



Standard Specification for Steel, Closed-Impression Die Forgings for General Industrial Use¹

This standard is issued under the fixed designation A 521; 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 untreated and heat-treated steel, closed-implosion die forgings (Note 1) for general industrial use.

NOTE 1—For the definition of a forging, refer to Definition A 509.

1.2 The classes of forgings are as follows, the choice depending on design and stress or service to be imposed:

1.2.1 *Class CA*—Untreated, carbon steel forgings,

1.2.2 *Classes CC, CC1, and CE*—Annealed, normalized and tempered, carbon steel forgings,

1.2.3 *Class CF*—Normalized and tempered carbon steel forgings,

1.2.4 *Class CF1*—Double normalized and tempered carbon steel forgings,

1.2.5 *Class CG*—Quenched and tempered, or normalized, quenched and tempered carbon steel forgings,

1.2.6 *Class AA*—Annealed, normalized, or normalized and tempered alloy steel forgings,

1.2.7 *Classes AB and AC*—Normalized and tempered alloy steel forgings, and

1.2.8 *Classes AD, AE, AF, AG, and AH*—Normalized, quenched, and tempered alloy steel forgings.

NOTE 2—The appendix tables list recommended tolerances for a number of materials other than those covered by the above classes. The tables are for information only and the purchaser must define the condition in which he desires forgings made from materials not described above.

1.3 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 ASTM Standards:

A 29/A 29M Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality²

A 322 Specification for Steel Bars, Alloy, Standard Grades²

¹ This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.06 on Steel Forgings and Billets.

Current edition approved Sept. 10, 1996. Published July 1997. Originally published as A 521 – 64. Last previous edition A 521 – 76 (1992)^{ε1}.

² Annual Book of ASTM Standards, Vol 01.05.

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products³

A 509 Definition of Terms Relating to Steel Forging⁴

A 576 Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality²

A 711 Specification for Steel Forging Stock²

E 10 Test Method for Brinell Hardness of Metallic Materials⁵

E 23 Test Method for Notched Bar Impact Testing of Metallic Materials⁵

E 94 Guide for Radiographic Testing⁶

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *annealing*—the forgings shall be reheated to a temperature which produces an austenitic structure and then cooled slowly. A furnace charge thus treated is termed an annealing charge.

3.1.2 *cooling prior to heat treatment*—after forging and before reheating for heat treatment, the forgings shall be cooled to provide substantially complete transformation of austenite.

3.1.3 *normalizing*—the forgings shall be reheated to a temperature which produces an austenitic structure and then withdrawn from the furnace and cooled in air. A furnace charge thus treated is termed a normalized charge.

3.1.4 *quenching*—the forgings shall be reheated to a temperature which produces an austenitic structure and then quenched in a suitable liquid medium by spraying or immersion. A group thus treated is termed a quenching charge.

3.1.5 *tempering*—the forgings shall be reheated to and held at the proper temperature, which will be below the austenitic transformation range, and then cooled under suitable conditions. A furnace charge thus treated is termed a tempering charge.

4. Ordering Information

4.1 The purchaser shall specify in the inquiry, contract, and order the class of steel desired; and any exceptions, modifications, or agreements with regard to the provisions of this specification.

³ Annual Book of ASTM Standards, Vol 01.03.

⁴ Discontinued—see 1982 Annual Book of ASTM Standards, Vol 01.05.

⁵ Annual Book of ASTM Standards, Vol 03.01.

⁶ Annual Book of ASTM Standards, Vol 03.03.