Designation: D1349 – 14

Standard Practice for Rubber—Standard Conditions for Testing[1]

This standard is issued under the fixed designation D1349; 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 Reliable comparisons between different rubber compounds and between different laboratories is an essential component of effective testing.

1.2 It is necessary to standardize the temperature and humidity conditions to which materials are subjected prior to and during testing.

1.3 Section 2 of this practice includes the definition of terms commonly used to describe the conditions of testing.

1.4 Section 3 of this practice covers a list of standard test temperatures for testing from which selection may be made for a specification, procedure, practice, standard or method.

1.4.1 Any specification, procedure, practice, standard or method that specifies test temperatures shall take precedence over this practice.

1.4.2 The standard test temperatures for testing do not apply to preparation, mixing, processing, or vulcanizing temperatures for rubber compounds.

1.5 Section 4 of this practice covers a list of standard relative humidity conditions for testing from which selection may be made for a specification, procedure, practice, standard or method.

1.5.1 Any specification, procedure, practice, standard or method that specifies relative humidity shall take precedence over this practice.

1.5.2 The standard relative humidity conditions for testing do not apply to preparation, mixing, processing, or vulcanizing of rubber compounds, but may serve as a guide when the condition is not specified.

1.6 Section 5 of this practice covers the standard conditioning of materials for testing.

1.6.1 Any specification, procedure, practice, standard or method that specifies the conditioning of materials for testing shall take precedence over this practice.

1.7 Section 6 of this practice includes the keywords associated with this document which may be used in standard document or internet searches.

1.8 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.9 *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. Terminology

2.1 *Definitions:*

2.1.1 *room temperature, n*—a temperature in the range from 20 to 30°C (68 to 86°F).

2.1.2 *standard laboratory atmosphere, n*—an atmosphere having a temperature of 23 ± 2°C (73.4 ± 3.6°F) and a relative humidity of 50 ± 10 %RH (40 to 60 %RH) shall be the standard laboratory atmosphere.

2.1.3 *standard laboratory temperature, n*—a temperature of 23 ± 2°C (73.4 ± 3.6°F) shall be the standard laboratory temperature.

3. Temperatures for Testing

3.1 When data are to be obtained for comparison purposes at a specific temperature, select the test temperature and associated tolerance from Table 1.

3.1.1 The temperatures in Table 1 are not to be considered exclusive. If agreed upon between customer and supplier, temperatures within the range shown in Table 1 may be employed, that is, where 195°C was found to be a desired temperature for testing, it would be used with a ±2.0°C tolerance. The temperature shall be recorded and reported.

3.1.2 Unless otherwise specified, tolerance for temperature shall be as given in Table 1.

3.1.3 A tolerance of ±1°C (±1.8°F) or less, may be required by a specification, procedure, practice, standard or method, or as agreed upon between customer and supplier and shall be recorded and reported. Refer to 4.3.1.

[1] This practice is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.10 on Physical Testing.

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TABLE 1 Test Temperatures and Tolerances

Test Temperatures, °C (°F)[A]	Tolerance, plus or minus, °C (°F)
–75 (–103)	2.0 (3.6)
–70 (–94)	2.0 (3.6)
–55 (–67)	2.0 (3.6)
–40 (–40)	2.0 (3.6)
–25 (–13)	2.0 (3.6)
–10 (14)	2.0 (3.6)
0 (32)	2.0 (3.6)
23 (73)[B]	2.0 (3.6)
35 (95)	2.0 (3.6)
40 (104)	2.0 (3.6)
50 (122)	2.0 (3.6)
55 (131)	2.0 (3.6)
70 (158)	2.0 (3.6)
85 (185)	2.0 (3.6)
90 (194)	2.0 (3.6)
100 (212)	2.0 (3.6)
105 (221)	2.0 (3.6)
120 (248)	2.0 (3.6)
125 (257)	2.0 (3.6)
130 (266)	2.0 (3.6)
135 (275)	2.0 (3.6)
155 (311)	2.0 (3.6)
160 (320)	2.0 (3.6)
175 (347)	2.0 (3.6)
180 (356)	2.0 (3.6)
200 (392)	3.0 (5.4)
225 (437)	3.0 (5.4)
250 (482)	3.0 (5.4)
275 (527)	3.0 (5.4)
300 (572)	3.0 (5.4)

[A] The test temperature is the (set point) temperature to which the testing environment is controlled (tolerance). The tolerance is the maximum allowable variation of the instrument's (chamber or room) indicated temperature during test conditions. If the indicated temperature is beyond the tolerance, immediately implement procedures to correct the problem.
[B] Standard laboratory temperature.

4. Relative Humidity for Testing

4.1 When the tolerance for temperature is ±3°C, the tolerance for relative humidity shall be no greater than 50 ± 15 %RH (35 to 65 %RH).

4.2 When the tolerance for temperature is ±2°C, the tolerance for relative humidity shall be no greater than 50 ± 10 %RH (40 to 60 %RH).

4.3 When the tolerance for temperature is ±1°C, the tolerance for relative humidity shall be no greater than 50 ± 5 %RH (45 to 55 %RH).

4.3.1 While a tolerance of ±1°C is not given in Table 1, it is used in many specifications, procedures, practices, standards or methods and it, as well as the tolerance for relative humidity, is presented for guidance in those instances.

4.4 The relative humidity ranges are not to be considered exclusive. If agreed upon between customer and supplier, the relative humidity range may be selected from those given in 4.1 – 4.3 notwithstanding the testing temperature. The relative humidity during testing shall be recorded and reported.

5. Conditioning of Materials for Testing

5.1 The conditioning of materials for testing does not apply to preparation, mixing, processing, or vulcanizing temperatures or humidity conditions for rubber compounds as these are typically well defined by individual specifications, procedures, practices, standards or methods.

5.2 Physical and other properties of rubber are influenced by temperature and relative humidity in a manner that materially affects test results.

5.3 Reliable comparisons between different materials and between different laboratories are reliant upon standardized temperature and relative humidity conditions to which specimens of these materials are subjected prior to testing.

5.4 Conditioning of materials for testing is typically conducted:

5.4.1 For the purpose of bringing the material into equilibrium with the standard laboratory atmosphere, and

5.4.2 To obtain reproducible results, regardless of a previous history of exposure.

5.5 Any specification, procedure, practice, standard or method that specifies the conditioning of materials for testing shall take precedence over this practice.

5.6 *Conditioning of Materials for Testing:*

5.6.1 Materials shall be conditioned for no less than 12 h at the *standard laboratory atmosphere* (refer to 2.1.2).

5.6.2 If a greater or lesser conditioning time, temperature, or relative humidity is mandated by a specification, procedure, practice, standard, method or agreement between customer and supplier it shall be recorded and reported.

6. Keywords

6.1 conditions for testing of rubber; room temperature; standard laboratory atmosphere; standard test temperatures