





Building America

Air Sealing Best Practices and Code Compliance for Multifamily Area Separation Walls

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Agenda

✓ Welcome and Introductory Remarks

✓ Overview of Building America (buildingamerica.gov)

Linh Truong: National Renewable Energy Laboratory

✓ Presentation

- Pam Cole, Pacific Northwest National Laboratory
- Ari Rapport, IBACOS
- Robby Schwarz, EnergyLogic
- ✓ Questions and Answers

✓ Closing Remarks



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- AIA Provider #: 1014
- AIA Course #: BACSI1216
- ICC Provider Course #10413





Course Description

This webinar will provide an overview of area separation wall assembly construction in multi-family buildings, air sealing methods, and code compliance requirements.

Air sealing of area separation wall assemblies is an identified barrier that limits the ability of builders to cost effectively achieve higher energy efficiency and quality levels in multi-family housing. Area separation wall assemblies that are tested and certified by UL have not been designed or tested for air tightness, and air leakage through these assemblies can be a barrier to achieving air leakage limits mandated by the International Residential Code (IRC) and International Energy Conservation Code (IECC). The 2012/2015 IECC mandates 3 ACH50 in climate zones 3-8 measured air leakage requirements for all units within multifamily buildings.

The Leadership in Energy and Environmental Design (LEED) certification program, ASHRAE Standard 189, and ASHRAE 62.2 all have comparable compartmentalization requirements. Fire-resistance rated wall assemblies (or area separation walls) have been identified as the major source of difficulty in air sealing/compartmentalization. Building owners are challenged with constructing to significantly tighter levels, addressing compartmentalization issues between units, and adopting test procedures to prove compliance.

Current efforts to engage with UL may address these challenges and provide a mechanism for code acceptance of air sealing methods for these area separation wall assemblies.

Learning Objectives

At the end of this course, participants should be able to:

- 1. Understand what constitutes as the UL fire rated assembly.
- 2. Understand the disconnect between the fire code and energy code for area separation walls.
- 3. Apply best practices for air sealing area separation walls in multi-family buildings.
- 4. Demonstrate compliance for multi-family buildings air sealing and air leakage requirements for area separation walls.





The Heart of the Matter







The Issue

What constitutes the UL fire rated assembly?

What are we asking the assembly to do?

- Fire •
- Sound
- Energy •

What is the disconnect between Fire Code and Energy Code?



Across the country, why is the assembly being built differently?



What Constitutes the UL fire Rated Assembly?



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"Shaftliner" Type Area Separation Wall Example: UL Design U373

Fire Testing and Building Code Compliance

The Georgia-Pacific Gypsum Area Separation Wall <u>has been fire</u> <u>tested</u> to ASTM E 119 and CAN/ULC S-101. The Georgia-Pacific Gypsum 2-hour fire-rated Area Separation Wall assembly, constructed using DensGlass Ultra Shaftliner panels, <u>is listed</u> by Underwriters Laboratory (UL), Underwriters Laboratories of Canada (ULC) and Warnock Hersey International (WHI/ITS) and <u>meets the</u> <u>requirements of the 2006 International Building Code (IBC)</u> Section 705 "Party Walls", and Section 705, "Fire Walls".

The Georgia-Pacific Gypsum Area Separation Wall assembly <u>is listed</u> in the UL Fire Resistance Directory under:

- UL Design U373,
- ULC Design W312, and
- WHI Fire Resistance Directory under WHI GP/WA 120-04.

For copies of these listings, please contact Georgia-Pacific Gypsum Technical Services at 1-800-225-6119.



Image Source: Georgia-Pacific Building Products, http://www.buildgp.com/bpsearch.aspx?q=Area+Separation+Walls



UL Design U373 ASW Constructed Using: Example: UL Design U373

- 1-inch thick
- 24-inch wide
- Paperless DensGlass Ultra Shaftliner panels
- 25 gauge steel H-studs
- 25 gauge steel C-track
- and 2" aluminum breakaway clips.



Image Source: Georgia-Pacific Building Products, http://www.buildgp.com/bpsearch.aspx?q=Area+Separation+Walls



Additional UL "Shaftliner" Assemblies





Area Separation Wall

The Area Separation Wall System is a 2-hour fire wal consisting of 2 in. (50.8 mm) light-gauge steel H-Studs that secure two layers of 1 in. (25.4 mm) shaftIner panels friction-fit between studs and a minimum 3/4 in. (19.1 mm) air space on each side.



U336 (U.S. Gypsum Company)

U375 U347 (American Gypsum Company) (National Gypsum Company)

Images sources: U.S. Gypsum Company, American Gypsum Company, National Gypsum Company





How ASW Systems Work





What are we asking the assembly to do?



Image source: What Sound Waves Look Like **BY TONKA DOBREVA**

Image source: "Secrets of Sound Health" Harvard Public Health https://www.hsph.harvard.edu/magazine/magazine_article/secrets-of-sound-health/



What is STC?

- In 1961, STC was introduced as the method for comparing sound transmission through various building assemblies.
- STC is calculated by taking the Transmission Loss (TL) values tested at 16 standard frequencies over the range of 125 Hz to 4000 Hz and plotted on a graph.



Decibels:

dB is simply a measurement of how loud a noise is. 50dB is quiet while 140 dB is so loud that is can immediately injure your ears. Think of dB as the volume knob on your receiver.



Law of Thermodynamics vs. Sound

No heat loss or gain



Image source: Luis F Saez Ph. D http://dallaswinwin.com/Thermodynamics/Zero Law.htm

 Heat moves from more to less





Insulation Installation Standards

Insulation for sound and thermal resistance must be installed in the same manner.

- ICC (International Code Council)
 - IECC (International Energy Conservation Code)
 - IRC (International Residential Code)
- NAIMA
- **RESNET**



Examples: IECC/IRC, NAIMA, and RESNET



IECC, R303.2

Installation All materials, systems and equipment shall be installed in accordance with the manufacturer's installation instructions and this code



NAIMA: Guide Specification for Fiber Glass Acoustical Insulation

"Sound Control for Commercial and Residential Buildings" Installation – General

A. **Comply with manufacturer's instructions** for particular conditions of installation in each case.

B. Batts may be friction-fit in place until the interior finish is applied. Install batts to <u>fill entire stud cavity</u>. If stud cavity is less than 96" in height, cut lengths to friction-fit against floor and ceiling tracks. Walls with penetrations require that insulation be <u>carefully cut to fit around outlets</u>, junction boxes and other irregularities.

North America Insulation Manufacture's Association: <u>www.insulationinstitute.org</u>



RESNET Standards Grade 1 Insulation Installation

- Installed according to manufacturer's instructions
- Fills each cavity side-to-side and top-to-bottom
- No substantial gaps, voids, compressions, or obstructions
- Split or fitted tightly around wiring or obstructions in wall
- Occasional very small gaps are acceptable for "Grade I"
- Wall insulation shall be enclosed on all six sides
- Must be in substantial contact with the sheathing material.
- Inset stapling is neat (no buckling), and the batt is only compressed at the edges of each cavity, to the depth of the tab itself.
- Compression or incomplete fill amounting to 2% or less, if the empty spaces are less than 30% of the intended fill thickness, are acceptable for "Grade I".

Residential Energy Services Network: <u>www.resnet.us</u>



Insulation

Air Barrier



Insulation traps pockets of air Stagnate Air Pockets create the R-value

Image source: REI

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Stopping the movement of air from scrubbing away the stagnate air pocket **Now it works**



What are we asking the assembly to do? Fire



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Fire Testing: Flame Spread Rating

- Flame-spread, is used to describe the surface burning characteristics of building materials, is one of the most tested fire performance properties of a material.
- The best known test for developing this **rating** is the American Society for Testing and Materials (ASTM) Test Method E-84, commonly known as the tunnel test.



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Surface Burning Characteristics

Fire Testing: Resistance

- The measure of containment of fire with a room or building.
- It is defined as protection against fire penetrating a wall, floor, or roof whether directly or through a high rate of heat transfer that might cause combustible materials to be ignited <u>on</u> the side of the wall or floor away from the actual fire.
- Is a property of an assembly of several materials, including fastening and the workmanship.
- A fire resistive construction gives time to discover a fire, to suppress it before it spreads, and to evacuate the building if needed and it is rated in hours.





Fire Tested Assemblies

- The standard test for measuring fire is ASTM Test Method E-119.
- Rating of assemblies are determined by actual fire test procedures approximating actual fire conditions.
- The resistance rating is expressed in hours or minutes that the construction withstands the test.
- The test approximates the time the assembly would be expected to withstand actual structurefire conditions.







What are we asking the assembly to do?

Energy



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History of IECC

The code that got peoples attention



Image Source: Building Energy Codes Program: National Benefits Assessment, 1992-2040, https://www.energycodes.gov/sites/default/files/documents/BenefitsReport_Final_March20142.pdf



2015 IECC, R402.4.1.2/N1102.4.1.2 Testing (Mandatory)

- The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding:
 - 5 ACH@50 in Climate Zones 1 and 2
 - 3 ACH@50 in Climate Zones 3 through 8
- Testing shall be conducted by an approved third party and reported to the code official.







Image Source: Georgia-Pacific Building Products, http://www.buildgp.com/bpsearch.aspx?q=Area+Separation+Walls









UL Design U373

- Fire blocking is installed on both sides of the Area Separation Wall at each floor level as defined in Section 717.2.1 of the 2006 IBC. (See details section).
- For approved fire-blocking materials, see Special Conditions, Item 8.

The required fire blocking may consist of:

- 2" nominal lumber or
- two thicknesses of 1" nominal lumber with broken lap joints or
- one thickness of 0.719" wood structural panel with joints backed by 0.719" wood structural panel or
- one thickness of 0.75" particleboard with joints backed by 0.75" particleboard.
- **Gypsum board, including 1" DensGlass** Ultra[®] Shaftliner and 5/8" DensArmor Plus drywall
- batts or blankets of mineral wool or fiberglass
- or other approved materials installed in such a manner as to be securely retained in place shall be permitted as an acceptable fireblock. (Section 717.2.1, 2006 IBC)









Image Source: Georgia-Pacific Building Products, http://www.buildgp.com/bpsearch.aspx?q=Area+Separation+Walls Photos Source: EnergyLogic and Colorado Code Consulting, http://coloradocode.net/







Image Source: Georgia-Pacific Building Products: <u>http://www.buildgp.com/bpsearch.aspx?q=Area+Separation+Walls</u> and Photos from EnergyLogic









Junction of Foundation and Sill Plate is Sealed!!!



Photos curtesy of Phoenix comfort systems and EnergyStar

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Sealing the rim joist and Box sill

- 1. Sill seal between foundation and sill plate (capillary break)
- 2. Seal sill plate to foundation
- 3. Seal rim board to sill plate
- 4. Seal rim board to sub floor



Ballooning Vapor Barrier in Crawlspace





Photos from Energylogic



Area Separation Wall Connection to the Garage





Photos from Energylogic




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AMEL (ALCONTROLLAR)

Air Leakage and Air Barriers (Mandatory)

IECC, R402.4/IRC, N1102.4 Air leakage (Mandatory)

 The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections N1102.4.1 through N1102.4.5

IECC, R402.4.1.1/IRC, N1102.4.1.1 Installation

The components of the building thermal envelope as listed in Table N1102.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table N1102.4.1.1

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a con- tinuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.

TABLE N1102.4.1.1 AIR BARRIER AND INSULATION INSTALLATION



Best Practices in Air Sealing

Goal: To complete air sealing of smaller gaps and seams that cannot be addressed by solid blocking

These details are not addressed in the UL assembly listings and BXUV Guide Notes, and are not specifically addressed in the I-Codes

Problem: Many jurisdictions do not allow air sealing of these smaller gaps and seams because these practices are not specifically detailed by UL and the I-Codes







Best Practices in Air Sealing

Treat Common / Party Walls Like Exterior Walls and require all air sealing and air barriers adjacent to the assembly.



Photos from Energylogic

Best Practices in Air Sealing



Architectural drawing from Parkwood homes

Best Practices in Air Sealing Examples



What are the ALTERNATIVES?

- Code allowance
- Jurisdiction initiatives
- Alternate ASW assemblies



Alternative Materials, Design and Method of Construction IECC, R102.1/IRC, R104.11

The Code official shall be permitted to approve an alternative material, design or **method of construction** where the code official finds that the proposed design is satisfactory and complies with the intent of the provision of this code and that the material, method or work offered is for the purpose intended, at least the equivalent of that prescribed in this code.



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City of Denver Amendment



- N1102.4.1.2 (R402.4.1.2) Testing The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding three air changes per hour in Climate Zones 3 through 8.
- Exceptions:
 - 1. R-2 occupancies that comply with section C402.5 2.
 - Attached or stacked dwellings sharing one or more fire rated separation walls, floors, or ceilings, shall achieve an air leakage rate not to exceed 4 air changes per hour in Climate Zones 3 through 8. Where approved by the code official, guarded blower door testing, using multiple blower doors, shall be permitted to ensure that air leakage is measured from/to the outdoors and not from/to adjacent attached units.



New York State - Amendments

New Section R402.4.1.3 (Optional testing procedure for buildings with two or more dwelling units within the building thermal envelope and new Section R402.4.1.3.1 (Buildings with seven or more dwelling units)

Each dwelling unit and each other conditioned occupied space location within the building thermal envelope of the building is referred to as "testing unit" and the "enclosure surface area" within a testing unit shall be equal to the sum of the area of each exterior wall in such testing unit, each interior wall in such testing unit that abuts other testing units, each ceiling in such testing unit that abuts other testing units or abut unconditioned space, and each floor in such testing unit that abuts other testing units or abuts.

Each testing unit shall be tested and verified as have an air leakage rate not exceeding 0.3 CFM/sq. ft. of enclosure surface area within the testing area.

For buildings with more than seven dwelling units (testing of each unit is not required) Testing units shall be grouped into sample sets of not more than seven testing units and common rooms in each sample set.

Addition of new Section R402.4.6 (tenant separation walls (Mandatory) Fire separations between dwelling units in two-family dwellings and multiple single-family dwellings (townhouses) shall be insulated to no less than R010 and the walls shall be air sealed in accordance with Section R402.4 of this chapter.



Fort Collins, CO - Amendments



Airtightness Testing Required for Different Building Types: City of Fort Collins Building Code

New Construction Building Types	Single Family Detached	Single Family Attached	Multi-family – stacked units (low- rise and high-rise)	Small Commercial (≤5,000 sf)	Large Commercial (>5,000 sf)	Commercial / Residential Mixed Use
			■			
Examples	Houses that are free of any shared walls and stand alone	Duplex, triplex, townhomes. Each unit has its own foundation and roof	Apartments or condos (low-rise projects built under the IRC, high-rise projects built under the IBC)	Small office buildings, offices adjacent to unconditioned space	Large multi-story office buildings, large multi-use buildings	Retail on street level, MF stacked units above
Test Required	Residential Air Tightness Test	Residential Air Tightness Test	Multifamily Unit Air Tightness Test	Small Commercial Building Air Barrier Test	Large Commercial Building Air Leakage Test	Large or Small Commercial Building Air Leakage Test & MF Unit Air Tightness Test
2012 Amended Code Reference	IECC R402.4.1 IRC N1102.4.1.2	IECC R402.4.1 IRC N1102.4.1.2	IECC R402.4.1 (effective 8/1/2014)	IECC C402.4	IECC C402.4	IECC C402.4 and IECC R402.4.1
Minimum Tester Qualifications	RESNET Rater, BPI Building Analyst	RESNET Rater, BPI Building Analyst	RESNET Rater, BPI MF Auditor or Building Analyst, LEED-H MF Auditor	RESNET Rater, BPI Building Analyst	Approved Large Commercial Building Air Leakage Testing Agency	RESNET Rater, BPI MF Auditor or Building Analyst, LEED-H MF Auditor
Compliance Metric (Leakage not to exceed)	3 ACH50	3 ACH50	0.30 CFM50/SF unit enclosure surface area	3 ACH50	0.25 CFM75/SF building envelope surface area	3ACH50 for small commercial space. 0.25 CFM75/SF for large commercial. 0.30 CFM50/sf for MF units above
Test Submittal Requirements (to Building Dept. for C.O.)	See Protocol for information to be included in report	See Protocol for information to be included in report	See Protocol for information to be included in report	See Protocol for information to be included in report	Certification of Compliance, Building Air Leakage Test Results	See Commercial and MF Protocols for information to be included in report
Compliance Protocol or Guide	CFC Building Code Air Tightness Testing Protocol, New Attached and Detached SFD	CFC Building Code Air Tightness Testing Protocol, New Attached and Detached SFD	CFC Building Code Protocol for New MF Building Air Tightness Testing	CFC Alternative Small Commercial Building Air Barrier Testing Protocol	CFC Building Air Leakage Test Protocol. CFC Commercial Air Barrier Fact Sheet	CFC Building Code Protocols for Air Tightness Testing: Large or Small Commercial, and MF

3/9/2015

Air tightness testing diff building types handout V5.docx



Alternative ASW Assemblies



Image source: Architectural rendering for Gateway Construction

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Alternative ASW Assemblies

WS6-2.1 Two-Hour Fire-Resistive Wood-Frame Wall Assembly 2x6 Wood Stud Wall - 100% Design Load - ASTM E 119/NFPA 251



1. Framing - Nominal 2x6 wood studs, spaced 24 in. o.c., double top plates, single bottom plate.

2. Sheathing:

Base Layer - 5/8 in. Type X gypsum wallboard, 4 ft. wide, applied horizontally, joints staggered on opposite sides of the wall.

Face Layer - 5/8 in. Type X gypsum wallboard, 4 ft. wide, applied horizontally, joints staggered with base layer.

Horizontal joints are unblocked. Horizontal application of wallboard represents the direction of least fire resistance as opposed to vertical application.

- 3. Insulation 5-1/2 in. thick mineral wool insulation (2.5 pcf, nominal)
- 4. Gypsum Fasteners: Base Layer 2-1/4 in. #6 Type S drywall screws, spaced 24 in. o.c.
- 5. Gypsum Fasteners: Face Layer 2-1/4 in. #6 Type S drywall screws, spaced 8 in. o.c.
- Joints and Fastener Heads Wallboard joints covered with paper tape and joint compound, fastener heads covered with joint compound

Tests conducted at the Fire Test Laboratory of National Gypsum Research Center Test No: WP-1262 (Fire Endurance) November 3, 2000 WP-1268 (Hose Stream) December 8, 2000

Third Party Witness: Intertek Testing Services Report J20-006170.3

Image source: American Wood Council "Design for Code Acceptance" http://studylib.net/doc/12742534/fire-rated-wood-frame-wall-and-floorceiling-assemblies-b...

This assembly was tested at 100% design load, calculated in accordance with the 2005 National Design Specification® for Wood Construction. The authority having jurisdiction should be consulted to assure acceptance of this report.

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Alternative ASW Assembly UL – U382

- UL classified U382 Firewall is a proprietary design of Nu-Wool Co., Inc.
- STC tests were also done on three configurations of the U382 assembly: One using one layer of gypsum board per side achieving an STC of 53.
- The second test added one layer of gypsum board to one side and this wall assembly achieved an STC of 58.
- The third test for STC used two layers of gypsum board per each side and achieved an STC of 63.

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ard per each STC of 63.



Alternative ASW Assembly UL - U370



http://database.ul.com

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Alternative ASW Assembly UL - U350



INTERIOR LOAD-BEARING WALL -UL DESIGN NO. U350 (TYPE A)

(2-HOUR PARTITION WALL; FIRE-RATED ON BOTH SIDES)

- · Commonly used in Type V 2-hour partition walls
- Reduces material/labor costs and dead load by eliminating two layers of gypsum
- Eliminates need for additional materials (C channels, H studs, breakaway clips)
- Allows for standard OSB design values, while FRT plywood must take deductions
- Sound Transmission Class (STC) rating of 61



INTERIOR LOAD-BEARING WALL -UL DESIGN NO. U350 (TYPE B)

(2-HOUR PARTITION WALL; FIRE-RATED ON BOTH SIDES)

- · Commonly used in Type V 2-hour partition walls
- Reduces material/labor costs and dead load by eliminating two layers of gypsum
- Eliminates need for additional materials (C channels, H studs, breakaway clips)
- Allows for standard OSB design values, while FRT plywood must take deductions
- Sound Transmission Class (STC) rating of 56

Image source: Louisiana Pacific Corporation

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Next Steps



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The Problem

Air sealing of ASW assemblies is an identified barrier that limits the ability of builders to cost effectively achieve higher energy efficiency and quality levels in multifamily housing.

Air leakage through these assemblies also is a barrier to achieving air leakage limits mandated by the 2015 IECC/IRC.

- The relevant UL 263 fire resistance test (UL 263 2014) is conducted on a laboratory test wall that has no intentional air sealing in place to address the energy efficiency impacts of air leakage.
- Therefore, no materials or methods for air sealing (beyond draft stopping measures) are shown in the "U" Design drawings or material listings.
- As a result, code officials are typically interpreting the U Designs as having no approved air sealing methods or materials for smaller gaps and seams in these wall structures.
- This makes it difficult to achieve code mandated air tightness targets, and limits the ability to achieve higher levels of energy efficiency in multi-family buildings.



Photo from Energylogic



www.ul.com



Past Work with DOE

- Stakeholder "expert" meeting on September 29, 2014
 - Cross section of industry (private, non-profit, government)
- Examined issue and explored possible solutions
 - Retest U Design assemblies with air sealing (too expensive)
 - Revise UL BXUV Guide language (most immediate)
 - Code change (longer term)
- Report available

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Current Effort: Building America Project

To facilitate clarification of language provided by UL for their Fire Resistance Designs (BXUV) to allow for sufficient air sealing of multifamily area separation wall (ASW) assemblies to meet the requirements of current and future energy and building codes, and to provide support to the residential building industry for the adoption of these acceptable air sealing strategies.





UL Engagement

 Complete engineering review of proposed revisions to allow specific air sealing methods and materials in multi-family area separation walls.



- Revise the online BXUV Guide Notes.
- Develop and publish an online Technical Library guidance document.



Potential Revisions

- Fire-blocking foam (meeting ASTM E 84 Class 1) to fill and seal the 3/4" air space at the area separation wall end conditions (bottom, sides, and top) and between floors.
- Fire-rated, fire-stopping foam to fill and seal the 3/4" air space at the area separation wall end conditions and between floors.
- Rockwool to fill the 3/4" air space at the area separation wall end conditions and between floors, and elastomeric coating to air seal the rockwool.
- Strips of gypsum liner panel to fill the 3/4" air space at the area separation wall end conditions and between floors.
- Strips of gypsum liner panel to fill the 3/4" air space at the area separation wall end conditions and between floors, and fire-blocking foam to seal between the gypsum liner and the protected wall.
- Strips of gypsum liner panel to fill the 3/4" air space at the area separation wall end conditions and between floors, and fire-rated, fire-stopping foam to seal between the gypsum liner and the protected wall.
- Strips of gypsum liner panel to fill the 3/4" air space at the area separation wall end conditions and between floors, and elastomeric coating to seal between the gypsum liner and the protected wall.



BXUV Guide Notes

http://productspec.ul.com/document.php?id=B

XUV.GuideInfo

(U)			
UL PRODUCT SPEC TM Quickly find, specify, or verify UL Certified	products for your projects.		
1. HOW DO YOU WANT TO SEARCH? 2. RESULTS	The fire-resistive materials applied to the steel sections should be protected from damage.		
FIRE-RESISTANCE DESIGN	VI. WALLS AND PARTITIONS		
Fire-resistance Ratings - ANSI/UL 263, BXUV Guide Information for Fire-resistance Ratings	The ratings for walls and partitions apply when either face of the assembly is exposed to the fire unless indicated otherwise in a specific design. Flashing and corner details may vary from those described in a design provided structural equivalency is maintained and similar materials to those specified in the design are used for supports, fasteners and flashings. Where dynamic movement is specified in Joint Systems (XHBN) that utilizes either U400, V400 W400 Series fire-resistance-rated wall and partition assemblies, the special features of the walls to accommodate dynamic movement are intended to be as specified in the individual designs under XHBN.		
Design Information Section	As stated in ANSI/UL 263, the test specimen is to be representative of the construction for which classification is desired as to		
The Design Information Section supplements the individual published designs and is organized as follows:	materials, workmanship, and details such as dimensions of parts, and is to be built under conditions representative of those practically applied in building construction and operation. Accordingly, wall and partition hourly ratings are applicable when walls are constructed in a true vertical position. Unless otherwise noted in an individual design, the performance of angled walls or walls constructed in the horizontal position has not been investigated.		
I. INTRODUCTION			
II. GENERAL			
III. FLOOR-CEILINGS AND ROOF-CEILINGS	The hourly rating of a load-bearing assembly also applies to the same assembly when it is used as a non-load-bearing assembly.		
IV. BEAMS	The size of studs is minimum unless otherwise stated in the individual designs.		
V. COLUMNS	The spacing of studs is a maximum unless otherwise stated in the individual designs.		
VI. WALLS AND PARTITIONS	Spacing between parallel rows of studs are minimums unless otherwise stated in the individual designs.		
I. INTRODUCTION			
This category covers fire-rating certifications based upon the test method and acceptance criteria in ANSI/UL 263 (ASTM E119), "Fire Tests of Building Construction and Materials." The ratings are expressed in hours and are applicable to floor-ceilings, roof-ceilings, beams, columns, walls and partitions.			
The average furnace temperature from which these ratings are derived is 1000°F at 5 min., 1400°F at 15 min., 1550°F at 30 min., 1700°F at 60 min., 1850°F at 120 min., 1925°F at 180 min. and 2000°F at 240 min.			
When a test assembly complies with the acceptance criteria, a detailed description of the assembly, its performance in the fire test, and other perfinent details such as specification of materials, certification coverage and alternate assembly details are included in a Report for the test sponsor. Sponsors may provide copies of the complete Test Report upon request. The Report also contains a summary of important features of the rated assembly. These summaries are also published in this Directory Variations from the published.			

UL Technical Library

Exterior Fire-Resistance Rated Walls

How can I determine if a fire-resistance rated wall described in a UL design is suitable for use as an exterior wall?



The fire-resistance rate wall assemblies published under the U, V and W series of designs on the UL Online Certifications Directory are intended for interior applications unless otherwise specified or implied in the design. There are two methods by which a wall design specifies or implies suitability for extenior applications.

First, the description of one or more of the components will include the phrase "Investigated for Exterior Use". This phrase indicates the component has been investigated and found suitable for use in an exterior application.

Second, the design will include an exterior wall covering, such as brick veneer or siding to provide a weather-resisting barrier to protect the remaining components of the wall. If either of these references is contained in the UL design, the wall is suitable for an exterior application.

When a UL design is being utilized in an exterior application, the local building code and code authority should be consulted to ensure compliance with other code requirements applicable to exterior walls.

For additional information on fire-resistance rated walls try the Ultimate Fire Wizard at www.ul.com/firewizard.

http://www.ul.com/codeauthorities/resources/technical-library/

For more information visit www.ul.com

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U.S. DEPARTMENT OF

Energy Efficiency & Renewable Energy



Immediate Needs & Timeline

- Engage with stakeholders to fund the UL BXUV Guide Notes revisions and UL Technical Library guidance document development
- Timeline:
 - January 31, 2017 Initiate agreement with UL
 - April 30, 2017 UL BXUV Guide Notes revised (online)
 - June 30, 2017 UL Technical Library guidance document and DOE's Building America Solution Center content published (online)



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Air Sealing Multifamily Party Walls

Scope Description Success Climate Training CAD Compliance More Sales

Scope

Air seal the common wall between units in a multifamily structure to minimize air leakage and provide a control layer for sound, smoke, fire, and air quality.

- In multifamily buildings, air seal the gap between the drywall shaft wall (i.e., common wall) and the structural framing between units at all exterior boundaries.
- Confirm with local code officials which air sealing materials are is preferred for fire safety reasons.
- Possible air sealing materials include fireproof spray foam for sealing the bottom plate to subfloor and bottom and top plates to sheathing in wood-framed walls, fire-rated caulk around plumbing and wiring, and twopart urethane foam for masonry block walls.



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Air seal the common wall between units in a multi-family structure to minimize air leakage.

See the <u>Compliance Tab</u> for related codes and standards requirements, and criteria to meet national programs such as DOE's Zero Energy Ready Home program, ENERGY STAR Certified Homes, and Indoor airPLUS.

Last Updated: 03/14/2016







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The 2012 IECC does not specifically address sealing multifamily party walls. Table R402.4.1.1 Air Barrier and Insulation Installation, Walls: Junction of foundation and wall sill plates, wall top

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Code Briefs

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The intent of Building America's Code Compliance Briefs are to provide code-related information about Building America's research, best practices, and new innovations to help ensure that the measures will be accepted as being in compliance with the code. Providing notes for code officials on how to plan review and conduct field inspections can help builders or remodelers with proposed designs and provide jurisdictional officials with information for acceptance. Providing the same information to all interested parties (e.g., code officials, builders, designers, etc.) is expected to result in increased compliance and fewer innovations being questioned at the time of plan review and/or field inspection.

<u>Air Sealing and Insulating Attic Knee Walls - Code Compliance Brief</u> Air sealing and insulating attic knee walls to code.

Air Sealing and Insulating Common Walls (Party Walls) in Multi-Family Buildings - Code Compliance Brief

Publication Date: May, 2016

The intent of this brief is to provide code-specific information about air sealing and insulating common walls in multi-family buildings to help ensure that the measures will be accepted as being in compliance with the code. Providing the same information to all interested parties (e.g., code officials, builders, designers, etc.) is expected to result in increased compliance and fewer innovations being questioned at the time of plan review and/or field inspection.

Air Sealing and Insulating Garage Walls - Code Compliance Brief

This brief provides an overview of the 2009 through 2015 IRC/IECC code requirements related to air sealing and insulating attached garage walls.

Bathroom Fan Ratings - Code Compliance Brief

If the bathroom fan is part of the whole-house mechanical ventilation system (WHMV), there are code provisions that should be verified during plan review and field inspection depending upon codes enforced in your jurisdiction.

<u>Buried Ducts in Vented Attics in Hot-humid and Mixed-humid Climate Zones - Code Compliance</u> <u>Brief</u>

Publication Date: May, 2016

The intent of this brief is to provide code-related information about buried ducts in vented attics to help ensure that the measure will be accepted as being in compliance with the code. Providing

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Code Compliance Briefs (CCBs)

- As part of the CSI efforts, the need was identified to develop additional guidance on codes and standards barriers to builders, remodelers, and code officials on certain Building America technologies.
- CSI barriers are defined as any requirement in a code, standard, or rating method that:
 - requires the wrong thing,
 - prohibits the Building America technology,
 - discourages a Building America technology, or
 - does not encourage a Building America technology that would lead to better, more efficient homes.
- Other content within the Building America Solution Center provides measure installation and climate-specific guidance.



Code Compliance Briefs (CCBs) - Intent

- The briefs provide detailed references to research findings and code and tips for plan review and field inspections.
- All interested parties (e.g., code officials, builders, contractors, designers, etc.) gain understanding of consistent expectations resulting in increased compliance and fewer innovations being questioned.
- Technical validation (TV) is critical for code officials to accept innovations and the audience must know that TV has been performed and is VALID without having to read extensive research reports.



Resource for Code Official/Builders

Resource for Code Official/Builders

- Questions regarding proper air sealing and leakage testing of multi-family buildings is one of the most widely compliance issues being captured throughout the U.S.
- For example, Circuit Rider/Code Official, and trainer in the State of Colorado receives approximately 100 questions a month from designers to code officials in jurisdictions throughout the state.
- CCB is used as a resource to assist with the code barriers regarding air sealing and leakage testing.
- Work is currently underway to further update the language specifications in UL (CCB will be updated in FY2017).

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NERGY STAR Certified	The intent of this brief is to provide code-specific information about air sealing and insulating common walls in multi-family buildings to help ensure that the measures will be accepted as being in compliance with the code. Providing the same information to all interested parties (e.g., code					
ero Energy Ready Home	officials, builders, designers, etc.) is expected to result in increased compliance and fewer innovations being questioned at the time of plan review and/or field inspection.					
PA Indoor airPLUS	*					
ND RESOURCES:	A common wail, or other known terminologies such as a party wail, inte wail, inte separation wail, townnouse separation wail, or tenant separatis wail, or tenant separation wail, or t					
ales Tool AD Files	or it may extend through the roof to a parapet closure. The purpose of a common wall is to prevent the spread of fire from one unit to another, and to allow the collapse of a unit that is on fire without structurally impacting the adjacent unit.					
mane Gallery	These as exceptions with a second standards baseling as a second to be a subtraction with the fact to building (standards second sign as a standard to second standards).					
are Studier	two dwelling units and three stories or less above grade), and workable approaches exist for resolving these barriers without the need for time					
ideos	consuming, expensive fire testing in a lab. Ultimately however, eventual code changes related to these barriers will be needed to bring these to finalize resolution. These barriers include, but are not limited to the followina:					
ptimized Climate olutions	No clear definition is included in the International Energy Conservation Code (IECC) and International Residential Code (IRC) for any of the					
eferences and Resources	terms used to describe a common wall.					
ode Driefs	 The International Building Code [IBC] defines a fire wall as, "A fire-resistance rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions 					
ND PUBLICATIONS:	to allow collapse of construction on either side without collapse of the wall."					
uilding Science ublications						
	Air leakage testing required in the IECC and IRC.					
	• Air leakage test requirements are based on a total building thermal envelope leakage to the outdoors. This is not the case for multi-family and single-family, attached housing. For these types of housing, a distinction between total leakage and leakage to the outside is necessary. Some practitioners and program administrators prefer fully guarded tests (FGTs). This test method requires all neighboring units to be pressurized or depressurized at the same time and to the same pressure as the unit being tested to eliminate any transfer of air between units and isolate only the air leakage to the outdoors. In retrofit situations, performing guarded blower door testing is by far more expressive, time consuming, and intrusive to occupants than testing an individual unit. The simpler and more common method for measuring air leakage in attached dwellings is to use a single blower door to pressurize and/or depressurize the test unit. This "single unit", "total" or "solo" (SO) test method measures the combination of air leakage to the outsides. Two significant limitation of the SO leakage test are:					
	• For extends to be able to be an extended to be all to the extended encounter of all any line and be also "Countly extended intended".					

- · For retrofit work, if total leakage is assumed to be all to the outside, energy benefits of air sealing can be significantly overpredicted.
- For new construction, the total leakage value may result in failing to meet an energy based house tightness program criterion. (O. Faakye, L. Arena, and D. Griffiths, July 2013).
- Proper air sealing of these assemblies to meet air leakage rates of 3 or 5 ACH50 depending on climate zone.
- · Air sealing has proven to be challenging for multi-family dwellings because it is difficult to identify all the locations that need to be sealed



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Acknowledgements & CEUs

DOE Building America Program: Eric Werling DOE Building Energy Codes Program: David Cohan and Jeremy Williams

AIA LUs, ICC CEUs and

Certificate of Attendance for Self-reporting

https://www.energycodes.gov/air-sealing-credit-

<u>request</u>



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EDUCA,

Thank You



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