



# Standard Test Method for Detergent Resistance of Ceramic Decorations on Glass Tableware<sup>1</sup>

This standard is issued under the fixed designation C676; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This qualitative test method is designed to provide a convenient and reproducible method of determining the detergent resistance of decorations applied to glass tableware.

1.2 *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:*<sup>2</sup>

**C927** Test Method for Lead and Cadmium Extracted from the Lip and Rim Area of Glass Tumblers Externally Decorated with Ceramic Glass Enamels

## 3. Terminology

3.1 *Definition:*

3.2 *detergent resistance*—the degree of resistance to the chemical action of detergents.

## 4. Significance and Use

4.1 This test method provides a means of estimating the qualitative performance of glass enamel decorations that are exposed to high phosphate detergents during use. This test method also attempts to simulate accelerated exposure to high phosphate detergents prior to testing for heavy metal release, such as in Test Method **C927** when long term performance of enamels must be evaluated.

## 5. Apparatus

5.1 *Test Chamber*—A thermostatically controlled tank, preferably stainless steel, that will maintain a solution temperature of  $60 \pm 2^\circ\text{C}$ .

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C14 on Glass and Glass Products and is the direct responsibility of Subcommittee C14.10 on Glass Decoration.

Current edition approved May 1, 2014. Published May 2014. Originally approved in 1971. Last previous edition approved in 2009 as C676 – 04 (2009). DOI: 10.1520/C0676-04R14.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

5.2 *Specimen Holder*—A device for supporting the specimens to be evaluated in such a manner as to ensure free and unobstructed contact between the decoration and the test solution.

## 6. Test Specimens

6.1 Test specimens consist of representative glass tableware with ceramic decorations.

## 7. Test Solution

7.1 Prepare a test solution consisting of 5 % sodium pyrophosphate ( $\text{Na}_4\text{P}_2\text{O}_7 \cdot 10\text{H}_2\text{O}$ ) and 95 % distilled water.

## 8. Procedure

8.1 Immerse the samples for 2-h periods in the test solution maintained at  $60 \pm 2^\circ\text{C}$ . Retain a duplicate piece of ware with each decoration under test without exposure to the solution as an aid in judging the degree of chemical action on the specimens under test. At the end of the 2-h periods, remove the specimens from the solution, rub vigorously with a cloth under running water, dry, and evaluate.

8.2 Grade the decorations after each 2-h period of immersion in accordance with one of the following classes:

*Class 1*—No loss of gloss.

*Class 2*—Gloss loss, no loss of opacity.

*Class 3*—Noticeable loss of opacity.

*Class 4*—Complete removal of decoration.

## 9. Interpretation of Results

9.1 Grade the decorations after each 2-h period of immersion in accordance with one of the following classes:

Grade 1—No attack apparent.

Grade 2—Appearance of iridescence or visible stain on the exposed surface when viewed at a  $45^\circ$  angle but not apparent at angles less than  $30^\circ$ .

Grade 3—A definite stain which does not blur reflected images and is visible at angles less than  $30^\circ$ .

Grade 4—Definite stain with a gross color change or strongly iridescent surface visible at angles less than  $30^\circ$  and which may blur reflected images.

Grade 5—Surface dull or matte with chalking possible.

Grade 6—Significant removal of enamel with pinholing evident.

Grade 7—Complete removal of enamel in exposed area.

## **10. Report**

10.1 Report the following information:

- 10.1.1 Identification of the specimen tested, including decorating material used and maturing cycle used,
- 10.1.2 Grading of the specimens into the classes above after each 2-h period of immersion, and
- 10.1.3 Date of test and name of operator conducting test.

## **11. Precision and Bias**

11.1 No justifiable statement can be made regarding the precision and bias of this test method since the degree of attack is determined using a subjective grading system.

## **12. Keywords**

12.1 ceramic decorations; detergent resistance; glass tableware

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the ASTM website (www.astm.org/COPYRIGHT/).*