

# GLASS BLOCK FIRE RATING FACTS:

**SUMMARY:** Ambiguous and potentially misleading information on glass block fire resistance has been disseminated to architects, interior designers, owners, builders and national code bodies.

The facts are that all Underwriters Laboratories® (UL®) fire-rated glass block on the market are tested in accordance with UL®9 (Fire Test of Window Assemblies) for a 45-minute or longer period. All national building codes recognize this test.

The UL® window assembly tests performed on glass block do not qualify glass block products for use in wall assemblies. Presently, no glass block are qualified as fire-rated wall assemblies because none can pass the UL® wall assembly test.

## Product Fire Resistance Versus Published Data

When designing a building, there is probably no greater concern by architects, designers and owners than that of fire. The fire-resistant characteristics of construction materials under consideration play a significant part in their specification and ultimate incorporation into a finished structure.

Of particular concern is the possibility of specifying a fire resistant product or equal when, in fact, the product has not been subjected to testing for the specific application or recognized by the major building codes.

Thus, accurate representation of fire-rating data is of critical importance. Ambiguous or misleading information which results in the specification or use of an unqualified product can have serious consequences. These could range from costly engineering change orders, replacement of an already installed product, to costly, time consuming lawsuits. Of even more importance is the potential for serious injury or loss of life in a fire due to failure of the product to achieve the intent of the codes.

Compounding the problem of vague product data is the fact that even code officials and building inspectors must often rely solely on manufacturer-supplied test data. While the appropriate installation of a product frequently can be visually ascertained during inspection, the behavior of a product under stress, i.e. fire, must be accepted at the "face value" of a manufacturer's reported product test results.

## ASTM & Underwriters Laboratories®

Most of the materials testing performed in this country, and even in other parts of the world, is based on test methods developed by the American Society of Testing and Materials, ASTM. This independent body's standardized testing procedures are created through technical committees of volunteer, expert representatives from all phases of industry. But, while ASTM develops the tests used to measure product performance for comparative evaluation, it is independent organizations, such as Underwriters Laboratories®, Inc. which perform these tests in an unbiased manner upon a manufacturer's request.

## Glass Block Wall Tests Versus Window Tests

Of specific concern in this report are the ASTM tests for "wall assemblies" and for "window assemblies"—ASTM E119 and ASTM E163, respectively; and Underwriters Laboratories® application of the window test, "Standards for Fire Tests of Window Assemblies, UL®9."

The differences in the ASTM window and wall tests are of critical importance, and, as might not be immediately appreciated, the standards for walls are *much* more stringent than those for windows. Table 1 presents these differences:

TABLE 1  
WINDOW/WALL TEST DIFFERENCES

Wall Assemblies (ASTM E119)	Window Assemblies (ASTM E163, UL 9)
Measures transmission of heat	Does not measure transmission of heat
To pass, requires that the temperature increase on the unexposed side not exceed 250°F above its initial temperature	Does not measure temperatures on the unexposed side
To pass, requires no passage of flames or gases hot enough to ignite combustibles	Does not measure passage of smoke or products of combustion
To pass, no openings may develop that allow water to pass through during the hose stream test	Allows up to 30% through openings in panel, which may therefore allow water to pass during the hose stream test

Unlike the wall assembly test which measures a material's integrity, stability and thermal transmission, the glass block window test *only* determines the ability of the assembly to remain *structurally* sound, that is remain in the opening for 45 minutes or longer. As Table 1 shows, the window test does *not* measure the assembly's contribution as a fire hazard, its unexposed surface temperatures, or its limiting affect on the passage of products of combustion through the assembly.

Basically, the window assembly test consists of exposing a panel to a fire under controlled temperature conditions in a furnace. The panel is removed from the furnace after 45 minutes or longer and immediately subjected to a standard water hose stream test to determine impact and thermal shock effects. A glass block window assembly passes if at least 70% of its glass block do not develop openings through both faces of the block.

## A significant fact to note:

Today, there is *no* glass block product, of any composition or design, that can provide the fire resistance characteristics of a wall assembly; and there is *no* glass block product that will pass the ASTM/UL® test for a *wall* assembly.

The data obtained from the window assembly test obviously does not compare with that for a wall—and acceptable results for one test offer no basis for compliance with the other.

In spite of the fact that 45-, 60- and 90-minute, fire-rated glass block do exist, architects, designers or building owners could be misled into believing that these glass block *would* be acceptable for fire-rated wall assembly installations.

In reality, the test results carry no implication as to qualification of these products for use as a fire-rated *wall* assembly.

In summary, the UL® window assembly tests performed on all glass block—including Pittsburgh Corning's—do not qualify these products for use as fire-rated wall assemblies. And, secondly, higher fire-rated glass block are not "more qualified" for wall applications than the 45-minute-rated glass block.



It is suggested that the prudent course for all architects, designers and building owners is a very careful examination of any fire-rating claims.

## Use of Glass Block In Wall Assemblies: The Only Exceptions

This information should not be interpreted as *totally* excluding glass block from incorporation into those wall assemblies required to have a 1-hour fire rating. Over the past several years, Pittsburgh Corning has worked closely with the major, national code bodies to qualify the use of 45-minute-or-longer-rated, glass block opening "protectives" in 1-hour-rated wall assemblies.

Table 2 presents the major building codes and their paragraph references allowing rated window assemblies.

**TABLE 2  
CODES ACCEPTING 45-MINUTE OR LONGER GLASS  
BLOCK "WINDOW" IN 1-HOUR WALL ASSEMBLIES**

CODE	YEAR	PARAGRAPH
BOCA National Building Code (Building Officials & Code Administrators)	1996	2118.1
Standard Building Code Conference International, Inc. (SBCCI)	1994	704.2.1.4
Uniform Building Code - UBC (International Conference of Building Officials)	1994	713.9 (Vol. 1) & 7.407.2 (Vol. 3)

## Helping You To Make An Informed Choice

It is regrettable that potentially harmful confusion has clouded the serious matter of glass block fire resistance. Suffice it to say, at present there is no one glass block product that exhibits a superior ASTM/UL® rating and thus qualifies as a wall assembly.

It is hoped that this report from Pittsburgh Corning Corporation will give you cause to question *all* glass block fire-ratings.

In the final analysis, you have to make your own glass block specification decisions. But, Pittsburgh Corning believes that now you will be able to make a more informed choice.

## Fire Resistance

All sizes and patterns (except products not fire-rated) of *Premiere* and *Thinline™* Series Pittsburgh Corning Glass Block products in panels up to 120 sq. ft. in masonry walls or 94 sq. ft. in non-masonry walls are classified by Underwriters Laboratories® for use as 45-minute-rated window assemblies. These panels are usually acceptable as window assemblies for use in fire separation walls requiring ratings of one hour or less.

THICKSET® and VISTABRIK® block are all listed for use as 45-, 60- or 90-minute fire rated window assemblies in panels up to 100 sq. ft.

**Refer to the latest issue of UL® Building Materials Directory as well as your local building codes.**

- Underwriters Laboratory® Classification: R2556
- Underwriters' Laboratories of Canada File CR1715
- In accordance with NFPA 80, Chapter 14.

## Fire Rated Glass Block Window Assemblies

Pittsburgh Corning Glass Block products previously listed have been tested and classified by Underwriters Laboratories® (UL®) for use as fire-rated window assemblies to panel sizes and dimension limitations listed below.

Where permitted by Building Codes, glass block fire-rated window assemblies having a fire resistance rating of not less than 45 minutes, may be used as "opening protectives" and to not exceed 25% of the wall areas separating a tenancy from a corridor or a corridor from an enclosed vertical opening or one fire-rated area from another fire-rated area.

### Exception:

Although glass block masonry units have been tested as window assemblies (*not* wall assemblies), they may be used as a one hour fire partition as required for corridors in the enclosure of atriums *only* when sprinkler protection is provided on occupied sides.

### 45- and 60-Minute Rated Construction:

All 45- and 60-minute rated Pittsburgh Corning Glass Block products may be used in both masonry and non-masonry (steel or wood stud gypsum board) walls. These rated glass block windows may be framed and anchored with either PC® Panel Anchor construction or channel-type restraints. The use of a fire retardant type sealant for head and jamb locations is required. Specifications and construction details of such panels are as per Pittsburgh Corning Corporation recommendations.

Non-masonry, fire-rated steel stud/gypsum board walls must conform to UL® listed wall assembly #U465. Framing and support of the rated glass block window assembly shall be provided with double-studding with height of supporting wall limited to no more than 3 feet.

### 90-Minute Rated Construction:

Where permitted by building codes, all 90-minute rated Pittsburgh Corning Glass Block products may be used in masonry walls *only*; framed and anchored with ¼ in. thick steel (not aluminum) channel-type restraints or masonry chases. *The use of panel anchor construction is not permitted.* Specifications and construction details of such panels are as per Pittsburgh Corning Corporation recommendations.

### Exception:

In 90-minute rated glass block window assemblies, twice the thickness (¾ in. total) of expansion material is required at head and jamb locations, as well as the use of a fire retardant type sealant.

### 45-Minute Rated Curved Construction:

The glass blocks noted under 90-minute "rating" and those 8" x 8" x 3/8" sized glass blocks noted under 45-minute "rating" are classified for use in masonry walls as curved window assemblies provided that the maximum allowable curvature does not exceed a ratio of 2:1 with respect to length of radius to length of assembly width.

### Pittsburgh Corning Glass Block products not fire-rated.

- All 12" x 12" sizes
- All Delphi® patterns
- All HEDRON®, ENCURVE®, ARQUE™ Block, Frosted Block—VUE® Pattern, TRIDRON 45° Block® corner and EndBlock™ finishing units
- All Paver Units.

**Refer to the latest issue of UL® Building Materials Directory as well as your local building codes and officials.**