

DAMP AND MOULD

Health risks, prevention and
remedial actions



Information brochure



Abstract

This information brochure has been developed in collaboration with WHO and the Health and Environment Alliance, and was co-funded by the European Commission (DG Sanco, grant agreement 2005156).

The brochure summarizes key messages that the public needs to know in order to prevent and reduce the exposure to dampness and mould, and to remove potential mould once it occurs. Emphasis is put on the problem of excessive moisture, which is the root cause for problems with dampness and mould in indoor built environments. Further references and user guides on actions against dampness and mould in several languages are provided, and reference is made to an international list of agencies providing more detailed damp and mould support functions to the public. This information brochure has also been produced in response to the WHO Indoor Air Quality Guidelines on Dampness and Mould.

This brochure was developed following the advice of the EU Indoor Air Quality expert group, and makes available to the public some main conclusions derived in the WHO project on policy implications of actions against indoor air pollution with biological agents.

Address requests about publications of the WHO Regional Office for Europe to:

Publications
WHO Regional Office for Europe
Scherfigsvej 8
DK-2100 Copenhagen Ø, Denmark

Alternatively, complete an online request form for documentation, health information, or for permission to quote or translate, on the Regional Office web site (<http://www.euro.who.int/pubrequest>).

© World Health Organization 2009

All rights reserved. The Regional Office for Europe of the World Health Organization welcomes requests for permission to reproduce or translate its publications, in part or in full.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either express or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use. The views expressed by authors, editors, or expert groups do not necessarily represent the decisions or the stated policy of the World Health Organization.

Acknowledgments

This brochure was co-written by the Health and Environment Alliance (HEAL). HEAL aims to raise awareness of how environmental protection improves health. Based in Brussels, it brings together 60 organisations working at the international, European and national level. Further information can be found at www.env-health.org

Scientific advice by project advisory group members (Dr Kelly, UK; Dr Kurnitski, Finland; Dr Szewzyk, Germany) during the production phase of this brochure is gratefully acknowledged.

Photo credits: Braubach (page 3; 4; 6 middle and lower picture); Kurnitski (page 6 upper picture); Moriske (page 5)

Damp and mould: why you should care!



In Europe, an estimated 10–50% (depending on the country) of the indoor environments where human beings live, work and play are damp. Too much moisture makes a home stuffy and gives it a faint odour. Humid walls create a coldness that makes more heating necessary and increases energy bills.

WHO is concerned about this situation because excessive dampness and mould are a threat to health. Occupants of damp or mouldy buildings are at increased risk of experiencing health problems such as respiratory symptoms, respiratory infections, allergic rhinitis and asthma.

Some people are more sensitive to mould than others, and some groups are especially vulnerable. Additional effort should be made to keep away from damp and mould babies and children, elderly people, those with existing skin problems, such as eczema, or respiratory problems, such as allergies and asthma, and anyone who is immuno-compromised (e.g., chemotherapy patients).

On the other hand, WHO has demonstrated that remedial action works. For example, research shows that people living in well-insulated and adequately ventilated accommodation are less likely to visit their doctor or be admitted to hospital due to respiratory conditions than those living in damp homes.

This brochure provides practical tips for the public on how to tackle the core problem of excessive moisture (which can take the form of damp air, condensation on surfaces and increased humidity levels in materials) and how to prevent mould growth, as well as on how to clean up mould safely.

→ If you have concerns about a health problem that may be related to humidity in your home, always contact your general practitioner.

Practical tips on getting rid of damp and mould

Key message: Measures to prevent or reduce moisture are the main way to limit the development of mould (and any microbial) growth:
Without water – no mould!

The three main actions are:

1. Detecting and locating the source of the moisture problem;
2. Removing the mould; and
3. Taking action to control excessive moisture and condensation.

This brochure begins with an introduction to measures to detect and locate a mould problem, and then provides advice on the adequate measures to take if you are to tackle the mould damage yourself (do-it-yourself work).

The important final section informs you about appropriate measures to prevent or reduce excessive moisture. It assesses causes of moisture, defines condensation and what to do to prevent it, and outlines what to do if problems persist.

1. Detecting and locating the source of the moisture problem

Key message: Moulds only grow when there is sufficient moisture.
When mould appears, the first task is to try to establish where the moisture is coming from.

If your home is damp and possibly mouldy, you need to find out why. The question to answer, therefore, is:

What is causing the moisture?

Major causes for excessive moisture are:

- 💧 Leaking pipes, wastes or overflows;
- 💧 Rain seeping through the roof where a tile or slate is missing, spilling from a blocked gutter, penetrating around window frames, or leaking through a cracked pipe; and
- 💧 Rising damp due to a defective damp-course or because there is no damp-course.



These causes of damp often leave a "tidemark" and you should have the necessary repairs carried out to remove the source of damp.

If your house is newly-built it may be damp because the water used during its construction (e.g., plaster) is still drying out.

If your home is damp for any of these reasons, it may take weeks of heating and ventilating (see section below: how to prevent condensation) to dry out. Hiring a dehumidifier may also help.

When the source of moisture does not appear to be related to structural faults, leaks or rising damp or the newness of the property, it is probably due to condensation (see below).

2. Removing the mould

Key message: After identifying and reducing/removing the moisture sources, the next step is to decide whether removing the mould from the affected areas is something that can be managed without professional help.

When the cause of the mould is related to building faults (leakages etc.) and/or the mould is also present in the building structure and material, it is recommended to get professional help. In this case, it may be useful to consult a national or local source of information to guide you in your selection of a suitable contractor.

If mould growth is due to condensation and the mould area is less than 1 m² (i.e., 1 metre high by 1 metre wide or roughly 3 feet high by 3 feet wide) and is not caused by sewage or other contaminated water, you can probably manage the job yourself following these guidelines or some of those listed in the references, such as the guidelines of the US Environment Protection Agency (EPA). Many national institutes have also published guidance documents in national languages (see examples in French, German and Spanish under “Further reading”).

Whether the job is undertaken by a contractor or yourself, care has to be taken to avoid personal exposure to microscopic mould spores and the spread of spores within the building. If you yourself are undertaking the task of the mould removal, use a protective mask which covers your nose and mouth, wear goggles (without ventilation holes) to avoid getting mould or mould spores in your eyes, and protect your hands by wearing rubber gloves, preferably long ones.

Chemical disinfection and the use of biocides are not recommended as a routine practice for mould control as it may be toxic for the occupants. The application of disinfecting substances also does not solve the cause of the problem, and therefore may provide more health risks than benefits.



Removal of mould-contaminated materials: a checklist

- ✓ Have a big plastic bag ready to take away mildewed clothes, curtains, rugs and carpets for cleaning. Consider replacing a mattress or soft toy that smells and feels damp.
- ✓ The process of cleaning will release mould spores into the air. Open any windows but close doors tightly to help prevent the spores being spread to other areas of the house. Leave the windows open during and after the clean up activity.
- ✓ Prepare a bucket of water, some mild detergent, such as washing up liquid or a soap used for hand-washing clothes, and some rags that can be thrown away after removing the mould.
- ✓ Carefully wipe the mould off the wall surface with the soapy rag. Take a dry rag to wipe down and remove the moisture following the cleaning process. Put the rags in a plastic bag prior to disposal.
- ✓ After mould removal, all surfaces in the room should be thoroughly cleaned either by wet wiping or by vacuum cleaning preferably with a HEPA filter¹ to remove spores that have spread during mould removal.

Once the work of removing the mould is completed, your energies should turn to preventing it from reappearing. The following section provides advice on preventing dampness and condensation.

¹ HEPA is an acronym for High Efficiency Particulate Air. A HEPA filter can trap a large amount of very small particles that other vacuum cleaners would simply re-circulate back into the air of your home.

3. Taking action to control excessive moisture and condensation

Key message: If your problem is not from a leak or a faulty or non-existent damp-course, it is probably caused by condensation.

What is condensation?

Three factors contribute to the condensation of water on building surfaces: high humidity of indoor air, low temperature of the walls/surfaces, and poor ventilation.



1) Humidity of indoor air: Condensation appears when the indoor air in a room cannot hold the level of moisture. Warm air can hold more moisture than cold air. For example, running a bath causes steam. As the air in the bathroom fills up with water vapour, it can no longer hold all the moisture that it contains. As a result, tiny drops of water appear, and develop first on cold surfaces such as mirrors and window sills.



2) Low temperature: Condensation can be worse when it is cold. The humid air comes into contact with cold indoor surfaces, transforms into surface mist and then into water that runs down the window causing wooden frames to rot and wallpaper and painted walls to blister. The tell-tale signs of dampness are often found on north-facing walls, the cooler side of any home, and especially in corners of rooms.



3) Poor ventilation: Humidity of indoor air can be reduced by ventilation. If air exchange is inadequate, then humidity accumulates indoors and leads to increased condensation. In addition, walls remain cool when a lack of free movement of indoor air prevents warm air from reaching them. Mould may therefore form where there is little movement of air, for example, in a windowless basement, or behind wardrobes and cupboards. In places where low ventilation comes together with cold surfaces (e.g. outside walls), they become the priority risk areas for mould growth.

After cleaning up mould due to condensation, stopping the dampness from coming back means understanding and dealing with each of the causes of condensation.

How to prevent condensation

a. Produce less moisture

- ✓ Put a lid on saucepans to keep the steam inside.
- ✓ Do not leave kettles boiling.
- ✓ Dry washing outside if possible. Otherwise, hang it up in the bathroom, close the door and have the window open or a fan working continuously while it dries.
- ✓ Try to avoid using paraffin or bottled-gas heaters that do not have an exhaust pipe to the outside. Burning paraffin or gas produces considerable amounts of water.

b. *Ventilate to remove moisture*

- ✓ Ventilate all rooms at regular intervals to remove humid air. Note that tight buildings require more active ventilation!
- ✓ Mechanical ventilation systems should not be stopped.
- ✓ Cooking, bathing and showering all produce steam. Open the window or put on the fan, and close the door to prevent the damp air circulating into other rooms.
- ✓ At other times, leave all the doors to different rooms open to allow the air to circulate.
- ✓ To avoid condensation in bedrooms, open the windows for 15 minutes each morning. Human breathing puts considerable moisture into the indoor air.
- ✓ Move items of furniture away from the wall slightly so that air can pass behind them. Leave the doors of cupboards open from time to time to air them.
- ✓ Do not ventilate cold basements when the outside temperature exceeds the inside temperature because the humidity of the warm air will condensate on the cold surfaces. In summer, only ventilate basements at night when outdoor temperatures have dropped.

c. *Insulate your building or heat your home a little more*

- ✓ Thermal comfort ranges are very subjective. When at home, the ideal temperature usually ranges between 19-22 degrees Celsius in the living rooms, including the kitchen and bathroom, and 16-20 degrees Celsius in the bedrooms.
- ✓ When away from home, the temperature in the rooms should not drop under 15 degrees Celsius to avoid condensation and increased humidity levels.
- ✓ Do not heat up cold bedrooms in the evening by opening the door to heated rooms. The warm and humid air will condensate on the cold walls of the bedroom.
- ✓ Good insulation of the building helps preventing mould growth due to higher temperature of the walls. Again: note that tight windows and buildings require more active ventilation!

If problems persist

Some households will find that despite taking steps to reduce the condensation, humidity remains a problem. It may then be worth considering:

- Covering cold surfaces, such as cold water pipes, with insulation.
- Installing ventilation flaps or grilles in windows.
- Using electric fans or forced ventilation systems.
- Contracting a professional building inspector for a thermal insulation assessment.
- Insulating the loft or wall cavity, and draught-proofing windows and doors.

In summary: avoid damp and mould in your home by

- ✓ removing mould when it appears.
- ✓ opening windows for short periods at least 2-3 times per day.
- ✓ not stopping mechanical ventilation systems (if installed).
- ✓ using fans in bathrooms and kitchens.
- ✓ not letting rooms and walls become cold.
- ✓ always repairing leaks and other building faults.

Further information sources

WHO and the Health and Environment Alliance (HEAL) have developed this information brochure. Further information on health effects of damp and mould can be found at the WHO Indoor Air Quality Guidelines web site at http://www.euro.who.int/air/activities/20070510_2 and technical and policy recommendations on damp and mould can be found at the WHO housing and health web site at http://www.euro.who.int/Housing/support/20080403_1. Further references providing information on damp and mould to the public are listed in the references box below.

The Health and Environment Alliance (HEAL) has set up a one-stop-shop for sources of public information on damp and mould in Europe. Next to this brochure, this information service features a contact list of agencies in countries in the WHO European Region that provide information and support on damp and mould to members of the public (for the list, see <http://www.env-health.org/r/157>). These agencies should be able to help you with technical or possibly legal questions. If a local certification scheme exists, they may also be able to provide you with a list of contractors recommended under this scheme.

In some cases, grants or other financial support may be available to help households resolve damp and mould problems within the home.

The contact list (contained in a database) has been compiled from two sources:

- responses to a questionnaire disseminated by HEAL to WHO and HEAL's own international networks of organizations, governments and experts; and
- a series of comprehensive internet searches of where consumers can seek advice at the national and local level.

Organizations, institutions and individuals that wish to be added to the contact list of agencies should complete and submit a short questionnaire (available at <http://www.env-health.org/a/3226>) on the offered services on damp and mould.

Further reading

WHO expert meeting on policy recommendations on damp and mould interventions, Bonn, Germany, 9-10 February 2009. Copenhagen, WHO Regional Office for Europe, 2009.
(http://www.euro.who.int/Housing/support/20090107_1 , accessed 12 June 2009).

WHO working group meeting on interventions and actions against damp and mould. Bonn, Germany, 28-29 February 2008. Copenhagen, WHO Regional Office for Europe, 2008.
(<http://www.euro.who.int/Document/E91664.pdf> , accessed 12 June 2009).

WHO working group meeting on development of WHO guidelines for indoor air quality: dampness and mould. Bonn, Germany, 17-18 October 2007. Copenhagen, WHO Regional Office for Europe, 2008.
(<http://www.euro.who.int/Document/E91146.pdf> , accessed 12 June 2009).

WHO Indoor Air Quality Guidelines on Dampness and Mould. Geneva, WHO, 2009.
(http://www.euro.who.int/air/activities/20070510_2 , accessed 12 June 2009).

Keep your home free from damp and mould. Leaflet to help householders deal with damp, particularly condensation. The Scottish Government, 2005.
(<http://www.scotland.gov.uk/Resource/Doc/1125/0011805.pdf> , accessed 12 June 2009).

Je peux résoudre les problèmes d'humidité dans ma maison! Série "La Santé et l'Habitat", Fiche d'information no 1. Region Wallonie, Belgique, 2006.
(http://www.espace-environnement.be/pdf/sante_fichehumidite.pdf , accessed 12 June 2009).

A brief guide to Mold, moisture and your home. Washington, US Environmental Protection Agency.
(<http://www.epa.gov/mold/pdfs/moldguide.pdf> , accessed 12 June 2009).

Una breva guía para el moho, la humedad y su hogar. Washington, US Environmental Protection Agency.
(http://www.epa.gov/mold/pdfs/moldguide_sp.pdf , accessed 12 June 2009).

Mold. Tips of Prevention and Remediation. International Code Council.
(<http://www.iccsafe.org/safety/pdf/mold2.pdf> , accessed 12 June 2009).

Leitfaden zur Vorbeugung, Untersuchung, Bewertung und Sanierung von Schimmelpilzwachstum in Innenräumen („Schimmelpilz-Leitfaden“). Berlin, Umweltbundesamt, 2002.
(<http://www.umweltdaten.de/publikationen/fpdf-l/2199.pdf> , accessed 12 June 2009).

Directory of Agencies Providing Information on Damp and Mould to the Public. Brussels, Health and Environment Alliance, 2009.
(<http://www.env-health.org/r/157> , accessed 12 June 2009).