



# Standard Test Method for Crazing Resistance of Fired Glazed Ceramic Whitewares by a Thermal Shock Method<sup>1</sup>

This standard is issued under the fixed designation C 554; 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 test method covers the determination of the resistance to crazing of fired, glazed, ceramic whitewares when stresses residual after glaze firing may cause a tendency to craze, such stresses being induced by factors other than moisture expansion.

1.2 This test is not intended to induce moisture expansion, which fact should be kept in mind if the materials to be evaluated may exhibit moisture expansion.

NOTE 1—Test Method C 424 covers a method for determining resistance to crazing induced by moisture expansion. Its use is generally confined to testing nonvitreous and semivitreous ceramic whitewares because these products may be subject to such expansion. For whitewares with negligible moisture expansion (such as vitreous and impervious ware), the thermal shock method described herein is generally to be preferred.

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.* For a specific hazard statement, see **Warning** in 6.3.

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

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

C 424 Test Method for Crazing Resistance of Fired Glazed Whitewares by Autoclave Treatment

## 3. Significance and Use

3.1 Unless there is a proper match between the expansions of the glaze and the body, all glazed whitewares may contain

residual stresses from the firing that bonded the glaze to the body. In addition, whitewares are increasingly subjected to thermal stresses in service. Hence, an important use criterion for a glazed whiteware is adequate resistance to repeated abrupt thermal changes. In most cases, the result of inadequate resistance to thermal shock is the appearance of a craze pattern in the glaze. This craze pattern is visible by inspection with oblique lighting and application of a suitable ink or dye.

3.2 This test method is applicable to vitreous whitewares that have negligible crazing as a result of moisture expansion. For nonvitreous and semivitreous bodies, refer to Test Method C 424.

## 4. Apparatus

4.1 *Oven*—An oven suitable to operate in the range 250 to 450°F (121 to 232°C) while holding the required temperatures within  $\pm 5^\circ\text{F}$  ( $\pm 3^\circ\text{C}$ ) and being capable of recovering temperature within 20 min after being loaded with the desired number of specimen(s).

4.2 *Water Containers*—Containers to hold water at  $68 \pm 5^\circ\text{F}$  ( $20 \pm 3^\circ\text{C}$ ) before quenching; the capacity of the containers shall be large enough so that the water temperature does not exceed 85°F (29°C) after quenching a single specimen. Two or more specimens may be quenched simultaneously in a single container provided they do not overlap on the bottom of the container and provided that the water temperature does not exceed 85°F (29°C) after quenching. As a general rule, it will be found that 10 cm<sup>3</sup> of water/g of ware, or 1 gal of water/lb of ware will be adequate to keep the temperature within the required limits. There shall be enough containers to quench all the specimens loaded in the oven. The containers shall be deep enough so that at least 1/2 in. (13 mm) of water will cover the quenched specimen(s).

## 5. Test Specimens

5.1 The specimen(s) shall preferably be whole pieces of ware; cut or broken specimen(s) shall be used only when whole pieces are impractical or impossible to test. If the specimen(s) are cut or broken from whole ware, they shall be selected so as to be representative of the item to be tested. In cutting or breaking specimen(s), cracks may be induced, therefore, broken or cut specimens shall be inspected for cracks by oblique lighting and application of a suitable ink or dye before the test.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C21 on Ceramic Whitewares and Related Products and is the direct responsibility of Subcommittee C21.03 on Methods for Whitewares and Environmental Concerns.

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