



भारत सरकार  
GOVERNMENT OF INDIA  
रक्षा मंत्रालय  
MINISTRY OF DEFENCE

संयुक्त सेवा विनिर्देश  
JOINT SERVICES SPECIFICATION

ON

SODIUM NITRATE GRADE I  
(DCAN 6810-001 134)

मानकीकरण निदेशालय  
रक्षा उत्पादन विभाग  
रक्षा मंत्रालय  
'एच'-ब्लॉक, निर्माण भवन डाकघर  
नई दिल्ली-११००११

DIRECTORATE OF STANDARDISATION  
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**LIST OF MEMBERS ASSOCIATED WITH FORMULATION OF THIS STANDARD**

1. This Joint Services Specification has been approved by Shri RS Gauba, Sc 'G', Associate Director, PO-II, DRDO, Chairman, Armament Standardisation Sub-committee by circulation.
2. The representatives of following organisations have been present/consulted in approving the document:

<b>S. No.</b>	<b>Organisations</b>
1.	Programme Office-II, DRDO Orgn, New Delhi
2.	ADGWE/GS (WE-2/3), New Delhi
3.	Dte of Arty (GS/Artillery-5), New Delhi
4.	Dte Gen of Naval Armt, Naval HQ, New Delhi
5.	Dte of Armt & Safety Eqpt, Air HQ, New Delhi
6.	DGEME, Army HQ, New Delhi
7.	DGNAI, Naval HQ, New Delhi
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9.	CQA (ME), Pune
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12.	CQA (W), Jabalpur
13.	HEMRL, DRDO, Pune
14.	ARDE/DRDO Orgn, Pune
15.	Ammunition Factory, Pune
16.	Secretary ASSC

**RECORD OF AMENDMENTS**

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

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**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 6810-87 : 2016, (Third Revision):

- a) was prepared in the year 1987.
- b) was reaffirmed in the year 1993.
- c) was revised in the year 2004 & 2011 and supersedes the same.

**0.4** This specification is meant to govern Manufacture, Supply and Quality Assurance of Sodium Nitrate Grade I.

**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.

**JSS 6810-87 : 2016**  
**(Third Revision)**

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

Directorate of Standardisation Website:

*[www.ddpdos.gov.in](http://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](http://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**

This specification is meant to govern Manufacture, Supply and Quality Assurance of Sodium Nitrate Grade I suitable for use in the manufacture of explosive, pyrotechnic and incendiary compositions.

## **2. RELATED SPECIFICATIONS/DOCUMENTS**

Reference is made in this specification to:

<i>S. No.</i>	<i>Specification/ Document No.</i>	<i>Nomenclature</i>
a)	IS 138 : 1992 (Third Revision) AMD 1 Reaffirmed 2014	Ready Mixed Paint, Marking, for Packages and Petrol Containers-Specification
b)	IS 301 : 1982 (Second Revision) AMD 1 Reaffirmed 2016	Specification for Potassium Nitrate for Explosive and Pyrotechnic Compositions
c)	IS 460 (Part 1) : 1985 (Third Revision) AMD 1 Reaffirmed 2013	Specification for Test Sieves Part 1 Wire Cloth Test Sieves
d)	JSG 0112 : 2015 (Second Revision)	General Methods of Tests and Assessment of Impurities in Chemical/Materials used in the Manufacture of Explosives and Ammunition

## **3. MATERIAL/FINISH**

Sodium Nitrate Grade I shall be in the form of fine colourless crystals, free from grit, foreign matter and visible impurities. The material shall essentially consist of Sodium Nitrate of the appropriate size and shall conform to this specification in all respects.

## **4. MANUFACTURE**

Sodium Nitrate Grade I shall be manufactured by a process which will produce the product conforming to this specification.

## **5. TENDER SAMPLE**

The manufacturer/supplier/contractor shall submit two tender samples each of 250 g, essentially from the same batch/lot of the manufacture, free of all charges and conforming to this specification, when called for in the tender to the Quality Assurance Officer/Quality Assurance Authority 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 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** Sodium Nitrate Grade I and the packages in which it is contained shall be subject to inspection by and to the final 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**

Two representative samples of 200 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:

<i>No. of Containers in a Batch/Lot</i>	<i>No. of Containers to be Sampled</i>
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 is found not to conform to this specification, the whole batch/lot/consignment shall be rejected.

**7.3.2** The foregoing provisions shall apply equally to prime contractors and to any sub-contractor. If any.



#### 7.4 Test Requirements

Samples taken from any portion of batch/lot shall be in accordance with the Clause 3 above and shall comply with the following test requirements:

<i>S. No.</i>	<i>Characteristics</i>	<i>Passing Standard</i>	<i>Test Method</i>
a)	Volatile matter at 105°C ±3°C for 3 hour, percent by mass	1.00 <i>Max</i>	JSG 0112 Method 1 (a)
b)	Matter insoluble in water		JSG 0112 Method 4 & 18
	1) Total percent by mass	0.10 <i>Max</i>	
	2) Organic percent by mass	0.10 <i>Max</i>	
	3) Retained on 125 micrometre IS Sieve	Nil	
c)	Chlorides, calculated as Sodium chloride (NaCl) percent by mass	0.10 <i>Max</i>	JSG 0112 Method 7 (b) or Alternatively by Chloride titrator
d)	pH of water extract	Min 5.50 7.50 <i>Max</i>	JSG 0112 Method 5 (b)
e)	Sulphates calculated as Sodium Sulphate (Na <sub>2</sub> SO <sub>4</sub> ), percent by mass	0.25 <i>Max</i>	JSG 0112 Method 8
f)	Chlorates	Nil	Method B-10 of APPX to IS 301
g)	Perchlorates, calculates as Sodium perchlorate, (NaClO <sub>4</sub> ), percent by mass	0.05 <i>Max</i>	JSG 0112 Method 12
h)	Nitrites, calculated as Sodium Nitrite, (NaNO <sub>2</sub> ), percent by mass	0.15 <i>Max</i>	JSG 0112 Method 13 (a)
j)	Ammonium Compounds calculated as Ammonia, percent by mass	0.01 <i>Max</i>	JSG 0112 Method 9
k)	Sieving : retained on appropriate sieve size	Nil	JSG 0112 Method 18
m)	Iodates, calculated as Sodium Iodate NaIO <sub>3</sub> , percent by mass	0.02 <i>Max</i>	APPX 'A'
n)	Calcium & Magnesium Compounds, calculated as Calcium Oxide, CaO, percent by mass	0.05 <i>Max</i>	APPX 'B'
p)	Sodium Nitrate content, percent by mass	99.50 <i>Min</i>	APPX 'C'

#### 8. WARRANTY

The stores supplied against this specification shall be deemed to bear warranty for 12 months from the date of receipt of store at consignee's end and against defective design/material/workmanship/performance. If during this period any of the stores supplied is found defective, the same shall be rectified/replaced by the contractor, free of charge, at the user's premises within a period of three months from date of intimation of defect.

## **9. PACKAGING**

**9.1** Sodium Nitrate shall be packed in polyethylene bags of 0.13 mm film thickness and the mouths hermetically sealed. These polythene bags will be placed in double gunny bags or dry poly woven bags and will be closed by stitching the mouths taking care not to damage the polythene bags.

**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/lot/consignment liable to rejection.

## **10. MARKING**

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

- a) Nomenclature and specification number of the material.
- b) Name and address of the consignee.
- c) A/T or SO number and date.
- d) Consignment number.
- e) Batch No. and date of manufacture.
- f) Gross and net mass.
- g) Consecutive number of package and total number of packages in consignment.
- h) Date of supply.
- j) Manufacturer's initials or recognised trademark.

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

**10.3** The paint used for marking should conform to IS 138 (latest issue) and to the satisfaction of the Quality Assurance Officer/Quality Assurance Authority.

## **11. DEFENCE CATALOGUE NUMBER**

The Defence Catalogue Number allotted to Sodium Nitrate Grade I is 6810-001 134.

**12. SAFETY OF OPERATIONS**

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

**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-110 011.

**DETERMINATION OF IODATES**

**A-1.** Take 10 g of the sample in two separate beakers. Dissolve each in the minimum quantity of distilled water. Make alkaline with 5 ml of a one per cent solution of Sodium hydroxide and add 10 ml of 3.0% solution of Hydrogen peroxide to oxidise the nitrites. Reduce the bulk of solution in each beaker to 20 ml by boiling. Neutralise by dropwise addition of dilute sulphuric acid, using litmus paper as indicator. In one beaker pass Hydrogen sulphide gas to saturate on. Boil and cool. To each beaker add 0.5 ml of O-Toluidine solution.

**A-2.** Transfer the contents of each beaker to separate Nessler tubes and make up the volume to 50 ml. Match the turbidity by addition of standard potassium iodide solution.

$$\text{Iodates as NaIO}_3, \text{ percent by mass} = \frac{0.1 \times X}{W}$$

where,

$X$  = ml of KI solution required for matching turbidity; and

$W$  = mass of sample taken for test.

**NOTES**

1. Standard Potassium Iodide solution - Dissolve 0.838 g of the salt in distilled water and make up the volume to 100 ml in a measuring flask.
2. O-Toluidine solution - Dissolve 1.0 g of the compound in 150 ml of 95% Ethyl alcohol.

**APPX 'B'**  
*(Clause 7.4)*

**DETERMINATION OF CALCIUM AND MAGNESIUM COMPOUNDS**

**B-1.** Dissolve 1.785 g of Calcium carbonate in 50 ml of 2 normal HCl and dilute to 1 litre in a volumetric flask. 1ml of this solution is equivalent to 1 mg of CaO.

**B.1.1** Weigh accurately about 10 g of the sample into a beaker and dissolve in 40 ml of distilled water. Add 5 ml of ethyl alcohol and 5 ml of freshly prepared 1% solution of Ammonium ferrocyanide. Stir well. Transfer to a Nessler tube and make up to 100 ml mark with distilled water. Similarly prepare another Nessler tube without the sample.

**B.1.2** Match the turbidities due to sample by adding dropwise to the blank Nessler tube the standard calcium solution, making the solution homogenous after each addition.

$$\begin{array}{l} \text{Calcium and Magnesium} \\ \text{compounds as CaO} \\ \text{percent by mass} \end{array} = \frac{0.1 \times (\text{ml of std. Calcium solution})}{\text{Mass of sample taken}}$$

**METHOD OF DETERMINATION FOR PURITY OF SODIUM NITRATE GRADE I**

**C-1. Principle** - When dilute solution of known quantity of Sodium Nitrate is passed through a suitable column containing strong cation exchanger in H<sup>+</sup> form the salt is converted to corresponding acid which is titrated against standard NaOH to determine purity of NaNO<sub>3</sub>.

**C-2. Apparatus** - The cation exchange column consists of a vertical glass tube of about 2 cm bore, fitted at the lower end with a stop-cock and containing a glass-wool plug above the stop-cock to retain the resin. It is filled to a height of about 25 cm with cation exchange resin. The total length of the tube may be 60 cm or it may be widened into a funnel above the level of the resin. Suitable cation exchange resin is zeocarb into the column by mixing it with water and pouring the slurry into the tube so that no air bubbles are trapped between the particles. During use the liquid level is not allowed to fall below the surface level of the resin.

**C-3. Preparation of the Column** - The resin is washed by passing carbon dioxide free water down the column until 50 ml of eluate requires not more than 0.05 ml of N/10 NaOH using phenolphthalein as indicator.

Upto four assays can normally be carried out by the column before regeneration. If the doubt exists as to the effectiveness of the column the eluate should be tested for the cation that should have been removed.

**C-4. Procedure** - Dissolve 0.3 g in 50 ml carbon dioxide free water and pass the solution through the cation exchange column at a rate of 3 to 4 ml per minute, collecting the eluate in a titration flask. Wash the resin with carbon dioxide free water at a rate of about 6 ml per minute and collect about 250 ml of eluate and titrated the eluate with standard N/10 sodium hydroxide using Bromothymol blue indicator as the washing proceeds, until 50 ml of eluate requires no further titration to the green end point.

**C-5. Calculation**

$$\text{Sodium Nitrate Content, percent by mass} = \frac{0.8499 \times V \times f}{W}$$

where,

$V$  = the volume in ml of Standard Sodium Hydroxide required for the titration.

$f$  = factor of standard Sodium Hydroxide used.

$W$  = mass of sample taken for the test.

**C-6. Regeneration of Resin** - The resin can be regenerated by leaving 4 Normal HCl in the column overnight and passing a further 50 ml of Normal HCl through the column before the usual washing.