



भारत सरकार
GOVERNMENT OF INDIA
रक्षा मंत्रालय
MINISTRY OF DEFENCE

संयुक्त सेवा विनिर्देश
JOINT SERVICES SPECIFICATION

ON

CARTRIDGE BRASS FOR AMMUNITION COMPONENTS

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

DIRECTORATE OF STANDARDISATION
DEPARTMENT OF DEFENCE PRODUCTION
MINISTRY OF DEFENCE
‘H’ BLOCK, NIRMAN BHAWAN PO
NEW DELHI-110011

LIST OF MEMBERS ASSOCIATED WITH REVISION OF THIS SPECIFICATION

1. The revision of this Joint Services Specification has been approved by Dr. N. Eswara Prasad, Sc. 'H', Outstanding Scientist, Director, DMSRDE, Chairman, Material Standardisation Sub Committee by circulation.
2. The representatives of following organisations were consulted in approving the document:

S. No.	Name & Designation	Organisation
1.	Sh VK Sohal, Controller	CQA(Metals), Ichapur
2.	Sh UK Singh, Dy Controller	CQA(ME), Pune
3.	Lt Col RD Mishra	CQA(EE), Pune
4.	-	CQA(Small Arms), Ichapur
5.	Sh. PV Setunath, Dy Controler	CQA(L), Bengaluru
6.	-	DQA(N), New Delhi
7.	Dr. Vikas Kumar, Sc 'H'	DMRL, Hyderabad
8.	Dr. SM Abbas, Sc 'G'	DMSRDE, Kanpur
9.	Mrs. Dhanalakshmi Sathishkumar, Sc 'E'	CVRDE, Avadi
10.	Lt. Col. K Shaji, JD(OS) P-1	DGOS(CP Cell-1), New Delhi
11.	-	DGEME(Armt), New Delhi
12.	Sh CK Mondal, Director	Metal & Steel Factory, Ichapur
13.	Sh DN Verma, Jt GM	Vehicle Factory, Jabalpur
14.	Lt Cdr Sudeep Sashidharan, DDAPI	DGNAI, New Delhi
15.	Shri P Upadhyay, PDNA	DGNA, New Delhi
16.	Cdr Rohit Prakash JDME	DME, New Delhi
17.	Cdr. Manish Singh, JDLS	DLS, New Delhi
18.	Dr. R Raghavendra Bhatt DGM(CMPL)	HAL, Bengaluru
19.	Dr. Chandan Halder, Manager (R&D)	MIDHANI, Hyderabad
20.	Gp Capt Navneet Bhatnagar, DMS(O&P)	JDQAS(Aero), New Delhi
21.	Sh. K.K.Mehta, SSO-I	DGAQA, New Delhi
22.	-	Dte of P&C, New Delhi

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)	

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0. FOREWORD

0.1 This Joint Services Specification has been prepared by the Material Standardisation Sub Committee on the authority of Standardisation Committee, Ministry of Defence.

0.2 This Joint Services Specification has been approved by the Ministry of Defence and is mandatory for use by the Defence Services.

0.3 This JSS 9535-02 : 2019 (Fifth Revision):

- a) was prepared in the year 1982.
- b) was revised in the year 1995, 2002, 2008 and 2013.
- c) is revision of JSS 9535-02 : 2013 (Fourth Revision) and supersedes the same.

0.4 This Joint Services Specification would be used to guide design, manufacture, quality assurance and procurement of the item.

0.5 Quality Assurance Authority for the items covered by this Joint Services Specification is, 'The Controller, Controllerate of Quality Assurance (Metals), Ichapur-Nawabganj, 24 Parganas (N), West Bengal-743144' (E-mail: cqametichapur-dgqa@nic.in). Enquiries regarding this specification relating to any technical parameters shall 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-110011.
E-mail: mssc.defstand@gov.in

0.6 Non-registered users can obtain the following on payment:

a) Copies of IS from:

Bureau of Indian Standards
Manak Bhavan
9, Bahadur Shah Zafar Marg
New Delhi-110002,
or
their regional/branch offices.

b) Copies of JSSs/JSGs from:

The Director
Directorate of Standardisation
Standardisation Documentation Centre
Room No. 05 'J' Block, Nirman Bhavan PO
New Delhi-110011.

0.7 Indian Standards (IS) which are related to this specification are available 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

This Joint Services Specification governs supply of Cartridge Brass for the manufacture of cartridge cases and other ammunition components in the form of plate, sheet, strip and discs and provides a basis for supply of other wrought forms to requirements to be agreed between the purchaser and supplier.

2. RELATED SPECIFICATIONS

References are made in this specification to:

Table 1 Related Specifications

S. No.	Specification/ Documents No.	Nomenclature
a)	IS 264 : 2005 (Third Revision) Reaffirmed 2017	Nitric Acid-Specification.
b)	IS 1070 : 1992 (Third Revision) Reaffirmed 2019	Reagent Grade Water-Specification
c)	IS 1501 (Part 1) : 2013 (Fourth Revision) Reaffirmed 2018	Metallic Materials-Vickers Hardness Test Part 1 Test Method
d)	IS 1599 : 2019 (Fourth Revision)	Metallic Materials-Bend Test
e)	IS 2305 : 1988 (First Revision) Reaffirmed 2015	Method for Mercurous Nitrate Test for Copper and Copper Alloys
f)	IS 3685 : 1966 Reaffirmed 2018	Methods of Chemical Analysis of Brasses
g)	IS 4748 : 2009 (Second revision) Reaffirmed 2017	Steel-Micrographic Determination of the Apparent Grain Size

3. MATERIAL

3.1 The material, Cartridge Brass for Ammunition Components, shall conform to the following chemical composition:

Table 2 Chemical Composition

S. No.	Element	%	
		<i>Min</i>	<i>Max</i>
a)	Copper	68.5	72.0
b)	Lead	-	0.015
c)	Iron	-	0.05 #

Table 2 Chemical Composition (Concluded)

S. No.	Element	%	
		<i>Min</i>	<i>Max</i>
d)	Bismuth	-	0.004
e)	Nickel	-	0.1
f)	Tin	-	0.03
g)	Arsenic	-	0.01
h)	Antimony	-	0.005
j)	Any other single impurity (Excluding Silver)	-	0.005
k)	Zinc	-	Remainder

Where specially required, Iron content of 0.025% maximum may be specified by the purchaser in contract or order.

NOTES

1. Phosphorus shall not be intentionally added to the charge except with prior agreement of the purchaser who shall, in such cases, state the maximum permissible contents.
2. Unless otherwise specified, analytical grade reagents and distilled water conforming to IS 1070 shall be used in all testing operations.

3.2 Use of Scrap

3.2.1 Clean process scrap upto 80% by mass of the charge may be used. However, clean process scrap may be replaced upto 40% by mass of the charge by fired cases of not less than 30 mm calibre with all caps and primers removed and pickled and washed to remove oxides, corrosion and other extraneous matter.

3.2.1.1 For small Arm Brass Cartridge Cases 50% clean process scrap may be used.

3.2.2 Clean process scrap shall consist of webbing, large chipping, rejected blanks and partly or completely formed components from brass to this specification. It may also include small chipping, swarf, turnings and millings of brass of the above-mentioned composition provided that it is free from contamination.

4. DIMENSIONS AND TOLERANCES

The dimensions and tolerances of the material shall be as specified in supply order or contract or in the drawing to be supplied by the purchaser.

5. SUPPLY CONDITION

5.1 Conditions and Properties

The material shall be supplied in annealed or unannealed condition as stated in contract or order. The material supplied in cold worked conditions shall be subjected to an adequate low temperature stress relief treatment and shall be sampled and tested as per Clause **8.9**.

5.2 The plate, sheet, strip and discs for the applications of manufacture of ammunition components, unless otherwise ordered, shall be supplied in annealed condition and shall meet the requirements of Table 3, 4 & 5. When the material is ordered in a harder condition for the applications of ammunition components, the supplier shall anneal Representative samples and certify that the annealed samples meet the requirements of Table 3, 4 and 5. The supplier shall also provide details of the annealing treatment used.

5.3 When material is ordered for other applications and the properties required are different from that listed in Table 3, 4 & 5 then these properties shall be agreed between the purchaser and supplier.

5.4 The plate, sheet, strip and discs for the applications of manufacture of ammunition components, shall be designated by appropriate type letter given in Table 3 & 4. The material for other applications shall be designated in contract or order by a type letter of Table 3 & 4 and the properties specified therein is required.

5.5 For concast or semiconcast materials, initial approval of the AHSP shall be obtained before proceeding for bulk production.

6. WORKMANSHIP AND FINISH

The plate, sheet, strip and discs shall be clean, sound free from scale, laminations, cracks, blow holes, inclusions or other defects and shall be suitable for working into the required form. The surfaces shall be smooth all over and the edges shall be free from burrs.

7. PRE-INSPECTION OF STORES/CONSIGNMENT

7.1 Manufacturer/supplier 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 manufacturer/supplier that 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.

7.2 If the Quality Assurance Officer finds that pre-inspection of the consignment as required above has not been carried out, the consignment is liable for rejection.

8. QUALITY ASSURANCE

8.1 The supplier shall notify the purchaser named in the contract or order when he is about to start work on the contract or order and shall grant facilities to the Quality Assurance Authority or his authorized representative to inspect the material at all stages of manufacture. The Quality Assurance Authority or his authorized representative shall select and identify samples for the tests specified in Clauses **8.4, 8.7, 8.8, 8.9** & also **8.10** when the material is supplied in the cold worked condition.

8.2 Where all manufacture and processing of the material is to be carried out by the ammunition component manufacturer, the test Clauses at **8.7** to **8.10** may, with the agreement of the Quality Assurance Authority, be waived off.

8.3 Sampling Procedure

8.3.1 One sample per 500 kg or part there of may be selected for specified tests for each cast.

8.3.2 Where casting is continuous or semi continuous subject to Clause **5.5**, a sample shall be taken from each casting furnace at intervals as agreed between the supplier and purchaser/Quality Assurance Authority. This sample shall be analysed and the cast product identified with the sample.

8.4 Analysis

8.4.1 The representative sample of each cast/lot of brass shall be analysed and the test results shall conform to the requirements of Clause **3.1**.

8.4.2 The frequency of analysis for impurity elements may be reduced with the approval of the Quality Assurance Authority provided that:

- a) The chemical composition has consistently complied with Clause **3.1**.
- b) The ratio of scrap to virgin metal is not increased.
- c) The scrap is derived from brass to this specification produced in the manufacturer's own plant in the form of webbing, large clippings, rejected blanks and partly or completely formed components and free from contamination (Fired cases turnings millings and other finely divided scrap shall not be used).

8.4.3 If any deviation is made from the above condition, impurity analysis of every sample shall be reinstated. If the analysis at reduced frequency shows that the brass does not meet the impurity requirements, every sample subsequent to the last satisfactory sample shall be fully analysed until the cause of discrepancy has been investigated and eliminated to the satisfaction of the Quality Assurance Authority or his authorised representative.

8.4.4 In case of dispute in chemical analysis, the procedure given in IS 3685 shall be the referee method.

8.5 Examination of Defects

Before rolling to plate, sheet, or strip, each separately cast ingot or slab shall be cropped and the cut face examined visually for freedom from piping or other internal defects. Defective ingots or slabs shall be further cropped until free from visual defects. Appropriate examination shall be made for continuously cast stock subject to Clause **5.5** depending on the process used. All finished material shall be examined visually and shall conform to the requirements of Clause **6**.

8.6 Dimensional Check

The material shall be gauged and shall conform to the requirements of Clause 4.

8.7 Hardness Test

The hardness of the representative samples of the material shall be tested in accordance with IS 1501 (Part 1). The test results shall conform to the requirements of Table 3 or to the requirements as agreed between the purchaser and supplier and stated in contract or order.

Table 3 Hardness Requirements for Cartridge Brass for Ammunition Components

Type	Ammunition Components	Maximum Hardness (HV)
A	Caps and Cartridge cases upto and including 30 mm Calibre	75
B	Cartridge cases over 30 mm Calibre, vent tube	75

8.8 Grain Size Determination

The representative samples of the material shall be prepared for microscopic examination and etched to reveal the grain structure and at a magnification of 75X, compared with the grain size standards shown in IS 4748. If an accurate match is obtained, the grain size of relative standards shall be reported. Intermediate assessments shall be quoted by the nearest standards. The test results shall conform to the requirements of Table 4 or to the requirements as agreed between the purchaser and supplier and stated in contract or order.

Table 4 Grain Size Requirements for Cartridge Brass for Ammunition Components

Type	Ammunition Components	Maximum Average Grain Size (mm)
A	Caps and Cartridge cases upto and including 30 mm calibre	0.065
B	Cartridge cases over 30 mm calibre, vent tube	0.090

8.9 Bend Test

The representative samples of the material, in annealed or otherwise agreed condition, shall be subjected to a bend test in accordance with IS 1599. The material shall conform to the requirements of Table 5. The reverse bend test shall be conducted on the material of thickness not more than 3 mm and the single bend test on the material of thickness over 3 mm. The test procedures derived from IS 1599 and requirements for acceptability of the material have been given below and summarized in Table 5.

8.9.1 Reverse Bend Test

A bend test piece 20 mm in width and of convenient length shall be cut from the material so that its major axis is at 90° to the rolling direction. If the width of the material is less than

50 mm, a longitudinal test piece having its major axis parallel to the rolling direction may be used. The longer sides of the test piece shall be rounded and made smooth longitudinally so that the cross section has approximately semi circular ends. Parts of the test piece shall be gripped between two formers each having an inner edge radius equal to 3 times the thickness of the material. The free ends of the test piece shall be bent through 90° over one former and back to its original position and then over the other former and back to its original position (2 bends). The necessary constraint being applied to maintain contact between the test piece and the former. Repeating this procedure, the number of completed bends before failure shall be determined, the failure is defined as the formation of a crack that prevents the test piece from following the curve of the former. The number of completed bends before failure shall be not less than 8.

8.9.2 Single Bend Test

A test piece of appropriate width as specified in Table 3 and of convenient length shall be cut from the material so that the major axis is at 90° to the rolling direction. For the material of thickness over 3 mm but not more than 20 mm, the width of the test piece shall be 40 mm and for material of thickness over 20 mm, the width of the test piece shall be twice the thickness of the material. The edges of the longer sides of the test piece shall be rounded and these edges and sides shall be made smooth longitudinally. The test piece shall not crack when bent through 180° over a former of radius equal to half of the thickness of the material.

Table 5 Bend Test Requirements for Cartridge Brass for Ammunition Components

Thickness of Material (t)	Width of Test Piece	Type of Test	Radius of Former	Number of Bends
Upto and including 3 mm	20 mm	Reverse bend test	3t	8 bends minimum
Over 3 mm upto and including 20 mm	40 mm	Single bend test	½ t	1 bend at 180°
Over 20 mm	2t	Single bend test	½ t	1 bend at 180°

8.10 Mercurous Nitrate Test

8.10.1 The representative samples of cold worked material shall be subjected to the Mercurous Nitrate test as prescribed. The samples shall not be identified by indenting.

8.10.2 Procedure

- 8.10.2.1**
- The sample shall be first degreased and then dipped in a solution of 50% distilled water and 50% concentrated Nitric acid (relative density 1.42) for a period of not exceeding 30 seconds to remove all traces of carbonaceous matter and oxide films.
 - It shall then be well rinsed in cold water and immediately immersed in a 1% m/v solution of Mercurous Nitrate in distilled water to which 1 ml of concentrated Nitric acid conforming to IS 264 (relative density 1.42) has been

added for each 100 ml of solution or reference shall be made to the methods given in IS 2305 for the preparation of Mercurous Nitrate solution.

c) The test specimen shall remain in solution for 30 minutes and shall then be removed, rinsed well in cold water and carefully wiped and examined immediately.

8.10.2.2 Should any test specimen show any crack, all the material submitted for inspection at the same time, shall be withdrawn and may be re-submitted for tests as per Clauses **8.7** to **8.10** after further low temperature stress relief treatment.

8.11 Retest

If any of the test samples first selected fails to pass the tests specified in Clauses **8.7**, **8.8** and **8.9**, two further test samples shall be selected as agreed with the Quality Assurance Authority or his authorised representative and both the samples shall be tested. One such sample shall be from the same plate, sheet, strip, discs etc. as the failed sample unless the same has been withdrawn by the supplier. If the test pieces from both the additional samples pass, the material represented by the test samples shall be deemed to comply with the standard. If any of the test pieces from either sample fails, the batch shall be deemed not to comply. Alternatively, where samples from annealed material fail in the tests specified in Clauses **8.7** or **8.9** only, the supplier may re-anneal the material represented by the failed sample and re-submit for tests specified in Clauses **8.7**, **8.8** and **8.9**.

9. WARRANTY

The stores supplied against this specification shall be deemed to bear warranty of the manufacturer/contractor against defective material for a period of 12 months from the date of receipt of stores at consignee's end. If during this period, the stores supplied are found to be defective, the same shall be replaced immediately with the serviceable stores by the manufacturer/contractor at site free of any charges or cost.

10. MARKING

10.1 The accepted material shall be identified by indelible markings or labels denoting the material, specification, manufacturer's name, cast or batch number, annealing batch number, when annealed and test number.

10.2 All the accepted plates, sheets, strips and discs being transferred from one works to another, shall be covered by release document.

11. PACKAGING

Packing and marking of the packages shall be in accordance with the schedule/details as agreed between the purchaser and supplier.

12. 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-110011.