



Designation: A367 – 22

Standard Test Methods for Chill Testing of Cast Iron¹

This standard is issued under the fixed designation A367; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 These test methods for chill testing apply to gray irons that are to be free of chill in the casting and to chilled irons that are to have a specific depth of chill in the casting. Two test methods for determining the chilling tendencies of cast iron are covered as follows. For many applications, either test method will be satisfactory if test pieces of the proper dimensions are selected.

1.1.1 *Test Method A, Wedge Test*—This test is adapted for the higher-strength gray irons. The accelerated cooling rate to induce the formation of a chill is brought about through the design of the test specimen. This test method is simpler than Test Method B since maintenance of chill blocks or plates is not necessary.

1.1.2 *Test Method B, Chill Test*—This test is adapted for the softer grades of gray iron and should be used if the casting is to have a specified depth of chill. The chill in this type of test is induced by casting one edge of the test specimen against a metal or graphite chilled plate or block.

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 to be part of the standard.

1.2.1 The metric equivalency charts in Figs. 1 and 2 are provided for information only.

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

1.4 *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.*

¹ These test methods are under the jurisdiction of ASTM Committee A04 on Iron Castings and are the direct responsibility of Subcommittee A04.21 on Testing.

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TEST METHOD A – WEDGE TEST

2. Application

2.1 Selection of a test specimen of appropriate dimensions will allow measurement of chilling tendencies of all gray iron compositions, with the exception of those having silicon contents over 2.50 % together with carbon contents over 3.50 %.

3. Test Specimens

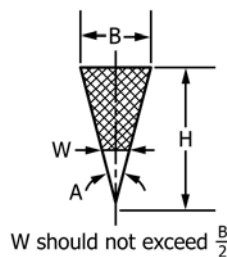
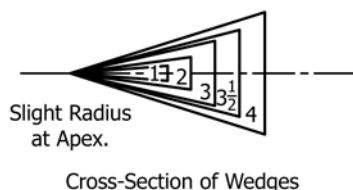
3.1 The patterns for the test specimens shall be made of metal to the dimensions shown in Fig. 1. With the exception of the length of the test specimen, dimensions shall not vary more than $\pm 1/32$ in. (0.8 mm). The tolerance on the length of the specimen shall be $\pm 1/8$ in. (3.2 mm). The radius on the apex of the wedge should be formed by filing a $1/32$ -in. flat on the sharp edge of the metal pattern and then carefully rounding the edges formed by the $1/32$ -in. flat and the sides of the wedge. If draft on the pattern is desired, it may be obtained by varying dimension H (Fig. 1) from one end of the specimen to the other. The pattern should be mounted in a core box so that the final specimen can be poured with the wedge in such a position that its length is vertical. There shall be 1 in. (25.4 mm) minimum sand at the bottom of the core.

4. Procedure

4.1 *Cores*—Make the test in a core. The cores may be either single cores or gang cores. If a gang core is used, the minimum amount of sand between adjacent test specimens shall be not less than $2\frac{1}{2} \times B$ (Fig. 1). The sand cores shall be cured and free of moisture. The base sand shall be of such fineness that a smooth casting will be obtained.

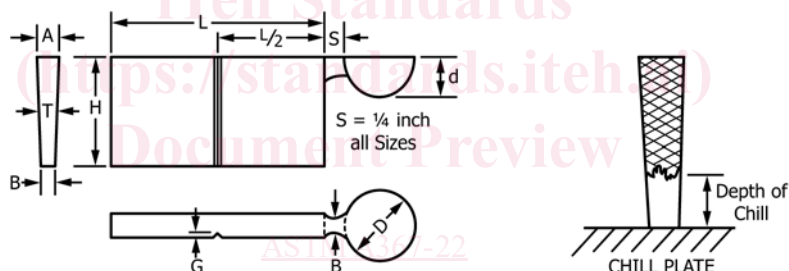
4.2 *Pouring Practice*—Pour all samples at as consistent a pouring temperature as possible, since the depth of chill is affected by the pouring temperature. Take precautions to obtain a representative sample of iron for the test specimen. The ladle should hold at least 5 lb (2.3 kg) of iron in order to avoid excessive chilling of the iron before the test specimen can be poured.

4.3 *Cooling of Test Specimen*—The test specimen may be quenched in water as soon as it is completely solid. The quenching must be done in such a manner as to avoid cracking of the chilled apex of the wedge. This may be accomplished by



Wedge No.	Wedge Dimensions						Length	
	<i>B</i>		<i>H</i>		A, deg			
	in.	mm	in.	mm				
W 1	0.20	5.1	1.00	25.4	11.5	4	101.6	
W 2	0.40	10.2	1.25	31.8	18	4	101.6	
W 3	0.75	19.1	1.50	38.1	28	4	101.6	
W 3½	1.00	25.4	1.75	44.4	32	5	127.0	
W 4	1.25	31.8	2.00	50.8	34.5	6	152.4	

FIG. 1 Dimensions for Test Wedges



Chill Test No.	Recommended Dimensions, in.									Recommended Chill Depth Range, 1/23 in. ^A
	T	A	B	H	L	D	d	G		
1C	3/16	1/4	1/8	1 1/4	2 1/2	3/4	1/2	1/32		3 to 12
2C	1/4	5/16	3/16	1 1/2	3	7/8	1/2	1/32		4 to 16
3C	3/8	7/16	5/16	1 3/4	3 1/2	7/8	1/2	1/16		6 to 24
4C	1/2	9/16	7/16	2	4	1	5/8	1/16		8 to 32
5C	3/4	13/16	1 1/16	2 1/2	5	1	5/8	3/32		12 to 48

^A T/2 to 2T.

Note 1—Casting to be made in a dry sand core.

Note 2—Allow 3/4 in. of sand on all sides.

Metric Equivalents

in.	mm	in.	mm	in.	mm
1/32	0.8	3/8	9.5	1	25.4
1/16	1.6	7/16	12.1	1 1/4	31.8
3/32	2.4	1/2	12.7	1 1/2	38.1
1/8	3.2	9/16	14.3	1 3/4	44.4
3/16	4.8	11/16	17.5	2	50.8
1/4	6.4	3/4	19.0	2 1/2	63.5
5/16	7.9	13/16	20.6		

FIG. 2 Recommended Dimensions for Test Method B Chill Test Specimens

grasping the wedge with tongs at the apex of the wedge and immersing about 1/4 to 1/2 in. (6.4 to 12.7 mm) of the base of the wedge in water. The wedge may then be gradually quenched

but should be removed while there is still sufficient heat in the wedge to dry off the water. The test specimen may be either cooled in the core or in the air. If cooled to a very dull red