



Standard Specification for Cast Tool Steel¹

This standard is issued under the fixed designation A597/A597M; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers tool steel castings having chemical compositions similar to those of the standard wrought grades.

1.2 Several grades are covered and are designated by chemical composition shown in **Table 1**.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard. Inch-pound units are applicable to material ordered to Specification A597 and SI units for material ordered to A597M.

2. Referenced Documents

2.1 *ASTM Standards*:²

A781/A781M Specification for Castings, Steel and Alloy, Common Requirements, for General Industrial Use

A957/A957M Specification for Investment Castings, Steel and Alloy, Common Requirements, for General Industrial Use

3. General Conditions for Delivery

3.1 Except for investment castings, material furnished to this specification shall conform to the requirements of Specification **A781/A781M**, including any supplementary requirements that are indicated in the purchase order. Failure to

comply with the general requirements of Specification **A781/A781M** constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification **A781/A781M**, this specification shall prevail.

3.2 Investment castings furnished to this specification shall conform to the requirements of Specification **A957/A957M**, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification **A957/A957M** constitutes nonconformance with this specification. In the case of conflict between the requirements of this specification and Specification **A957/A957M**, Specification **A957/A957M** shall prevail.

4. Ordering Information

4.1 Orders for material under this specification should include the following information:

4.1.1 Quantity,

4.1.2 Specification, including year date,

4.1.3 Grade of steel,

4.1.4 Description of the casting by pattern number or drawing. Dimensional tolerances should be included on the drawing.

4.1.5 Options in the specification, and.

4.1.6 Supplementary requirements desired, including standards of acceptance.

5. Materials and Manufacture

5.1 Heat treatment, if any, shall be as agreed between the producer and the purchaser.

5.2 Welding shall not be performed on these grades except by approval of the purchaser.

6. Chemical Composition

6.1 Alloys shall conform to the requirements prescribed in **Table 1**.

7. Keywords

7.1 cast tool steel

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.29 on Tool Steels.

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² 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.



TABLE 1 Chemical Requirements

NOTE 1—Where ellipses (...) appear in this table, there is no requirement, and the element need not be analyzed for or reported.

Element	Composition, %					
	Grade	CA-2	CD-2	CD-5	CS-5	CM-2
	UNS	T90102	T90402	T90405	T91905	T11302
Carbon		0.95–1.05	1.40–1.60	1.35–1.60	0.50–0.65	0.78–0.88
Manganese		0.75 max	1.00 max	0.75 max	0.60–1.00	0.75 max
Silicon		1.50 max	1.50 max	1.50 max	1.75–2.25	1.00 max
Sulfur		0.03 max	0.03 max	0.03 max	0.03 max	0.03 max
Phosphorus		0.03 max	0.03 max	0.03 max	0.03 max	0.03 max
Chromium		4.75–5.50	11.00–13.00	11.00–13.00	0.35 max	3.75–4.50
Molybdenum		0.90–1.40	0.70–1.20	0.70–1.20	0.20–0.80	4.50–5.50
Vanadium		0.20–0.50 ^A	0.40–1.00 ^A	0.35–0.55	0.35 max	1.25–2.20
Cobalt		...	0.70–1.00 ^A	2.50–3.50	...	0.25 max
Tungsten		5.50–6.75
Nickel		0.40–0.60 ^A	...	0.25 max

Element	Composition, %			
	Grade	CS-7	CH-12	CH-13
	UNS	T91907		CD-51
Carbon		0.45–0.55	0.30–0.40	0.30–0.42
Manganese		0.40–0.80	0.75 max	0.75 max
Silicon		0.60–1.00	1.50 max	1.50 max
Sulfur		0.03 max	0.03 max	0.03 max
Phosphorus		0.03 max	0.03 max	0.03 max
Chromium		3.00–3.50	4.75–5.75	4.75–5.75
Molybdenum		1.20–1.60	1.25–1.75	1.25–1.75
Vanadium		...	0.20–0.50	0.75–1.20
Cobalt	
Tungsten		...	1.00–1.70	...
Nickel	

^A Optional element. Tool steels have found satisfactory application either with or without element present. If desired, it should be specified on the order.

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A597–87(2010)) that may impact the use of this standard. (Approved Oct. 1, 2014.)

(1) Section 6, 7, and 8 deleted. Sections 1, 4, 5, 6, and Table 1 revised.

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