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Standard Specification for GALFAN¹ (Zinc-5 % Aluminum-Mischmetal) Alloy in Ingot Form for Hot-Dip Coatings²

This standard is issued under the fixed designation B750; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers GALFAN, zinc-5 % aluminum-mischmetal (Zn-5Al-MM) alloy (UNS Z38510)³ in ingot form for remelting for use in the production of hot-dip coatings on steel. Alloy composition is specified in Table 1.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar with all hazards including those identified in the appropriate Material Safety Data Sheet (MSDS) for this product/material as provided by the manufacturer, to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:⁴

B899 Terminology Relating to Non-ferrous Metals and Alloys

B949 Specification for General Requirements for Zinc and Zinc Alloy Products

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications E88

E88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E1277 Test Method for Chemical Analysis of Zinc-5 % Aluminum-Mischmetal Alloys by ICP Emission Spectrometry

2.2 Other Standard:⁵

GF-1 Standard Practice for Determination of Cerium and Lanthanum Compositions in GALFAN Alloy (5 % -0.04 % La-0.04 % Ce-Bal SHG Zn)

2.3 ISO Standards:⁶

ISO 3815-1 Zinc and zinc alloys — Part 1: Analysis of solid samples by optical emission spectrometry

ISO 3815-2 Zinc and zinc alloys — Part 2: Analysis by inductively coupled plasma optical emission spectrometry

3. Terminology

3.1 Terms shall be defined in accordance with Terminology B899.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *mischmetal, n*—a naturally occurring mixture of rare-earth elements in metallic form, primarily cerium and lanthanum.

3.3 *Abbreviations:*

3.3.1 MM—mischmetal.

3.3.2 Zn-5Al-MM—zinc-5 % aluminum mischmetal.

4. Ordering Information

~~4.1 Orders for ingot under this specification shall include the following information:~~

¹ GALFAN is a registered trademark of the GALFAN Information Center, Inc.

² This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.04 on Zinc and Cadmium.

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³ UNS number in conformance with Practice E527.

⁴ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁵ Available from International Lead Zinc Research Organization, 2525 Meridian Parkway, P.O. Box 12036, Research Triangle Park, NC 27709 - 2036, http://www.ilzro.org.

⁶ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

*A Summary of Changes section appears at the end of this standard.

TABLE 1 GALFAN, Zn-5Al-MM Alloy Ingot Chemical Requirements^{A,B,C,D,E}

Element	UNS Z38510 Composition, %
Aluminum ^F	4.2–6.2
Cerium + lanthanum, total	0.03–0.10
Iron, max	0.075
Silicon, max	0.015
Lead ^G , max	0.005
Cadmium ^G , max	0.005
Tin ^G , max	0.002
Others ^H , each, max	0.02
Others ^H , total, max	0.04
Zinc	Remainder

^A For purposes of acceptance and rejection, the observed value or calculated value obtained from analysis should be rounded to the nearest unit in the last right-hand place of figures, used in expressing the specified limit, in accordance with the rounding procedure prescribed in Section 3 of Practice E29.

^B By agreement between purchaser and supplier, analysis may be required and limits established for elements or compounds not specified in the table of chemical composition.

^C GALFAN, Zn-5Al-MM alloy ingot for hot-dip coatings may contain antimony, copper, and magnesium in amounts of up to 0.002, 0.1, and 0.05 %, respectively. No harmful effects have ever been noted due to the presence of these elements up to these concentrations and, therefore, analyses are not required for these elements.

^D Magnesium may be specified by the buyer up to 0.1 % maximum.

^E Zirconium and titanium may each be specified by the buyer up to 0.02 % maximum.

^F Aluminum may be specified by the buyer up to 12 % maximum.

^G Lead and cadmium, and to a lesser extent tin and antimony, are known to cause intergranular corrosion in zinc-aluminum alloys. For this reason it is important to maintain the levels of these elements below the limits specified.

^H Except antimony, copper, magnesium, zirconium, and titanium.

4.1.1 Quantity in pounds;

4.1.2 Alloy (Table 1);

4.1.3 Size, if not manufacturer's standard;

4.1.4 Specification number and year of issue;

4.1.5 Inspection (Section 9), and

4.1.6 Product marking (Section 12).

4.1 Orders for ingot under this specification shall include the relevant information as listed in Specification B949, Section 4.

5. Materials and Manufacture

5.1 The alloys may be made by any approved process.

5.2 The material covered by this specification shall be free from dross, slag, or other harmful contamination.

6. Chemical Composition

6.1 *Limits*—The alloys shall conform to the requirements as to chemical composition prescribed in Table 1. Conformance shall be determined by the producer by analyzing samples taken at the time ingots are made. If the producer has determined the chemical composition of the metal during the course of manufacture, he shall not be required to sample and analyze the finished product.

7. Sampling

7.1 If the alloy is in the form of standard ingots at the customer's plant, the sample for chemical analysis shall be taken in accordance with 7.1.1 to 7.1.5, inclusive:

7.1.1 *Selection of Portion*—A portion representative of the total shipment or order shall be selected at random for the final sample. The portion preferably shall be taken during loading or unloading. At least one ingot shall be taken from every 10 000 lb (4530 kg), or fraction thereof, of each lot of alloy in the shipment. From smaller lots, five ingots shall be taken.

7.1.2 *Preparation of Sample*—Each ingot shall be cleaned thoroughly to rid the surface of extraneous material and drilled or sawed, without lubricant in accordance with 7.1.3 or 7.1.4. The drillings or sawings shall be subjected to the action of a strong magnet to remove any adventitious iron with which the sample may have become contaminated from the drill or saw.

7.1.3 *Drilling*—Two holes shall be drilled, preferably from the bottom or brand side of each ingot, at two points located along one diagonal of the ingot so that each point is halfway between the center and one extremity of the diagonal. If two holes from each ingot do not yield the weight of sample prescribed in 7.1.5, a third hole shall be drilled at the center of each ingot. Each hole shall be bored completely through the ingot, care being taken to avoid starting the drill in a depression and to adjust the feed to give drillings 0.010 to 0.020 in. (0.25 to 0.51 mm) in thickness. The drill used preferably shall be one twisted from flat stock. The diameter of the drill shall be 5/16 in. (7.9 mm). The drillings shall be broken or cut with clean shears into pieces not over 1/2 in. in length and mixed thoroughly.