Management of Indoor Moulds
Part II Prevention and Control

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環境保護署
Environmental Protection Department

Management of indoor moulds – why?

Prevention and control of mould growth in indoor environment is

essential to protect occupant health.

How can we avoid mould exposure and prevent indoor mould growth?

Management of indoor mould growth (1)

It is **neither necessary or possible to eliminate all moulds in the indoor environment**. Appropriate **management** of mould growth indoors is achieved by:

1) **controlling** the two main environmental factors, **moisture and nutrients**, e.g.
   - **Moisture – avoid water condensation, reduce humidity** in air, **repair leaking pipes** which contribute to increasing moisture level in air.
   - **Nutrients – remove dust** and interior decoration **items which have become mouldy** (e.g. wallpaper, carpets, fabric-covered furniture).

2) **regular or weekly vacuuming** using high efficiency particulate air (HEPA) filtration or central vacuum systems with adequate filtration.

Management of indoor mould growth (2)

Most effective way to control indoor mould growth is to:

(i) prevent and control
- dust accumulation,
- dampness,
- water problems,

and

(ii) remove moulds/ mouldy items once found.

achieved by

- Good building design
- Proper housekeeping in a building
- Mould prevention and control plan

Prevention of indoor mould growth (1): design stage

- Select **mould-resistant** and **easily cleaned building materials** that are **not prone to accumulate dust**
  - e.g. non-porous flooring and wall covering materials
- **Mechanical ventilation and air conditioning (MVAC) system** should be properly designed to
  - **efficiently filter outdoor air pollutants** including dust,
  - **prevent condensation**, and
  - be accessible for **regular inspection, cleaning and maintenance**.

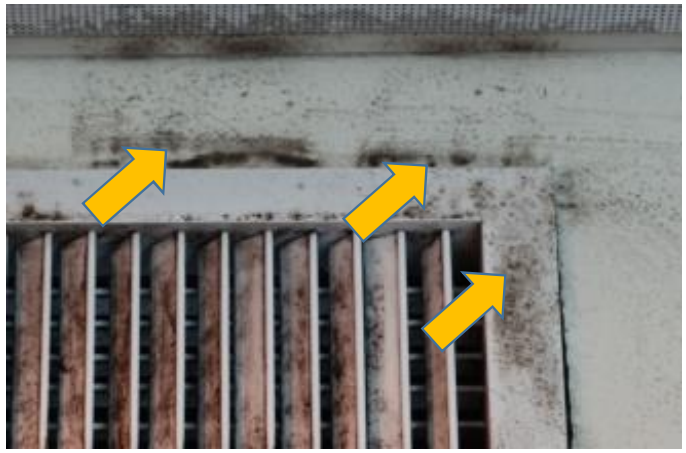
More information on design, construction, and commissioning of buildings for good indoor air quality can be found **in** ***ASHRAE's Indoor Air Quality Guide: Best Practices for Design, Construction and Commissioning***

Prevention of indoor mould growth (2): housekeeping

Good housekeeping and regular maintenance of the building/premises are also critical for prevention of mould growth.

REGULARLY

- maintain all elements of the MVAC system to ensure cleanliness and optimal performance,
- replace dust filters,
- inspect and clean air ducts,
- clean air diffusers and return grilles, and
- clean floor and carpet.



Mould growth due to dust accumulation and repeated condensation events on the surface of the air diffuser and surrounding wall

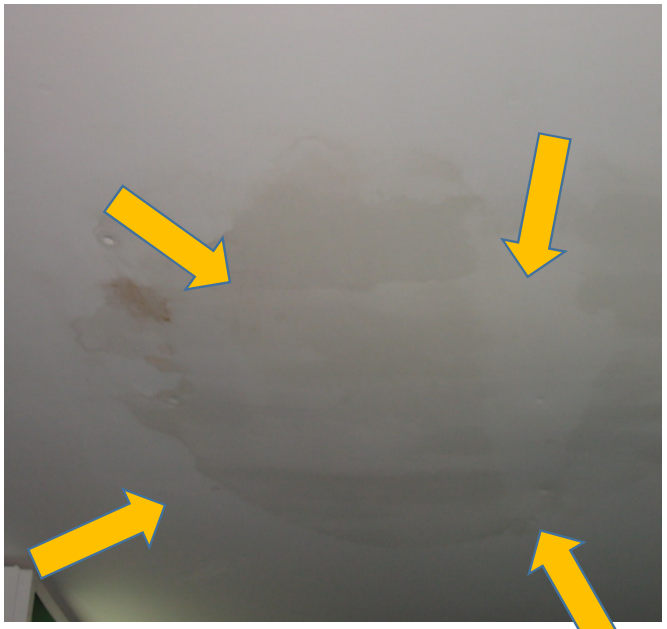
Prevention of indoor mould growth (3): housekeeping

PREVENT LEAKS and FLOODS in the building, e.g.

- plumbing leaks,
- floods from washrooms, and
- seepage from water dispensers and kitchen drains.

AVOID CONDENSATION

- on walls, ceilings and floors in the MVAC system by preventing high relative humidity.

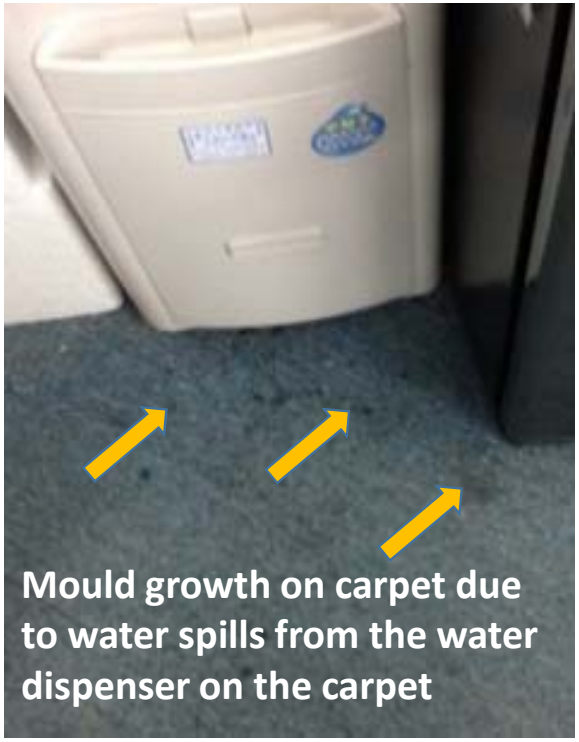


Water stain with a thin layer of mould growth on the ceiling

Prevention of indoor mould growth (4): housekeeping

WATER DISPENSER

- Avoid placing water dispensers in office areas with carpets, and
- ensure adequate separation between water dispenser and carpet.



Mould growth on carpet due to water spills from the water dispenser on the carpet

Mould prevention and control plan (1): preparation

Prepare a mould prevention and control plan which should include:

1. A checklist for routine mould inspection in the building.
2. A schedule for regular servicing and maintenance of building facilities.
3. A remediation plan for water and mould incidents.

Mould prevention and control plan (2): routine inspection

The inspection should cover **areas** likely to be susceptible to

- dampness and water problems
- leaks
- maintenance failures

Mould growth on the walls of a non-ventilated stair well

Mould growth on the ceiling due to flooding in the past

Mould prevention and control plan (3): effective implementation – documentation

Effective implementation of the plan should include the following **documentation**:

a) general **housekeeping works** including cleaning and maintenance schedules,

b) records for **servicing and maintenance of the MVAC system**,

c) mould-related inspection schedules and checklist,

d) water and mould incident handling and remediation plans, and

e) event records, e.g. water intrusions.

Mould prevention and control plan (4): effective implementation – designated personnel

Effective implementation should also include the **assignment of staff designated to the task** e.g.

- a facility manager, and
- building management staff.

The designated person **should**:

- **conduct routine inspections regularly**, more frequently during humid months,
- know **how to prevent mould growth**, and
- know **how to remediate water and mould incidents**.

General tips for mould prevention (1)

- Maintain the relative humidity at <70% through proper operation of the MVAC system and use of dehumidifier.

- Close all openings at building envelope and shut off the fresh air/exhaust air outlets to avoid infiltration/ingress of hot humid air inducing water condensation in the air-conditioning space, in particular, when switching off the air conditioners/chillers and/or ventilation system.

General tips for mould prevention (2)

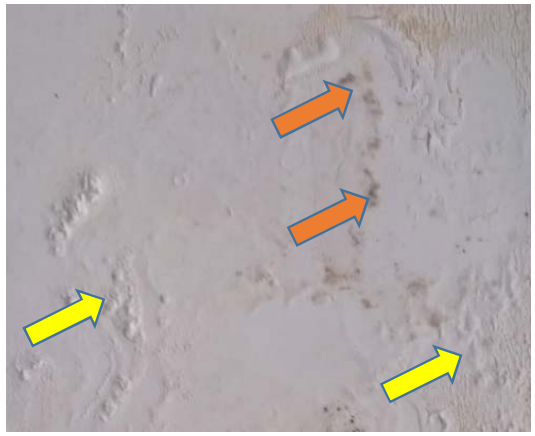
- Dry water damaged areas and materials within 24 to 48 hours.
- Remove and clean visible moulds once they are found.
- Remove mouldy materials immediately if moulds cannot be cleaned.
- Vacuum regularly using cleaner with HEPA filtration or central vacuum system with adequate filtration.
- If mouldy odour is detected, take action to locate the visible and/or hidden mould growth.

What should we do when there is mould growth?

Remediation of mould damage (1): investigation

When **visible mould growth** or **damp/musty odour** is detected, an **investigation** is necessary **before working out the cleanup procedures**:

- to determine the location, extent and damaged materials,
- to identify the source of water/moisture problem which caused the mould growth, and
- to check hidden areas (e.g. behind wallpapers, under carpet and walls behind furniture), and components of the ventilation system (e.g. filters, insulation and coils/fins) for moulds or water damage.



Visible mould growth on the plastered surface of building wall. Bubbling of paint indicates the wall was damp, probably due to leakage of the building envelope.

Mould growth behind wall paper

Remediation of mould damage (2): investigation

The mould and water problem should be **fixed as soon as possible**:

- to avoid **causing health effects** to the occupants, and
- to limit **further damage to the building.**

After the cleanup, the mould damaged area should **be inspected to ensure the mould problem has been fixed.**

Information about mould remediation can be found in ***United States Environmental Protection Agency "Mold Remediation in Schools and Commercial Buildings (2008)"***

General tips for mould cleanup (1)

- Engage a competent person for the cleanup if necessary.
- Wear appropriate personal protection equipment such as N-95 mask, rubber gloves and safety goggles, and wash hands immediately after the cleanup work.
- Prevent dust generation during the cleanup and removal of mould-damaged items, for example, gently misting mould-damaged wallpaper with a dilute soap or detergent solution prior to removal; or using HEPA filter vacuum-shrouded tools or a vacuum equipped with HEPA filter at the point of dust generation.
- Minimise effect of mould or mould spores to the occupants and isolate the contaminated area when necessary.

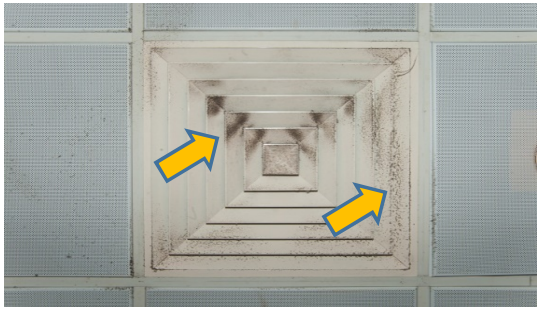
General tips for mould cleanup (2)

Use of biocides or disinfectants for cleaning visible moulds are not recommended because of its potential toxic effects to the cleaning personnel and other individuals.

General tips for mould cleanup (3)

- For moulds on hard surfaces or non-porous materials (e.g. diffuser surface), wash them with cleaning detergent and water; or HEPA vacuum them followed by wet-wiping with cleaning detergent; then dry them completely within 24 to 48 hours to prevent mould growth.

- For moulds on absorbent and porous materials (e.g. ceiling tile, carpets), that cannot be cleaned, remove and put them in a sealed plastic bag. Clean the outside of the bag, and take it away from the mouldy area, then put it in another plastic bag and tie it up for disposal.



General tips for mould cleanup (4)

- Do not operate the MVAC system if the MVAC system is contaminated with mould to avoid spreading the mould spores through the air duct.
- The air duct should be cleaned by a competent service provider.
- The wetted and mouldy insulation and air ducts have to be replaced if effective cleaning is impossible.

What should we do when there is flood or water damage?

Cleanup of flooding and water damage

- Floods and burst pipes represent a considerable risk for causing mould damage in a building.

- It is most important to remove standing water and all building materials are dried within 24–48 hours, otherwise mould growth may result.

Active water leakage in Air Handling Unit (AHU) room and the wet ceiling below the AHU room

General tips for water cleanup

- Employ wet vacuum cleaners or water pumps to remove the standing water.
- Remove any wetted materials (e.g. **wetted carpets**) that cannot be dried thoroughly.
- Remove the baseboard to assess the situation and facilitate drying if water might have penetrated into the wall cavities.
- Use fans and air dryers to accelerate the drying process.

Wetted carpet

Water damaged base-board resulting in mould growth on the adjacent wall

What are the roles of building owners/management ?

Role of building owners/management (1): training and assignment

- **Train** all building management personnel so that they
  - have a **comprehensive knowledge** of the issues related to mould growth and water damage in the indoor environment, and
  - **recognise their responsibilities** to prevent mould growth.
- **Assign** and **train maintenance and building management staff**
  - to **report and act on early indicators of moisture/water and mould incidents** such as stained ceiling tiles, unusual odours, bubbling of paint, rust stains and signs of water entry, plumbing leak or other early indicators of a moisture problem.
- **Hire competent contractors and/or consultants** to expedite action to rectify the mould/water problem if necessary.

Role of building owners/management (2): involving occupants

Building management should **communicate well with occupants** by:

- providing guidelines to occupants on **good housekeeping practices**.
- setting up a reporting system for **occupants to report** on:
  - signs of leaks, flooding, dampness,
  - musty odours, observable mould growth, and
  - ventilation problems in the building.

Role of building owners/management (3): team work

Set **up an Indoor Air Quality (IAQ) team** which consists of building management and occupants **to oversee all IAQ problems** and work together on any IAQ **problems including dampness and mould events**.

END