



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

This standard is issued under the fixed designation B 750; 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

B 899 Terminology Relating to Non-ferrous Metals and Alloys

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E 47 Test Methods for Chemical Analysis of Zinc Die-Casting Alloys⁵

E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition

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 E 29.

^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.

E 527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E 1277 Test Method for Chemical Analysis of Zinc-5 % Aluminum-Mischmetal Alloys by ICP Emission Spectrometry

2.2 Other Standard:⁶

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

⁶ Available from International Lead Zinc Research Organization, 2525 Meridian Parkway, P.O. Box 12036, Research Triangle Park, NC 27709 – 2036, <http://www.ilzro.org>.

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 E 527.

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 Withdrawn.

2.3 ISO Standards:⁷

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 **B 899**.

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:

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).

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 $\frac{5}{16}$ in. (7.9 mm). The drillings shall be broken or cut with clean shears into pieces not over $\frac{1}{2}$ in. in length and mixed thoroughly.

7.1.4 *Sawing*—Using, preferably, a heat treated high-speed steel saw, make two cuts completely across the ingot from one long side to the other. Each cut shall be approximately half way between the center and each end. The width of the saw cut shall be sufficient to give the weight of sample prescribed in 7.1.5, and cuttings from all the ingots shall be mixed thoroughly to form a uniform sample.

7.1.5 *Size of Sample and Storage*—The prepared sample shall weigh at least 300 g. The properly mixed sample shall be split into three equal parts, each of which shall be placed in a sealed package, one for the manufacturer, one for the purchaser, and one for a referee, if necessary. Tight, leakproof, paper sample envelopes or cardboard cartons may be used to hold the sample.

7.2 If the alloy is in shapes other than standard ingots, the sampling procedure shall be agreed upon between the manufacturer or seller and the purchaser.

7.3 An optimal method of sampling for analysis may be by melting together representative portions of each ingot selected, and then sampling the liquid composite by casting suitable specimens for either spectrographic or chemical analysis.

7.4 *Samples for Spectrochemical and Other Methods of Analysis*—Samples for spectrochemical and other methods of analysis shall be suitable for the form of material being analyzed and the type of analytical method used.

7.5 Aspects of sampling and sample preparation not covered specifically in this specification shall be carried out in accordance with Practice **E 88**.

8. Analytical Methods

8.1 *Method of Analysis*—The determination of chemical composition shall be made in accordance with suitable chemical (Test Method **E 47** for tin), ICP argon plasma spectrometric (Test Method **E 1277**) or other methods (including spectrochemical methods **ISO 3815-1** or **ISO 3815-2**. In case of dispute, the results secured by Test Method **E 1277** shall be the basis of acceptance.

8.2 A standard practice for X-ray fluorescence spectrometry for determination of cerium and lanthanum in a zinc-5 % aluminum alloy has been established by the International Lead Zinc Research Organization (Standard Practice **GF-1**). In case of dispute, the results secured by Test Method **E 1277** shall be the basis of acceptance.

⁷ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

9. Inspection

9.1 If the purchaser desires that his representative inspect or witness the inspection and testing of the product prior to shipment, such agreement shall be made by the purchaser and producer or supplier as part of the contract or purchaser order.

9.2 When such inspection or witness of inspection and testing is agreed upon, the producer or supplier shall afford the purchaser's representative all reasonable facilities to satisfy him that the product meets the requirements of this specification. Inspection and tests shall be conducted so there is no unnecessary interference with the producer's operations.

10. Rejection and Rehearing

10.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing. If the rehearing establishes that the material does not conform to the requirements of this specification, as much of the rejected original material as possible shall be returned to the producer or supplier.

11. Certification

11.1 When specified in the purchase order or contract, the manufacturer's or supplier's certification shall be furnished to the purchaser stating that samples representing each lot have been manufactured, tested, and inspected in accordance with this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

12. Product Marking

12.1 All ingots shall be properly marked for identification with the producer's name or brand.

12.2 Each bundle or skid shall be identified with the producer's heat, lot, or other identification mark.

13. Packaging and Package Marking

13.1 Unless otherwise specified, the ingot shall be packaged to provide adequate protection during normal handling and transportation. Each package shall contain only one alloy unless otherwise agreed upon.

14. Keywords

14.1 Galfan; hot dip coating alloy; zinc alloy; zinc-5 % aluminum mischmetal alloy

SUMMARY OF CHANGES

Committee B02 has identified the location of selected changes to this standard since the last issue (B 750 - 07) that may impact the use of this standard. (Approved November 1, 2008.)

(I) Revisions have been made to Sections 2.3 and 8.1 to add analytical spectrochemical methods ISO 3815-1 and ISO 3815-2.

Committee B02 has identified the location of selected changes to this standard since the last issue (B 750 - 03) that may impact the use of this standard. (Approved May 1, 2007.)

(I) Footnote F in Table 1 was revised to increase maximum aluminum to 12 %.

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