



Designation: B 102 – 00

Standard Specification for Lead- and Tin-Alloy Die Castings¹

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1. Scope

1.1 This specification covers die castings produced from five alloys whose primary metal is either lead or tin. Table 1 lists the designations for these alloys as well as their chemical compositions.

1.2 *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 establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 The following documents of the issue in effect on date of order acceptance form a part of this specification to the extent referenced herein.

2.2 ASTM Standards:

B 23 Specification for White Metal Bearing Alloys (Known Commercially as Babbitt Metal)²

B 275 Practice for Codification of Certain Nonferrous Metals and Alloys, Cast and Wrought³

E 8 Test Methods for Tension Testing of Metallic Materials⁴

E 23 Test Methods for Notched Bar Impact Testing of Metallic Materials⁴

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁵

E 46 Test Methods for Chemical Analysis of Lead- and Tin-Base Solder⁶

E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition⁷

2.3 Federal Standards:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)⁸

2.4 *Military Standards:* MIL-STD-129 Marking for Shipment and Storage (Military Agencies)⁸

2.5 *Military Specifications:* MIL-P-116 Methods of Preservation⁸

3. Terminology

3.1 Definitions:

3.1.1 *die casting*—a metal object produced by the introduction of molten metal under substantial pressure into a metal die and characterized by a high degree of fidelity to the die cavity.

4. Ordering Information

4.1 Orders for die castings shall include the following basic information:

4.1.1 This specification number and date,

4.1.2 Quantity and delivery schedule, as required,

4.1.3 Part name and number,

4.1.4 Alloy (Table 1), and

4.1.5 Drawings of die casting, when required, giving all necessary dimensions and showing latest revisions and allowances for machining, if any. Location of ejector pin marks or parting lines shall be at the option of the producer, unless specifically designated on the drawing.

4.2 Additional tests, options and special inspection requirements as provided below shall be specified in the contract or purchase order, as additional procedures. Extended delivery time may be involved.

4.2.1 Chemical analysis (7.1.1),

4.2.2 Quality assurance (Section 9),

4.2.3 Special proof tests or mechanical properties (Section 7),

4.2.4 General quality options for internal soundness or for finish (Section 11),

4.2.5 Source inspection (Section 11),

4.2.6 Certification (Section 12),

4.2.7 Marking for identification (Section 13), and

4.2.8 Special packaging (Section 14).

¹ This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys, and is the direct responsibility of Subcommittee B02.02 on Lead, Tin and their Alloys.

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² *Annual Book of ASTM Standards*, Vol 02.04.

³ *Annual Book of ASTM Standards*, Vol 02.02.

⁴ *Annual Book of ASTM Standards*, Vol 03.01.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.

⁶ Discontinued—See 1994 *Annual Book of ASTM Standards*, Vol 03.05.

⁷ *Annual Book of ASTM Standards*, Vol 03.05.

⁸ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

TABLE 1 Chemical Requirements^A

Alloy ^{B,C}	Composition, %															
	Tin			Antimony			Lead			Copper			Other Elements, max			
	Min	Desired	Max	Min	Desired	Max	Min	Desired	Max	Min	Desired	Max	Iron	Arsenic	Zinc	Aluminum
CY44A ^D	90	91	92	4	4.5	5	...	...	0.35	4	4.5	5	0.08	0.08	0.01	0.01
YC135A	80	82	84	12	13	14	...	...	0.35	4	5	6	0.08	0.08	0.01	0.01
PY1815A ^D	64	65	66	14	15	16	17	18	19	1.5	2	2.5	0.08	0.15	0.01	0.01
YT155A ^D	4	5	6	14	15	16	79	80	81	...	...	0.50	...	0.15	0.01	0.01
Y10A ^D	...	...	...	9.25	10	10.75	89	90	91	...	...	0.50	...	0.15	0.01	

^A For purposes of acceptance and rejection, the observed value or calculated value obtained from analysis should be rounded off 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 Recommended Practice E 29.

^B These alloy designations were established in accordance with Recommended Practice B 275.

^C Prior to 1952 these alloys were designated as No. 1, No. 2, No.3, No. 4, and No. 5, respectively.

^D These alloys are similar to grades Nos.1, 5, 8 and 12, respectively, of Specifications B 23.

5. Quality Assurance

5.1 *Responsibility for Inspection*—When specified in the contract or purchase order, the producer or supplier is responsible for the performance of all inspection and test requirements specified herein. Except as otherwise specified in the contract or order, the producer or supplier may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless disapproved by the purchaser. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification. Quality assurance standards shall be agreed upon between the producer or supplier and purchaser at the time a contract or order is placed.

5.2 *Lot Definition*— An inspection lot shall be defined as follows:

5.2.1 An inspection lot shall consist of the production from each die or compound die on each machine for each 24 h during the first week of normal operation and the production for each 48 h thereafter of normal operation. Any significant change in the machine, composition, die or continuity of operation shall be considered as the start of a new lot. Die castings inspected by this method shall be so marked or handled during the finishing operations as not to lose their identity.

5.2.2 Each die casting of a randomly selected sample shall be examined to determine conformance to the requirements with respect to general quality, dimensions, and identification marking. The producer or supplier may use a system of statistical quality control for such examinations.

6. Mechanical Properties and Tests

6.1 Unless specified in the contract or purchase order or specifically guaranteed by the manufacturer, acceptance of die castings under this specification shall not depend on mechanical properties determined by tension or impact tests. The appendix contains a reference to a source of information on properties. When tension or impact tests are made, the tension test specimen shown in Fig. 18 of Test Methods E 8, and the impact test specimen shown in Fig. 6 of Test Method E 23 shall be used.

6.2 When specified in the contract or purchase order, die castings shall withstand proof tests without failure as defined by agreement between the purchaser and the producer or supplier.

7. Permissible Variations in Dimensions

7.1 Permissible variations in dimensions shall be within the limits specified on the drawings or in the contract or purchase order.

7.2 Dimensional tolerance deviations waived by the purchaser shall be confirmed in writing to the producer or supplier.

8. General Quality

8.1 *Internal Soundness*—When specified, the soundness of die castings shall conform to standards or requirements agreed upon between the producer or supplier and the purchaser. The number and extent of imperfections shall not exceed those specified by the purchaser. The standards or requirements may consist of radiographs, photographs, or sectioned die castings.

8.2 Imperfections inherent in die castings shall not be cause for rejection provided it is demonstrated that the die castings are in accordance with the requirements and standards agreed upon.

8.3 *Workmanship*— Die castings shall be of uniform quality free of injurious discontinuities that will adversely affect their serviceability.

8.4 *Finish*—When specified in the contract or purchase order the as-cast surface finish required shall conform to standards agreed upon between the purchaser and the producer or supplier.

8.5 *Pressure Tightness*—When specified in the contract or purchase order the pressure tightness of die castings shall conform to standards agreed upon between the purchaser and the producer or supplier.

9. Chemical Requirements

9.1 *Limits*—The die casting 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 castings 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.

9.1.1 When a detailed chemical analysis is required with a shipment, it shall be called for in the contract or purchase order.

9.1.2 If the producer's or supplier's method of composition control is acceptable, sampling for chemical analysis may be waived at the discretion of the purchaser.