

## Avoiding Condensation Problems



Homeowner  
Protection Office  
Branch of BC Housing

Have you ever noticed water droplets on your window or black staining on the drywall of your walls? Have you ever wondered why the moisture returns around your windows after you have wiped it away? This type of moisture is from the interior air and is commonly referred to as condensation.



Condensation forms first on the coldest surfaces of a room, usually on glass surfaces of windows and doors.

### What is condensation and how does it form in my home?

Condensation occurs in your home when moist air comes into contact with a surface which is at a lower temperature. Moist air contains water vapour — commonly referred to as humidity. Indoors, we can increase humidity through our activities and lifestyle. If a surface in your home is cold enough, the air in the immediate vicinity of the surface will be cooled sometimes causing the moisture in the air to condense or change into a liquid on the surface.

Condensation forms first on the coldest surfaces of a room, usually on glass surfaces of windows and doors. These surfaces are typically cooled by lower exterior temperatures during the winter months much more easily than the walls which are kept warm by insulation. For example, if it is cold enough outside and/or warm and humid enough inside, condensation may occur on or around your windows resulting in fogging, water or ice on

the windows themselves or even a puddle of water on the window frame or sill. Other examples of condensation in your home can include damp spots or mildew on outside wall corners, closet walls or baseboards. Areas of your home with poor air circulation, such as behind furniture or in a cupboard or closet, can also be susceptible to condensation.

**If a surface in your home is cold enough, the air in the immediate vicinity of the surface will be cooled sometimes causing the moisture in the air to condense or change into a liquid on the surface.**

A small amount of condensation appearing on a surface may not necessarily be a problem, depending on the amount of moisture that forms,

### Maintaining your building envelope

This publication is one in a series of bulletins designed to provide practical information on the maintenance of the building envelope of multi-unit residential buildings including townhouses, low and high-rise residential buildings.



### What is a building envelope?

The building envelope includes all parts of the building (assemblies, components and materials) that are intended to separate the interior space of the building from the exterior climatic conditions. It includes, for example, the foundation, exterior walls, windows, exterior doors, balconies, decks and the roof.

### Who should read this bulletin?

Anyone who lives in or looks after a multi-unit residential building should read this bulletin including residents/unit owners, strata councils, housing co-ops, maintenance managers, property managers or building owners. Proper maintenance of the building envelope can help prevent damage and avoid costly repairs in the future.



This bulletin is funded by the Homeowner Protection Office in partnership with Canada Mortgage and Housing Corporation and Polygon Homes Ltd.



As a general rule, steps should be taken to avoid condensation problems wherever possible as moisture can lead to damage.

how long it stays, and whether it accumulates on surfaces that can be damaged by water. Condensation can be short-term during a severe cold spell, or occur in a localized area such as kitchen, bathroom or laundry room.

In many instances, condensation moisture simply evaporates back into the air once the surfaces warm up or the moisture source is reduced. An example of this is moisture that condenses on a bathroom window during a shower and quickly disappears shortly after the shower is turned off. However, as a general rule, steps should be taken to avoid condensation problems wherever possible as moisture can lead to damage.

Taking preventative steps to avoid condensation will help prevent problems in the future.



Condensation has led to mould problems on the drywall.

hygrometers

measure

humidity levels

### Why must I avoid condensation problems?

Condensation can cause serious damage to the interior and structural elements of your home or building. If condensation occurs frequently enough and for prolonged periods of time, materials in contact with the moisture may be damaged. Drywall and wood finishes around windows are two examples of materials in your home that can readily absorb moisture and become damaged if they remain wet for a sustained period of time. If left unchecked, condensation problems can cause:

- crumbling or soft spots in drywall
- decay in wood framing or corrosion of steel framing
- peeling paint
- damage to the insulation inside the walls, and
- mould and mildew problems in your home.

Most importantly, taking preventative steps to avoid condensation from occurring in your home will help prevent avoidable and expensive problems in the future.

### Sources of moisture in the home

We add to humidity levels in our home through our activities and lifestyle. Water vapour is added to the air in large quantities by our breathing and perspiration, cooking, bathing, cleaning and other daily activities.

### How we produce humidity in our homes

- A family of four can add moisture to the air equivalent to 30 to 40 litres of water per week
- Showering, cooking, bathing and washing can add 15 to 20 litres per week
- Drying clothes indoors can add 10 to 15 litres per week

Source: Natural Resources Canada



Evidence of problems resulting from condensation can be seen on the interior window sill.

Newly constructed homes may temporarily exhibit a higher potential for condensation as moisture in plaster, cement and other building materials escapes into the air during the first heating season. This elevated level of moisture in the air should taper off after a month or two. If it doesn't, you should inform your building or maintenance manager of the situation.

### What should the indoor temperature and humidity levels be?

Interior temperature and relative humidity is often a matter of personal preference, but exceeding recommended humidity levels for extended periods of time can lead to a higher risk of condensation problems in your home. The recommended relative humidity level varies between winter and summer, and by location.

As a rough “rule of thumb”, interior air temperatures should generally be maintained between 18°C and 24°C with relative humidity falling between 35% and 60% for the coastal temperate climate regions of British Columbia during the winter months. In colder and drier regions of the province, interior humidity levels should be limited to between 25% and 40% during the winter months. If you are unsure of the relative humidity in your home, small devices called “hygrometers” can be purchased that will allow you to measure the humidity levels in your home. See the “For more information” section at the end of this bulletin for references to other publications that provide information on how to measure humidity in your home.

Humidity cannot be eliminated from the air altogether. It is needed to maintain a comfortable and healthy interior environment. Without humidity we would suffer from chapped lips and dry skin, sore throats, breathing problems, static electricity, and damage to equipment and furniture. However, if humidity gets too high, problems will arise in your home such as condensation, musty smells, mould growth, allergic reactions and damage to walls and interior finishes.

### How do I avoid condensation problems?

There are number of steps that you can take to prevent condensation problems from occurring in your home.

#### 1) Reduce the amount of moisture or humidity generated in your home

- Do not regularly hang large amounts of clothes to dry indoors. Wherever possible, dry your clothes in a dryer with an outside vent.
- Shut off the humidifier if you are using one.
- While cooking, put a lid on boiling water — it will also boil faster!
- Try to have shorter showers. You will save the energy required to heat the water and conserve on water.
- Ensure the lint trap in your clothes dryer is clean. The lint trap should be inspected and cleaned before each use.
- As much as possible, try to wash full loads of dishes in the dishwasher.
- Do not store wood for your fire place indoors.

#### 2) Promote good air circulation in your home

- Open blinds and drapes so that air can circulate freely over the windows.
- Direct heat towards exterior walls and windows.
- Where condensation at window sills is a persistent problem, remove any objects on the window sill such as books, photographs, and knickknacks as they prevent air from circulating and removing the moisture.
- Move furniture such as sofas and

bookcases so they are not touching outside walls. This will improve air circulation around the cooler outside wall and reduce condensation potential.

#### 3) Promote good ventilation in your home

- Use the kitchen exhaust fan or range hood to remove humidity generated by cooking. Note: the exhaust fan or range hood should be vented to the outside.



Use your kitchen exhaust fan or range hood to remove humidity generated by cooking. The exhaust fan should be vented to the outside.

- Use bathroom fans and humidistats (if you have one) while bathing or showering. Some bathroom exhaust fans are connected to a humidistat that can be preset to ventilate the room when the humidity reaches a certain level, and keep the fan running until the humidity is below that set point. It is important that humidistats be set to the appropriate level and not turned to “off”. If the bathroom does not have a humidistat, the exhaust fan should be left running for a period of time after bathing or showering to remove the excess moisture from the bathroom. The exhaust fan should be vented to the outdoors.
- Some newer homes have a pre-set principal exhaust fan. Ensure that this fan is set to run for two 4-hour periods per day.
- Open windows periodically and

ensure that fresh air intake vents are not blocked.

- Make sure exterior vent hoods for your dryer, bathroom and kitchen vents are unobstructed and operating freely. Clothes dryers that take longer to dry than usual, and kitchen or bathroom fans that seem to not move the air could be signs of some obstruction in the duct or the outlet. Keeping vent hoods and lint traps clear will also reduce the amount of energy required to dry the clothes, thus reducing utility bills. Qualified professionals should be used to carry out this maintenance item.
- Consider upgrading your kitchen or bathroom fans. If you feel that your kitchen or bathroom fans make noise, but don't seem to do anything, you may be right. Some older or cheaper units may not work effectively and tend to be noisy. A simple upgrade is relatively inexpensive and will often dramatically improve performance. Look for units with high air movement measured in cubic feet per minute (cfm) or litre per second (L/s), and a low noise rating measured in decibels (dB) or sones.



Use bathroom fans, and humidistats if you have one, while bathing or showering.

In most cases you can address high humidity and condensation through reducing the amount of humidity generated in your home. Ventilation may only reduce humidity levels if the air introduced into the room is drier than the interior air. When ventilation is not effective at lowering the humidity sufficiently, you may need to incorporate the use of a dehumidifier (or air con-

ditioner) to further reduce humidity levels. However, this should be considered as a last resort after you have taken necessary steps to reduce the amount of humidity generated in your home. Also, dehumidifiers require electricity to operate and, therefore, may be an expensive option for you to pursue.

### Dealing with persistent condensation problems

Condensation is usually a localized problem that you can address by taking the steps described above to reduce the humidity or to promote good air circulation and ventilation in your home. However, if you have taken these steps and continue to experience condensation problems, other problems may exist that are more appropriately addressed by your maintenance manager or a qualified professional. Symptoms related to *persistent condensation* problems include:

- windows that continue to have water droplets or that fog up, frost or get ice build-up, even after you have taken necessary steps to lower humidity levels and prevent condensation in your home
- black staining on the inside of walls, mainly in corners and near the floor or ceiling
- mould or mildew growth
- ice or frost under roof sheathing-boards
- delamination of plywood materials
- damp or moist basement walls or floors

Report persistent condensation problems to your maintenance manager. Persistent condensation problems may relate to air leakage in your home, typically at the base of the wall, (sometimes causing black staining at carpet edges) or at electrical lighting and receptacle outlets, and around windows<sup>1</sup> and doors. This air leakage can allow cold air into the wall assembly and thus cool the wall and increase the potential for condensation. In other cases, it may be necessary to bring warm air to cold surfaces, either by changing the building's heating patterns or by providing dedicated heat sources to problem areas.

Blowing warm air at problem areas has the additional effect of encouraging evaporation at the problem location. In some cases the solution may be to insulate surfaces against cold temperatures, usually by increasing insulation levels in the walls behind the problem areas. The solutions to each of these potential problems, however, must be carried out by qualified professionals and co-ordinated by your maintenance manager.

<sup>1</sup> In some climates, such as central and northern British Columbia, a historical remedy for condensation around windows was to open the window slightly to allow the very dry outdoor air to mix with the relatively humid indoor air and reduce the potential for condensation. This approach is NOT recommended as it can result in condensation and serious damage in parts of the wall that are not visible to the occupants. It also results in a large consumption of energy.

### ACTION PLAN TIPS

- Take steps to avoid condensation problems in your home:
  - Reduce the amount of moisture

or humidity generated in your home. For example, do not hang laundry to dry indoors and take shorter showers.

- Promote good air circulation in your home. For example, open blinds and drapes and move furniture so that it is not touching an outside wall.
- Promote good ventilation in your home. For example, use kitchen exhaust fans, bathroom fans and humidistats as well as consider upgrading your exhaust fans if they are poor performers.
- If a persistent condensation problem becomes evident (after taking the above steps), notify your maintenance manager. A qualified professional may be needed to address the underlying cause of this problem.

### For more information

1. "About Your House" fact sheets on The Importance of Bathroom and Kitchen Fans (CE 17), Measuring Humidity in Your Home (CE 1), Choosing a Dehumidifier (CE 27) published by Canada Mortgage and Housing Corporation (CMHC). Available online at [www.cmhc.ca](http://www.cmhc.ca).
2. "Moisture Problems: Why Should I Worry About Moisture Problems?"; published by Natural Resources Canada, EnerGuide for Houses. Available online at [www.oeo.nrcan.gc.ca](http://www.oeo.nrcan.gc.ca).
3. "Condensation on Inside Window Surfaces" (Canadian Building Digest 4), "Moisture Problems in Houses" (Canadian Building Digest 231), and "Current Approaches for Mechanical Ventilation of Houses" (Construction Technology Update No. 15) published by National Research Council of Canada's Institute for Research in Construction. Available online at [www.irc.nrc-cnrc.gc.ca](http://www.irc.nrc-cnrc.gc.ca).
4. "Best Practice Guide to Wood-Frame Envelopes in the Coastal Climate of British Columbia", published by CMHC and available online at [www.cmhc.ca](http://www.cmhc.ca).
5. See your building's maintenance manual.

Note: This bulletin and others are available on the HPO website.

## promote good ventilation

### Acknowledgements

This bulletin was prepared by a consortium of firms including: Levelton Consultants Ltd., JRS Engineering Ltd., Morrison Hershfield Ltd. and Read Jones Christoffersen Ltd.

Organizations represented on the project steering committee included: RDH Building Engineering Ltd., the Condominium Home Owners' Association, Canada Mortgage and Housing Corporation, Polygon Homes Ltd., and the Homeowner Protection Office, a branch of BC Housing.

### Disclaimer

This bulletin is intended to provide readers with general information only. Issues and problems related to buildings and construction are complicated and can have a variety of causes. Readers are urged not to rely simply on this bulletin and to consult with appropriate and reputable professionals and construction specialists before taking any specific action. The authors, contributors, funders and publishers assume no liability for the accuracy of the statements made or for any damage, loss, injury or expense that may be incurred or suffered as a result of the use of or reliance on the contents of this bulletin. The views expressed do not necessarily represent those of individual contributors or the Homeowner Protection Office.

The regulations under the *Homeowner Protection Act* contain specific provisions requiring owners to mitigate and restrict damage to their homes and permitting warranty providers to exclude coverage for damage caused or made worse by negligent or improper maintenance. These apply to both new and building envelope renovated homes covered by home warranty insurance. Failure to carryout proper maintenance or carrying out improper maintenance either yourself or through qualified or unqualified personnel may negatively affect your warranty coverage. Refer to your home warranty insurance documentation or contact your warranty insurance provider for more information.



For HPO Technical Research and Education inquiries, contact:  
HPO Technical Research & Education

1701 – 4555 Kingsway  
Burnaby, BC V5H 4V8  
Tel: 778 452 6454  
Toll-free: 1 866 465 6873

[www.hpo.bc.ca](http://www.hpo.bc.ca)  
[www.bchousing.org](http://www.bchousing.org)  
Email: [hpo@hpo.bc.ca](mailto:hpo@hpo.bc.ca)