

ENGINEERING EVALUATION

Dörken Systems, Inc. WRBs and

Carlisle Polyiso Foam Insulation in NFPA 285 Assemblies

Project No. 10750E, Revision 1

Prepared for:

Dörken Systems, Inc. 4655 Delta Way Beamsville, ON LOR 1B4

February 13, 2020

Abstract

Comparative Cone Calorimeter (ASTM E1354) data from Dörken Systems, Inc. were analyzed to justify allowing specific Dörken Systems, Inc. WRBs on the base wall surface (under Carlisle polyisocyanurate foam) in the previously evaluated NFPA 285 tables for NFPA 285 compliance referencing Carlisle EEV 10123.

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.

Submitted by,

Javier Trevino Associate Engineer 210-601-0655

February 13, 2020

Reviewed and Approved,

Deg Priest President

February 13, 2020



INTRODUCTION

The purpose of this evaluation is to allow the use of specific Dörken Systems, Inc. WRBs on the base wall surface (under the Carlisle polyiso) in previously evaluated Carlisle NFPA 285 assemblies (Ref. 3) that can meet the requirements of NFPA 285 (Ref. 1). Comparative Cone Calorimeter data (Ref. 2) was submitted to compare the flammability of various Dörken Systems, Inc. WRB products to at least one WRB listed in the EEV. The peak Heat Release Rate of the Dörken Systems, Inc. WRBs were shown to be less than the listed product – thus the proposed use is justified.

REFERENCED DOCUMENTS

- 1) NFPA 285-12 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-loadbearing Wall Assemblies Containing Combustible Components
- Cone Calorimeter Data for Dörken Systems, Inc. Data Confidential btw the client and Priest & Associates
- 3) Carlisle EEV 10123 NFPA 285 Assemblies
- 4) Babrauskas et al., 10 Years of Heat Release Research NIST Publication https://www.researchgate.net/publication/280309156 Ten Years of Heat Release Research w ith_the_Cone_Calorimeter

EVALUATION METHOD

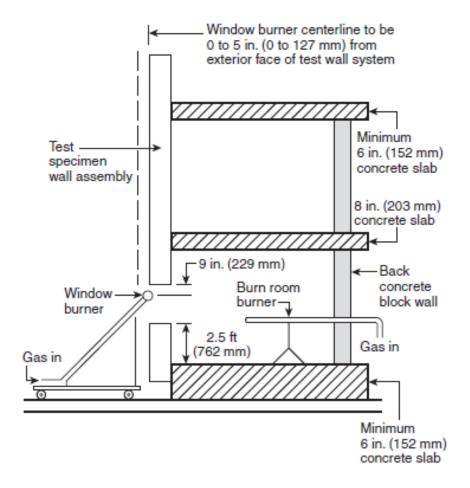
NFPA 285 Criteria

The NFPA 285 fire test (Ref. 1) is designed to test the flame spread properties of exterior walls containing combustible components. Two noncombustible 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.

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. 1) are as follows (reworded in simple 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 6 8 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).
- Flames shall not escape (visually) from the interior to the exterior at the wall/wall intersection of the bottom story room.



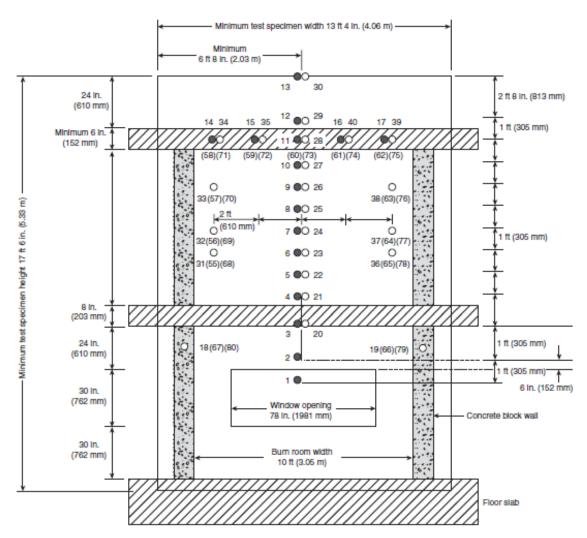


Two burners are ignited to produce a specific time-temperature profile in the room and on the exterior face of the wall.

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

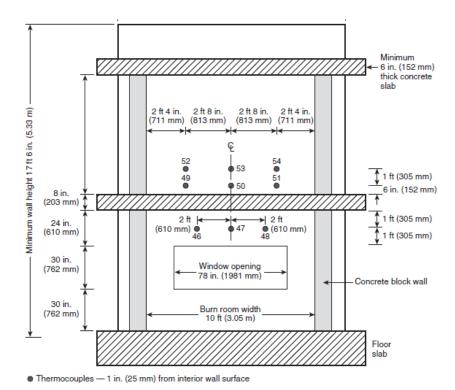
In the depictions below, Thermocouples 1 - 10, and 20 - 27 are not used for compliance purposes. The remainders are used to monitor flame spread.





- Thermocouples 1 In. (25 mm) from exterior wall surface
- O 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.





WRB Analysis

If an alternate WRB is less flammable than the NFPA 285 approved WRB, it is allowed as an alternate component. Cone calorimeter data (Ref. 2) of Dörken Systems, Inc. was submitted for evaluation.

Flame spread rate is dictated by the peak Heat Release Rate (pk HRR). The pk HRR induces heat flux on unburned material which ignites the unburned material and the process repeats as flames spread along surfaces. An excerpt from Ref. 4 suggests the following:

"The earliest applications of Cone Calorimeter data have been in the polymers industry. Hitherto, in the US manufacturers typically have relied either on limiting oxygen index (LOI) [14] tests or on UL94 [15]. The latter is a simple Bunsen-burner type test which gives only pass/fail results; it is clear that quantitative information useful for polymer development does not come from such a test. The former, however, does give quantitative results and uses what would appear to be a suitable engineering variable. Again, however, a recent study has clearly demonstrated that the results, while quantitative, are not capable of even correctly rank-ordering according to actual fire behavior [16]. By contrast, it has been shown quite clearly that heat release rate is the single most important variable describing the hazard of the actual fire [17]."

Based on this, when comparing a tested material to an alternate material, the alternate material shall have a lower peak Heat Release Rate (pk HRR) than the tested material when tested per ASTM E1354.

A previous Dörken evaluation (Ref. Carlisle EEV 10123) evaluated other Dörken products to be used as well.



Based on the analysis and previous evaluation, the following is allowed.

WRB	Allowed Location
Dörken Systems Inc., Delta-Vent SA, Delta- Vent S, Delta-Fassade S, Delta Maxx, Delta Stratus SA	Under Carlisle polyiso insulation (on base wall surface) in EEV 10123
Dörken Systems Inc., Delta-Vent SA, Delta- Vent S, Delta-Fassade S, Delta Maxx	Over Carlisle polyiso insulation in EEV 10123

Approved Assemblies

This evaluation is based on the Carlisle EEV 10123 (Ref. 3) as the basis document.

NFPA 285 Table of Allowed Constructions

The following table shows the relevant content for specific WRBs for use with Carlisle insulation based on the referenced EEV.

4 pcf (min.), 1 inch thick (min.) mineral wool may replace the polyiso since mineral wool is noncombustible. If no insulation is used, only the WRBs allowed for use over the insulation may be used on the base wall surface.

Table 1: R2+ SHEATHE Exterior Insulation

Table 1: RZ+ SHEATHE	Table 1: R2+ SHEATHE Exterior Insulation		
Wall Component			
Base Wall - Use	1)	Cast Concrete Walls	
either 1, 2, 3 or 4	2)	CMU Concrete Walls	
	3)	25 GA. min. 35/8" (min.) steel studs spaced 24" OC (max.)	
		a. 5/8" type X Gypsum Wallboard Interior	
		b. Lateral Bracing every 4 ft	
	4)	FRTW (Fire-retardant-treated wood) studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.)	
		a. ⁵‰ in. type X Gypsum Wallboard Interior	
		b. Bracing as required by code	
Fire-Stopping at	1)	Any approved mineral fiber based safing insulation in each stud cavity at	
floor lines	',	floor line. Safing thickness must match stud cavity depth.	
	2)	Solid FRTW fire blocking at floor line in accordance with building code	
		requirements for Type III construction.	
Cavity Insulation –	1)	None	
Use either: 1, 2, 3, 4,	2)	1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity	
5, 6, 7, 8, 9, 10 or 11.		thickness)	
Note:	3)	1½" (min.) of BASF Walltite SPF (up to full cavity thickness)	
	4)	Any noncombustible insulation per ASTM E136	
Items 2, 3, 8, 9, 10 &	5)	Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced)	
11 may only be used 6)		Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced)	
with exterior	7)	Any foam plastic insulation (SPF or board type) which has been tested per	
sheathing 2.		ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis	
		to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro)	
		EcoBay CC or BASF Walltite.	
	8)	NCFI InsulBloc SPF (up to full cavity thickness)	



9 Lopnene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10 SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavilies with an air gap not exceeding 2½ inches. 11 115" (min.) ThermoSeal 2000 (up to full cavify thickness) 12 WRB over Base Wall Surface 13 ½" or thicker exterior gypsum sheathing ½" (min.) FRTW structural panels in Type III construction 13 ½" thick (max.) R2+ SHEATHE for all claddings listed 14 4" thick R2+ SHEATHE for claddings 1-6 ½" thick R2+ SHEATHE for sheat R2+ SHEATHE for s	_			
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11 1½" (min.) ThermoSeal 2000 (up to full cavity thickness)		10)	SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud	
None (only with Cavity Insulation 1, 4, 5 or 6)		11)		
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System with ½" thick bricks using TABS Wall Adhesive		15)		
			System with ½" thick bricks using TABS Wall Adhesive	



16)	Natural Stone Veneer – minimum 11/4" thick using any standard installation
	technique.
17)	FunderMax M.Look Grey Core – minimum ¼ inch thick using any standard
	installation technique

Table 2: R2+ MATTE or R2+ MATTE (Class A) Exterior Insulation

Base Wall – Use either 1, 2, 3 or 4 2) CMU Concrete Walls 2) CMU Concrete Walls 3) 25 GA. min. 3%* (min.) steel studs spaced 24" OC (max.) a. %* type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) a. % in. type X Gypsum Wallboard Interior b. Bracing as required by building code 1) Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing hickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction Cavity Insulation – Use either: 1, 2, 3, 4, 4, 5, 6, 7, 8, 9, 10 or 11 Iltems 3, 8, 9, 10 & 11 may only be used with exterior sheathing 2. Any noncombustible insulation per ASTM E136 Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A Data Bate faced or unfaced) Any Fiberglass (Batt Type Class A Data Bate faced or unfaced) Any Fiberglass (Batt Type Class A Data Bate faced or unfaced) Any Fiberglass (Batt Type Class A Data Bate faced or unfaced) Any Fiberglass (Batt Type Class A Data Bate faced or unfaced) Bate Proseal up to 5% inches (only with ½ in. (min.) exterior gypsum sheathing) Bate Proseal up to 5% inches (only with ½ in. (min.) exterior gypsum sheathing) Bate 1, 2 or 3 Exterior Sheathing Use 1, 2 or 3 WRB over Base Ball Surface Exterior Insulation Use either 1, 2, 3 or 4 Bate Type Class A Bate Bate Bate Bate Bate Bate Bate Bate		R2+	MATTE (Class A) Exterior Insulation
2) CMU Concrete Walls 3) 25 GA. min. 3%" (min.) steel studs spaced 24" OC (max.) a. %" type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) a. % in. type X Gypsum Wallboard Interior b. Bracing as required by by bilding code 4 Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction Cavity Insulation – 11 None 12 1%" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 13 1%" (min.) of BASF Walltite SPF (up to full cavity thickness) 14 Any noncombustible insulation per ASTM E136 2 Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 3 Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 3 NCFI InsulBloc SPF (up to full cavity thickness) 10 SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2% inches 11 1%" (min.) ThermoSeal 2000 (up to full cavity thickness) 11 None (only with Claddings 1 – 6, and Cavity Insulations 1, 2, 3, 4, 5, 6 or 11) – also see note for Cavity Insulation 2 See Table 5 Exterior Insulation – Use either 1, 2, 3 or 4 WRB over Base Wall Surface Exterior Cladding – Use either 1, 2, 3 or 4 WRB over Exterior Insulation – 10 See Table 5 WRB over Exterior Insulation – 11 Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2 Stucco – minimum %" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wap or 15# felt	Wall Component		
3) 25 GA. min. 3½" (min.) steel studs spaced 24" OC (max.) a. ½" type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) a. ½in. type X Gypsum Wallboard Interior b. Bracing as required by building code 1) Any approved mineral fiber based safing insulation in each stud cavity at floor lines 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction 20 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3) 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 6) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any Joan plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tigh, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10 SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11 1/2" (min.) FRTW structural panels in Type III construction 8ee Table 5 Exterior Insulation – Use either 1, 2, 3 or 4 WRB over Base Wall Surface Exterior Cladding - Use either 1, 2, 3 or 4 WRB over Exterior Insulation – Use either 1, 2, 3 or 4 By Title (max.) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 11 10 11 11 11 11 11 11 11 11 11 11 11 1	Base Wall - Use	1)	Cast Concrete Walls
a. %" type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4 FRTW Studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) a. % in. type X Gypsum Wallboard Interior b. Bracing as required by building code Fire-Stopping at floor lines 1) Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction 1) None 2) 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heaf tlux) and shown by analysis to be less flammable (improved Tign., Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Wallitie. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) 11) Anone (only with Claddings 1 – 6, and Cavity Insulations 1, 2, 3, 4, 5, 6 or 1) – also see note for Cavity Insulation) 2%" or thicker exterior gypsum sheathing 3) ½" (min.) FRTW structural panels in Type III construction See Table 5 WRB over Base Wall Surface Exterior Cladding - Use either 1, 2, 3, 4, 5, 6 or 1) – also see note for Cavity Insulation) 20) With the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 In Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 20) Stucco – minimum 3" thick exterior ceme	either 1, 2, 3 or 4	2)	CMU Concrete Walls
a. %" type X Gypsum Wallboard Interior b. Lateral Bracing every 4 ft 4 FRTW Studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) a. % in. type X Gypsum Wallboard Interior b. Bracing as required by building code Fire-Stopping at floor lines 1) Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction 1) None 2) 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heaf tlux) and shown by analysis to be less flammable (improved Tign., Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Wallitie. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) 11) Anone (only with Claddings 1 – 6, and Cavity Insulations 1, 2, 3, 4, 5, 6 or 1) – also see note for Cavity Insulation) 2%" or thicker exterior gypsum sheathing 3) ½" (min.) FRTW structural panels in Type III construction See Table 5 WRB over Base Wall Surface Exterior Cladding - Use either 1, 2, 3, 4, 5, 6 or 1) – also see note for Cavity Insulation) 20) With the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 In Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 20) Stucco – minimum 3" thick exterior ceme		3)	25 GA. min. 3 ⁵ / ₈ " (min.) steel studs spaced 24" OC (max.)
b. Lateral Bracing every 4 ft 4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) a. % in. type X Gypsum Wallboard Interior b. Bracing as required by building code 1) Any approved mineral fiber based safing insulation in each stud cavity at floor lines 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction 1) None 2) 1/8" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3) 1/8" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3) 1/8" (min.) of Bayer Walltite SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 5 Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) 2) See Table 5 Exterior Insulation – Use either 1, 2, 3 or 4 1) 3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for all claddings 1-6 (max) thickness) (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 (max) R2		,	
4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.) a. % in. type X Gypsum Wallboard Interior b. Bracing as required by building code floor lines 1) Any approved mineral fiber based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction 1) None 2) 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3) 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3) 1½" (min.) of Bayer Wallitite SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign., Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Wallitie. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11) 1/" (min.) ThermoSeal 2000 (up to full cavity thickness) 11) 1/" (min.) ThermoSeal 2000 (up to full cavity thickness) 12) See Table 5 13) Withick (max.) R2+ MATTE or R2+ MATTE (Class A) for all claddings listed 2) 4" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for claddings 1.6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum 3" thick exterior cement plaster and lath. For systems which require a			J1 J1
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b. Bracing as required by building code fire-Stopping at floor lines 1) Any approved mineral fiber based safing insulation in each stud cavity at floor lines 2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction 1) None 1) Use either: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 1) None 2) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 6) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² beat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) Exterior Sheathing Use 1, 2 or 3 11) - also see note for Cavity Insulation 2) ½" or thicker exterior gypsum sheathing WRB over Base Exterior Insulation — Use either 1, 2, 3 or 4 WRB over Exterior Insulation 1) 3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 9 ATTM E136 non-combustible testing. 1) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 WRB over Exterior Insulation Exterior Cladding - 10 Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24"		-,	
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floor lines floor line safing thickness must match stud cavity depth. Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction IN One 1 None 1 None 1 None 1 None 2 Nor liv" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 4 Any noncombustible insulation per ASTM E184 faced or unfaced) 5 Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6 Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7 Any floor plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 8 NCFI InsulBloc SPF (up to full cavity thickness) 9 Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10 SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) 12 Ye' or thicker exterior gypsum sheathing 3 Ye' (min.) FRTW structural panels in Type III construction See Table 5 Exterior Insulation – Use either 1, 2, 3 or 4 WRB over Base Exterior Insulation – Use either 1, 2, 3 or 4 WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 10 Fick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 5 Succo – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt	Fire-Stopping at	1)	
2) Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction 1) None Use either: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 Items 3, 8, 9, 10 s 11 may only be used with exterior sheathing 2. 1) Any floam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 1) None (Plus title and the sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches (11) - also see note for Cavity Insulations 1, 2, 3, 4, 5, 6 or 11) - also see note for Cavity Insulations 1) None (only with Claddings 1 - 6, and Cavity Insulations 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 5 for which require a more durable WRB system, any building wrap or 15# felt with require a more durable WRB system, any building wrap or 15# felt		',	
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Cavity Insulation Use either: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity thickness) 3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 1½" (min.) and plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign., Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. NCFI InsulBloc SPF (up to full cavity thickness) 10 yenene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11½" (min.) ThermoSeal 2000 (up to full cavity Insulations 1, 2, 3, 4, 5, 6 or 11) - also see note for Cavity Insulation) ½" or thicker exterior gypsum sheathing 3) ½" or thicker exterior gypsum sheathing 3) ½" or thicker exterior gypsum sheathing 3) ½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for all claddings listed 24" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 30 Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4 None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) 34" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 30 Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 54		2)	
Use either: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 Items 3, 8, 9, 10 or 11 Items 3, 8, 9, 10 & 11 may only be used with exterior sheathing 2. Any noncombustible insulation per ASTM E136 5 Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 7 Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) loynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11) ½" (min.) ThermoSeal 2000 (up to full cavity thickness) Exterior Sheathing Use 1, 2 or 3 11) Anone (only with Claddings 1 – 6, and Cavity Insulations 1, 2, 3, 4, 5, 6 or 11) – also see note for Cavity Insulation WRB over Base Wall Surface Exterior Insulation — Use either 1, 2, 3 or 4 WRB over Exterior Insulation WRB over Exterior Insulation WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 2, 3, 14, 15, 16 or	Cavity Insulation	1)	
thickness) 3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness) 4) Any noncombustible insulation per ASTM E136 5) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tigh, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 8) NCFI InsulBiloc SPF (up to full cavity thickness) 9) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) Exterior Sheathing Use 1, 2 or 3 11) – also see note for Cavity Insulation 12) ½" or thicker exterior gypsum sheathing 13) ½" (min.) FRTW structural panels in Type III construction 14) See Table 5 WRB over Base Wall Surface Exterior Insulation – Use either 1, 2, 3 or 4 WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or History (min.) From Seal 2000 (up to full cavity thickness) 15) Infaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 16) Any floar draw face and lath. For systems which require a more durable WRB system, any building wrap or 15# felt		,	
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Items 3, 8, 9, 10 & 11 may only be used with exterior sheathing 2. 4) Any noncombustible insulation per ASTM E136 5 Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) 6 Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) 7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 8 NCFI InsulBloc SPF (up to full cavity thickness) 9 Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness) Exterior Sheathing Use 1, 2 or 3 11) – also see note for Cavity Insulations 2) ½" or thicker exterior gypsum sheathing 3) ½" (min.) FRTW structural panels in Type III construction See Table 5 Exterior Insulation – Use either 1, 2, 3 or 4 WRB over Exterior Insulation In 3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for all claddings 1-6 3 Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 45, 16 or Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 5 Succo – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt	5, 6, 7, 6, 9, 10 0f 11	2)	
may only be used with exterior sheathing 2. 5) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) (6) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) (7) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1364 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. 8) NCFI InsulBloc SPF (up to full cavity thickness) 9) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) 10) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches 11) ½" (min.) ThermoSeal 2000 (up to full cavity thickness) Exterior Sheathing Use 1, 2 or 3 1) None (only with Claddings 1 – 6, and Cavity Insulations 1, 2, 3, 4, 5, 6 or 11) – also see note for Cavity Insulation) 2) ½" or thicker exterior gypsum sheathing 3) ½" (min.) FRTW structural panels in Type III construction See Table 5 WRB over Base Wall Surface Exterior Insulation — Use either 1, 2, 3 or 4 1) 3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for claddings listed 2) 4" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for claddings listed 2) 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings listed 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or	Homo 2 0 0 10 0 11		
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WRB over Base Wall Surface Exterior Insulation – Use either 1, 2, 3 or 4 WRB over Exterior WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or WRB over Base Wall Surface 1) 3½" (min.) FRTW structural panels in Type III construction See Table 5 WATTE or R2+ MATTE (Class A) for all claddings listed 2) 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 5, 6, 7, 8, 9, 10, 11, 2, 13, 14, 15, 16 or See Table 5	Use 1, 2 or 3		11) – also see note for Cavity Insulation)
WRB over Base Wall Surface Exterior Insulation – Use either 1, 2, 3 or 4 Use either 1, 2, 3 or 4 WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or Use Exterior Insulation See Table 5 See Table 5 See Table 5 1) 3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt		2)	½" or thicker exterior gypsum sheathing
Wall Surface Exterior Insulation – Use either 1, 2, 3 or 4 Use either 1, 2, 3 or 4 Use either 1, 2, 3 or 4 Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 1) 3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt		3)	½" (min.) FRTW structural panels in Type III construction
Wall Surface Exterior Insulation – Use either 1, 2, 3 or 4 1) 3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for all claddings listed 2) 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt	WRB over Base		\
Use either 1, 2, 3 or 4 1) 3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for all claddings listed 2) 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 1) Brick - Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco - minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt	Wall Surface		
Use either 1, 2, 3 or 4 2) 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or Ilisted 2) 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or Visit of thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or		1)	3½" thick (max.) R2+ MATTE or R2+ MATTE (Class A) for all claddings
2) 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 2) 4" thick (max) R2+ MATTE or R2+ MATTE (Class A) for claddings 1-6 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 2) Stucco – minimum 3/4" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt		',	` ,
3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 3) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 See Table 5 Stucco – minimum 3/" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt	, _, _, _, _, _, _, _, _, _, _, _, _,	2)	
ASTM E136 non-combustible testing. 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or ASTM E136 non-combustible testing. None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt			
4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 4) None (only with the WRB list below (WRB over insulation) with the WRB applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt		,	
applied direct to base wall surface) WRB over Exterior Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or applied direct to base wall surface) See Table 5 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt		۵)	
WRB over Exterior InsulationSee Table 5Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or1) Brick - Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) Stucco - minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt		7)	
Insulation Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 1) Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) 2) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt	WRR over Exterior		
 Exterior Cladding - Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/Anchors 24" OC (max.) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt 			JEE I ANIE J
Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 2) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt		41	Driek Neminal 4" aloy or congrete brief or your act with manifer or O' air
5, 6, 7, 8, 9, 10, 11, 2) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems which require a more durable WRB system, any building wrap or 15# felt	_	1)	
12, 13, 14, 15, 16 or which require a more durable WRB system, any building wrap or 15# felt		٥)	
· · · · · · · · · · · · · · · · · · ·		2)	
1/			which require a more durable WRB system, any building wrap or 15# felt
	17		



		that meets requirement #11 in "WRB over Exterior Insulation" can be used	
Item 7 may use any		as a slip sheet between the WRB/exterior insulation and the lath	
tested/approved	3)	Limestone - minimum 2" thick using any standard non-open joint	
installation technique.	,	installation technique such as shiplap	
·	4) Natural Stone Veneer – minimum 2" thick using any standard non-		
Items 8, 9 and 12		joint installation technique such as grouted/mortared stone	
may use any	5)	Cast Artificial Stone – minimum 1½" thick complying with ICC-ES AC 51	
standard installation	,	using any standard non-open joint installation technique such as shiplap	
technique.	6)	Terra Cotta Cladding – minimum 1¼" thick (solid or equivalent by weight)	
10011119401		using any standard non-open joint installation technique such as shiplap	
	7)	Any MCM that has successfully passed NFPA 285	
	8)	Uninsulated sheet metal building panels including steel, copper, aluminum	
	9)	1/4 inch (min.) uninsulated fiber-cement siding or porcelain or ceramic tile	
	10)	mechanically attached Stone, porcelain, ceramic/aluminum honeycomb composite building	
	10)	panels that have successfully passed NFPA 285 criteria	
	11)	Autoclaved-aerated-concrete (AAC) panels that have successfully passed	
	11)	NFPA 285 criteria	
	12)	Terra Cotta Cladding – Any Rain-screen Terra Cotta (min. ½" thick) with	
	12)	ventilated shiplap.	
	13) ½ inch Stucco – Any one coat stucco (½ inch min.) which meets		
acceptance criteria or is approved for use in Type I-IV construction		acceptance criteria or is approved for use in Type I-IV construction or has	
		been tested per NFPA 285 or stays in place when tested per ASTM E119	
		(stucco exposed to fire) for at least 30 minutes	
	14)		
		been tested to ASTM E119 (brick exposed to furnace) and remains in	
		place for a minimum of 30 minutes, or has passed an NFPA 285 test.	
		Minimum 3/4". For these systems which require a more durable WRB	
		system, any building wrap or 15# felt that meets requirement #11 in "WRB	
		over Exterior Insulation" can be used as a slip sheet between the	
		WRB/AVP and the lath.	
	System with ½" thick bricks using TABS Wall Adhesive		
		Natural Stone Veneer – minimum 11/4" thick using any standard installation	
	4-1	technique.	
	17)	FunderMax M.Look Grey Core – minimum ¼ inch thick using any standard	
		installation technique	

Table 3: R2+ SILVER Exterior Insulation

Well Component	
Wall Component	
Base Wall - Use	1) Concrete Walls
either 1, 2, 3 or 4	2) CMU Concrete Walls
	3) 25 GA. min. 35/8" (min.) steel studs spaced 24" OC (max.)
	a. 5⁄8" type X Gypsum Wallboard Interior
	b. Lateral Bracing every 4 ft
	4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.)
	a. ⁵%" type X Gypsum Wallboard Interior
	b. Bracing as required by code
Fire-Stopping at	1) Any approved mineral fiber based safing insulation in each stud cavity at
floor lines	floor line. Safing thickness must match stud cavity depth.
	2) Solid FRTW fire blocking at floor line in accordance with building code
	requirements for Type III construction.
Cavity Insulation –	1) None
Use either: 1, 2, 3, 4,	2) 11/2" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity
5, 6, 7, 8, 9, 10 or 11.	thickness)
	3) 1½" (min.) of BASF Walltite SPF (up to full cavity thickness)



Note: Items 2, 3, 8, 9, 10 & 11 may only be used with Exterior Sheathing 2.	 Any noncombustible insulation per ASTM E136 Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro) EcoBay CC or BASF Walltite. NCFI InsulBloc SPF (up to full cavity thickness) Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2½ inches. 		
	11) 1½" (min.) ThermoSeal 2000 (up to full cavity thickness)		
Exterior Sheathing	1) None (only with Cavity Insulations 1, 4, 5 or 6)		
Use 1, 2 or 3	2) ½" or thicker exterior gypsum sheathing		
,	3) ½" (min.) FRTW structural panels in Type III construction allowed in place		
	of gypsum sheathing when combustible cavity insulation is not used.		
WRB over Base	See Table 5		
Wall Surface			
Exterior Insulation –	1) 4" thick (max.) R2+ SILVER		
Use either 1, 2 or 3	2) Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets		
	ASTM E136 non-combustible testing.		
	3) None (only with the WRB list below (WRB over insulation) with the WRB		
	applied direct to base wall surface)		
	R2+Silver may be used with or without CavClear drainage mat (CavClear		
	insulation system)		
WRB over Exterior	See Table 5		
Insulation			
Exterior Cladding -	1) Brick - Nominal 4" clay or concrete brick or veneer with maximum 2" air		
Use either 1, 2, 3, 4,	gap behind the brick. Brick Ties/Anchors 24" OC (max.)		
5 or 6	2) Stucco – minimum ¾" thick exterior cement plaster and lath. For systems		
	which require a more durable WRB system, any building wrap or 15# felt		
	that meets requirement #11 in "WRB over Exterior Insulation" can be used		
	as a slip sheet between the WRB/exterior insulation and the lath.		
	3) Limestone – minimum 2" thick using any standard non-open joint installation technique such as shiplap		
	4) Natural Stone Veneer – minimum 2" thick using any standard non-open		
	joint installation technique such as grouted/mortared stone		
	5) Cast Artificial Stone – minimum 1½" thick complying with ICC-ES AC 51		
	using any standard non-open joint installation technique such as shiplap		
	6) Terra Cotta Cladding – minimum 1½" thick (solid or equivalent by weight)		
	using any standard non-open joint installation technique such as shiplap		

Table 4: R2+ BASE Exterior Insulation

WOLD IN INC. 27 TO 2 EXTENS OF THE STATE OF		
Wall Component		
Base Wall - Use	1) Cast Concrete Walls	
either 1, 2, 3 or 4	2) CMU Concrete Walls	
	3) 25 GA. min. 35/8" (min.) steel studs spaced 24" OC (max.)	
	a. 5/8" type X Gypsum Wallboard Interior	
	b. Lateral Bracing every 4 ft	
	4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.)	
	a. 5/8" type X Gypsum Wallboard Interior	
	b. Bracing as required by code	



E: 0/			
Fire-Stopping at	1)	Any approved mineral fiber based safing insulation in each stud cavity at	
Floor Lines	٥)	floor line. Safing thickness must match stud cavity depth.	
	2)	Solid FRTW fire blocking at floor line in accordance with building code	
Cavity Insulation –	41	requirements for Type III construction None	
Use either: 1, 2, 3, 4,	1) 2)	1½" (min.) of Bayer (Covestro) EcoBay CC SPF (up to full cavity	
5, 6, 7, 8, 9, 10 or 11.	۷)	thickness)	
3, 0, 7, 0, 3, 10 01 11.	3)	1½" (min.) of BASF Walltite SPF (up to full cavity thickness)	
Note: Items 3, 8, 9,	4)	Any noncombustible insulation per ASTM E136	
10 & 11 may only be	5)	Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced)	
used with Exterior	6)	Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced)	
Sheathing 2.	7)	Any foam plastic insulation (SPF or board type) which has been tested per	
		ASTM E1354 (at a minimum of 20 kW/m² heat flux) and shown by analysis	
		to be less flammable (improved Tign, Pk. HRR) than Bayer (Covestro)	
	_,	EcoBay CC or BASF Walltite.	
	8)	NCFI InsulBloc SPF (up to full cavity thickness)	
	9)	Icynene Proseal up to 5½ inches (only with ½ in. (min.) exterior gypsum sheathing)	
	10)	sheathing) SWD Urethane Quick-Shield 112 up to 6 inches in 6 inch (max.) stud	
	10)	cavities with an air gap not exceeding 2½ inches.	
	11)	1½" (min.) ThermoSeal 2000 (up to full cavity thickness)	
Exterior Sheathing	1)	None (only with Cavity Insulations 1, 2, 4, 5 or 6) – Also see note for cavity	
– Use either 1, 2 or 3	,	insulation)	
·	2)	½" or thicker exterior gypsum sheathing	
	3)	½" (min.) FRTW structural panels in Type III construction.	
WRB over Base		See Table 5	
Wall Surface			
Exterior Insulation –	1)	4.25" (max.) R2+ BASE (3.5 inch foam max., ¾ inch FR Plywood max.)	
Lloo either 4 O O or	2)	with all claddings listed	
Use either 1, 2, 3 or 4. Items 1 and 2	2)	4¾ inch (max) R2+ BASE (4" foam max, ¾" FR Plywood max) may be used with claddings 1-6	
depend on cladding	3)	Unfaced mineral wool (minimum 1 inch thick, 4 pcf density) that meets	
used.	3)	ASTM E136 non-combustible testing.	
dood.	4)	None (only with the WRB list below (WRB over insulation) with the WRB	
	,	applied direct to base wall surface)	
WRB over Exterior		See Table 5	
Insulation			
Exterior Cladding -	1)	Brick - Nominal 4" clay or concrete brick or veneer with maximum 2" air	
Use either 1, 2, 3, 4,		gap behind the brick. Brick Ties/Anchors 24" OC (max.)	
5, 6, 7, 8, 9, 10, 11,	2)	Stucco – minimum ³ / ₄ " thick exterior cement plaster and lath. For systems	
12, 13, 14, 15, 16 or		which require a more durable WRB system, any building wrap or 15# felt	
17		that meets requirement #11 in "WRB over Exterior Insulation" can be used as a slip sheet between the WRB/exterior insulation and the lath	
Item 9 may use any	3)	Limestone – minimum 2" thick using any standard non-open joint	
tested/approved	3)	installation technique such as shiplap	
installation technique.	• • • • • • • • • • • • • • • • • • • •		
2.2	.,	joint installation technique such as grouted/mortared stone	
Items 10, 11 and 14	5)	Cast Artificial Stone - minimum 1½" thick complying with ICC-ES AC 51	
may use any	,	using any standard non-open joint installation technique such as shiplap.	
standard installation	6)	Terra Cotta Cladding – minimum 1¼" thick (solid or equivalent by weight)	
technique.		using any standard non-open joint installation technique such as shiplap	
	7)	Thin brick/cultured stone set in thin set adhesive and metal lath that has	
		been tested to ASTM E119 (brick exposed to furnace) and remains in	
		place for a minimum of 30 minutes, or has passed an NFPA 285 test.	
		Minimum 3/4". For these systems which require a more durable WRB system, any building wrap or 15# felt that meets requirement #11 in "WRB	
		system, any building wrap of 15# felt that meets requirement #11 In "WRB	



	over Exterior Insulation" can be used as a slip sheet between the WRB/AVP and the lath.
8)	Glen Gery Thin Tech Elite Series Masonry Veneer or TABS II Panel
, i	System with ½" thick bricks using TABS Wall Adhesive
9)	Any MCM that has successfully passed NFPA 285
10)	Uninsulated sheet metal building panels including steel, copper, aluminum
11)	1/4 inch (min.) Uninsulated Fiber-cement siding or porcelain or ceramic tile mechanically attached
12)	Stone, porcelain, ceramic/aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria
13)	Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria
14)	Terra Cotta Cladding – Any Rain-screen Terra Cotta (min. ½ " thick) with ventilated shiplap
15)	½ inch Stucco – Any one coat stucco (½ inch min) which meets AC11 acceptance criteria or is approved for use in Type I-IV construction or has been tested per NFPA 285 or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes
16)	Natural stone veneer – minimum 1½" thick using any standard installation technique.
17)	FunderMax M.Look Grey Core – minimum ¼ inch thick using any standard installation technique

Table 5: Allowable WRB's for Tables 1 - 4

Tubic C. Allowable TTI	20:0: 148:00: 1	
WRB over Base	1) None	
Wall Surface	2) Dörken Systems Inc., Delta-Vent SA,	
Use any of Items 1 -	3) Dörken Systems Inc. Delta-Vent S,	
6	4) Dörken Systems Inc. Delta-Fassade S,	
	5) Dörken Systems Inc. Delta Maxx,	
	6) Dörken Systems Inc. Delta Stratus SA	
WRB over Exterior	1) None	
Insulation	2) Dörken Systems Inc. Delta-Vent SA,	
Use any of Items 1 -	3) Dörken Systems Inc. Delta-Vent S,	
5	4) Dörken Systems Inc. Delta-Fassade S,	
	5) Dörken Systems Inc. Delta Maxx	

~ End of Report ~

