



# Building Officials Newsletter

Building Standards  
October 2000

## Carpet on Walls

Several recent callers have asked about the possibility of using carpet as the interior finish on walls. This was being considered in one instance because of the acoustical benefits to a “noisy” room. In another case, the relative cost compared to other long-wearing finishes was the incentive.

The National Building Code of Canada (NBC) 1995 sets limits on the flame-spread rating and smoke developed classification for interior finishes. These numbers indicate the surface burning characteristics of materials under specific test conditions set out in CAN/ULC-S102.2 “Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies.” Red oak flooring and inorganic reinforced cement board are used as the calibration checks for the tests, at 100 and 0, respectively.

Subsection 3.1.12. sets maximum flame-spread ratings and smoke developed classifications for buildings falling under Part 3 of the NBC 1995. Unless otherwise provided, surface flame-spread rating of walls and ceilings in sprinklered buildings shall not exceed 150, and in unsprinklered buildings, 75. Exits, lobbies, corridors, and all areas in high buildings must meet more stringent requirements. Subsection 9.10.16. sets maximum flame-spread ratings for buildings falling under Part 9 of the NBC 1995. Except as otherwise provided, surface flame-spread ratings of walls and ceilings shall not exceed 150. More stringent requirements are set for exits and corridors, while more lenient requirements are set for bathrooms. Smoke developed classification limits are typically set for materials within ducts and plenums and for interior finishes in high buildings.

Appendix D of the NBC 1995 includes flame-spread ratings and smoke developed classifications of some common finish materials, with 150/300 representing a flame-spread rating of 75 to 150 and a smoke developed classification of 100 to 300. For example, min. 9.5 mm thick gypsum wallboard is assigned 25/50, and min. 16 mm thick Douglas Fir plywood is assigned 150/300. Generic wool and carpet samples are given 300/500 when tested on the floor. It is easy to speculate that typical carpets would likely not meet the requirements when applied on walls.

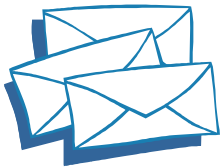
Thus, to decide whether a carpet can be used as a wall finish it is necessary to determine what the permitted flame-spread and smoke developed classifications are, and to obtain test results that verify that the carpet characteristics are within these limits. A final word of caution. Many carpets manufactured in the U.S. are tested to an ASTM standard, but unless the relationship between this and the ULC standard is known, the results are not comparable. §

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### Attached to this issue ...

Child Care Facilities Advisory  
Announcement — Review of Objectives of the  
National Model Codes



## Readers' Letters

I was just reading your July 2000 edition of the Building Officials Newsletter and I noted an article that put a slant on the contained information. The "Roof Covering Classifications" article provided accurate but incomplete information. There is another agency in Canada that is accredited by the SCC [Standards Council of Canada] for testing and certification of roof covering systems.

Intertek Testing Services NA Ltd. through the Warnock Hersey building materials group, is SCC accredited in many subject areas, including roofing systems. We also issue hard copy listing books which are available to Authorities Having Jurisdiction on request by contacting me at the numbers noted below.

Even more conveniently, we have our listings user available on our web site. By contacting [www.itsqs.com](http://www.itsqs.com) and clicking on the "directory of listed products" you get switched into the new web site section which includes listing books for our powered products and building materials. Select the ETL logo for the powered products (Gas, electric, etc.) or the WHI logo (3<sup>rd</sup> one down) for the building materials. In the building materials directory segment enter "roof" to open you to all our roof related listings complete with details and drawings (where applicable). Click on the name of the manufacturer to review the listings, and for qualification information click on the arrow at the bottom of the page of listings.

We would greatly appreciate it if you could share our information with your readership too.

Regards,  
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*If you wish to comment on anything you've read in the Building Officials Newsletter, please send your letter to us by fax, e-mail or post-mail at the addresses listed on the last page.*

**"never stay at a hotel whose sprinkler system is a dixie cup with holes in the bottom"**

— B.C. by Johnny Hart

## Construction of Insulated Floors over Unheated Space

*by G. Adaire Chown, B.Arch., Technical Advisor,  
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Construction, National Research Council of Canada*

A question was raised at the Spring 2000 SBOA Conference regarding the construction of insulated floors over unheated space, for example, floors over garages. The question focused on the location of the vapour barrier relative to other materials, ducting and spaces in the assembly. The response provided in the April 2000 *Building Officials Newsletter* provided some misleading information. Some of the confusion appears to be due to misunderstandings related to the functions, and consequently the required properties and locations, of the airtight element of the air barrier system and the vapour barrier; and the relationships among Article 9.25.1.2. on low air and vapour permeance materials, Subsection 9.25.3. Air Barrier Systems, and Subsection 9.25.4. Vapour Barriers.

### Low Air and Vapour Permeance Materials and Location of the Vapour Barrier

The *Building Officials Newsletter* article correctly states that insulated floors, like insulated walls and ceilings, must incorporate an air barrier system [Sentence 9.25.3.1.(1)] and a vapour barrier [Sentence 9.25.4.1.(1)].

Sentence 9.25.1.2.(1) identifies where, in an insulated assembly, sheet or panel materials with low air and vapour permeance may be located. This provision applies not only to polyethylene or other vapour barrier materials but also to all materials with an air leakage characteristic less than  $0.1 \text{ L}/(\text{s}\cdot\text{m}^2)$  measured at 75 Pa and a water vapour permeance less than  $60 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ . For example, depending on specific material properties, it would likely apply to 38 mm extruded polystyrene. It would apply to sheet metal cladding; it would not apply to strip siding. The provision is intended to reduce the probability of moisture entrapment within an insulated assembly.

Sentence 9.25.4.3.(2) requires that vapour barriers be installed sufficiently close to the warm side of the assembly to prevent condensation at design conditions. This provision applies regardless of what other low vapour permeance materials might be included in the assembly or where they are located. The requirement is intended to reduce the rate of

*(continued on page 3)*

*(continued from page 2 — Construction of Insulated Floors over Unheated Space)*

transfer of moisture, by vapour diffusion, into the assembly from the interior, and consequently to reduce the probability of excessive condensation and accumulation of moisture in the assembly.

Sentence 9.25.1.2. assumes that a vapour barrier is installed toward the warm side of the assembly in accordance with Sentence 9.25.4.3.(2). Consequently, the values provided in Table 9.25.1.2. do not relate to the position of the vapour barrier. Rather they relate to the position of other low air and vapour permeance materials in the assembly.

### **Function and Properties of the Vapour Barrier**

As noted above, the function of the vapour barrier is to reduce the rate of transfer of moisture, by vapour diffusion, into the assembly from the interior, and consequently to reduce the probability of excessive condensation and accumulation of moisture in the assembly.

To fulfil its function, the critical property of the vapour barrier is its water vapour permeance. Sentences 9.25.4.2.(1) and (2) specify maximum permeances of 45 ng/(Pa•s•m<sup>2</sup>) or 15 ng/(Pa•s•m<sup>2</sup>) depending on other materials used in the assembly. <sup>(1)</sup> A variety of materials can be used to provide the required resistance to diffusion. For example, depending on specific product properties, 15.5 mm plywood or O-2 Grade OSB installed as subflooring should conform to the 45 ng/(Pa•s•m<sup>2</sup>) limit. T&G board subflooring might or might not serve as a vapour barrier depending on the permeability of the wood used, the thickness of the material and the tightness of the joints. Where the subfloor material complies with the specified limits for vapour permeance, polyethylene would not be required in the assembly to serve as a vapour barrier.

### **Function and Properties of the Airtight Element of the Air Barrier System and Its Location Relative to the Insulation**

Air barrier systems serve a number of functions including a) reducing the rate of transfer of moisture, by air exfiltration, into the assembly from the interior, and consequently to reduce the probability of excessive condensation and accumulation of moisture

in the assembly; and b) to reduce the probability of uncomfortable conditions for the occupants due to drafts from air infiltration.

To fulfil its functions, the critical properties of the air barrier system are its air leakage characteristics, its resistance to air pressure loads and its continuity. Part 9 does not specify limits on air leakage or air pressure resistance. It relies on common knowledge of good practice, as described in numerous practice publications, that has demonstrated acceptable performance over time. The most common approaches using polyethylene or gypsum board as the principal airtight elements of the air barrier system are well documented.

As with vapour barriers, a variety of materials can be used to serve as the airtight element of the air barrier system. Polyethylene can be used for this purpose in low-rise construction provided it is sufficiently supported to resist imposed air pressures. It is commonly used in residential construction because, installed toward the warm side of the assembly, it can serve the additional function of the vapour barrier. T&G board subflooring would not serve as the airtight element of the air barrier system unless all of the joints were sealed against air leakage. The long-term performance of such sealing would have to be determined.

Although it is standard practice in residential construction to install the airtight element of the air barrier system toward the warm side of the assembly, and there are real advantages in doing so, this element can be installed anywhere within the assembly and still perform its function. However, for thermal insulation to perform its function, it must be either airtight itself and installed with airtight joints, or installed in direct and continuous contact with an airtight element of the assembly [9.25.2.3.(3)]; this is usually the airtight element of the air barrier system.

### **Identification of Components**

In the case of floors insulated with fibrous insulation, the designer must identify which component in the assembly is to serve as the airtight element of the air barrier system and ensure that the insulation can be installed in direct and continuous contact with that element.

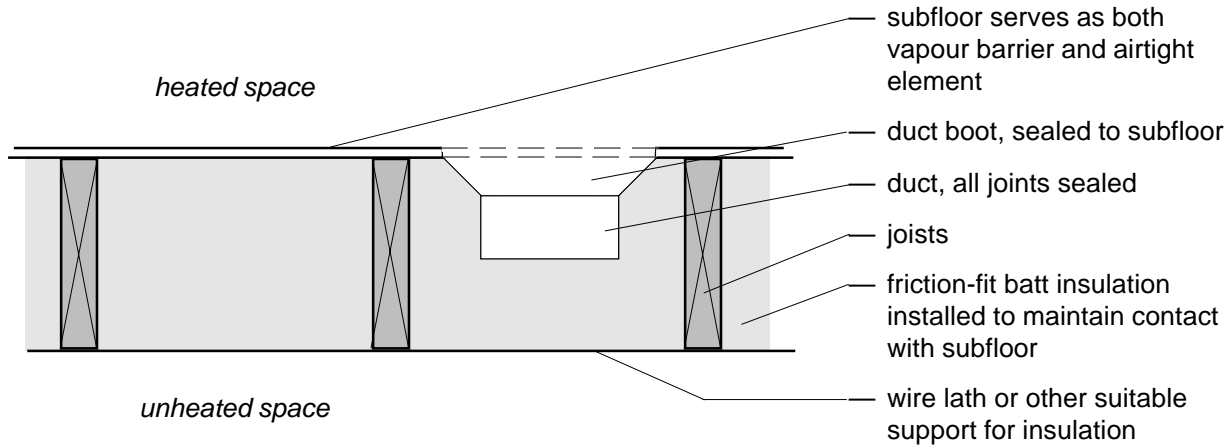
Note:

(1) Sentence 9.25.1.2.(1) addresses the issues that Sentence 9.25.4.2.(2) was originally written to address. The Standing Committee on Houses is reviewing this provision.

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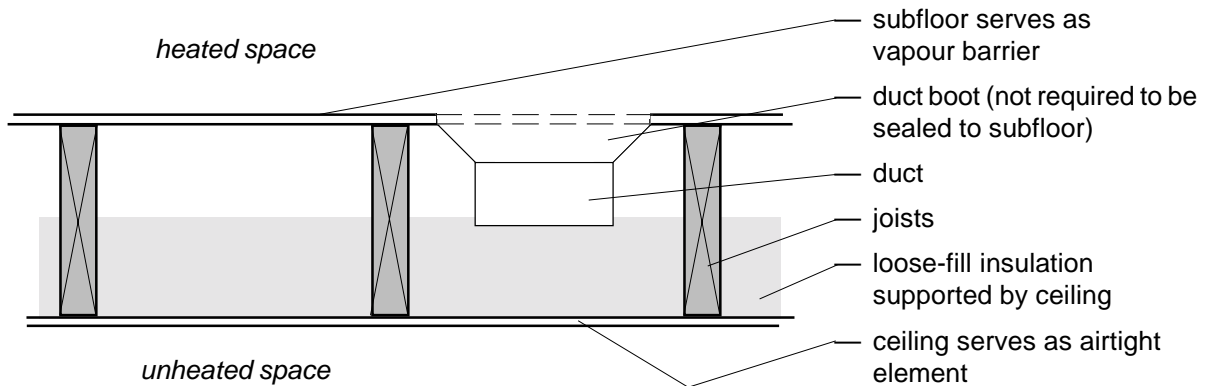
*(continued from page 3 — Construction of Insulated Floors over Unheated Space)*

- If the subfloor is to serve as the airtight element, either the full depth of the joist space must be filled with insulation or it must be supported so as to maintain contact with the bottom of the subfloor. This approach is problematic where ducting is installed in the joist spaces as the duct will penetrate the airtight element of the air barrier system. Although joints in heating and ventilation ducts are required to be sealed in any case where they pass through unheated space, special care will be needed to ensure a durable seal, and the boots will have to be sealed to the subfloor. Insulation of the ducts will also have to be addressed. (Figure 1)



**Figure 1**

- Where the ceiling of the space below is to serve as the airtight element, the insulation can be simply supported on the top of the ceiling. This is probably the simplest approach and avoids compromising the tightness of the air barrier system with ducting. The designer and builder, however, must ensure that this airtight plane is made continuous with the airtight elements in adjoining constructions such as walls that support or are supported by the floor. Any penetrations of the ceiling must be sealed. (Figure 2)



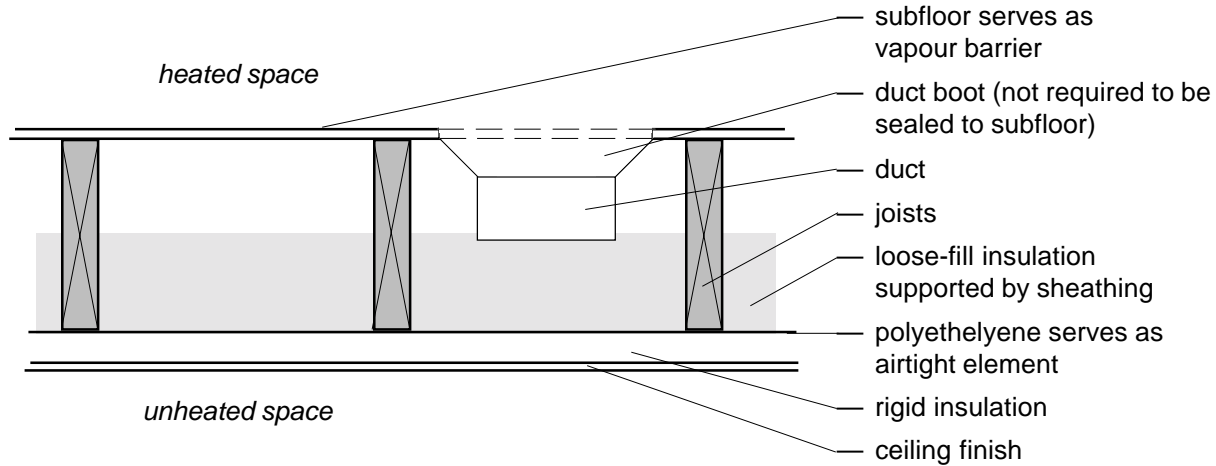
**Figure 2**

- If polyethylene is installed below the floor joists to serve as the airtight element of the air barrier system, Sentence 9.25.1.2.(1) will come into play as a low air and vapour permeance component is now located in a position where it will reduce the rate of dissipation of moisture from the assembly. Additional insulation would be required on the cold side of the polyethylene as defined by Table 9.25.12. (Figure 3)

*(continued on page 5)*

*(continued from page 4 — Construction of Insulated Floors over Unheated Space)*

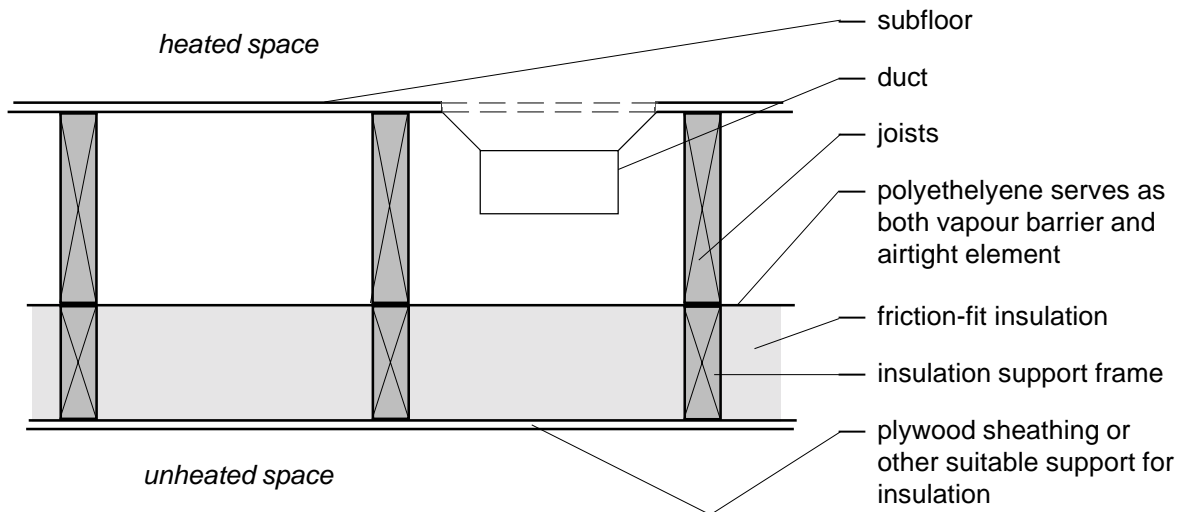
Keep in mind that, in this location, the poly cannot also serve as the vapour barrier. Because the poly is closer to the colder side of the assembly, even greater care must be taken to ensure that it adequately controls air leakage. Lapping and clamping to the framing members may not be sufficient. Sealing the joints with acoustical sealant may be needed. Given these concerns, and the need to add insulation, it would be simpler to use a higher vapour permeance material, such as a polyolefin, as the airtight element of the air barrier system, under a non-airtight ceiling in an assembly that is otherwise the same as Figure 2. §



**Figure 3**

Dear Readers: Here’s another approach that we’ve seen. This is sometimes used underneath bay windows and cantilevers, and we’ve heard of it being used on floors over garages. A separate frame, the same depth as the insulation is built. The “ceiling” of the garage is attached to the bottom of the frame, the insulation is added and a polyethylene sheet is attached to the top. Then this assembly is lifted into place under the floor assembly. We asked Adaire what she thought about this technique. Her reply: *“So long as you can tie in the poly from the top of the frame to the airtight elements in the adjoining constructions, and the poly doesn’t end up on the cold side at these junctions, this approach would also meet the requirements of the code.”*

Thanks again, Adaire. §



## WETT Certification Continuing Education Requirements

Wood Energy Technology Transfer Inc. (WETT) offers numerous opportunities to learn skills and knowledge of residential wood energy technology. Courses in chimney sweeping, code compliance, basic inspection and woodburning each lead to WETT certification.

All WETT certificate holders are required to take at least one course every five years to maintain certification. Members who achieved certification at any level prior to 1997 are required to take at least one continuing education course before the end of 2000.

Continuing education courses offered by WETT include:

- New and Review (Code Compliance)
- Chimney in the House as a System
  - Part I, Smoke Spillage Prevention,
  - Part II, Testing and Managing House Pressures,
- Central Heating Systems,
- Pellet Heating Technology.

## SPAG News

by Tim Macaulay, Saskatchewan Health

*NOTE: The Saskatchewan Plumbing Advisory Group (SPAG) has not met since our last newsletter. Those who have questions regarding SPAG should contact Tim Macaulay, Saskatchewan Health at (306) 787-7128, fax (306) 787-3237, or e-mail [tmacaula@health.gov.sk.ca](mailto:tmacaula@health.gov.sk.ca).*

The WETT website includes course information and other items of interest, including a list of certificate holders that can be searched by several fields such as province or certificate type. Homeowners who are searching for contract inspection or advisory services find this list useful.

WETT courses are offered on an as needed basis for groups of 15 or more. For more information about WETT training and certification, please contact the WETT office in Toronto by phone at (416) 968-7718 or 1-888-358-9388, or visit their website at [www.wettinc.ca](http://www.wettinc.ca). §

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## Climatic Design Data

Many areas of Saskatchewan received a considerable amount of rain this spring and summer. As a result, we received numerous calls about newly-found problems in existing buildings.

Several callers told us about damage caused by rainwater runoff from a neighbouring property. The effect of rainwater runoff onto adjacent property is not regulated by the building code. The code requires that a building design account for rainfall by deflecting it away from the building or gathering and disposing of it. However, review of a building permit application will typically include comparison of the proposed elevation of the building and surrounding grades to any applicable grading plan set by the municipality, to ensure that runoff will move as planned through the streets, ditches, and sewers to a suitable collection basin.

A few callers told us about bowing inward of preserved wood foundation walls. Of course, PWFs are regulated in the building code by reference to the applicable CSA standard. After exhausting other ideas for complying construction, the best we could conclude was that the most likely cause was that this year's rainfall caused conditions that hadn't previously occurred. Whether from deterioration due to age or structural inability to withstand the new conditions, the walls performed differently than they had before.

Building designers must consider the effects of the local climate when designing a building. Appendix C of the National Building Code of Canada 1995 gives climatic information for over 30 locations to use in this regard. Information for other locations can be obtained from Environment Canada by contacting (416) 739-4365 or [climate.services@ec.gc.ca](mailto:climate.services@ec.gc.ca) or by visiting their website at [www.cmc.ec.gc.ca/climate](http://www.cmc.ec.gc.ca/climate). But even strict adherence to the design requirements and use of local climatic information cannot guarantee that Mother Nature and her weather will act as they have in the past. §

## Special Changes for Environmental Separations, Piping, and Spatial Separations

Special changes to the National Building Code of Canada (NBC) 1995 and the National Plumbing Code of Canada (NPC) 1995 were approved by the Canadian Commission on Building and Fire Codes (CCBFC) on June 5, 2000. These changes relate to:

- parts of buildings that are exposed to the exterior or the ground but do not separate spaces,
- piping for domestic hot water or heating, and
- limits on unprotected openings in exposing building faces of houses.

Since changes approved by the CCBFC do not become part of Saskatchewan law until they are issued, the formal implementation will be delayed. However, building officials can immediately begin looking for compliance with the special changes to address an important safety issue.

<i><b>NBC 1995</b></i>	<i><b>NPC 1995</b></i>
<p style="text-align: center;"><i>REVISED</i></p> <p><b>5.1.2.1. Exposure to Exterior Space or the Ground and Separation of Environments</b></p> <p>1) This Part applies, as described in Section 2.1, to</p> <ul style="list-style-type: none"> <li>a) <i>building</i> materials, components and assemblies exposed to exterior space or the ground including those separating interior space from exterior space or separating interior space from the ground,</li> <li>b) <i>building</i> materials, components and assemblies separating environmentally dissimilar interior spaces, and</li> <li>c) site materials, components, assemblies and grading that may affect environmental loads on <i>building</i> materials, components and assemblies exposed to exterior space or the ground. (See Appendix A.)</li> </ul> <p><i>REVISED</i></p> <p><b>A-5.1.2.1. Application.</b> Section 2.1 specifies that the requirements of Part 5 apply to all buildings except those within the scope of Part 9 or the scope of the National Farm Building Code of Canada. Because of their intended use, many buildings need only provide a limited degree of separation from the outdoor environment, the ground or between interior spaces. The requirements of Part 5 are written to allow exemptions for these buildings. The requirements in Part 5 apply to building elements that separate dissimilar environments and to site conditions that may affect environmental loading on the building envelope. The requirements address</p> <ul style="list-style-type: none"> <li>• the design and construction, or selection of building components such as windows and doors,</li> </ul>	<p style="text-align: center;"><i>REVISED</i></p> <p><b>3.4.4. Support for Vertical Piping</b></p> <p>1) Except as provided in Sentence (2), vertical piping shall be supported at its base and at the floor level of alternate storeys by rests, each of which can bear the weight of pipe that is between it and the rest above it.</p> <p>2) The maximum spacing of supports shall be 7.5 m.</p> <ul style="list-style-type: none"> <li>• the design and construction of building assemblies such as walls, floors and roofs,</li> <li>• the design and construction of the interfaces between the elements identified in the previous points, and</li> <li>• the design or selection, and installation of site materials, components, and assemblies, such as back-fill and drainage, and grading.</li> </ul> <p>The requirements apply not only to building elements that separate indoor space from outdoor space, but also those elements that separate indoor space from the ground and that separate adjacent indoor spaces that have significantly different environments.</p> <p>Indoor spaces that would require separation include interior conditioned spaces adjacent to indoor unconditioned spaces, and adjacent interior conditioned spaces which are intended to provide different environments. An extreme example of the last would be a wall that separates an indoor ice rink from a swimming pool.</p> <p>Some building elements are exposed to exterior environmental loads but do not separate dissimilar environments. Solid guards on exterior walkways are one example. Such constructions are subject to the requirements in Part 5.</p>

*(continued on page 8)*

*(continued from page 7 — Special Changes for Environmental Separations, Piping, and Spatial Separations)*

**REVISED**

**6.2.9.3. Clearance between Steam or Hot Water Pipes and Combustible Material**

Forming Part of Article 6.2.9.3.

Steam or Water Temperature, °C	Minimum Clearance, mm
Up to 95	No clearance
Above 95 to 120	15
Above 120	25

**REVISED**

**9.10.14.12 Exposing Building Face of Houses**

1) For the purposes of this Article, where maximum area of glazed openings is determined using Table 9.10.14.1., an exposing building face may be considered to be made up of any number of separate portions and the requirements for fire-resistance rating and cladding material and the limits on glazed openings for each portion may be determined based on the limiting distance for that portion. (See Appendix A.)



Saskatchewan Municipal Affairs,  
Culture and Housing  
www.municipal.gov.sk.ca



Saskatchewan Building Officials Association  
www.sboa.sk.ca

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