



Designation: C 581 – 00

An American National Standard

Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-Fiber-Reinforced Structures Intended for Liquid Service¹

This standard is issued under the fixed designation C 581; 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 This practice is designed to evaluate, in an unstressed state, the chemical resistance of thermosetting resins used in the fabrication of reinforced thermosetting plastic (RTP) laminates. This practice provides for the determination of changes in the properties, described as follows, of the test specimens and test reagent after exposure of the specimens to the reagent: hardness of specimens, weight change thickness, appearance of specimens, appearance of immersion media, and flexural strength and modulus.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values in parentheses are given for information only.

NOTE 1—This practice may also be used to evaluate other factors, such as surfacing veils, the effect of resin additives, and fabrication variables on the chemical resistance of the resin.

NOTE 2—There is no similar or equivalent ISO standard.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials²
- D 2563 Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts³
- D 2583 Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor³
- D 2584 Test Method for Ignition Loss of Cured Reinforced Resins³

¹ This practice is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.23 on Reinforced Plastic Piping Systems and Chemical Equipment.

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² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Annual Book of ASTM Standards*, Vol 08.02.

3. Significance and Use

3.1 The results obtained by this practice shall serve as a guide in, but not as the sole basis for, selection of a thermosetting resin used in an RTP structure. No attempt has been made to incorporate into the practice all the various factors that may enter into the serviceability of an RTP structure when subjected to chemical environments. These factors may include stress, different resin-to-glass ratios, and multiple veils.

4. Apparatus

4.1 *Hardness Testing Instrument*—This shall be as described in Test Method D 2583.

4.2 *Flexural Properties Testing Apparatus*, in accordance with Test Methods D 790.

4.3 *Thickness Measurement*—A micrometer suitable for measurement to 0.001 in. (0.025 mm).

4.4 *Containers*, of sufficient size, capacity, and inertness to allow total immersion of reinforced thermosetting plastic specimens in the specific corrosives chosen for testing. These containers shall, when necessary, be capable of maintaining liquid levels of volatile solutions, that is, solvents. This can be accomplished by the use of reflux condensers.

4.5 *Heating Apparatus*—A constant temperature oven, heating mantle, or liquid bath capable of maintaining temperature within range of $\pm 4.0^{\circ}\text{F}$ ($\pm 2.2^{\circ}\text{C}$). Proper precautions should be taken if the corrosives selected are flammable liquids.

4.6 *Analytical Balance*, suitable for accurate weighing to 0.001 g.

5. Reagents

5.1 The test media shall consist of the reagents or solutions to which the RTP laminates are to be exposed.

6. Test Specimens

6.1 *Standard Laminates*—Prepare standard fiber-reinforced laminates using identical reinforcement in all of the laminates. The laminates shall be constructed of the following materials:

6.1.1 *Surfacing Mat (Veil)*—A thin mat of fine fibers used primarily to produce a smooth, resin-rich surface on a reinforced plastic. The surfacing veil helps determine the thickness of the resin-rich layer, reduces microcracking and provides a non-wicking chemically-resistant layer. The surfacing veil