Designation: ~~A958/A958M – 15~~ A958/A958M – 17

Standard Specification for Steel Castings, Carbon and Alloy, with Tensile Requirements, Chemical Requirements Similar to Standard Wrought Grades[1]

This standard is issued under the fixed designation A958/A958M; 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 carbon and low-alloy steel castings having chemical analyses similar to that of the standard wrought grades.

1.2 Several classes are covered and are designated by chemical composition as shown in Table 1.

1.3 Options for tensile properties are shown in Tables 2 and 3.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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 ~~non-conformance~~nonconformance with the standard.

1.4.1 Within the text, the SI units are shown in brackets.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A488/A488M Practice for Steel Castings, Welding, Qualifications of Procedures and Personnel
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
~~A1067/A1067M Specification for Test Coupons for Steel Castings~~
~~E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications~~

3. General Conditions for Delivery

3.1 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 Steel 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 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.~~information:

4.1.1 Quantity,

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[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 A01.18 on Castings.

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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.

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

TABLE 1 Chemical Composition, Weight Percent

NOTE 1—Values are maximum unless a range is given.

Grade	C	Mn	P	S	Si	Ni	Cr	Mo
SC 1020	0.18/0.23	0.40/0.80	0.040	0.040	0.30/0.60	-	-	-
SC 1025	0.22/0.28	0.40/0.80	0.040	0.040	0.30/0.60	-	-	-
SC 1030	0.28/0.34	0.50/0.90	0.040	0.040	0.30/0.60	-	-	-
SC 1040	0.37/0.44	0.50/0.90	0.040	0.040	0.30/0.60	-	-	-
SC 1045	0.43/0.50	0.50/0.90	0.040	0.040	0.30/0.60	-	-	-
SC 4130	0.28/0.33	0.40/0.80	0.035	0.040	0.30/0.60	-	0.80/1.10	0.15/0.25
SC 4140	0.38/0.43	0.70/1.10	0.035	0.040	0.30/0.60	-	0.80/1.10	0.15/0.25
SC 4330	0.28/0.33	0.60/0.90	0.035	0.040	0.30/0.60	1.65/2.00	0.70/0.90	0.20/0.30
SC 4340	0.38/0.43	0.60/0.90	0.035	0.040	0.30/0.60	1.65/2.00	0.70/0.90	0.20/0.30
SC 8620	0.18/0.23	0.60/1.00	0.035	0.040	0.30/0.60	0.40/0.70	0.40/0.60	0.15/0.25
SC 8625	0.23/0.28	0.60/1.00	0.035	0.040	0.30/0.60	0.40/0.70	0.40/0.60	0.15/0.25
SC 8630	0.28/0.33	0.60/1.00	0.035	0.040	0.30/0.60	0.40/0.70	0.40/0.60	0.15/0.25

TABLE 2 Tensile Requirements

Class	65/35	70/36	80/40	80/50	90/60	105/85	115/95	130/115	135/125	150/135	160/145	165/150	210/180
Tensile, ksi	65	70	80	80	90	105	115	130	135	150	160	165	210
Tensile, min. (MPa)	[450]	[485]	[550]	[550]	[620]	[725]	[795]	[895]	[930]	[1035]	[1105]	[1140]	[1450]
Yield, ksi	35	36	40	50	60	85	95	115	125	135	145	150	180
Yield, min. (MPa)	[240]	[250]	[275]	[345]	[415]	[585]	[655]	[795]	[860]	[930]	[1000]	[1035]	[1240]
Elongation in 2 in. or 50 mm, min, %	24	22	18	22	18	17	14	11	9	7	6	5	4
Reduction of Area, min. %	35	30	30	35	35	35	30	25	22	18	12	10	8

TABLE 3 Tensile Requirements/Grade Suitability

Class	65/35	70/36	80/40	80/50	90/60	105/85	115/95	130/115	135/125	150/135	160/145	165/150	210/180
Grade													
SC 1020	X[A]	X											
SC 1025	X	X											
SC 1030	X	X	X	X									
SC 1040	X[B]	X	X	X	X								
SC 1045	X[B]	X[B]	X	X	X	X	X						
SC 4130	X[B]	X[B]	X	X	X	X	X	X	X	X			
SC 4140	X[B]	X[B]	X[B]	X[B]	X	X	X	X	X	X	X	X	
SC 4330	X[B]	X[B]	X[B]	X[B]	X	X	X	X	X	X	X	X	X
SC 4340	X[B]	X[B]	X[B]	X[B]	X[B]	X	X	X	X	X	X	X	X
SC 8620	X[B]	X[B]	X	X	X	X	X						
SC 8625	X[B]	X[B]	X	X	X	X	X	X	X				
SC 8630	X[B]	X[B]	X	X	X	X	X	X	X	X			

[A] "X" denotes that the properties may be achieved by at least one of the heat treatments referenced in 5. The effect of section thickness should be considered in making grade selections. The heat treatment requirements do not imply that all section thicknesses will be through hardened.
[B] These grades significantly exceed the minimum strength levels; therefore, they may be unsuitable for use due to weldability, and machinability issues.

4.1.2 Specification, including year and date of issue,

4.1.3 Grade and class of steel,

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

4.1.5 Options in the specification, and

4.1.6 Supplementary requirements desired, including standards of acceptance.

5. Heat Treatment

5.1 All castings shall receive a heat treatment indicated in Table 4. Preliminary heat treatment prior to final heat treatment as well as multiple tempering is permitted.

5.2 Heat treatment shall be performed after the castings have been allowed to cool below the transformation range.

5.3 The furnace temperature for heat treating shall be effectively controlled by the use of recording-type pyrometers.

6. Chemical Composition

6.1 The steel shall conform to the requirements of chemical composition as prescribed in Table 1.

TABLE 4 Heat Treatment

NOTE 1—The effect of section thickness should be considered in making grade selections. The heat treatment requirements do not imply that all section thicknesses will be through hardened.

NOTE 2—Post-weld heat treatment must be at or below the final tempering temperature.

NOTE 3—Following quenching the castings must be cooled below ~~500°F [260°C]~~500 °F [260 °C] prior to tempering.

Grade	Class	Austenitizing Temperature, min, °F [°C]	Media	Tempering Temperature, min,° F [°C]
SC1020	65/35	1700 [925]	A[A]	–
	70/36	1700 [925]	A	–
SC1025	65/35	1700 [925]	A	–
	70/36	1700 [925]	A	–
SC1030	65/35	1650 [900]	A	–
	70/36	1650 [900]	A	1100 [595]
	80/40	1650 [900]	L[A]	1100 [595]
	80/50	1650 [900]	L	1100 [595]
SC1040	65/35[B]	1650 [900]	A	1150 [621]
	70/36	1650 [900]	A	1150 [621]
	80/40	1650 [900]	A	1150 [621]
	80/50	1650 [900]	A	1100 [595]
	90/60	1650 [900]	A	1100 [595]
SC1045	65/35[B]	1600 [870]	A	1150 [621]
	70/36[B]	1600 [870]	A	1150 [621]
	80/40	1600 [870]	A	1150 [621]
	80/50	1600 [870]	A	1150 [621]
	90/60	1600 [870]	A	1100 [595]
	105/85	1600 [870]	A	1100 [595]
	115/95	1600 [870]	A	1050 [565]
SC4130	65/35[B]	1650 [900]	A	1200 [650]
	70/36[B]	1650 [900]	A	1200 [650]
	80/40	1650 [900]	A	1200 [650]
	80/50	1650 [900]	A	1200 [650]
	90/60	1650 [900]	A or L	1150 [621]
	105/85	1650 [900]	L	1100 [595]
	115/95	1650 [900]	L	1100 [595]
	130/115	1650 [900]	L	1000 [538]
	135/125	1650 [900]	L	1000 [538]
	150/135	1650 [900]	L	1000 [538]
SC4140	65/35[B]	1600 [870]	A	1200 [650]
	70/36[B]	1600 [870]	A	1200 [650]
	80/40[B]	1600 [870]	A	1200 [650]
	80/50[B]	1600 [870]	A	1150 [621]
	90/60	1600 [870]	A	1150 [621]
	105/85	1600 [870]	A or L	1150 [621]
	115/95	1600 [870]	L	1050 [566]
	130/115	1600 [870]	L	1000 [538]
	135/125	1600 [870]	L	1000 [535]
	150/135	1600 [870]	L	950 [510]
	160/145	1600 [870]	L	950 [510]
	165/150	1600 [870]	L	950 [510]
SC4330	65/35[B]	1650 [870]	A	1200 [650]
	70/36[B]	1650 [870]	A	1200 [650]
	80/40[B]	1650 [870]	A	1200 [650]
	80/50[B]	1650 [870]	A	1200 [650]
	90/60	1650 [870]	A or L	1150 [620]
	105/85	1650 [870]	L	1100 [595]
	115/95	1650 [870]	L	1100 [595]
	130/115	1650 [870]	L	1000 [535]
	135/125	1650 [870]	L	1000 [535]
	150/135	1650 [870]	L	1000 [535]
	160/145	1650 [870]	L	950 [510]
	165/150	1650 [870]	L	950 [510]
	210/180	1650 [870]	L	900 [482]
SC4340	65/35[B]	1600 [870]	A	1200 [650]
	70/36[B]	1600 [870]	A	1200 [650]
	80/40[B]	1600 [870]	A	1200 [650]
	80/50[B]	1600 [870]	A	1150 [620]