GOVERNMENT OF INDIA
MINISTRY OF DEFENCE

JOINT SERVICES SPECIFICATION

ON

SODIUM NITRITE, TECHNICAL

(DS CAT NO. 6810 - 001 135)

JSS 6810 - 104 : 2012
(Revision No. 3)

Supersedes JSS 6810 - 104 : 2005
(Revision No. 2)

DIRECTORATE OF STANDARDISATION
DEPARTMENT OF DEFENCE PRODUCTION
MINISTRY OF DEFENCE
'H' BLOCK, NIRMAN BHAWAN PO
NEW DELHI – 110 011

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LIST OF MEMBERS ASSOCIATED WITH FORMULATION OF THIS STANDARD SUB COMMITTEE

1. This Joint Services Specification has been approved by Dr. DK Kharat, Sc 'G' Director, Directorate of Armaments (R&D), and Chairman Armament Standardisation Sub Committee by circulation.

2. The following members have been present / consulted in approving the document :-

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2.	Col SK Mohan	ADGWE / GS (WE - 2 / 3), New Delhi
3.	Col RN Nambiar	Dte of Arty (GS / Artillary - 5), New Delhi
4.	Shri B.P. Singh, DON	Dte Gen of Naval Armt, Naval HQ, New Delhi
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10	Col JS Lotay, Jt Controller	CQA (Amn), Pune
11.	Lt Col Y.C Panday	CQA (SA), Ichapur, West Bengal
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15.	Shri Shrish Kumar Jt. General Manager	Ammunition Factory, Pune
16.	Shri S K Saxena, NSO	Secretary ASSC

RECORD OF AMENDMENTS

Amendment		Amendment pertains to : Sl. No. / Para No. / Column No.	Authority	Amended by	Signature & Date
No.	Date			Name & Appointment (IN BLOCK LETTERS)	

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0. FOREWORD

0.1 This specification has been prepared by 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 The present Document JSS 6810 - 104 : 2012 (Revision No. 3) is a revision of JSS 6810 - 104 : 2005 (Revision No. 2) and supersedes the same.

0.4 This specification would be used for manufacture, supply and quality assurance of Sodium Nitrite, Technical.

0.5 Quality Assurance Authority for the item covered in the JSS is the controller, Controllerate of Quality Assurance (Military Explosives), Aundh Road, Kirkee, Pune - 411 020. Enquiries regarding this specification relating to any contractual conditions should be addressed to the Quality Assurance Authority named in the tender or contract. Other enquiries should 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 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 JSS / JSG 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.defstand.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 JSS / JSGs are available on the Directorate of Standardisation Website **www.defstand.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 manufacture, supply and quality assurance of Sodium Nitrite, Technical for use in the manufacture of explosives.

2. RELATED SPECIFICATIONS / DOCUMENTS

2.1 Reference is made in this specification to :-

(a)	IS 138 : 1992 (Third Revision) Reaffirmed 2009, Amd 1	Ready Mixed Paint, Marking, for Packages and Petrol Containers - Specification
(b)	IS 323 : 2009 (Second Revision) Reaffirmed 2008	Rectified Spirit For Industrial Use - Specification

3. MATERIAL

3.1 Sodium Nitrite, Technical shall be in the form of clear crystals or lumps or sticks not more than pale yellow in colour and free from foreign matter, grit and visible impurities.

4. MANUFACTURE

4.1 Sodium Nitrite, Technical shall be manufactured by a process which will produce the product conforming to this specification.

4.2 Nothing in this specification shall relieve the manufacturer of his responsibility for the safety of his operations during manufacture.

5. TENDER SAMPLE

5.1 The manufacturer / supplier / contractor shall submit two tender sample of each 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 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.

6.2 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 Nitrite, Technical 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 or the packages may be taken from any portion of the batch / lot / consignment.

7.2 Sampling

7.2.1 Two representative samples 250 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 :-

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 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 subcontractor, if any.

7.4. **Test Requirements**

7.4.1 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.

TEST REQUIREMENTS OF SODIUM NITRITE, TECHNICAL

Sl. No.	Characteristics	Passing Standard	Test Method
1	2	3	4
(a)	Volatile matter, per cent by mass	Max 2.0	Appendix 'A'
(b)	Sodium Nitrite ($NaNO_2$) content, per cent by mass	Min 98.0	Appendix 'B'
(c)	Matter insoluble in water, per cent by mass	Max 0.10	Appendix 'C'
(d)	Alkalinity (as $Na_2 Co_3$) per cent by mass	Max 0.20	Appendix 'D'
(e)	Heavy Metals including Iron calculated as Lead (Pb), per cent by mass	Max 0.005	Appendix 'E'
(f)	Iron (as Fe_2O_3), per cent by mass	Max 0.002	Appendix 'F'
(g)	Sodium Nitrate, content ($NaNO_3$), per cent	Max 1.0	Method as agreed between the purchaser and the contractor

Note :- The percentage of tests from Sl. No. (b) to (g) shall be calculated on the dry mass of the material, free from moisture and volatile matter.

8. WARRANTY

8.1 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 Nitrite, Technical is deliquescent and shall be supplied in sound, clean and dry approved packages (25 kg in a heat - sealed polythene bag of 0.13 mm thickness placed inside a wooden drum or barrel).

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 foreign matter or impurities in any of the package shall render the whole batch / lot / 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 No. of the material.
(b)	Name and address of the consignee.
(c)	A.T. or S.O. No. and date.
(d)	Consignment No.
(e)	Lot / Batch No. and date of manufacture.
(f)	Gross and net mass.
(g)	Consecutive No. of package and total number of packages in the consignment.
(h)	Date of supply.
(j)	Manufacturer's / Contractor's initial or his recognised trade mark.

10.2 In addition to the above the Quality Assurance Officer may suggest some more marking / identification suitable at the time of inspection.

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

11. DEFENCE STORES CATALOGUE NUMBER

11.1 The Defence stores catalogue number allotted to Sodium Nitrite, Technical is 6810 - 001 135.

12. SAFETY OF OPERATION

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

13. SUGGESTIONS FOR IMPROVEMENT

13.1 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'

DETERMINATION OF VOLATILE MATTER

1. Weigh accurately by difference about 2 g of the material in a squat form stoppered glass weighing bottle and dry to constant mass in a vacuum desiccator over freshly regenerated silica gel. Express the loss in mass as the percentage of the mass of the material taken for test.

2. **Calculations**

$$\text{Volatile Matter Content, Percent by mass} = \frac{(M\,2 - M\,3) \times 100}{\text{Mass of sample taken}}$$

Where,

M 2 = Mass of the weighing bottle + sample (before desiccation).

M 3 = Mass of the weighing bottle + sample (after desiccation).

APPENDIX 'B'

DETERMINATION OF SODIUM NITRITE CONTENT

1. **Preparation of samples solution** – Dissolve about 1.2 g of the dried material, accurately weighed, in water and dilute it to exactly 100 ml in a volumetric flask.

2. **Reagents** – The following reagents are required :-

(a) Concentrated Sulphuric acid – Specific Gravity 1.84

(b) Standard Potassium Permanganate Solution – approximately 0.1 N but of known normality.

(c) Standard Ferrous Ammonium Sulphate solution – approximately 0.1 N but of known normality.

3. **Procedure** – Take 300 ml of freshly boiled and cooled distilled water and 5 ml of concentrated Sulphuric acid in an Erlenmayer flask and then immediately add standard Potassium Permanganate solution until a faint colour persists for 2 minutes. Disregard this volume of the Permanganate solution. Add from a pipette, exactly 50 ml of standard Potassium Permanganate solution, mix thoroughly and slowly add with stirring 10 ml of the prepared sample solution (B.1), care being taken to hold the tip of the pipette under the surface of the liquid during the addition. Warm the mixture of 40 ^{o}C and maintain at this temperature of 10 minutes. Cool the mixture to 10 ^{o}C and then add 15 ml of the standard Ferrous Ammonium Sulphate solution. (Colour of Permanganate should be discharged by this volume of Ferrous Ammonium Sulphate solution. If not, more of Ferrous Ammonium Sulphate solution should be added). Let it stand for 5 minutes and titrate the excess of Ferrous Ammonium Sulphate with standard Potassium Permanganate solution.

4. **Calculation**

$$\text{Sodium Nitrite, percent by mass} = \frac{34.50\,(50 + X)\,N\,1 - VN\,2}{M}$$

Where,

X = Volume of Potassium Permanganate solution required to back titrate the excess of Ferrous Ammonium Sulphate solution.

N 1 = Normality of standard Potassium Permanganate solution.

V = Volume in ml of Ferrous Ammonium Sulphate solution required for excess Potassium permanganate solution.

N 2 = Normality of standard Ferrous Ammonium Sulphate solution.

M = Mass in g of the dried material taken from the prepared sample solution.

APPENDIX 'C'

DETERMINATION OF MATTER INSOLUBLE IN WATER

1. Dissolve about 20 g of the material dried and accurately weighed, in 150 ml of water in a 300 ml beaker and heat on a steam bath for one hour. Filter through a tared Gooch crucible previously washed and dried at 105 ^{o}C to 110 ^{o}C. Cool and weigh. Repeat the drying till constant mass is obtained.

2. Determine the mass of the insoluble residue and express the result as percentage of the mass of the dried material taken for test.

3. **Calculations** :-

$$\text{Total matter insoluble in water, Percent by mass} = \frac{\text{Mass of residue} \times 100}{\text{Mass of sample taken}}$$

APPENDIX 'D'

DETERMINATION OF ALKALINITY

1. **Reagents** – The following reagents are required :-

   (a) **Methyl Red Indicator** – Dissolve 0.1 g of the Methyl red in 200 ml of rectified spirit, 95 per cent by volume (conforming to IS 323)

   (b) **Standard Hydrochloric Acid** – Approximately 0.1 N.

2. **Procedure** – Dissolve 5 g of the material, dried and accurately weighed, in 100 to 200 ml of water. Add 2 drops of Methyl red indicator and titrate with standard Hydrochloric acid.

3. **Calculations**

   Alkalinity (as Na_2CO_3), percent by mass $= \frac{5.3\,VN}{M}$

   Where,

   V = Volume in ml of standard Hydrochloric acid used for the test.

   N = Normality of standard Hydrochloric acid.

   M = Mass in g of the dried material taken for the test.

APPENDIX 'E'

DETERMINATION OF HEAVY METALS INCLUDING IRON

1. **Apparatus**

Nesseler Tubes – Two flat bottomed tubes of thin colourless glass, about 25 mm in diameter and about 150 mm in length, graduated at 50 ml. The depth, measured internally from the graduation mark to the bottom shall not vary by more than 2 mm in the two tubes.

2. **Reagents** – The following reagents are required :-

(a) **Concentrated Hydrochloric acid** – Specific gravity 1.16.

(b) **Standard Lead solution** – Dissolve 1.60 g of Lead Nitrate in water, add 1 ml of concentrated Nitric acid and make the volume upto 1000 ml. Transfer exactly 10 ml of this solution to a volumetric flask, again dilute with water and make up volume to 1000 ml mark. One millilitre of this solution is equivalent to 0.01 mg of Lead (Pb).

(c) **Acetic acid** – Approximately 1 N.

(d) **Hydrogen Sulphide solution** – Prepare a fresh, saturated aqueous solution of Hydrogen sulphide gas.

3. **Procedure**

3.1 Weigh 10 g of the material, dried as described in para A.1 above and dissolve in 50 ml of water. Add 10 ml of concentrated Hydrochloric acid and evaporate to dryness on the water bath. Dissolve the residue in water and make up the solution to exactly 500 ml (solution X).

3.2 Take 10 ml of solution X in a Nessler tube and add 2 ml of standard Lead solution. Dilute to 30 ml and add 1 ml of Acetic acid (Solution Y).

3.3 Take 30 ml of solution X in another Nessler tube and add 1 ml of Acetic acid (Solution Z).

3.4 Add 10 ml of Hydrogen sulphide solution to each of solution Y and Z. The limit prescribed shall be taken as not having been exceeded if the intensity of colour produced in solution Z is not greater than that of Solution Y.

APPENDIX 'F'

DETERMINATION OF IRON

1. **Apparatus**

Nesserler Tubes – Same as under Appendix 'E' para 1.

2. **Reagents** – The following reagents are required :-

(a) **Concentrated Hydrochloric acid** - Specific Gravity 1.16.

(b) **Butanolic Potassium Thiocyanate Solution** – Dissolve 10 g of Potassium Thiocyanate in 10 ml of water of 27 ^{o}C ± 2 ^{o}C. Add sufficient butanol to make to 100 ml and shake vigorously until the solution is clear.

(c) **Standard Iron Solution** – Dissolve 0.6040 g of Ferric Ammonium Sulphate Fe (NH_4), (SO_4)2, 12 H_2O) in 10 ml of dilute Sulphuric acid (10 per cent by volume) and dilute with water to 1000 ml. Take 10 ml to this solution and dilute to 100 ml. One millilitre of the final solution is equivalent of 0.01 mg of Ferric oxide (Fe_2O_3).

3. **Procedure** – Dissolve 1 g of the dried material in 10 ml of water, add 1 ml of concentrated Hydrochloric acid and 15 ml of Butanolic Potassium Thiocyanate Solution, shake vigorously for thirty seconds and allow to separate. Carry out a control test in the other Nesserler Tube using 2 ml of standard Iron solution in place of the material and the same quantities of other reagents in the same total volume of the reaction mixture. Compare the colour produced in the two tubes after 5 minutes.

4. The limit prescribed shall be taken as not having been exceeded if the intensity of the colour produced in the test with the material is not greater than that produced in the control.