Designation: G 60 – 95

An American National Standard

Standard Test Method for Conducting Cyclic Humidity Tests[1]

This standard is issued under the fixed designation G 60; 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 test method covers procedures for conducting cyclic humidity tests with a corrosive dip.[2] It sets forth the conditions required in cyclic humidity testing.

1.2 This test method does not prescribe the type of test specimen or exposure periods nor the interpretation to be given to the results.

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

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

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water[3]

G 1 Practice for Preparing, Cleaning, and Evaluating Corrosion Test Specimens[4]

3. Significance and Use

3.1 The procedure described is used to observe the behavior of steels under test conditions that retard the formation of a protective type of rust.

3.2 This test method should not be used to rank steels that form a protective type of rust under atmospheric exposure conditions.

4. Apparatus

4.1 The apparatus required for cyclic humidity testing consists of a test chamber, provisions for heating the chamber, a humidifying tower, a drying train, a dip mechanism, provisions for introducing and draining the solution, a supply of compressed air, specimen supports, and necessary means of control (see Annex A1).

4.2 A schematic diagram of the apparatus is shown in Fig. 1.

4.3 The apparatus should be capable of providing an 8-h humidity cycle three times per day, as shown in Fig. 2, and a dip cycle once a day.

4.3.1 The cyclic variation of humidity can be obtained by variation of the temperature of the water in the humidifying tower. The temperature of the water is cycled thermostatically such that the relative humidity of air bubbling through the water at a minimum rate of 1 L/min (.04 ft^3/min) will vary between 100 and 50 % when the temperature of the air in the test chamber is brought to 52 ± 1°C (125 ± 2°F).

4.3.2 The range of relative humidity can be extended by adding a drying period to the humidity cycle described above. The control circuit (see Annex A1 and Fig. 3) is arranged such that the air is switched to the drying train when the relative humidity has descended to 50 %. The drying train can be a desiccating tower containing anhydrous calcium sulfate. The minimum relative humidity shall be 20 % or less and the maximum relative humidity shall be 95 % or more for each cycle.

NOTE 1—Instruments to continuously record temperature and humidity are not mandatory, but these provide the most reliable and economical way of recording such information. In the absence of such instrumentation, temperature and humidity measurement shall be made, at least twice a day, at the maximum and minimum humidity in a cycle.

4.4 *Materials of Construction*:

4.4.1 The test chamber should be made of inert materials such as plastics, glass or metals lined with impervious plastics, rubber or epoxy-type materials, or materials exhibiting equivalent corrosion resistance.

4.4.2 The dip solution container should not be affected by or cause contamination of the dip solution.

4.4.3 *Specimen Supports*:

4.4.3.1 The specimen-supporting device should not be affected by or cause contamination of the dip solution.

4.4.3.2 The method of supporting specimens will vary with the apparatus used for conducting the tests, but should be designed to insulate the specimens from each other physically and electrically and to insulate the specimens from any metallic container or supporting device used within the apparatus.

4.4.3.3 Shape and form of the specimen support should assure free contact of the specimen with the corrosive solution, the liquid line, or the vapor phase. In a stacked rack, the first and last specimens should be dummy specimens so that the outermost test specimens are shielded by their neighbors in the

[1] This test method is under the jurisdiction of ASTM Committee G-1 on Corrosion of Metals, and is the direct responsibility of Subcommittee G01.05 on Laboratory Corrosion Tests.

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[2] Opinsky, A. J., Thomson, R. F., and Boegehold, A. L., "A Cyclic Humidity Accelerated Corrosion Test for Sheet Steel", *ASTM Bulletin*, January 1953.

[3] *Annual Book of ASTM Standards*, Vol 11.01.

[4] *Annual Book of ASTM Standards*, Vol 03.02.

TABLE 1 Summary of Mass Loss from Replicate Tests of Low Carbon Steels in the Cyclic Humidity Test

Steel	Mass Loss (g/m^2)								
	Test 8			Test 9			Test 18		
	No.	Mean	Stnd. Dev.	No.	Mean	Stnd. Dev.	No.	Mean	Stnd. Dev.
A	10	9.22	0.16	...	...	...			
B	9	10.77	0.18	...	...	...			
C	10	9.60	0.13	...	...	...			
D	...	...	...	...	...	...	6	8.90	0.17
E	...	...	...	6	10.02	0.52	6	9.80	0.31
F	...	...	...	6	9.21	0.21	6	9.35	0.48
G	...	...	...	6	11.30	0.48	6	11.00	0.21

No. = Number of test specimens.
Stnd. Dev. = Standard deviation.

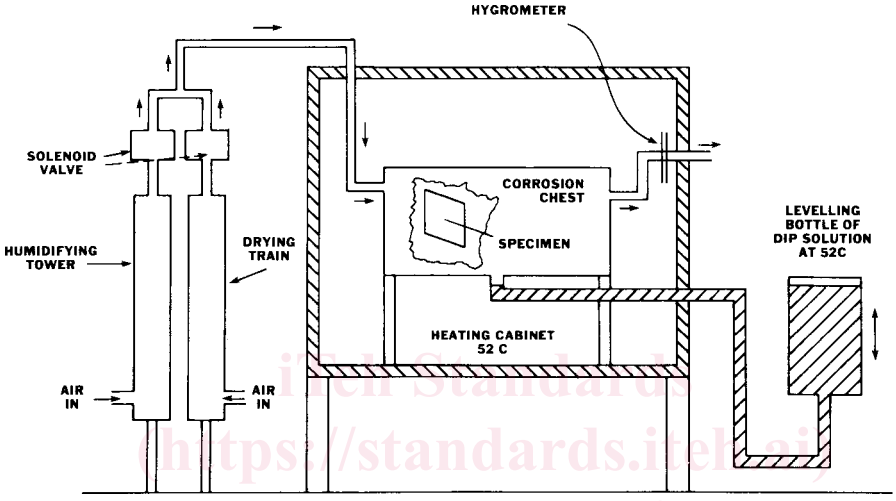

FIG. 1 Main Parts of the Corrosion Testing Apparatus (Schematic)

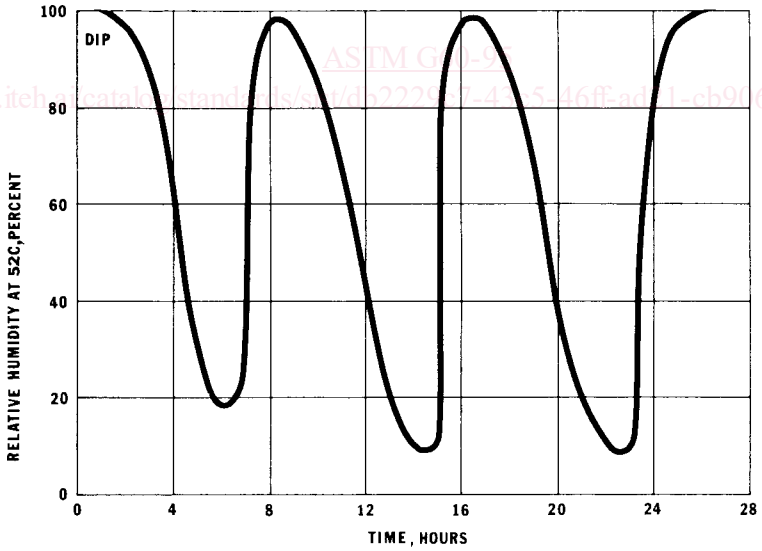

FIG. 2 Humidity Cycle (Schematic)

same manner as specimens in the middle of the stack.

5. Reagents and Materials

5.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society,