



**GOVERNMENT OF INDIA  
MINISTRY OF DEFENCE**

**JOINT SERVICES SPECIFICATION**

**ON**

**SULPHUR GRADE I**

**(DS CAT NO. 6810-001 112)**

**JSS 6810-103: 2012  
(Revision No.3)**

**(Supersedes JSS 6810-103: 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 ARMAMENT STANDARDISATION**  
**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 were present/consulted in approving the document: -

<b><u>Sl No.</u></b>	<b><u>Name &amp; Designation</u></b>	<b><u>Organisation</u></b>
1.	Shri A C Jain, Addl. Director	Dte of Armaments, DRDO Orgn, New Delhi
2.	Col SK Mohan	ADGWE/GS (WE-2/3), New Delhi
3.	Col RN Nambiar	Dte of Arty (GS/Artillery-5), New Delhi
4.	Shri B.P. Singh, DON	Dte Gen of Naval Armt, Naval HQ, New Delhi
5	Air Cmde R Kumar, PDA	Dte of Armt & Safety Eqpt, Air HQ, New Delhi
6.	Col Sunil Bhatia	DGEME, Army HQ, New Delhi
7.	Capt VP Varghese	DGNAI, Naval HQ, New Delhi
8.	Shri Yogesh Kumar, SSO – II	DGAQA, DD (Armt) Gp, New Delhi
9.	Dr. H.C. Dwivedi, Jt. Controller	CQA (ME), Pune
10	Col JS Lotay, Jt Controller	CQA (Amn), Pune
11.	Lt Col Y.C Panday	CQA (SA), Ichapur, West Bengal
12.	Col A.N. Mathur	CQA (W), Jabalpur
13.	Shri SC Aglawe, Sc 'F'	HEMRL, DRDO, Pune
14.	Shri GC Adhikari, Sc 'F'	ARDE/DRDO Orgn, Pune
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 This specification is a revision of JSS 6810 – 103 : 2005 (Revision No. 2) and supersedes the same.

0.4 This specification is meant to govern manufacture, supply and quality assurance of Sulphur Grade I.

0.5 Quality Assurance Authority for the item covered in this specification 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-110002.

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-110011.

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

Directorate of Standardisation Website  
[www.defstand.gov.in](http://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 Sulphur Grade I suitable for use in explosives and pyrotechnic mixtures.

**2. RELATED SPECIFICATIONS/DOCUMENTS**

2.1 Reference is made in this specification to: -

(a)	IS 460 (Part 1): 1985	Specification for test sieves : Part 1 wire cloth test sieves (Third Revision) Reaffirmed 2008, Amds 1
(b)	JSG 0112 : 1997	General methods of tests and assessment of impurities in chemicals / materials used in the manufacture of explosives and ammunition.

**3. MATERIAL**

3.1 The Sulphur Grade I is to be an yellow powder obtained by grinding refined lump sulphur. It shall be free from foreign matter, grit and visible impurities and shall be capable of passing the appropriate sieve as indicated in clause 7.4.1.

**4. MANUFACTURE**

4.1 Sulphur Grade 1 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 samples 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 alongwith 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 Sulphur Grade 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.

### **7.2 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: -

	<b><u>No. of containers in a batch/lot</u></b>	<b><u>No. of containers to be sampled</u></b>
(a)	Up to 25	3
(b)	26 to 50	4
(c)	51 to 100	5
(d)	101 to 150	6
(e)	151 to 300	7
(f)	301 to 500	8
(g)	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 the batch / lot / consignment of material shall be in accordance with the clauses 3 above and in addition also shall conform to the following requirements:-

#### **TEST REQUIREMENTS OF SULPHUR GRADE 1**

<b>Sl. No.</b>	<b>Characteristics</b>	<b>Passing Standard</b>	<b>Test Method</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
(a)	Volatile matter at 70°C for 1.5 hour, per cent by mass	Max 0.05	Method 1 (a) of JSG 0112
(b)	Ash on incineration per cent by mass	Max 0.10	Method 2 (a) of JSG 0112
(c)	Ash retained on 63 micrometre IS Sieve	Nil	18 of JSG 0112
(d)	Reaction of aqueous extract, Acidity to Methyl orange	Nil	Appendix 'A'
(e)	Sulphur content per cent by mass	Min 99.80	Appendix 'B'
(f)	Sieving requirements: -  (i) Size 850 micrometre Retained on 850 micrometre IS Sieve  (ii) Size 600 micrometre Retained on 600 micrometre IS Sieve  (iii) Size 250 micrometre Retained on 250 micrometre IS Sieve  (iv) Size 125 micrometre Retained on 125 micrometre IS Sieve  (v) Size 90 micrometre Retained on 90 micrometre IS Sieve		18 of JSG 0112  Nil  Nil  Nil  Nil  Nil

Note: - Particulars of IS Sieve referred to above shall be found in IS 460 (Part 1).

**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 The material is supplied in clean dry approved packages containing an approved quantity. The inclusion of foreign matter or impurities in any of the packages shall render the whole 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 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 consignment
(h)	Date of supply
(j)	Manufacturer's initials or recognized trademark.

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

**11. DEFENCE STORES CATALOGUE NUMBER**

11.1 Defence Stores Catalogue Number allotted to this store is 6810 – 001 112.

**12. SAFETY OF OPERATIONS**

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 stores.

**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.

**DETERMINATION OF ACIDITY**

A.1 Mix 5 g of the material thoroughly with 2 ml of Ethyl alcohol and add 100 ml of distilled water gradually. Allow the mixture to stand for 15 minutes with occasional stirring. Then filter through a filter paper, wash the filter paper and contents with 20 ml of distilled water and collect the filtrate and washings. Carry out a blank experiment also side by side under identical conditions. Titrate the two liquids in comparison employing a standard N/20 Alkali solution with Methyl orange as indicator.

**APPENDIX 'B'**

**DETERMINATION OF SULPHUR CONTENT**

B.1 Weigh accurately about 0.2 g of the sample and transfer it in to a tall beaker, not lipped, of about 400 ml capacity. Take a similar beaker for a blank experiment. Add 10 ml of a mixture of 9 volumes of glacial Acetic acid and 1 volume of water to each beaker. Then add 6 ml of liquid Bromine to each beaker. As Bromine is liable to contain sulphur as impurity, it is necessary to add exactly the same volume to each beaker. It is also advisable to use a supply of Bromine which has been shown by previous experiment to be relatively sulphur free. Cover the beaker and allow to stand for 16 to 24 hours. Then add 150 ml of distilled water to each beaker and boil gently to volatilise all the residual Bromine. Filter the solution, if necessary and make up the volume in each beaker to about 250 ml. Add 10 ml of 10% Hydrochloric acid and a solution containing 1.7 g of Barium Chloride crystal ( $\text{Ba Cl}_2 \cdot 2\text{H}_2\text{O}$ ) to each beaker. Boil for 30 minutes and allow to stand in the cold for 16 to 24 hours. Filter the precipitated Barium sulphate through a No. 42 whatman filter paper (previously washed with hot water), wash free of chloride, dry, ignite and weigh. Calculate the percentage of sulphur from the mass of Barium sulphate obtained after applying the necessary correction for the blank test.