

FIRE RATINGS OF BRICK VENEER ON WOOD FRAME CONSTRUCTION

In 2006 Southwest Research Institute performed ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials for the Brick Industry Association, Reston, VA. All test panels consisted of wood framed walls typical of residential and some commercial construction with three different thicknesses of hollow brick veneer. Wall construction was as follows from inside to outside:

Test Panel 1	Test Panel 2	Test Panel 3
<ul style="list-style-type: none"> • 1/2" paper faced gypsum board • 2x4 wood studs (1.5"x3.5") w/ 3.5 inch batt insulation • 7/16" OSB • 15 lb asphalt paper WRB • 1" air space • 3.50" clay brick attached with 22 ga corrugated strip ties 	<ul style="list-style-type: none"> • 1/2" paper faced gypsum board • 2x4 wood studs (1.5"x3.5") w/ 3.5 inch batt insulation • 7/16" OSB • 15 lb asphalt paper WRB • 1" air space • 2.87" clay brick attached with 22 ga corrugated strip ties 	<ul style="list-style-type: none"> • 1/2" paper faced gypsum board • 2x4 wood studs (1.5"x3.5") w/ 3.5 inch batt insulation • 7/16" OSB • 15 lb asphalt paper WRB • 1" air space • 1.75" clay brick attached with 22 ga corrugated strip ties

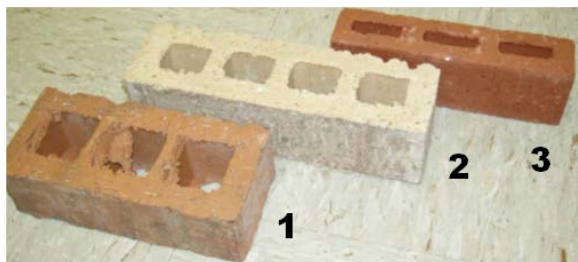


Photo 1 – Samples of brick used in these tests are shown in the photo to the left.

Brick 1 is a hollow modular brick

Brick 2 is a typical King size brick used in residential and some commercial construction

Brick 3 is a special 1 3/4" brick made for this test.

All three test panels were exposed to temperatures prescribed in ASTM E119 for 1 hour. After full fire exposure, panels were removed from the test chamber and subjected to the hose stream test. All three panels passed the fire exposure and hose stream test to qualify for a 1-hour fire rating.

Panel 1 (Photo 2) – was undamaged. There was no charring or singeing of combustible materials in the brick cavity. Asphalt paper heated only enough to stain the OSB.

Panel 2 (Photo 3) – had some charring as temperatures in the brick cavity reached 350 deg F. There was minor cracking in the brickwork after fire exposure and hose stream.

Panel 3 (Photo 4) – had some combustion of asphalt paper and OSB in the brick cavity and flames erupted from cracks in the brickwork after the panel was removed. It was clearly at the end of its useful fire exposure, but no flame passed through the wall, cool side temperatures were less than allowed, and the assembly was not breached by the hose stream. See Photo 4 below.

CONCLUSIONS

These tests clearly demonstrate the ability of commonly used anchored brick veneer to resist outside fire exposure of up to one hour. The minimum brick thickness in these tests was far less than the 2.625" minimum thickness of anchored veneer in the masonry code (TMS 402/ACI 530/ASCE 5). Yet all three panels passed the 1-hour fire exposure test with hose stream. So any wood framed wall with similar construction and code compliant anchored brick veneer would qualify for 1-hour fire resistance from outside exposure.



Photo 2 – Test panel 1



Photo 3 – Test panel 2

REFERENCES

ASTM C 270-06, *Standard Specification for Mortar for Unit Masonry*, Vol. 04.05, Annual Book of Standards, ASTM International, West Conshohocken, PA, June 2006. (ASTM 2006a)

ASTM C 652-05a, *Standard Specification for Hollow Brick*, Vol. 04.05, Annual Book of Standards, ASTM International, West Conshohocken, PA, June 2006. (ASTM 2006b)

ASTM E 119-05a, *Standard Test Methods for Fire Tests of Building Constructions and Materials*, Vol. 04.07, Annual Book of Standards, ASTM International, West Conshohocken, PA, November 2005. (ASTM 2006)

Fire Resistance Directory, Volume 1, Underwriters Laboratories, Northbrook, IL, 2006. (UL 2006)

International Building Code, International Code Council, Washington, DC, January 2006. (IBC 2006)

International Residential Code, International Code Council, Washington, DC, February, 2006. (IRC 2006)

Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies, ACI 216.1-97/TMS 0216.1-97, American Concrete Institute, Farmington Hills, MI, September 1997. (ACI 1997)

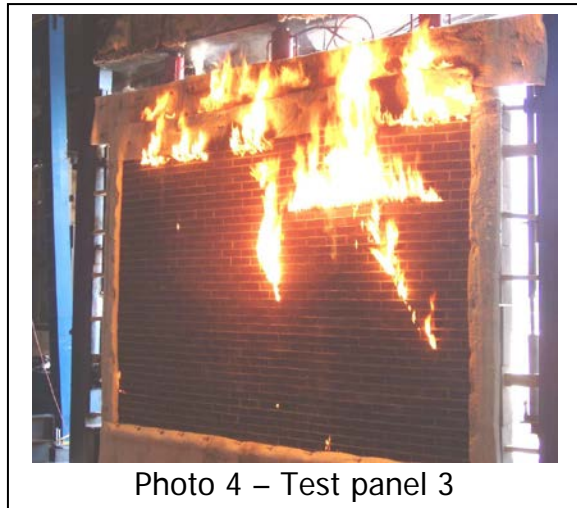


Photo 4 – Test panel 3