

Important Fire Safety Information 5/8" Type X Gypsum Wallboard Standards, Testing, and Certification

Introduction

PABCO® Gypsum receives many requests for “one-hour board”. Ensuing discussions have revealed that there is confusion over the terminology and definitions concerning fire-resistant or fire-resistive systems. The following discussion clarifies the meanings of the terms and cautions concerning the ratings of fire-resistive gypsum board systems.

Summary

- Type X gypsum wallboard, 5/8" in thickness (“5/8” type X wallboard”), is manufactured for use as one component of a assembly/system (such as a wall) where a fire resistance rating is required in a residential, commercial, or other structure by an applicable building code.
- 5/8" type X wallboard is required to be manufactured in accordance with established ASTM standards defining type X wallboard as that which provides not less than one-hour fire resistance when tested in specified building assemblies/systems in a laboratory setting under certain controlled conditions pursuant to certain ASTM standards.
- Because ASTM procedures required that fire tests be conducted on complete building assemblies/systems and not just on the wallboard by itself, the ability of a particular 5/8" type X wallboard product to pass a specific ASTM fire test may well depend on factors other than the fire resistance of the wallboard being tested. These factors include the other components used to construct the building system being tested, the manner in which the system is constructed, and the inherent variability of ASTM fire tests.
- Independent third party organizations, such as Underwriters Laboratories, Inc. (“UL”), may authorize manufacturers to certify or label their 5/8" type X wallboard as acceptable for use in one-hour fire rated systems based on criteria established by the third party organizations. The third party organizations may approve changes to certified formulations using criteria they believe appropriate, such as new full-scale ASTM fire tests, small-scale fire tests, or engineering studies and evaluations, and without requiring a full-scale ASTM one-hour fire test. Accordingly, the fact that a particular 5/8" type X wallboard product has been certified as acceptable for use in one-hour fire rated systems by a third party organization does not necessarily mean that wallboard made according to that specific formulation has been subjected to a full-scale ASTM one-hour fire test.

- Given the very different circumstances that may exist from one fire to another, the differences between conditions in an actual and the laboratory conditions in which a test is conducted, and the inherent variability of ASTM fire tests, passing an ASTM fire test in a controlled laboratory setting or certifying or labeling of 5/8" type X wallboard as acceptable for use in one-hour fire rated assemblies/systems under third party certification or labeling procedures does not mean that either a particular assembly/system incorporating 5/8" type X wallboard or any given piece of 5/8" type X wallboard will necessarily provide "one-hour fire protection" in an actual fire or last for an hour in a new laboratory fire test.
- Even if 5/8" wallboard is referred to using terms such as "one-hour board" or "has a one-hour fire rating" this does not mean that either a particular assembly/system incorporating 5/8" type X wallboard or any give piece of 5/8" type X wallboard will necessarily last for an hour in a new laboratory fire test or provide "one-hour fire protection" in an actual fire.
- Once a 5/8" type X wallboard formula has been certified by a third party organization, the company using that formula to manufacture 5/8" type X wallboard does not have to conduct periodic fire tests on that wallboard as long as the company follows the procedures established by that third party organization to ensure that the wallboard is manufactured in compliance with the certified formula.

Background and Discussion

5/8" type X gypsum wallboard, 5/8" in thickness, is currently manufactured in accordance with ASTM Standard C 36/1396. One section of ASTM C 36/1396 requires type X gypsum wallboard meet specific requirement when tested using the test method defined in an ASTM Standard, the E 119 test, *Standard Test Method for Fire Tests of Building Construction and Materials*. Additionally, all gypsum wallboard manufacturers in the United States subscribe to an independent third party certification and labeling service such as Underwriters Laboratories, Inc. to ensure product consistency and quality.

ASTM E 119 was initially published in 1918 (as ASTM C 19) and has been used continuously since then as the principal method to test the fire-resistance of construction assemblies/systems. (Similar protocols from other standards groups or laboratories were developed later and are used in some cases.) Refinements have been made in the standard since 1918, however, several of its test criteria, including the conditions required to "pass" an individual fire test, have remained essentially unchanged.

The test method described in the ASTM E 119 standard evaluates (in terms of endurance time) "the ability of an assembly[/system,] to contain a fire or to retain its structural integrity, or both, during the test conditions imposed by the standard." By the standard's own definition, ASTM E 119 does not assess individual materials or products for their fire-resistance characteristics. ASTM E 119 does, however, generate results that can be used to evaluate the general fire resistance of assemblies/systems made up

of multiple components such as walls, columns, slabs, and floor- and roof-ceiling systems under laboratory conditions.

The ASTM E 119 standard does not contain specific details for construction of the test furnace. Since test furnaces are subject to variation due to individual characteristics of construction and design, including ventilation, atmospheric conditions, and general thermal tendencies, test results are typically not fully repeatable or reproducible from one laboratory to another. Test results attained in an E 119 test are not precise predictors of future performance. Additionally, differences in assembly/system components and construction methods, the design and control features of individual furnaces, and other variables regarding the testing regimen, can cause wide fluctuations in ASTM E 119 test results. A fire test, therefore, is a snapshot of a single assembly/system at a given time that includes the measurement of the performance of a specific assembly/system, composed of specific materials, constructed in a specific test furnace, on a specific day. This simply means that for a “one-hour fire rating” of a gypsum board assembly/system, all requirements of an ASTM E 119 test were successfully met in a testing laboratory furnace for a least 59 minutes and 30 seconds for that specific assembly/system and with those specific components of the assembly/system.

The ASTM E 119 test method does not incorporate all dynamics essential for fire hazard analysis or fire risk assessment of the assemblies/systems under conditions in an actual fire situation. The results of an ASTM E 119 test, therefore, should be regarded as one component among a variety of factors used to assess the potential of a system to perform as part of a structure.

Model building codes reference the ASTM E 119 standard fire test method (or one of its closely allied counterparts). Gypsum board systems are tested based on the requirements of the ASTM E 119 standard. Referencing the same test method(s) by the building codes facilitates the descriptions and comparisons of fire resistance ratings of assemblies/systems that have been objectively evaluated. Numerical fire resistance ratings created by ASTM E 119 tests may be considered as benchmarks for comparison purposes. The higher the numerical rating (i.e., one, two, three, or four hour(s)), the longer the assembly's/system's comparative endurance. The hourly fire resistance ratings found in commercial and residential building codes that refer to an ASTM E 119 test do not imply that a specific assembly/system will remain intact for the prescribed time of the hourly rating in an actual fire situation.

Fire resistance classifications are based on results of tests conducted on assemblies/systems created with specific materials and built in a specified manner; therefore, variations from the test conditions or the construction specifications (including, but not limited to, the type and size of materials and the method of construction) will affect the results of fire tests. Because fire exposure conditions vary with changes in a wide variety of factors, including the amount, nature, and distribution of available fuel; ventilation; and the size, configuration, and other characteristics of the compartment, the test method contained in the ASTM E 119 standard should not be

considered to be representative of all fire conditions. Fire resistance ratings created through use of the ASTM E119 test method reflect a relative measure of comparative assembly's/system's performance under specific fire test conditions. ASTM E 119 test results should not be construed as having determined performance of an assembly/system under different conditions.

To maintain industry-wide quality assurance standards for 5/8" type X gypsum wallboard, the Gypsum Association requires that all member companies relying on the generic assemblies/systems contained in the Gypsum Association's *Fire Resistance Design Manual* subscribe to an on-going, third-party, in-plant inspection and labeling service. This objective certification and labeling process ensures that manufacturers continue to manufacture the same quality of product as that originally tested. For more information on Underwriters Laboratories, Inc. testing, certification, follow-up, and labeling procedures, visit its Web site at <http://www.ul.com>.