

TECHNICAL BULLETIN NO. 19-2009

Note:

Date Issued: April 22, 2009

Subject: ASHRAE Standard 62.2 – Suite Ventilation –
Environmental Tobacco Smoke Control

Reference: Provincial Homelessness Initiative Design Guidelines
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SUBJECT:

Methods for controlling Environmental Tobacco Smoke as per the Suite Ventilation requirement in Section 15500 Heating, Ventilating and Air Conditioning of the Independent Living BC Non-Profit Housing Design and Construction Standards and Provincial Homelessness Initiative Design Guidelines & Construction Standards.

PURPOSE:

Provides methodology to assist design teams and contractors to achieve the Environmental Tobacco Smoke Control prerequisite in LEED, with a focus on reducing air leakage between suites in BC Housing projects.

REFERENCE:

Independent Living BC Non-Profit Housing Design and Construction Standards (ILBC Standards), Revised October 2006:

- Section 15500 Heating, Ventilating and Air Conditioning.

Provincial Homelessness Initiative Design Guidelines and Construction Standards, (PHI Standards), October 2006:

- Section 15500 Heating, Ventilating and Air Conditioning.

DESCRIPTION:

LEED Environmental Quality Prerequisite 2, Environmental Tobacco Smoke (ETS) Control is intended to prevent or minimize exposure of building occupants to environmental tobacco smoke due to cross-suite air leakage.

Technical Bulletin

Environmental Tobacco Smoke Control

For

BC Housing New Construction Projects

Issued:
April 2009

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Introduction

Background

BC Housing requires new construction projects to achieve Leadership in Energy and Environmental Design (LEED) Gold performance levels. LEED Environmental Quality Prerequisite 2, Environmental Tobacco Smoke (ETS) Control is intended to prevent or minimize exposure of building occupants to environmental tobacco smoke.

Three compliance options are permitted to achieve the ETS compliance prerequisite, including:

1. Prohibit smoking in the building
2. Establish negative pressure in rooms with smoking
3. For residential buildings only, reduce air leakage between rooms with smoking and non-smoking areas in residential buildings

In general, compliance option 3 is most practical for BC Housing Projects.

Objective

This technical Bulletin has been developed to assist design teams and contractors to achieve the Environmental Tobacco Smoke Control prerequisite in LEED, with a focus on reducing air leakage between units in BC Housing projects.

Approach

Air leakage between units shall be minimized through

1. Sealing of penetrations in floors, ceilings and walls
2. Air sealing vertical chases located adjacent to units
3. Weather stripping the suite access door (weather stripping of doors may be omitted if it can be demonstrated that a 1 Pa pressure drop from the corridor to the suite is maintained).

A range of approaches may be applied to minimize air leakage between units, including

1. Sealed poly ethylene air/vapour barrier installation
2. Air tight drywall
3. Installation of closed cell expanding foam in conjunction with typical drywall installation.

Air leakage control details are presented in Appendix 1.

Compliance

The test procedures to demonstrate compliance is:

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ASTM-779-99, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

Acceptable alternatives test methods include:

ASTM-779-03, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

Or

CBSB 149.10.M86, Determination Of The Air-tightness Of Building Envelopes By The Fan Depressurization Method

Units shall demonstrate a Normalized Leakage Area of less than 0.875cm² per square meter of enclosure area (1.25in² per 100ft²) when calculated using the ASTM methodology (i.e., 4 Pa). This typically converts to 1.65cm²/m² (2.37in²/100ft²) when using the CGSB calculation methodology (i.e., 10 Pa).¹.

In buildings with less than 100 units, at least 10% of units shall be tested. For buildings with more than 100 units, 10% of the first 100 units and an additional 5% of units in excess of the first 100 units shall be tested in each building. Testing shall be distributed throughout the building's elevations, orientations and suites.

Submittals

A sample air leakage test report submittal is attached. One test report per unit shall be submitted with other LEED submittals. The building owner or responsible party shall sign the air leakage submittal. In addition, a LEED Letter Template shall be signed by the building owner or responsible party.

Additional References

A range of documents have been prepared to assist with air sealing and compartmentalizing buildings:

¹ Note that while the intent of this prerequisite is to reduce air transfer between units, overall air leakage of the unit is being measured for compliance. Therefore, reducing air leakage to the exterior will impact the test.

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- Canada Mortgage and Housing Corporation, **Air Leakage Control in Multi-unit Residential Buildings**, 2005
- City of Calgary, **Fire Stopping Service Penetrations in Buildings**, Version 1.0, 2003
- National Energy Conservation Association, **Air Leakage Control Manual**, 1989

Submittal: Sample Air Leakage Test Report

Building Address		
Date of Construction		
Description of Construction		
Interior Partitions		
Exterior Envelope		
Suite Description		
Unit Number		
Floor Area	[square meters]	
Surface Area	[square meters]	
Volume	[cubic meters]	
Set-up	Open/Closed/Not applicable	
Interior doors		
Exterior Doors	Open/Closed/Not applicable	
Door to Conditioned Common Area	Open/Closed/Not applicable	
Windows	Open/Closed	
Ventilation	Open/Closed	
Chimneys and dampers	Open/Closed	
HVAC equipment	Open/Closed/Sealed/Not applicable	
Test Equipment		
Manufacturer		
Date of Calibration		
Measurement Data		
Interior Temperature		
Exterior Temperature		
House Pressure/Flow Pressure	House Pressure [Pa]	Flow Pressure [Pa]

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Range		
Calculated Data		
Leakage Coefficient		
Pressure Exponent		
Effective Leakage Area at 10 Pa		[square meters]
Normalised Leakage Area at 10 Pa		[square centimetres/square meters]
Confidence Limits		
Compliance Statement		
Date of Test		
Name and Company of Testing Agent		
Signature of Testing Agent		

Signature of Building Owner or Responsible Party

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Appendix 1: Typical Air Sealing Details and Leakage Areas

This appendix provides potential leakage points and sealing options to address interior compartmentalization of MURBs. In addition to sealing the interior walls, continuity of the exterior air barrier is critical to achieving the LEED prerequisite. Envelope air barrier details are not included in this appendix.

Table 1: Typical Air Sealing Details and Leakage Areas

Location	Description	Detail
Manage the number of penetrations through partitions	<p>Minimizing the number of penetrations while preserving the functional requirements of a space may be considered at the design stage.</p> <p>Painters tape is installed over wall penetrations to highlight the number or air leakage points in this project.</p> <p>In this project, the pot lights installed in the drop ceiling was a significant source of air leakage that proved difficult to seal after the drywall was installed.</p>	

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Location	Description	Detail
<p>Seal Bottom/top plate to the floor/ceiling slab</p>	<p>Foam Sealant installed after drywall installed as a remedial measure to achieve the ETS prerequisite in a LEED certified project.</p> <p>Sealant is recommended for joints from 3 mm to 20 mm. Foam sealant is recommended for joints between 20 mm and 75 mm.</p> <p>Alternatively, the slab to wall joint may be treated by sealing the bottom plate/top plate to the slab, then using neoprene gasket to seal the drywall to the plates.</p>	
<p>Plumbing/electrical fixtures</p>	<p>Plumbing and electrical penetrations may be treated similarly using sealant for small joints and foam for larger joints. Fire rated foam may be used to achieve both air leakage control and fire stopping.</p> <p>Large electrical or plumbing penetrations (greater than 50 mm diameter) are most effectively treated by boxing out the penetration within the stud cavity, filling with foam, then installing neoprene gaskets around the perimeter of the box. This is used when a double plate party wall provides the sound and fire separation and is required by Code.</p>	<p>The diagram illustrates the four steps for sealing a penetration in a fire-rated assembly:</p> <ol style="list-style-type: none"> 1 Clean Opening: Shows a pipe or wire passing through a hole in a fire-rated assembly. 2 Insert backer rod: Shows a backer rod being inserted into the opening behind the pipe/wire. 3 Apply sealant to correct depth: Shows a sealant gun applying sealant around the pipe/wire and backer rod. 4 Tool (if required by manufacturer): Shows a tool being used to finish the sealant application.

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Location	Description	Detail
<p>Electrical Receptacles</p>	<p>Electrical receptacles may be treated using air tight drywall type gasketed boxes prior to the installation of drywall.</p> <p>In situations where the drywall has been installed, pre-punched neoprene gaskets may be installed.</p> <p>In cases where the fit between the electrical box and the drywall is poor, foam may be installed to seal the joint.</p>	
<p>Door weather stripping</p>	<p>Weather-stripping is a requirement of the Environmental Tobacco Smoke prerequisite for LEED. A range of products are available for jamb, head and sill details.</p> <p>In applications where accessibility precludes the use of a sill threshold, a pile seal may be considered to provide the necessary air sealing. As entrance doors are self latching, ensuring the door can operate properly with the door weather stripping should be confirmed.</p>	

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Location	Description	Detail
<p>Transfer grille fire dampers</p>	<p>Transfer grilles installed in walls for supply air may be sealed between the duct and the wall. If the transfer grille is installed in the door, it should be sealed between the duct and the door. In general transfer grilles require a fire damper when installed between the suite and corridor.</p> <p>Testing of the fire damper in the closed position should be included in assessing the overall air tightness of units.</p>	<p>The diagram shows a horizontal duct labeled 'DUCT' with arrows indicating airflow. Above and below the duct are vertical sections representing walls or doors. A fire damper is shown installed in the wall/door. A label 'FOAM SEALANT OR CAULKING' points to the seal between the duct and the wall. Another label 'CLOSURE' points to the fire damper mechanism.</p>

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Location	Description	Detail
Pocket Doors	Pocket doors connected to partition walls may provide a significant air leakage path unless the stud space is compartmentalized. Boxing in and air sealing the pocket door rough opening is recommended, as it is difficult to air seal pocket door once installed.	

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Location	Description	Detail
Supply and Exhaust Ducts	<p>Seal duct to flange and flange to wall connections of supply and exhaust ducts. Ensure that duct grilles are equipped with flaps or dampers to prevent back flow.</p> <p>Joints in ducting can be a significant source of air leakage that may be addressed through specifying maximum duct leakage, and installing joint seals in all duct joints.</p>	 A close-up photograph showing a metal duct connection to a wall. The duct is secured with a metal flange and a grille. The image highlights the joint between the duct and the wall, which is the focus of the technical bulletin's advice on sealing.

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Location	Description	Detail
Stacks and vents	<p>Vertical stacks for water and sewer lines may run within party walls and provide floor to floor air leakage paths. In general these penetrations are fire sealed. However, air sealing is not fire sealing, and even fire-stopped stacks may still be a source of leakage.</p> <p>A range of fire rated foam products are available that meet fire rating and air seal requirements and may be considered for these applications, such as:</p> <ul style="list-style-type: none">• ABESCO® FP200 Fire Rated Expanding Foam• Handi-Foam E-84	

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Location	Description	Detail
Plumbing fixtures	Plumbing fixtures may be treated as other large penetrations. They are most effectively treated by boxing out the penetration within the stud cavity, filling with foam, then installing neoprene gaskets around the perimeter of the box. This detail is required by code when configured back to back but frequently gets omitted in single sided applications.	

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Location	Description	Detail
Drop Ceiling	<p>Drop ceiling frequently provide runs for electrical, plumbing and ventilation runs. As such they can be difficult to air seal prior to closing in. However, they are almost impossible to treat once drywall is up.</p> <p>It is recommended to install wiring within sleeves that can be sealed once rough in is complete. Similarly, it is recommended to install collars or flanges in ducts as they penetrate walls and seal the flanges to the walls.</p>	

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Location	Description	Detail
Party Wall to Exterior Wall	<p>The interface between the building envelope air barrier and compartmentalization of interior units can be a complex detail to achieve continuity of air barriers.</p> <p>To ensure continuity, it is recommended that the envelope air barrier be tied to the party wall air barriers.</p> <p>In general a structural air barrier is recommended to ensure a durable system, precluding the use of polyethylene sheet.</p>	

END