JSS 9535-06 : 2010
(Revision No. 2)
Reaffirmed 2016

भारत सरकार
GOVERNMENT OF INDIA

रक्षा मंत्रालय
MINISTRY OF DEFENCE

संयुक्त सेवा विनिर्देश
JOINT SERVICES SPECIFICATION

ON

FOIL, TIN/LEAD

(DS Cat. No.)

(Thickness 0.03 mm - 9535-000 869)
(Thickness 0.05 mm - 9535-000 870)

Issued by

मानकीकरण निदेशालय
रक्षा उत्पादन विभाग
रक्षा मंत्रालय
'एच' ब्लाक, निर्माण भवन डाकघर
नई दिल्ली-110 011

DIRECTORATE OF STANDARDISATION
DEPARTMENT OF DEFENCE PRODUCTION
MINISTRY OF DEFENCE
'H' BLOCK, NIRMAN BHAVAN POST OFFICE
NEW DELHI-110 011

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.

2 The following members have been present/consulted in preparing the document:

S No.	*Name & Designation*	*Organisation*
1	Shri Benzamin Lionel, Sc 'G' HPO-II	Programme Office-II, DRDO Orgn, New Delhi
2	Col Sushil Chander	ADGWE / GS (WE - 2 / 3), New Delhi
3	Col Himanshu Tiwari	Dte of Arty (GS / Artillary - 5), New Delhi
4	Capt. Roopak Barua, DNAI	Dte Gen of Naval Armt, Naval HQ, New Delhi
5	Air Cmde Sunil Padegaonkar, PDA (ASE)	Dte of Armt & Safety Eqpt, Air HQ, New Delhi
6	Lt. Col A.V Kulkarni, JD, EME, Armt	DGEME, Army HQ, New Delhi
7	Shri. P Upadhyay, PDONA/DGONA	DGNAI, Naval HQ, New Delhi
8	Shri A.K. Parashar, Director	DGAQA, JD (Armt) Gp, New Delhi
9	Shri L Sriniwasan, SSO-I	CQA (ME), Pune
10	Shri Ashok Kumar, PScO (NFSG)	CQA (Amn), Pune
11	Lt Col Tapan Sharma	CQA (SA), Ichapur, West Bengal
12	Shri K. Yadav, PScO	CQA (W), Jabalpur
13	Dr.[Mrs.] N. Sikder, Sc 'G'	HEMRL, DRDO, Pune
14	Shri P. W. Sonawane, Jt. Director	ARDE / DRDO Orgn, Pune
15	Shri V.K. Tiwari, Addl GM	Ammunition Factory, Pune
16	Shri Satvinder Singh, SSO - II	Secretary ASSC

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 9535-06 : 2010, (Revision No. 2) Reaffirmed 2016

a) was revised in the year 2000.
b) is the reaffirmation of JSS 9535-06 : 2010, (Revision No. 2) and supersedes the same.

0.4 This specification is meant to govern Manufacture, Supply and Quality Assurance of Foil, Tin/Lead.

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 Manufacture, Supply and Quality Assurance of Foil Tin/Lead suitable for prevention of coppering in guns.

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 1817 : 1961 Reaffirmed 2010	Methods of Sampling Non-Ferrous Metals for Chemical Analysis.

3 MATERIAL

3.1 The foil, Tin/Lead shall consists of 60% Tin and 40% Lead.

3.2 The foil may be supplied in uniform thickness.

3.3 The foil shall have a finish and general appearance to the satisfaction of the Quality Assurance Officer.

3.4 The surface of the foil shall be free from grit, oiliness and surface acidity or alkalinity.

4 MANUFACTURE

4.1 The foil, Tin/Lead be manufactured by a process which will produce the product conforming to this specification.

5 TENDER SAMPLE

5.1 The manufacturer/supplier/contractor shall submit a tender sample of 30 cm full width, 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 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 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 The foil Tin/Lead during manufacture and after completion shall be subject to inspection by and to the approval of the Quality Assurance Officer/Quality Assurance Authority.

7.2 Sampling

7.2.1 The sampling shall be carried out as per IS 1817.

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 contractor and to any sub-contractor.

7.4 Test Requirements

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

Test Requirements of Foil Tin/Lead

a) Chemical

S No.	*Characteristics*	*Passing Standard*	*Test Method*
i)	*Composition, %*		Appendix 'A'
	aa) Tin	65 *Max* 55 *Min*	
	ab) Lead	45 *Max* 35 *Min*	
	ac) Other Impurities	2.0 *Max*	

b) *Physical*

S No.	*Characteristics*	*Passing Standard*	*Test Method*
i)	Thickness 0.05 mm		Appendix 'B'
	aa) Width	As per contract	
	ab) Length	As per contract	
	ac) Mass per square metre	370 g *Min* 515 g *Max*	
ii)	Thickness 0.03 mm		Appendix 'B'
	aa) Width	As per contract	
	ab) Length	As per contract	
	ac) Mass per square metre	222 g *Min* 309 g *Max*	
iii)	Thickness 0.07 mm		Appendix 'B'
	aa) Width	As per contract	
	ab) Length	As per contract	
	ac) Mass per square metre	518 g *Min* 721 g *Max*	

8 WARRANTY

8.1 The stores supplied against the contract shall be deemed to be warranted against the defective material and performance by the contractor for a period of 12 months from the date of receipt of the stores at the consignee's end and shall retain the properties described above. If during this period any of the stores supplied is found defective, the same shall be replaced by the manufacturer/supplier/contractor free of charges at the consignee's premises.

9 PACKAGING

9.1 The Foil, Tin/Lead shall be supplied in approved packages containing an approved quantity.

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) Batch Number 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/Contractor's Initials or Recognised Trademark.

10.2 In addition to the above the Quality Assurance Officer/Quality Assurance Authority may suggest some more markings/identifications considered 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 as applicable to this specification are as under:

S No.	*Thickness*	*DS Cat. Number*
a)	0.03 mm	9535-000 869
b)	0.05 mm	9535-000 870

12 SAFETY OF OPERATIONS

12.1 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.

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'

A DETERMINATION OF COMPOSITION OF THE FOIL, TIN/LEAD

A.1 Lead Content

A.1.1 Weight out accurately about 0.5 g of the finely divided foil into a 150 ml -200 ml beaker and cover with a watch glass. Add 5 ml of water, followed by 15 ml of concentrated Nitric acid. Keep the beaker covered during the ensuing violent reaction. When the vigorous reaction is over, evaporate on a water bath to a volume of about 5 ml but not to dryness. Dilute to 50 ml, heat on a water bath for 10-15 minutes and then filter through a whatman No. 42 filter paper and collect the filtrate in a 250 ml -400 ml beaker, Wash the precipitate at least ten times with dilute Nitric acid (1:100). Keep the filtrate and washing for the determination of Lead.

A.1.2 The insoluble residue consists of Metastannic acid and Antimonic acid, together with some co-precipitated Lead compound. The ignited residue will consist of SnO_2 + Sb_2 O_4 + PbO. The Tin and Antimony are volatilised as the Iodides by the addition of about 15 times its weight of pure Ammonium iodide and heating until no fumes are evolved. The Lead remains behind as a mixture of Oxylo-dide and oxide. This is then treated with 2 – 3 ml concentrated Nitric acid evaporated to dryness on the hot plate, the Nitrate cautiously decomposed and finally ignited to oxide at a low heat. The residual PbO in the crucible is dissolved in concentrated Nitric acid and added to the above main filtrate from the Metastannic acid. The Lead is then determined as Lead Sulphate by the usual standard method.

A.2 Tin and Antimony Content

A.2.1 Repeat the above experiment and transfer the impure metastannic acid precipitate and filter paper preferably dried at 100°C to a Kjeldahl flask. Add a mixture of 12 ml of concentrated Sulphuric acid and 5 g of Potassium hydrogen sulphate. Boil gently until the organic matter is destroyed. The mixture is evaporated to fumes Sulphur trioxide, allowed to cool, cautiously transfer quantitatively to a conical flask with the aid of 50 ml of water; 5 ml concentrated Hydrochloric acid is added. The solution cooled to 10°C & titrated with standard 0.1 N Potassium permanganate solution and percentage of Antimony is calculated.

A.2.2 Excess of concentrated Hydrochloric acid (about 20% of the volume of the entire solution) is then added, followed by 2 g -3 g of pure Lead and the mixture boiled gently in an atmosphere of Carbon dioxide. The quadrivalent Tin is reduced by the Lead to the bivalent state and the Antimony is precipitated as the metal. The Stannous Tin is titrated with standard 0.1N Iodine and from the volume required of the latter the percentage of Tin is calculated.

1 ml 0.1N Iodine = 0.05935 g Tin

Appendix 'B'

B DETERMINATION OF MASS PER UNIT AREA

B.1 The mass of foil shall be determined as follows. Weigh accurately about 900 cm^2-1000 cm^2 sample piece in g (W) and calculate the mass per square metre as under:

$$\text{Mass/Square metre } (g/m^2) = \frac{W \times 10000}{Y}$$

Where

Y = area in square cm for the sample piece taken

W = Mass of the sample piece in grams.