Designation: C424 – 93 (Reapproved 2020)

Standard Test Method for Crazing Resistance of Fired Glazed Whitewares by Autoclave Treatment[1]

This standard is issued under the fixed designation C424; 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 the determination of the crazing resistance of fired glazed whitewares using the autoclave treatment and under the conditions specified in this test method.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Significance and Use

2.1 This test method is particularly useful for porous materials that can exhibit moisture expansion.

2.2 This test method is a primary test method that is suitable for use in specifications, quality control, and research and development. It can also serve as a referee test method in purchasing contracts or agreements.

3. Apparatus

3.1 *Autoclave*—An autoclave built for a steam pressure of at least 275 psi (1.9 MPa), and preferably with sufficient capacity to contain at least ten specimens. The apparatus shall be equipped with a safety valve, a blow-off valve, pressure gauge measuring pressure above atmospheric pressure with an accuracy of ±5 psi (34 kPa), and a source of heat of sufficient capacity to ensure a constant steam pressure within the autoclave.

4. Number of Specimens

4.1 The crazing test shall be made on at least ten identical uncut specimens having facial dimensions up to and including 6 by 6 in. (152 by 152 mm) or 6 by 8 in. (152 by 200 mm). For larger specimens, specifically tile products, five samples will suffice and these may be cut to facilitate entry into the autoclave. However, all cut pieces should be as large as possible and all cut pieces are to be tested.

5. Procedure

5.1 *Placement of Specimens in the Autoclave*—Place a sufficient amount of distilled water in the autoclave so that after the test a slight excess of water will remain. Place all specimens on a suitable support at least 2 in. (51 mm) above the water line within the autoclave at room temperature. Fasten the autoclave head securely in place.

5.2 *Operation of Autoclave*—Gradually heat the water in the bottom of the autoclave. Keep the blow-off valve open for several minutes after steam begins to escape, thereby expelling most of the air. After closing the blow-off valve, increase the steam pressure at a uniform rate until the desired pressure is reached within a period of not less than 45 min nor exceeding 1 h. Apply sufficient heat to maintain the indicated pressure constant (±2 psi (14 kPa)) for an additional hour. Shut off the heat source and release the steam pressure immediately by opening the blow-off valve.

5.2.1 If it is desirable to ascertain whether failure occurs as a result of rehydration only, the blow-off valve should be cracked only and the steam released slowly over a period of 30 min. If this method of steam release is used, the report shall so state.

5.3 *Removal of Specimens From Autoclave*—Loosen the autoclave head and allow the specimens to cool in place for 30 min. Remove the specimens and allow to cool at room temperature for an additional 30 min before examination.

5.4 *Examination of Specimens for Crazing Failures*—Use oblique lighting and the application of a suitable ink or dye solution upon the glazed surfaces to aid in the detection and

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examination of crazing failures. Consider only those failures visible to the naked eye.

5.5 *Pressure Schedule*—Make the initial test at 50 psi (345 kPa). If any or all of the specimens show no crazing, repeat the test on the uncrazed pieces at 100 psi (689 kPa) and, if necessary, at increasing intervals of 50 psi until all specimens have crazed or until a pressure of 250 psi (1.7 MPa) has been reached. Successive tests shall be separated by a time interval not exceeding 24 h. If it is desired to use this procedure in conjunction with a product specification, the test may be limited to one or more of these specified pressures.

6. Report

6.1 Report the following information:

6.1.1 Identification of specimens.

6.1.2 Number of specimens tested.

6.1.3 Identification of ink or dye solutions used in examination of specimens.

6.1.4 Table listing each steam pressure, in pounds per square inch (or pascals), with the number of specimens failing at each pressure,

6.1.5 Average failure pressure, calculated by multiplying each pressure by the number of specimens failing at that pressure and dividing the sum of these products by the total number of pieces tested (specimens having withstood the 200-psi (1.4 MPa) test shall be said to have failed at 250 psi (1.7 MPa) for the purpose of calculation), and

6.1.6 Time consumed for steam release, if the pressure was not released immediately at the conclusion of each test.

7. Precision and Bias

7.1 Duplicate determinations should not differ by more than 50 psi (0.34 MPa).

7.2 Bias has not been determined.

8. Keywords

8.1 autoclave; crazing; crazing resistance