टेलीफैक्स : 23231085 Please Contact at Telefax 23231085 E-mail: mtd@bis.org. in

व्यापक परिचालन में मसौदा

DRAFT IN WIDE CIRCULATION

प्रलेख प्रेषण सूचना /DOCUMENT DESPATCH ADVICE

एमटीडी 7/टी-113 MTD 7/T-113 dated 29 11 2017

हल्की धात्एँ एवं उनकी मिश्रधात्ओं की विषय समिति एमटीडी 07

LIGHT METALS AND THEIR ALLOYS SECTIONAL COMMITTEE, MTD 07

क) धातुकर्म इंजीनियरिंग विभाग परिषद (एमटीडीसी), के रूचि रखने वाले सदस्य

1) Interested Members of Metallurgical Engineering Division Council, MTDC

ख) हल्की धातुएँ एवं उनकी मिश्रधातुओं की विषय समिति एमटीडी 07 के सदस्य

2) All Members of Light Metals and Their Alloys Sectional Committee, MTD 07

ग) अन्य सभी रूचि रखने वाले निकाय

3) All Others Interested

महोदय/महोदया, Dear Sir/ Madam,

निम्नलिखित प्रलेख संलग्न हैं:

Please find enclosed the following draft standard:

प्रलेख संख्या/Document No. विषय/ Title

प्रलेख: एमटीडी 07 (11900)W2 ढलाई उत्पाद अनुप्रयोगों के लिए एल्यूमिनियम एवं एल्यूमीनियम मिश्र धातु स्क्रैप Doc: MTD 7 (11900)W2 Aluminium and Aluminium Alloys Scrap for Casting Product Applications

कृप्या उपरोक्त प्रलेख का अवलोकन करे अपनी सम्मतियां यह बताते हुए भेजें, कि यदि अंतत: यह प्रलेख राष्ट्रीय मानक के रूप में स्वीकृत हो जाए, तो इस पर अमल करने में आपके व्यवसाय अथवा कारोबार में क्या कठनाईयाँ आ सकती हैं ।

Kindly examine this draft standard and forward your views stating any difficulty which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

सम्मति की अन्तिम तिथि/ Last date for comments: 29 12 2017

सम्मति यदि कोई हो तो पीछे दिए गए प्रारूप में लिख कर, ऊपरलिखित पते पर अधोहस्ताक्षरी को भेजें I Comments, if any, may please be made in the format given overleaf and mailed to the undersigned at the above address.

धन्यवाद, Thanking you,

भवदीय, yours faithfully,

(अर्चना रोहेला) वैज्ञानिक 'ईं' प्रमुख (एमटीडी.) Scientist 'E' & Head (MTD) Email: <u>mtd@bis.org.in</u>; hmtd@bis.org.in

संलग्न: ऊपरलिखित /Encl: As above

BUREAU OF INDIAN STANDARDS

Draft Indian Standard

ALUMINIUM AND ALUMINIUM ALLOYS SCRAP FOR WROUGHT PRODUCT APPLICATION ICS 77.120.10: 77.150.10

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BIS or used as STANDARD	comments is 29/12/2017

FOREWORD

(Formal clauses will be later on)

The standards define specifications for aluminium and aluminium alloy scrap to be used for:

- Wrought product applications (electrical, extrusion, rolled product and utensils) covering both, food and non-food applications
- Casting product applications (auto and other castings)

Aluminium is often referred to as the 'Green Metal' as it is endlessly recyclable and can directly substitute primary metals. However, the scrap should be processed considering the integrity of the environment, quality of human health, appropriate processing of hazardous waste with scrap and quality of end applications.

While developing these standards, inputs from **domestic regulations** – Foreign Trade Policies and Hazardous And Other Wastes (Management and Transboundary Movement) Rules 2016; from **EU regulations and guidelines** – End of Waste Criteria, Scrap Standards, RoHS and REACH and from **International accepted regulations and guidelines** – ISRI and ISPM15 have been derived.

The Committee formulated the Indian Standards to cover the various requirements such as ordering information, chemical composition, heavy metal and hazardous material limits and procedures for sampling and testing.

These Indian Standards are prescribed to promote sustainable growth of aluminium and aluminum alloy scrap among the industry players, while promoting human health and environmentally sound practices in the long term interest of consumers in mind.

1 SCOPE

This standard defines specification of aluminium and aluminium alloy scrap to be used for wrought product applications (electrical, extrusion, rolled product and utensils) only. This covers both, food and non-food applications.

The standard encompasses ordering information, chemical composition, heavy metal and hazardous material limits and procedures for sampling and testing.

2 **REFERENCES**

The following standards constitute provisions that through reference in this text constitute provisions 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 editions of the standards indicated below:

IS No.	Title
IS 2066 : 1962	Coding and classification for non-ferrous scrap metals and residues
IS 504 (Parts 1 to 12) : 2002	Chemical analysis of aluminium and its alloys

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply:

3.1 Food Applications – Aluminium scrap used for rolled products (foil and other food packaging) and utensil applications (aluminium scrap as specified in Table 1).

3.2 Non-food Applications – Aluminium scrap used for electrical, extrusion and other rolled product applications (aluminium scrap as specified in Table 2).

3.3 Actual User – A company or a person who procures and processes hazardous and other waste for reuse, recycling, recovery, pre-processing, utilisation including co processing as per 'Hazardous And Other Wastes (Management and Transboundary Movement) Rules, 2016'.

3.4 Aluminium Scrap – Raw material mainly consisting of aluminium and/or aluminium alloys, resulting from the collection and/or recovery of metal that arises at various stages of fabrication (new scrap); or products after use (old scrap) to be used for production of aluminium and/or aluminium alloy products.

3.5 New Scrap – Scrap arising out of production and fabrication of aluminium products.

3.2 Types of Scrap

3.2.1 *Skimming* – Material made up of mixed aluminium and aluminium oxides that originate as a by-product in the process of aluminium manufacturing.

3.2.2 *Metallic* – Material produced by grinding of skimming followed by selection of coarser fraction by screening, thereby capturing most metallic aluminium.

3.2.3 *Turnings* – grains/chips/curls/flakes of aluminium that are produced as a by-product from various machining process

3.3 Conditions of Scrap

3.3.1 *Loose scrap* – Scrap that is not compacted or shredded. Individual pieces of scrap are visible and can be picked up.

3.3.2 *Shredded scrap* – Scrap that has gone through shredding operation.

3.3.3 *Granulated scrap* – Scrap consisting of small to medium size pieces that are generally produced by crushing or chopping of larger pieces.

3.3.4 *Briquetted scrap* – scrap that is compacted to form briquettes or bales.

3.4 Components of Scrap

3.4.1 *Foreign material* – Any material other than aluminium or aluminium alloys which can be visually identified as part of the scrap. Foreign material can either be attached to scrap or separate. It includes:

3.4.1.1 Metals other than aluminium and aluminium alloys;

3.4.1.2 Metal composites;

3.4.1.3 Non-metallic materials, including flammable materials, such as dirt, fibre glass, glass, insulation materials, plastic, fabric and other organic materials;

3.4.1.4 Non-metallic and non-conductor of electricity like rubber tyres, wood, concrete or cement;

3.4.1.5 Residues from melting/heating/cutting of aluminium and aluminium alloys, like slag, dross, skimming, baghouse dust, grinder dust and sludge; or

3.4.1.6 Volatile substances are foreign material (usually liquid, such as water, rolling oils, emulsions, grease etc. or solid such as paints, lacquers, plastic, paper etc.) that can be removed from scrap through gasification or thermal processes before melting.

3.4.2 *Free iron* – Any ferrous metal, either magnetic or non-magnetic, present as a foreign material.

3.4.3 *Moisture* – Liquid that adheres to the scrap and can be identified in the delivered lot.

Scrap Sampling, Analysis and Testing

- **3.4.4** *Consignment* Ordered quantity of scrap of the same requirements, sent in one or more shipments.
- **3.4.5** *Shipment* Each quantity sent with separate shipping document.
- **3.4.6** Inspection lot Shipment or part thereof used for inspection.
- **3.4.7** *Sample* A representative part of an inspection lot used for testing.
- **3.4.8** *Free from* Presence of foreign material is negligible.

3.4.9 *Metal content* – aluminium and aluminium alloys obtained after removing foreign material (including volatile material and moisture) from the sample.

3.4.10 *Metal yield* – Proportion (in per cent) of an aluminium and aluminium alloy scrap shipment which after the separation of foreign material, volatile material, moisture and proper melting, can become useable aluminium or aluminium alloy metal.

4 CLASSIFICATION OF SCRAP

Scrap categories to be used by actual users for food and non-food wrought product applications shall be as specified in Table 1 and Table 2 respectively or as specified in Table 3.

Table 1 Scrap Category as Defined by 'Institute of Scrap Recycling Industries (ISRI)' for Food Applications

Tablet	Tall	Tesla
Tabloid	Tann	Throb
Tabor	Teens	Tooth
Taint	Terse	Tough
Tale		

Table 2 Scrap Category as Defined by 'Institute of Scrap Recycling Industries (ISRI)' for Non-food Applications

Tabor	Tale	Tetra
Tablet	Tall	Throb
Tabloid	Talon	Tooth
Tabor	Tann	Toto
Taint	Tassel	Tough
Take	Taste	Tread
Talc	Tata	Trill
Talcred	Teens	Tutu
Taldack	Tepid	Twang

Taldon	Terse	Twirl
Taldork	Tesla	Twist

Table 3 Scrap Category as defined by IS 2066

Abad	Ajmer	Atari
Abu	Akola	Amla
Agra		

5 ORDERING INFORMATION

The ordering information shall define the scrap and should include:

- 1) HS Code,
- 2) The respective Indian Standard (IS) number,
- 3) Gross weight of the consignment,
- 4) The scrap category as specified in Table 1/ Table 2 or Table 3,
- 5) The required chemical composition (0),
- 6) Assumed percentage of foreign material,
- 7) The expected minimum metal yield (0),
- 8) Packaging in which scrap shall be delivered (10),
- 9) Mentions the country / countries of origin of scrap,
- 10) Port of delivery for imported scrap, and
- 11) The necessary certifications and documentation as required by Indian laws.

6 MATERIAL

The metal content in the scrap composition for food and non-food applications shall conform to the maximum permissible limit as given in Table 4 and Table 5 respectively, unless otherwise specified.

Table 4 Maximum Permissible Limit (in %) of Metals in the Composition of Scrap for Food Application

Silicon	Iron	Magn- esium	Mang- anese	Copper	Zinc
1.3	0.95	1.8	1.5	0.2	0.25

Table 5 Maximum Permissible Limit (in %) of Metals in the Composition of Scrap for Non-food Application

Silicon	Iron	Magn- esium	Mang- anese	Copper	Zinc
21.5	9.3	5.6	1.8	6.84	12

Aluminium scrap shall have been segregated at the source or shall have been separated from the non-metal, non-ferrous and ferrous scrap. All mechanical treatment (like cutting, shearing, shredding, granulating, sorting, separation, cleaning) shall have been completed at the source.

The scrap shall be free from the following as determined by visual inspection:

6.1.1 Any pressurized, closed or insufficiently open containers or tubes to avoid possible closed hollow spaces.

6.1.2 Any type of arms, ammunitions, mines, shells, live or used cartridge or any other explosive materials in any form either used or otherwise.

6.1.3 *PVC*, free iron and asbestos.

The chemical composition after melting as determined according to IS 504 (Parts 1 to 12) shall conform to Table 4 or Table 5 (*see* 0).

Metal yield should be more than 88% (see 0).

The cumulative content of moisture and volatile material shall be lower than 5% (see 0).

The content of the heavy metal /hazardous material in scrap for food and non-food applications shall not exceed the limits as given in Table 6 and

Table 7 respectively (see 0).

Table 6 Maximum Limit of Heavy Material in the Scrap for Food Applications

Heavy Metals	Maximum limit in PPM
Lead	500
Mercury	1 000
Cadmium	100
Hexavalent Chromium	1 000

Table 7 Maximum Limit of Hazardous Material in the Scrap for Non-food Applications

Hazardous Materials	Maximum limit in PPM
Lead	1 000
Mercury	1 000
Cadmium	100
Hexavalent Chromium	1 000
Bis (2-Ethylhexyl) phthalate (DEHP)	1 000
Benzyl butyl phthalate (BBP)	1 000
Dibutyl phthalate (DBP)	1 000
Diisobutyl phthalate (DIBP)	1 000

The scrap shall adhere to the hazardous waste leachable concentration limits of the following constituents (*see* 6.1.1) as given in Schedule II of 'Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016' (*see* 0).

6.1.1 The constituents are arsenic, chromium and/or chromium (III) compounds, lead, manganese, mercury, selenium, cyanide, antimony, beryllium, chromium (VI), cobalt, copper, molybdenum, nickel, thallium, vanadium and zinc.

The scrap shall not exhibit radioactivity. It shall not contain:

6.1.2 Material presenting radioactivity in excess of the ambient level of radioactivity (see 9); and

6.1.3 Radioactive material in sealed containers even if no significant exterior radioactivity is detectable due to shielding or position of the sealed source in the scrap delivery.

The scrap for non-food applications shall be free from polychlorinated biphenyls (PCB), poly brominated biphenyls (PBB) and poly brominated diphenyl ethers (PBDE) (*see* 0).

The scrap for food applications shall adhere to 'Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)' regulations and accompany a test certificate for the same (*see* 0).

7 SAMPLING

7.1 General

The sample shall be collected at the exporter's facility/warehouse for each shipment. Following tests need to be conducted:

- 1) Determination of chemical composition,
- 2) Determination of volatile and moisture content,
- 3) Determination of free iron,
- 4) Determination of metal yield, and
- 5) Determination of hazardous material content.

Sampling procedures of granulated, shredded and loose scrap (generally turnings or new scrap).

7.1.1 In such cases, a small inspection lot (1-5% of the shipment) can be easily picked-up from different places of the shipment.

7.1.2 The inspection lot shall be mixed precisely and shall be spread to make a circle.

7.1.3 Samples shall be collected from different parts of this inspection lot.

7.1.4 This sample should be stored in such a way that the moisture content does not change. The moisture test shall be carried out as soon as possible.

7.1.5 The sample so produced shall weigh not less than 10 kgs. Minimum of three such samples shall be taken. Sampling procedures and sample preparations for large size scrap material:

Usually, this scrap category does not allow the extraction of a small representative sample.

7.1.6 Sort the inspection lot into two parts:

- 1) The large pieces rich in aluminium;
- 2) The small pieces including powdery parts

Determine the mass proportion of the two parts. Take two different samples, one from each part (*see* 7.1.6). Investigate both samples as follows:

- 1) The large pieces sample shall weigh not less than 100 kg. It shall be melted in a furnace of a size suitable for such tests, to determine the metal yield (*see* **0**).
- 2) The small pieces sample should be dried (as per **0**). A sample of not less than 20 kg from the concentrated fraction of metallic shall be developed. Determine the free iron, chemical composition, metal yield and heavy metal/hazardous material (*see* **0**, **0**, **0** and **0**).
- 3) Calculate the weighted average of test results (from small and large piece samples) to arrive at test results for the shipment.

Sampling of other scrap

Take 100 kg sample from the inspection lot. The sample shall represent all the portions of the scrap similar for type, size and composition that represent the entire lot inclusive of any foreign materials present.

8 TESTS

All the necessary tests and analysis should be carried out for each sample at ISO 17025 accredited laboratory. Say that the sample mass is m1

Determination of moisture and volatile material content

Dry the sample taken (*see* 7) in an oven at approximately 105° C for the determination of water. For scrap, that is suspected to contain volatile materials like oil or oil emulsion, the sample should be heated to approx. 360° C. Say, the mass after drying is *m*2.

Estimate moisture and volatile material content as the difference between *m1 and m2*.

Moisture and volatile material Content =
$$(1 - \frac{m^2}{m^1})\%$$

Determination of free iron content

8.1.1 From the dried sample (m^2) , the magnetic iron should be removed from the scrap sample by using an appropriate sized magnet, whereas, the non-magnetic stainless steel shall be removed by visual inspection. If required, the scrap should be shredded in order to facilitate removal of the iron inserts from the aluminium scrap.

8.1.2 The removed iron shall be weighed and related to the sample mass (m1) to calculate its percentage. Say, the mass of sample after removal of free iron is m3.

Free iron content =
$$(1 - \frac{m3}{m1})\%$$

Determination of metal yield and the chemical composition

8.1.3 The sample after drying and elimination of volatile substances (*see* 0) and removal of free iron (*see* 0) shall be melted in a suitable oven. After melting, the liquid metal (separated from the slag) shall be cast into a mould and solidified.

8.1.4 If required, the slag shall be ground in order to verify the presence of any metallic inclusions. If present these shall be added to the mass of the metal.

8.1.5 Say, the mass of metal after melting is m4. The metal yield shall be calculated according to the equation below:

Metal Yield =
$$\binom{m4}{m2}$$
%

Determination of hazardous material

8.1.6 The adequate quantity of sample (but no less than 10 kgs) shall be taken and converted to the required form (liquid or solid) using necessary solvents.

8.1.7 The tests carried out for metallic elements shall be in accordance with IS 504 (Parts 1 to 12) or by Spark Emission Spectroscopy. For other hazardous substances, Gas chromatography (GS) with electron-capture or mass-spectrometric (MS) detection or Liquid Chromatography - mass spectrometry (LC-MS) or High-resolution gas chromatography or Inductively Coupled Plasma Techniques shall be used.

8.2 Retest

If a sample selected for testing fails to meet the required specifications, three additional samples for food applications and two additional samples for non –food application shall be taken. If any of these additional samples fail to meet the requirements of the specification, the lot represented by that sample shall be rejected.

9 MONITORING OF RADIOACTIVE MATERIAL IN SCRAP

Each shipment needs to be checked by the competent person for radiation levels. It should not have radiation levels (gamma and neutron) in excess of natural background.

Types of monitoring equipment used on -site

9.1.1 *Pocket-type instruments* – These are small, lightweight instruments used to detect the presence of radioactive materials and to inform the user about radiation levels. The instrument can be worn by skilled personnel for monitoring.

9.1.2 *Hand-held instruments* – These instruments have greater sensitivity and can be used to detect, locate or (for some types of instrument) identify radioactive material. The instrument can be worn by the skilled personnel for monitoring.

9.1.3 *Fixed, installed, automatic instruments* – These installations are designed to be used at checkpoints. Such instruments can provide high sensitivity monitoring of a continuous flow of vehicles (at regulated speed). These installations need to be placed within the port facility or at the loading / unloading sites.

The specification of the monitoring instruments is as mentioned by IAEA in clause 4.4, 4.5 and 4.6 of 'Detection of radioactive materials at borders'. The specification includes application; operation, calibration, and testing along with minimum performance recommendations.

For radiological laboratory testing, the tests shall be carried out by an Atomic Energy Regulatory Board (AERB) accredited laboratory. The measurements shall be carried out using non-destructive gamma spectrometry method

10 PACKAGING

The scrap shall be supplied either as loose or as briquetted scrap. Briquettes have to be bundled together as well as strapped to the pallet with sufficient bands. Pallets shall be free from any contamination like dirt, lacquer, oil, etc.

For imported scrap:

10.1.1 The packing, packing material and dunnage shall be in accordance with the ISPM15 standard.

10.1.2 The carrying container shall be free of hitchhiking pests, including Asian Gypsy Moth (AGM), plant debris contaminants, soil contaminants and animal feed and by-products.

11 LABELLING AND TEST CERTIFICATE

Each package shall be legibly marked, with the manufacturer's name or trade-mark, code designation and gross weights.

The supplier shall supply aluminium scrap along with necessary test certificates as per sampling (*see* 7) and testing (*see* 8) procedures mentioned in the standard.