भारतीय मानक

IS 5479 : 2024

Indian Standard

एल्युमिनियम और एल्युमिनियम मिश्र संयुक्त प्रक्रिया के लिए सोल्डर — विशिष्टि

(दूसरा पुनरीक्षण)

Solders for Jointing Aluminium and Aluminium Alloys — Specification

(Second Revision)

ICS 25.160.50

भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

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April 2024 **Price Group 5**

Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/ Alloys and Products Sectional Committee, MTD 09

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/ Alloys and Products Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1969 and subsequently revised in 1985. In the first revision grades, SnZn10 and SnZnl5 were deleted as these solders were not in regular use and a new ternary abrasion solder was added which is used for jointing aluminium sheath, solidal cables and on lugs and connectors for aluminium wound transformers. This current revision has been brought out to bring the standard in the latest style and format of the Indian Standards. In addition, the following changes have been made:

a) Clause **2** on References has been added;
b) Condition of supply clause has been modified;
c) BIS marking clause has been modified as per *Bureau of Indian Standards Act*, 2016.

Information on types of fluxes used, melting ranges and the typical applications of the solders is given in Annex A.

This standard contains clauses **7** and **8.2**, which call for agreement between the purchaser and the supplier.

The composition of the Committee responsible for formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SOLDERS FOR JOINTING ALUMINIUM AND ALUMINIUM ALLOYS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard covers requirement for five grades of soft solders and four grades of hard solders for jointing aluminium and aluminium alloys.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)
IS 1817 : 1961	Methods of sampling non-ferrous metals for chemical analysis
IS 8097 : 1976	Methods of chemical analysis of soft solders for jointing aluminium and aluminium alloys
IS 8812	Methods of chemical analysis of hard solders for jointing aluminium and aluminium alloys:
(Part 1) : 1978	Determination of silver, copper, zinc, antimony, arsenic, iron and bismuth
(Part 2) : 1982	Determination of aluminium

3 SUPPLY OF MATERIAL

General requirements relating to the supply of solders for jointing aluminium and aluminium alloys shall conform to IS 1387.

4 MANUFACTURE

Solders shall be made from virgin metals or such clean scrap as may result from the manufacture of material of the same composition.

5 CHEMICAL COMPOSITION

5.1 Soft solders when analysed either in accordance with IS 8097 or any other established chemical/instrumental method shall have the chemical composition as given in Table 1A. In case of dispute the procedure given in IS 8097 shall be the referee method.

5.2 Hard solders when analysed either in accordance with IS 8812 (Part 1) and IS 8812 (Part 2) or any other established chemical/instrumental method shall have the chemical composition as given in Table 1B. In case of dispute the procedure given in IS 8812 (Part 1) and IS 8812 (Part 2) shall be referee method.

6 FREEDOM FROM DEFECTS

The material shall be of uniform quality, clean and free from foreign matter.

7 CONDITIONS OF SUPPLY

Unless otherwise agreed to, solders shall be supplied in the form of sticks each approximately 300 mm long and weighing about 600 g; other dimensions and masses shall be as agreed between the purchaser and the supplier.

Solders may also be supplied in any other form by the mutual agreement between the purchaser and the supplier. The dimensions and the mass for the same shall be mutually as agreed to between the purchaser and the supplier.

8 SAMPLING

8.1 A composite sample of 50 g shall be taken from each lot of 50 kg or part thereof representing one grade of alloy produced under uniform conditions of manufacture and offered for chemical analysis at one time.

8.2 Unless otherwise agreed between the purchaser and the supplier, method of preparing samples for chemical analysis shall be in accordance with IS 1817.

Table 1A Chemical Composition of Soft Solders

(*Clause* 5.1)

Sl No.	Grades	Alloying Element Percent			Tin	Impurities Percent, *Max*						Total Impurities, Percent, *Max*
		Zinc	Lead	Cadmium		Antimony	Arsenic	Iron	Bismuth	Copper	Aluminium	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	SnZn20	19.25 to 20.75	–	–	Remainder	0.04	0.05	0.02	0.04	0.05	0.001	0.25
ii)	SnZn30	29 to 31	–	–	Remainder	0.04	0.05	0.02	0.04	0.05	0.001	0.25
iii)	SnPb53Zn	1.75 to 2.25	52 to 54	–	Remainder	0.04	0.05	0.02	0.04	0.05	0.001	0.25
iv)	SnPb58Zn	1.75 to 2.25	57 to 59	–	Remainder	0.04	0.05	0.02	0.04	0.05	0.001	0.25
v)	SnZn35Cd10	34 to 36	–	9.5 to 10.5	Remainder	0.04	0.05	0.02	0.04	0.05	0.001	0.25

Table 1B Chemical Composition of Soft Solders

(*Clause* 5.2)

Sl No.	Grades	Alloying Element Percent			Zinc	Impurities Percent, *Max*					Total Impurities, Percent, *Max*
		Aluminium	Silver	Copper		Antimony	Arsenic	Iron	Bismuth	Copper	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(13)
i)	ZnAg5	–	4.75 to 5.25	–	Remainder	0.04	0.05	0.02	0.04	0.04	0.25
ii)	ZnAl5	4.75 to 5.25	–	–	Remainder	0.04	0.05	0.02	0.04	0.04	0.25
iii)	ZnAl5Cu5	4.75 to 5.25	–	4.75 to 5.25	Remainder	0.04	0.05	0.02	0.04	–	0.25
iv)	ZnAl30	29 to 31	–	–	Remainder	0.04	0.05	0.02	0.04	0.04	0.25

9 RETESTS

If the sample, taken from the composite sample, prepared under 8.2, fails to meet the requirements specified under 5.1 and/or 5.2, two more samples shall be taken from the same composite sample and analysed. If both the samples satisfy the relevant requirements, the lot shall be accepted. Should either of the samples fail, the lot represented shall be deemed as not complying with this standard.

10 MARKING

10.1 Each package of solders containing the solder sticks shall be legibly marked at least with the following information:

a) Grade of the material;

b) Shape/form of the material;

c) Net mass;

d) Unit mass;

e) Manufacturer's name or trademark;

f) Month and year of manufacture or their symbol; and

g) Manufacturing or lot number.

Each stick shall be legibly marked to indicate the grade of the material and manufacturer's name or trade-mark.

NOTE — In case the material is supplied in any form other than sticks to meet the purchaser's requirements, the material and the package shall be suitably marked with the above details.

10.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

ANNEX A

(*Foreword*)

PROPERTIES AND APPLICATIONS OF SOLDERS

(For information only)

Sl No.	*Grade*	*Flux Type*	*Melting Range,* °C	*Typical Application and Method*	*Corrosion Resistance*
(1)	(2)	(3)	(4)	(5)	(6)
i)	SnZn20	Inorganic (mixtures of chlorides of heavy metals such as tin and zinc)	200 to 265	Work requiring low melting point or free running solders, for example, sheet metal work. Used with flux, no flux or abrasive methods. Heat may be supplied by soldering iron on light work, or by hotplate or flame on heavier work, used with integral resin flux or inorganic flux available to wire form as cored solder	Poor unless protected
ii)	SnZn30	No flux	200 to 250	As abrasive solder without any flux. Used for aluminium sheaths and solid aluminium	Generally poor unless protected
iii)	SnPb53Zn	Organic[(1)]	170 to 215	Used for soldering conducting of electric cables. Good pasty range, used with flux	As joints are protected, corrosion resistance is not important
iv)	SnPb58Zn	Organic[(1)]	175 to 220	Used for soldering conductors of electric cables. Good pasty range, used with flux	As joints are protected, corrosion resistance is not important
v)	SnZn35Cd	–	–	Used for jointing aluminium sheath, solidal cables and even on lugs and connectors for aluminium wound transformers	–
vi)	ZnAg5	Halide[(2)] (a small amount of zinc chloride together with potassium chloride, lithium chloride and sodium fluoride)	420 to 450 operating temperature 450 to 500	Used for sheet metal joints and repairs to castings. Joins aluminium to other metals, for example, copper and iron. It is an alternative to brazing, Used with an inorganic flux and flame heating sheet metal work	Good

Table (*Concluded*)

Sl No.	*Grade*	*Flux Type*	*Melting Range,* °C	*Typical Application and Method*	*Corrosion Resistance*
(1)	(2)	(3)	(4)	(5)	(6)
vii)	ZnA1-5	Halide[(2)]	380 to 355	Furnace soldering possible with zinc flux	Good
viii)	ZnA1-5Cu	Halide[(2)] (zinc chloride)	370	Sheet metal work. Particularly useful for jointing mitred corners of frames. Holes in castings may be filled after gouging out. Used with halide flux or no flux	Good
ix)	ZnAl-30	Halide[(2)]	460 to 510	Casting repairs	Good

[(1)] Organic fluxes are of reaction type, free from chlorides and suitable for soft soldering.

[(2)] Halide fluxes are inorganic fluxes for hard soldering and arc more akin to brazing fluxes.

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/ Alloys and Products Sectional Committee, MTD 09

Organization	*Representative(s)*
CSIR – National Metallurgical Laboratory, Jamshedpur	DR ABHILASH **(*Chairperson*)**
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Bhabha Atomic Research Centre, Mumbai	DR DHRUVA KUMAR SINGH DR BHASKAR PAUL (*Alternate*)
BT Solders Private Limited, Bengaluru	SHRI SHRI S. RAMESH
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BIS Directorate General	SHRI SANJIV MAINI, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (METALLURGICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI SAAQIB RAAHI
SCIENTIST 'B'/ASSISTANT DIRECTOR
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Bureau of Indian Standards

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