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April 2017

To Whom It May Concern,

Attached is the *Engineering Evaluation Engineering Extensions based on 4 NFPA Tests Prepared for Rmax Operating*

Refer to pages 4 and 12 to find multiple VaproShield WRB/Air Barrier membranes as an acceptable air/water membrane solution in the NFPA 285 assembly tests conducted for Rmax.

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PRIEST & ASSOCIATES CONSULTING, LLC

ENGINEERING EVALUATION

Engineering Extensions based on 4 NFPA 285 Tests

Project No. 10220, Revision 2

Prepared for:

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June 6, 2014

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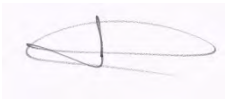
Abstract

Four NFPA 285 test reports and cone calorimeter data was submitted to determine Engineering Extensions on wall components of NFPA 285 wall designs. These include exterior sheathing, water resistive barrier (WRB), exterior insulation, exterior WRB, air gap, and claddings. We have determined that Engineering Extensions on various components of the tested wall designs can meet the criteria of NFPA 285 with specific limitations.

The conclusions reached by this evaluation are true and correct, within the bounds of sound engineering practice. All reasoning for our decisions is contained within this document.



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Date: June 6, 2014

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INTRODUCTION

Four NFPA 285 tests were conducted on various configurations of Rmax exterior wall system designs. The designs incorporated many components including exterior insulation, air gaps, and claddings. Additionally, cone calorimeter data was submitted for analysis to allow specific WRB materials to be added without negatively affecting expected NFPA 285 test results.

The purpose of this evaluation is to determine Engineering Extensions for the components that can meet the requirements of NFPA 285.

From the four wall systems tested, an analysis is conducted on the components tested. This will form a base wall system from which replacement components can be added.

REFERENCE DOCUMENTS

1) *ITS Test Report 100354356SAT-004 NFPA 285 Rmax TSX-8500 w/ Alpolic ACM*

2) *ITS Test Report 101574268SAT-001A NFPA 285 Rmax ECOMAXci w/ Brick*

3) *ITS Test Report 101574268SAT-001B NFPA 285 Rmax ECOMAXci w/ Alpolic ACM*

4) *SWRI Report 01.15210.01.613 NFPA 285 Rmax TSX-8500 w/ Brick*

5) *HAI Report 1JJB00041.000 NFPA 285 Engineering Analysis*

6) *NFPA 285-12 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-loadbearing Wall Assemblies Containing Combustible Components*

7) Babrauskas, V., Lucas, D., Eisenberg, D., Singla, V., Dedeo, M., & Blum, A. (2012). Flame retardants in building insulation: a case for re-evaluating building codes. *Building Research & Information*. doi:10.1080/09613218.2012.744533

8) *Cone Calorimeter Data for Rmax, Henry, BASF, Carlisle, Soprema, Prosoco, Vaproshield – Data Confidential between manufacturers and Priest & Associates.*

9) *Priest & Associates Consulting EEV 10213 – Stone Panels Inc. NFPA 285 EEV*

TABLE OF SUBSTITUTIONS

The results of the analysis is presented in the following table which lists the allowable substitutions based on the tests submitted and Engineering Extensions as detailed in the remainder of this report.

Wall Component	
Base Wall – Use either 1, 2 or 3	1) Cast Concrete Walls 2) CMU Concrete Walls 3) 20 GA (min.) 3⅝ in. (min.) steel studs spaced 24 in. o.c (max.) a. ½ in. (min.) type X Special Fire Resistant Gypsum Wallboard Interior
Fire-Stopping in Stud Cavity at floor-lines	1) 4 pcf mineral fiber insulation installed with z-clips
Cavity Insulation – Use either 1, 2, 3 or 4	1) None 2) Any non-combustible insulation per ASTM E136 3) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 4) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced)
Exterior Sheathing – Use either 1 or 2	1) ½ in. or thicker exterior gypsum sheathing 2) None

WRB Over Sheathing– Use either 1 or 2 installed per mfr's application instructions. Note: when using exterior sheathing, option 2 (no exterior sheathing) items 2 a-d may be applied directly to studs.	1) None 2) Any WRB which has been tested per ASTM E1354 (at a minimum of 20 kW/m^2 heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than the exterior insulation foam core. The following WRB products are allowed: a. Pactiv Green Guard®Max Building Wrap b. Tyvek Commercial Wrap c. Dow Weathermate™ d. Dow Weathermate™ Plus e. Carlisle (CCW) Fire Resist 705FR-A f. Carlisle (CCW) Fire Resist Barritech NP g. Carlisle (CCW) Fire Resist Barritech VP h. BASF Enershield HP i. BASF Enershield I j. Henry Air Bloc 31MR k. Henry EnviroCap l. Henry Air Bloc 33MR m. Henry Air Bloc 21 FR n. Henry VP 160 o. Henry Air Bloc 17 p. Henry BlueSkin SA q. Henry FoilSkin r. Soprema Stick VP s. Prosoco R-Guard Spray Wrap t. Prosoco R-Guard MVP u. Prosoco R-Guard VB v. Prosoco R-Guard Cat 5 w. Vaproshield Revealshield SA x. Vaproshield Wrapshield SA
Exterior Insulation – Use either 1 or 2	1) 3 in. (max. consisting of a single panel or multiple thinner panels) Rmax TSX-8500 2) 3 in. (max. consisting of a single panel or multiple thinner panels) Rmax ECOMAXci.
WRB Over Exterior Insulation – Use either a. – h. for claddings 1-6 with non-open joint installation technique, or i. – n. for all approved claddings 1-12 below. Note: items b-d and j-l are not traditional WRB products, but are insulation panel joint tapes. The insulation panel joints shall be staggered. These tapes are listed to allow use in both categories 1-6, or 1-12).	1) For use with cladding options 1-6 (Brick Equivalent) with non-open joint installation technique. a. None b. 6 in. (max.) Venture Tape CW over insulation joints c. 6 in. (max) Rmax R-SEAL 3000 over insulation joints d. 6 in. (max.) asphalt or butyl based tape over insulation joints e. Pactiv Green Guard®Max Building Wrap f. Tyvek Commercial Wrap g. Dow Weathermate™ h. Dow Weathermate™ Plus For use with all approved claddings 1-12 as written below i. None j. 6 in. (max.) Venture Tape CW over insulation joints k. 6 in. (max) Rmax R-SEAL 3000 over insulation joints l. 6 in. (max.) asphalt or butyl based tape over insulation joints m. Henry FoilSkin n. Carlisle (CCW) Fire Resist 705FR-A

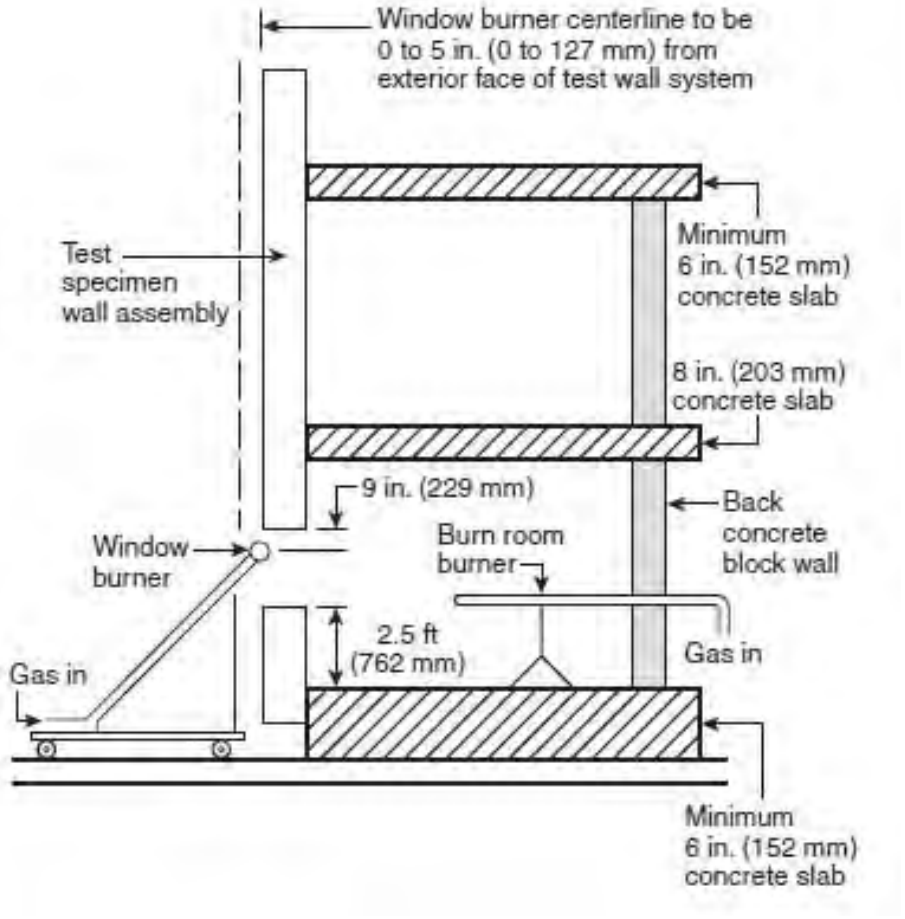
Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12 Note: For WRB over exterior insulation options a. – h. above, claddings 1-6 shall incorporate non-open joint installation techniques. Note: WRB over exterior insulation items b. – d. and j. – l. are not traditional WRB products, but are insulation panel joint tapes. The insulation panel joints shall be staggered. These tapes are listed to allow use in both categories of claddings (1-6 or 1-12).	1) Brick – Nominal 4 in. clay brick or veneer with maximum 2 in. air gap behind the brick. Brick Ties/Anchors 24 in. o.c. (max) 2) Stucco – minimum ¾ in. thick exterior cement plaster and lath with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. 3) Limestone – minimum 2 in. thick using any standard installation technique. 4) Natural Stone Veneer – minimum 2 in. thick using any standard installation technique. 5) Cast Artificial Stone – minimum 1½ in. thick complying with ICC-ES AC 51 using any standard installation technique. 6) Terra Cotta Cladding – minimum 1¼ in. thick using any standard installation technique. 7) Any MCM (aluminum, steel, copper) (w/ 1⅛ in. ± ½ in. air gap) that has successfully passed NFPA 285 using any standard installation technique. 8) Uninsulated sheet metal building panels including aluminum, steel or copper using any standard installation technique. 9) Uninsulated Fiber-cement siding using any standard installation technique. 10) Stone/Aluminum honeycomb composite building panels that have passed NFPA 285 or equivalent. a. Stone Panels Inc. Stone Lite Panel system has been analyzed using mfr's standard installation technique. 11) Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 using any standard installation technique. 12) Thin Set Brick a. Glen Gery Thin Tech Elite has been analyzed using mfr's standard installation technique.

Note: Window Headers for all constructions shall incorporate 0.078 in. (min.) aluminum flashing to cover air gaps between the exterior insulation and exterior façade. Also, flashing of window, door, and other exterior wall penetrations may be done with asphalt, acrylic, or butyl based flashing tape – max. 12 in. width, or R-SEAL 6000 35 mil thick woven polyethylene tape – max. 12 in. width.

EVALUATION METHOD

NFPA 285 Criteria

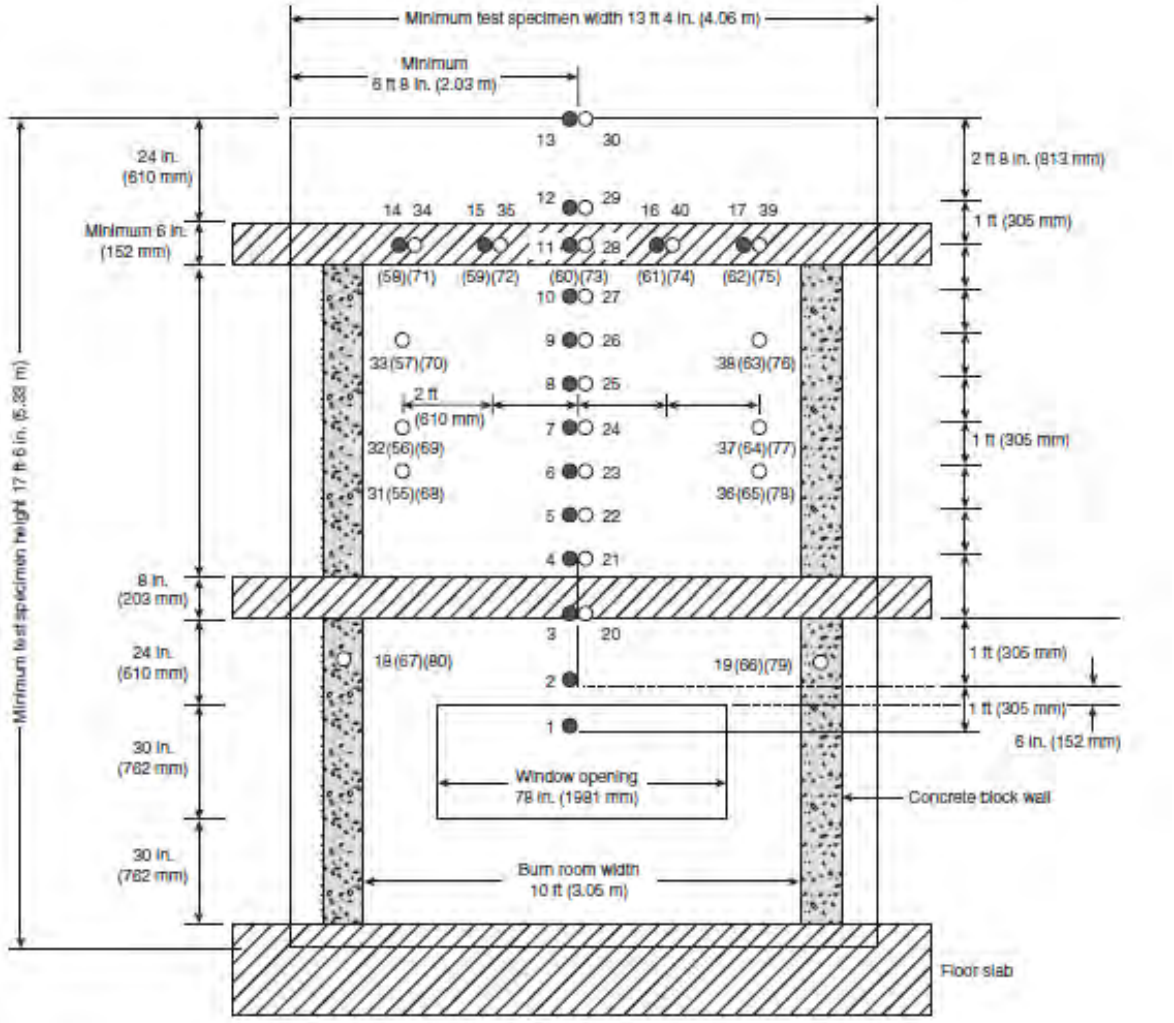
The NFPA 285 fire test (Ref. 6) is designed to test the flame spread properties of exterior walls containing combustible components. Two non-combustible rooms are stacked to simulate two stories of a multi-story building. The wall assembly is then attached to the exterior face of the rooms. A typical test wall measures 14 ft x 18 ft with a 30 in. x 78 in. window opening placed on the bottom floor.



Two burners are ignited to produce a specific time-temperature profile in the room and on the exterior face of the wall.

Thermocouples are placed at strategic locations to monitor temperature as an indicator of flame spread.

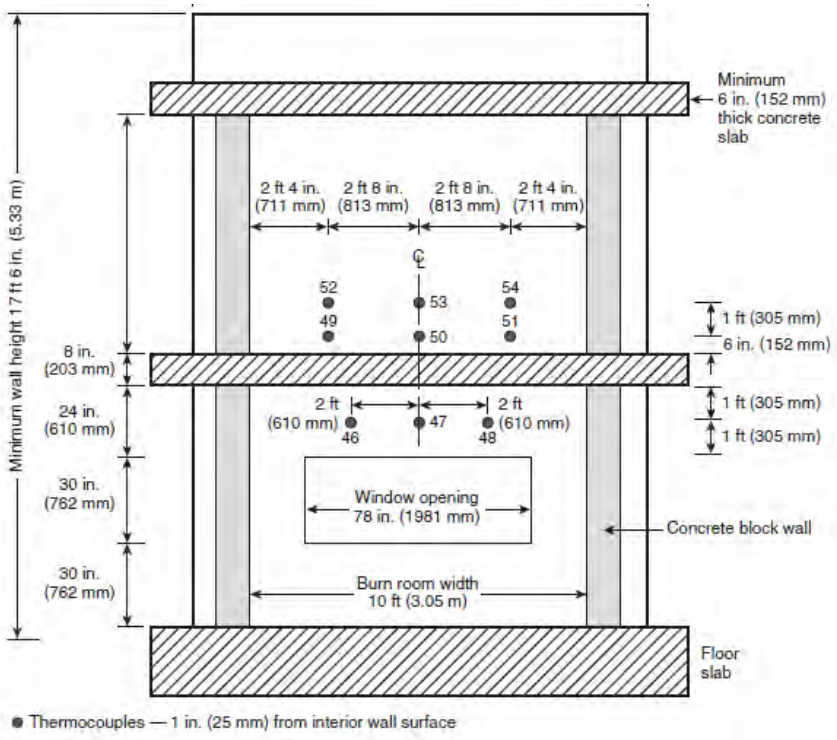
In the depictions below, thermocouples 1-10, and 20-27 are not used for compliance purposes. The remainders are used to monitor flame spread.



● Thermocouples — 1 in. (25 mm) from exterior wall surface

○ Thermocouples — in the wall cavity air space or the insulation, or both, as shown in Figure 6.1(b) Details A through I.

( ) Thermocouples — Additional thermocouples in the insulation or the stud cavity, or both, where required for the test specimen construction being tested, as shown in Figure 6.1(b) Details C through I.



During a test, a calibrated fire starts in the bottom room. After 5 minutes, the exterior burner is ignited to produce a specific heat flux/temperature pattern on the exterior of the wall. Both burners remain ignited during the 30 minute test. Personnel monitor flame spread visually during the course of the test. A computer data acquisition system monitors and records the thermocouples temperatures. The criteria for passing (Ref. 6) are as follows (reworded in simpler terms for this analysis):

1) Flames shall not spread vertically 10 ft above the window opening as determined visually or by thermocouples located at the 10 ft level. Failure occurs when thermocouples 11 or 14-17 exceed 1000°F.
2) Flames shall not spread (visually) horizontally 5 ft on either side of the centerline of the window opening.
3) Flames shall not spread inside the wall cavity as determined by thermocouples placed within the wall cavity insulation and air-gaps if present. Failure occurs when thermocouples 28 or 31-40, or 55-65 and 68-79 exceed 750°F above ambient.
4) Flames shall not spread horizontally within the wall cavity past the interior room dimension as determined by wall cavity thermocouples. Failure occurs when thermocouples 18-19 or 66-67, or 79-80 exceed 750°F above ambient.
5) Flames shall not spread to the second story room as determined by interior wall surface thermocouples. Failure occurs when thermocouples 49-54 exceed 500°F above ambient.
6) Flames shall not occur in the second story (visually).
7) Flames shall not escape (visually) from the interior to the exterior at the wall/wall intersection of the bottom story room.

Constructions Tested

The table below outlines the reports submitted for analysis (Refs. 1-4). For each tested system, critical components are listed. These include interior sheathing, steel studs, exterior insulation, air gaps, claddings and window details.

Some details such as faster patterns, application rates, etc. are not included. For those details, the descriptions in the referenced reports should be used.

Reports Submitted

Ref.	Int. Sheath	Stud	Cavity Insulation	Ext. Sheath	WRB	Ext. Insulation	Ext. WRB	Gap	Ext. Cladding
1. Note 1	⅝ in. Type X	20 GA. 3⅝ in. 24 in. o.c. w/ lateral Bracing every 4 ft vertically	None – no floor line firestop reported	None	None	3 in. Rmax TSX-8500	None – Joints taped with 4 in. Venture Tape CW	Not reported – TFC dwg states approx . 1⅛ in.	Alpolic/fr ACM Thickness not reported
2. Note 2	⅝ in. Type X	20 GA. 3⅝ in. 24 in. o.c. w/ lateral Bracing every 4 ft vertically	None – 4pcf mineral fiber floorline firestopping w/ z-clips	None	None	3 in. Rmax ECOMAXci	None. Joints taped with 4 in. alum. foil tape	2 in.	4 in. nom. Clay Brick
3 Note 3	⅝ in. Type X	20 GA. 3⅝ in. 24 in. o.c. w/ lateral Bracing every 4 ft vertically	None – no floorline firestop reported	None	None	3 in. Rmax ECOMAXci	None – Joints taped with 4 in. Venture Tape CW	Not reported – TFC dwg states approx. 1-1/8 in.	Alpolic/fr ACM Thickness not reported
4 Note 4	⅝ in. Type X	20 GA. 3⅝ in. 24 in. o.c. w/ lateral Bracing every 4 ft vertically	None – 4pcf mineral fiber floor line firestopping w/ z clips	None	None	3 in. Rmax TSX-8500	None – Joints taped with 4 in. Venture Tape 1520CW	2 in.	4 in. Nom Clay Brick

Note 1: Window Header 0.081 in. Aluminum
Note 2: Window Header 0.078 in. Aluminum
Note 3: Window Header 0.081 in. Aluminum
Note 4: Window Header 0.078 Aluminum

Analysis of Components

When making flammability comparisons of NFPA 285 wall systems, the elements which could potentially cause increased flame spread should be considered. The wall systems depicted above all have similar design elements – differing only in brand/type/model of components for each element. Each wall consisted of a base wall utilizing steel studs, exterior insulation, air gap, and exterior cladding. Since each system is unique, the analysis below outlines the various brands/types/models of components used for each element and criteria are established for interchanging/removing/adding brands/types/models of components for each element.

1) **Interior Gypsum Wallboard** – All Tests incorporated ⅝ in. type X gypsum wallboard. Experience has shown that using ½ in. regular gypsum wallboard causes failures of thermocouples 18 and 19 (Foam Core Thermocouples). Therefore, use of ½ in. regular gypsum board is not permitted as

the interior sheathing. However, ½ in. type X Special Fire Resistant Gypsum wallboard may be used since it performs similar to ⅝ in. type X in 30 minute NFPA 285 fire tests (Ref. 5).

2) **Steel Studs** – All tests incorporated 3⅝ in. steel studs. The thinnest gauge used was 20 GA. (Refs. 1-4). These were spaced 24 in. o.c. with lateral horizontal bracing. Field applications typically use 16 or 24 in. o.c. spacing and these are allowed. Wider spacing is worst case since the wall is potentially more flexible and prone to warping. Care must be taken to choose the gauge needed to support items such as z-clips or ties used to support panels or claddings. *Since the tests in Ref. 2 and 4 incorporated brick ties and bricks (the heaviest cladding), 20 GA. or heavier may be used in all of the designs referenced (Refs. 1-4.)*

3) **Cavity Insulation** – The tests listed above did not incorporate cavity insulation. *However, any noncombustible insulation or listed fiberglass (faced or unfaced) may be added to any wall system listed above (Refs. 1-4), since this does not increase flammability and decreases the air cavity behind the exterior insulation when sheathing is not used.*

4) **Exterior Sheathing** – The tests listed above did not incorporate exterior sheathing. *Exterior sheathing (min. ½ in.) may be added to any of the test designs (Ref. 1-4) since this reduces the air cavity behind the exterior insulation.* This allows installation of various WRB products as described below. *Note, if exterior sheathing is not used, it is not possible to attach many WRB products, except those that are thin sheet building wraps which can be applied directly to studs.*

5) **WRB Over Exterior Sheathing** - The constructions tested did not incorporate WRB products behind the exterior insulation. However, cone calorimeter analysis (Ref. 8) allows use of WRB products which are less flammable than the core of the Rmax exterior insulation. Additionally, since the Rmax insulation is clad on both sides with foil facers, it acts as an effective ignition barrier for the WRB product. Also, in order for a WRB product to ignite, the fire must first penetrate the exterior insulation. Since this insulation chars and is clad on both sides with aluminum foil facers, ignition of the WRB is unlikely since the foil and char acts as an effective ignition barrier. Additionally, analysis of the tested systems by a reputable fire consulting firm (Ref. 5), allows use of various WRB products over the exterior sheathing. The allowed WRB products are listed in the Engineering Extensions section below. *Note, if exterior sheathing is not used, it is possible to attach thin sheet building wraps applied directly to studs.*

6) **Exterior Insulation** – All constructions as referenced herein utilized exterior insulation. Two products were tested. These were: 3 in. Rmax TSX-8500; and, Rmax ECOMAXci. *Since all products passed the NFPA 285 tests using ACM building panels (considered worst case), these insulation products (up to 3 in. thick consisting of a single panel or multiple thinner panels) may be substituted for each other in the tested designs (Refs. 1-4).*

7) **Exterior WRB** - All constructions as referenced herein did not utilize WRB's over the exterior insulation. They did use foil tape for panel joints. The product used was 4 in. Venture Tape CW. *This tape may be used in any of the tested designs (Ref. 1-4).* Additionally, some WRB products are known to have nearly zero combustibility based on cone calorimeter data (Ref. 11). These may be added since they will improve the overall flammability of the wall design. Also, analysis of the tested systems by a reputable fire consulting firm (Ref. 5), allows use of various WRB products over the exterior insulation. The allowed WRB products are listed in the Engineering Extensions section below. Additionally, specific tapes applied to panel joints are allowed (Ref 5) since the joints are not continuous (staggered).

8) **Air Gap** - All constructions as referenced herein (Refs. 1-4) utilized air gaps between the exterior cladding and the exterior insulation. Various gap sizes were installed ranging from 1⅛ in. (ACM) to 2 in. (Brick). Typically, smaller air gaps tend to spread flame less than larger air gaps (Ref. 10). *It would therefore not be possible to increase the size of the air gap for any of the claddings in this report (Refs. 1-4). However, any air gap listed may be reduced.*

9) **Exterior Cladding** - All constructions as referenced herein (Refs. 1-4) utilized exterior claddings. Various types were installed. These were ACM building panels and Brick. *In all cases, Brick (with up to 2 in. air gap and 0.078 (min) aluminum flashing) may be substituted for ACM cladding since it represents the heaviest (greatest heat sink), thickest material (high R Value).* ACM building panels are considered worst case since the product easily melts and degrades under NFPA 285 heat flux conditions.

Engineering Extensions

Base Walls
Since all tests submitted (Refs. 1-4) utilized steel stud (minimum 20 GA. with lateral bracing every 4 ft above window) base wall systems, other base wall types which tend to perform the same or better are allowed. These include:

1) Cast Concrete Walls
2) CMU Concrete Walls
3) 20 GA. (min.) 3⅝" (min.) steel studs spaced 24 in. o.c (max)
    a. ½" type X Gypsum Special Fire Resistant Gypsum Wallboard Interior

Cavity Insulation
The tests submitted (Refs. 1-4) did not utilize stud cavity insulation. Any noncombustible cavity insulation may be utilized in the referenced designs. Additionally, any listed faced or unfaced fiberglass insulation may be utilized. The list of approved cavity insulations is listed below:

1) None
2) Any noncombustible insulation per ASTM E136
3) Any Mineral Fiber (Board type Class A, ASTM E84 faced or unfaced)
4) Any Fiberglass (Batt Type Class A, ASTM E84 faced or unfaced)

Exterior Sheathing
Since the tests submitted did not utilize exterior gypsum sheathing, adding sheathing will improve the overall flammability of the wall designs (Ref. 1-4) since the air gap behind the exterior insulation is reduced. The list of approved sheathings is listed below:

1) ½" or thicker exterior gypsum sheathing
2) None

WRB over Exterior Sheathing.
Based on the WRB analysis described above, the following WRB products are allowed if exterior sheathing is used:

1) None
2) Any WRB which has been tested per ASTM E1354 (at a minimum of 20 kW/m^2 heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than the exterior insulation foam core. Cone Calorimeter data submitted (Ref. 8) and 3rd party analysis (Ref. 5) will allow the following WRB products:
    a. Pactiv Green Guard®Max Building Wrap
    b. Tyvek Commercial Wrap
    c. Dow Weathermate™ Wrap
    d. Dow Weathermate™ Plus Wrap
    e. Carlisle (CCW) Fire Resist 705FR-A
    f. Carlisle (CCW) Fire Resist Barritech NP
    g. Carlisle (CCW) Fire Resist Barritech VP
    h. BASF Enershield HP
    i. BASF Enershield I

j. Henry Air Bloc 31MR
k. Henry EnviroCap
l. Henry Air Bloc 33MR
m. Henry Air Bloc 21 FR
n. Henry VP 160
o. Henry Air Bloc 17
p. Henry BlueSkin SA
q. Henry FoilSkin
r. Soprema Stick VP
s. Prosoco R-Guard Spray Wrap
t. Prosoco R-Guard MVP
u. Prosoco R-Guard VB
v. Prosoco R-Guard Cat 5
w. Vaproshield Revealshield SA
x. Vaproshield Wrapshield SA

WRB over studs without Exterior Sheathing.

Based on the WRB analysis described above, the following WRB thin film wrap products are allowed if exterior sheathing is not used (i.e., with the wrap applied directly to studs).

a. Pactiv Green Guard®Max Building Wrap
b. Tyvek Commercial Wrap
c. Dow Weathermate™ Wrap
d. Dow Weathermate™ Plus Wrap

Exterior Insulation
Based on the discussion in Analysis of Components, the following is allowed:

1) 3 in. (max. consisting of a single panel or multiple thinner panels) Rmax TSX-8500
2) 3 in. (max. consisting of a single panel or multiple thinner panels) Rmax ECOMAXci.

Exterior WRB Applied over Exterior Insulation
Based on the discussion in Analysis of Components, the following is allowed:

2) For use with cladding options 1-6 (Brick Equivalent) with non-open joint installation technique.
    a. None
    b. 6 in. (max.) Venture Tape CW over insulation joints
    c. 6 in. (max) Rmax R-SEAL 3000 over insulation joints
    d. 6 in. (max.) asphalt or butyl based tape over insulation joints
    e. Pactiv Green Guard®Max Building Wrap
    f. Tyvek Commercial Wrap
    g. Dow Weathermate™
    h. Dow Weathermate™ Plus

For use with all approved claddings as written below

    i. None
    j. 6 in. (max.) Venture Tape CW over insulation joints
    k. 6 in. (max.) Rmax R-SEAL 3000 over insulation joints
    l. 6 in. (max.) asphalt or butyl based tape over insulation joints
    m. Henry FoilSkin
    n. Carlisle (CCW) Fire Resist 705FR-A

Claddings
Substitutions based on worst case scenario testing:

Since test results submitted include testing with aluminum based ACM building panels (considered to be the worst case since the panels readily melt and ignite due to the plastic cores), other claddings which tend to perform better may be used as well. Also, the walls tested passed with ACM, so the limitation of non-open joint installation technique is waived. The list approved exterior claddings includes the following:

1) Brick – Nominal 4 in. clay brick or veneer with maximum 2 in. air gap behind the brick. Brick Ties/Anchors 24 in. o.c. (max)

2) Stucco – minimum ¾ in. thick exterior cement plaster and lath with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane.

3) Limestone – minimum 2 in. thick, using any standard installation technique.

4) Natural Stone Veneer – minimum 2 in. thick, using any standard installation technique.

5) Cast Artificial Stone – minimum 1½ in. thick, complying with ICC-ES AC 51 using any standard installation technique.

6) Terra Cotta Cladding – minimum 1¼ in. thick, using any standard installation technique.

7) Any MCM (aluminum, steel, copper) (w/ 1⅛ in. ± ½ in. air gap) that has successfully passed NFPA 285 using any standard installation technique.

8) Uninsulated sheet metal building panels including aluminum, steel or copper using any standard installation technique

9) Uninsulated Fiber-cement siding using any standard installation technique.

10) Stone/Aluminum honeycomb composite building panels that have passed NFPA 285 or equivalent.
    a. Stone Panels Inc. Stone Lite Panel system has been analyzed (Ref. 9) using mfr's standard installation technique

11) Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 using any standard installation technique.

12) Thin Set Brick
    a. Glen Gery Thin Tech Elite has been analyzed (Ref. 5) using mfr's standard installation technique.

CONCLUSIONS

Four NFPA 285 tests were conducted on various configurations of Rmax exterior wall system designs. The designs incorporated many variables including exterior insulation, air gaps and claddings.

The purpose of this evaluation was to determine Engineering Extensions for the components that can meet the requirements of NFPA 285. From the four wall systems submitted, an analysis was conducted on the components tested. This allowed us to form a base wall system from which replacement components can be interchanged.

In conclusion, we have determined that Engineering Extensions on various components of the tested wall designs can meet the criteria of NFPA 285 with specific limitations.

- end of report -