	Nil	
	**v) Size 250 micrometre A		
	aa) Retained on 250 micrometre IS Sieve	Nil	
	ab) Retained on 150 micrometre IS Sieve	50 *Max*	
	**vi) Size 125 micrometre A		
	aa) Retained on 180 micrometre IS Sieve	Nil	
	ab) Retained on 125 micrometre IS Sieve	*10 Max*	
	ac) Retained on 63 micrometre IS Sieve	50 *Min* 70 *Max*	
	**vii) Size 150/90 micrometre A		
	aa) Retained on 150 micrometre IS Sieve	Nil	
	ab) Retained on 90 micrometre IS Sieve	50 *Min*	

NOTES-

1 *When the material, with the above moisture content is not suitable for the use in compositions; the limit for moisture content may be adjusted as per the requirement.

2 +The Hygroscopicity clause is applicable only when the material is used in initiatory compositions.

3 +The Hygroscopicity limits can be relaxed up to a maximum of 0.5% by the Quality Assurance Authority depending upon the merit of the case till the indigenous source of supply meeting the hygroscopicity requirements of 0.15% are fully established.

4 **Cryastalline variety.

9 WARRANTY

9.1 The stores supplied against the contract shall deem to have been warranted against defective material and performance by the contractor/manufacturer for a period of 2 years from the date of receipt of the stores at the consignees end and if during this period any of the stores supplied is found defective the same shall be replaced by the contractor/manufacturer free of charge at the consignee's premises.

10 PACKAGING

10.1 Barium nitrate Gr I shall be initially packed in hermetically sealed Polythene bag of film thickness 0.13 mm which in turn shall be packed again in sound, clean dry wooden boxes (lined with brown paper) or in closely woven hessian bag and stitched without damaging the inner contents.

10.2 The quantity per package shall be 50 kg or as agreed to between the purchaser and the supplier. Material offered in other packages shall receive a prior approval of the Quality Assurance Officer/Quality Assurance Authority.

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

11 MARKING

11.1 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 Address of the Consignee.
c) A.T. or S.O Number and Date.
d) Consignment Number.
e) Lot/Batch No. 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 Initials or Recognized Trademark.

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

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

12 DEFENCE STORES CATALOGUE NUMBER

12.1 The Defence Stores Catalogue Number allotted to the store covered by this specification is 6810-000 905.

13 SAFETY OF OPERATIONS

13.1 Nothing in this specification shall relieve the manufacturer/supplier/contractor of his responsibility for the safety of operations in the manufacture, storage, transit or use of this store.

14 SUGGESTION FOR IMPROVEMENT

14.1 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-110 011

Appendix 'A'

A DETERMINATION OF SODIUM COMPOUNDS

A.1 Dissolves 5 g of the material in 250 ml of distilled water. Heat until boiling and add drop by drop 50 ml of a 10% solution of Sulphuric acid. Continue boiling for about 20 minute and allow to stand overnight. Then filter and wash the precipitate. Evaporate the filtrate and washings to dryness in a tared silica dish and ignite it at a dull red heat to remove Sulphuric acid. Cool in a desiccator and weigh. Express the mass of the residue as Sodium nitrate and record as a percentage of the original sample.

Appendix 'B'

B DETERMINATION OF CALCIUM COMPOUNDS

B.1 Reagent: Picrolonic acid.

B.2 Dissolve the residue of Sodium, Potassium and Calcium sulphates (from Appendix 'A') in neutral distilled water. Warm the solution and add 2 g of the reagent, dissolved in 750 ml of warm water. After standing, for several hours the precipitrate is collected on a No. 3 sintered glass crucible and after washing with water is dried by aspirating with air for 2 h. The precipitate has the composition Ca (C_{10} H_7 N_4 O_5), $8H_2O$ and contains 5.642% of Calcium. The method is applicable even in the presence of Magnesium provided the concentration of the latter does not exceed ten times that of Calcium.

B.3 Colorimetric Method

B.3.1 A colorimetric method for determining the Calcium Picrolonate has been proposed. The precipitate is washed with Diethyl Ether, dissolved in hot water and 1 ml of a saturated aqueous solution of Bromine added for every 50 ml Calcium Picrolonate solution. After heating the mixture on a water bath for 10 minutes, 10 ml of Ethanol is added and after allowing it to cool, 2 ml of 2 N Sodium hydroxide is introduced. The pink colour thus produced is compared with standards similarly prepared, starting with known amounts of Calcium.

Appendix 'C'

C DETERMINATION OF BARIUM NITRATE

C.1 Weigh accurately 1 g of the material, dissolve in 50 ml of water and filter, wash the filter paper thoroughly with cold water. Dilute the filtrate to about 200 ml. Boil and add drop by drop, 25 ml of 10% sulphuric acid. Continue the boiling for about 30 minutes and set aside overnight. Then filter on a tared, asbestos padded, silica Gooch crucible (M_1). Wash thoroughly with water containing a few drops of Sulphuric acid and finally with about 50 ml of Methylated spirit. Dry the crucible and precipitate in an oven at 100°C and then ignite slowly at a low flame and finally at 800°C in a muffle furnace. Cool initially in air and then in a desiccator to room temperature and weigh (M_2). Express the mass of the precipitate as Barium nitrate and record as a percentage of the original sample.

$$\text{Barium nitrate, \% by mass} = \frac{(M_2-M_1) \times 1.12 \times 100}{\text{Mass of Sample}}$$

$$= \frac{(M_2-M_1) \times 112}{\text{Mass of Sample}}$$

Appendix 'D'

D DETERMINATION OF HYGROSCOPICITY

D.1 Reagents : The reagents used shall be of recognized analytical reagent quality.

Glycerine 45% by volume. Prepare by diluting Glycerol with water to a density of 1.113 g per ml at 20°C.

NOTE- This solution produces an atmosphere of 85% humidity at 20°C.

D.2 Procedure

D.2.1 Transfer 5 g of Barium nitrate to flat bottomed glass dish, 70 mm in diameter and fitted with a ground glass cover. Spread the material uniformly over the bottom of the dish and heat both dish and cover in an oven at 105°C ±2°C for 3 h. Remove the dish from the oven and cover. Cool in a desiccator, replace the cover and weigh.

D.2.2 Remove the cover and expose both dish and cover to 85% humidity for 24 h. Remove, replace the cover and reweight.

D.3 Calculation

$$\text{Hygroscopicity, \% by mass} = \frac{100\ A}{W}$$

Where:

A = gain in mass of dish in g.

W = mass of sample taken in g.