



Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

Report to Housing SPC

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Item No.2b

Mould and Condensation SPC Report

Mould and Condensation

SPC REPORT



Cothabháil Tithí ochta, Seirbhí sí Tithí ochta agus Cónaithe,
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Pilot Condensation Subgroup Report.

Introduction:

The Minimum Standards for Rented Houses 2017 sets out Local Authorities requirements when it comes to their units. The Standards became a requirement in July 2017. A number of requirements are outlined but briefly the main points are:

1. The Condition of the Structure
2. Sanitary Facilities
3. Heating Facilities
4. Ventilation
5. Lighting
6. Fire Safety
7. Heating Installations.
8. Planned Inspections with a Response Activity

With regards to condensation within our units, DCC must provide adequate Heating, Ventilation and Insulation.

Historical Issues:

A large number of dwellings have been improved to meet modern day living standards. The installation of double glazed windows, central heating systems, installing insulation. All of these measures have reduced the ventilation in the properties i.e. the properties have become less draughty. A common occurrence is to find vents stuffed with newspapers or old clothes to stop the drafts. All of these measures will increase relative humidity in a property.

A sizeable proportion of D.C.C.'s social housing stock was constructed between 1930 and 1977 accounting for 50% of the total. 81% of dwellings were built before the introduction of the Building Regulations in 1991 (22,575 units). Construction prior to the 1960's tended to be in solid wall. During the 1960's D.C.C. changed to cavity wall construction in line with best practice at the time.

Resolving the Issues:

- a working group was established with the explicit task of:

1. identifying the causes of condensation/mould that can be attributed to building performance/fabric;
2. establish the responsibility of the local authority in remedying such causes;
3. exploring the most effective evidence based solutions;
4. establish the guidelines that will inform unreasonable tenant activities.

What is Condensation?

- ▶ When air cools it is less able to “hold” moisture, that is, the saturation water vapour density falls, and so the relative humidity rises. When the relative humidity reaches 100%, the air will be saturated. This is described as the dew point. If the air continues to cool, moisture will begin to condense.
- ▶ Typically this happens in buildings when warm, moist air comes into contact with cooler surfaces that are at or below the dew point, such as windows, and water condenses on those surfaces. Condensation can occur on surfaces, or can be interstitial condensation, occurring between the layers of the building envelope, typically as a result of air diffusing from the warm interior of the building to the cool exterior and reaching its dew point within the building fabric.

- ▶ Condensation affects the performance of buildings, causing problems such as:
 1. Mould growth which is a cause of respiratory allergies.
 2. Mildew.
 3. Staining.
 4. Slip hazards.
 5. Damage to equipment.
 6. Corrosion and decay of the building fabric.

How does Condensation occur?

- ▶ To understand the solutions to condensation the causes have to be identified. In a property of 4 people, each will contribute approximately 4 pints of moisture per day through, breathing, showers, baths, boiling kettles, cooking etc. This will add up to over 110 pints of water vapour per week a huge volume which must go somewhere.
- ▶ Condensation: Forms on a surface when the temperature of that surface is below the dew point of the surrounding air. When you take a bottle of milk out of the fridge you will see droplets of water forming.

In addition to the direct effect on comfort, damp air:

1. facilitates the growth of fungi (mould) and bacteria that can cause respiratory problems and/or allergic reactions
2. provides the conditions for dust mite populations to grow, which can affect asthma sufferers
3. results in odours in poorly ventilated spaces because of fungal growth
4. will result in condensation forming on windows, walls and ceilings that are colder than the air temperature and potentially damaging building materials.

Reasons for high humidity:

- ▶ Household activities such as cooking, washing and using unflued gas heaters, as well as peoples' breathing, provide the primary sources of moisture that cause humidity indoors. (A person exhales approximately 200 millilitres of water vapour per hour while awake and approximately 20 millilitres of water vapour per hour during sleep).

Other sources of moisture may also include:

1. water leakage through the building envelope
2. damp ground conditions under suspended timber floors
3. retained construction moisture, i.e. moisture retained in building materials such as timber framing, concrete floors and plaster, after installation
4. plumbing leaks.

Controlling humidity

Internal humidity can be controlled by:

1. passive ventilation by opening windows for cross ventilation
2. removing moisture at source, for example, using an extract fan in the bathroom, using an extractor hood in the kitchen, venting a dryer to the outside and using only externally vented gas heaters.
3. raising indoor temperatures by heating or insulating, since warmer temperatures imply lower relative humidity's,
4. occupants not drying clothes on racks inside.

To prevent moisture from occurring:

1. The most effective passive ventilation to remove internal moisture is simply to open windows. These should preferably be on opposite sides of the building to maintain a good cross air flow.
2. Vents in window frames allow air movement while maintaining security when the house is closed up. The recommended minimum vent area is 4000 mm² of air opening per room space for an average size room. This can be achieved by a 600 mm long vent in a window frame.
3. Limiting sources of moisture (including reverse condensation, where moisture evaporates from damp materials). For example, replacing flueless gas or oil heaters.
4. Increasing air temperatures.
5. Dehumidification.
6. Natural or mechanical ventilation.
7. Increasing surface temperatures, such as by the inclusion of insulation or by improving glazing.
8. Avoiding cold bridges. These are situations where there is a direct connection between the inside and outside through one or more elements that are more thermally conductive than the rest of the building envelope. Thermal bridges are common in older buildings, which may be poorly constructed, poorly insulated, with single skin construction and single glazing. In modern buildings, thermal bridging can occur because of poor design, or poor workmanship. This is common where elements of the building penetrate through its

insulated fabric, for example around glazing, or where the structure penetrates the building envelope, such as at balconies.

9. The introduction of vapour barriers (vapour control layers) which prevent moisture from diffusing through the building fabric to a point where temperatures might be low enough to reach dew point.

▶ ***The 3 basic ingredients for mould to start are:***

1. Organic Material (Wood, Wallpaper)
2. A fungal Spore
3. Water

- ▶ The vast majority of products used to build and furnish homes are made from organic materials. Fungal spores are microscopic and are present in any indoor or outdoor environment, they can easily enter any dwelling undetected. The main source of water for mould is from the air around it, so if relative humidity is high the mould will thrive. Therefore to reduce the risk of mould growth in a property you must reduce the relative humidity.

▶ ***There are 3 things needed to prevent mould growth in dwellings.***

1. Heating
2. Insulation
3. Ventilation

- ▶ Heating should be at least 20 degrees, the dwelling should be insulated with no cold bridging and ventilation should be in place. A large number of dwellings have been improved to meet modern day living standards. The installation of double glazed windows, central heating systems and the installation of insulation. All of these measures have reduced the ventilation in the properties i.e. the properties have become less draughty. A common occurrence is to find vents stuffed with newspapers or old clothes to stop the drafts. All of these measures will increase relative humidity in a property.

In 2018 Housing Maintenance trialed 4 separate products in order to see if various solutions can combat the problems that tenants are facing.

Damp Doctor:

- ▶ This company provide Positive Input Ventilation (PIV), which circulates air around a flat or house, the idea behind this is similar to your car when it fogs up, in that the PIV unit reduces the moisture content in the units. Please see the list of jobs that are currently underway or complete using Damp Doctors products.

Soler & Palau:

- ▶ This company are installing filterless fans in all of the units that they visit. Very similar to a PIV unit these fans are a lot smaller and go on the wall of a bathroom and kitchen. When the humidity rises in either of these rooms the fans automatically kick in and take the air out of the rooms.

Mould Growth Consultants:

- ▶ This product is different in that the area that mould is present is treated and then a type of insulation called sempatap is applied over the surface and then painted over. The idea behind the product is that it heats the wall which in turn prevents moisture from being attracted to the cold surface; we currently have trialled this product at 11 locations in the city and are about to trial 10 more locations.

Inducoat:

- ▶ This final product is similar to the previous product whereby it is a paint but this paint has a chemical that 'fights' mould when it is trying to form on a surface. We currently have trialled this product in 150 locations citywide. We are taking on more locations and working through these as they come in.

These trials were carried out on 600 units in 2018.

Company	Number of Trials
Dampdoctor	240
Inducoat	150
Mould Growth Con	11
Solar & Palau	199
Total	600

This trials are not a permanent solution on our units, however it makes good sense to continue with this method until all of phase 2 works are complete which currently will take a minimum of 14 years due to the cost and nature of the work. Given the requirements set out in the Standards for Rented Houses (July 2017) it makes sense to continue with these trials.

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Introduction

Damp Doctor attended the above property at the request of Robert Buckle Senior Executive Engineer Dublin City Council. The location was 1 Kilshane Court, Dublin. This was following the initial discovery of damp and moisture issues in various rooms in the property. The following document presents a detailed report of the moisture damage identified on-site during our site visit.

Inspection Details

The survey was carried out using a Protimeter MMS 2 digital moisture meter and a Flir E5 Thermal imaging camera. The primary inspection revolved around the moisture conditions found within the property. Levels of moisture are determined in relation against the moisture content of similar construction materials found outside of the supposed affected area, in this case from plaster above 1.2m on an internal hall wall inside the front door. These readings are then compared with readings from the target area.

Areas of Damage

The below table details the results of moisture profiling throughout the property and are used as a base for justification of the scope of works required.

Room	Material	Location	Reading	Target	Height
Bedroom 1	Atmosphere	Centre of the room	75.4% RH	40%-65%	N/A
Bedroom 1	Skimcoat plaster	RHS of the window	235 REL	<180	1400mm
Bedroom 2	Skimcoat plaster	Under the window, behind the bed	198 REL	<180	1200mm
Bedroom 2	Wood	Centre of the window board	15.3% WME	<16%	N/A
Living room	Skimcoat plaster	Ceiling on the RHS of the back wall.	190 REL	<180	2400mm
Bathroom	Skimcoat plaster	Wall/ceiling junction above the window	220 REL	<180	2400mm

At what level of REL (relative humidity) is a material in a wet or dry condition?

- <180 REL- This is the optimum level for walls and ceilings in a property that have not been subject to water damage.
- <240 REL – The material is in a dry condition, this level is a target to be benchmarked as “Dry” when drying and certifying the property.
- 240 REL – 260 REL – This is a level in which drying works are likely to be at completion and will permit the material to return to equilibrium.
- 260 REL – 450 REL – The material is considered as “wet” and intervention is required.
- 450 REL – 1,000 REL – The material is in a wet condition, decay / deterioration is inevitable in time unless the moisture level of the material is reduced.

At what level of % WME is a material in a wet or dry condition?

- < 16% (**Green zone**) – The material is in a safe, dry condition, moisture related problems of decay/ deterioration will not occur.
- 16% - 20% (**Yellow zone**) -The material is in a borderline condition, decay/ deterioration may occur in certain conditions.
- >20% (**Red zone**) – The material is in a wet condition, decay / deterioration is inevitable in time unless the moisture level of the material is reduced.

Thermal Imaging

Further surveying of the areas using thermal imaging also supported the moisture profile indicating the location of excessive moisture by determining the difference in temperatures.

Survey

- Rising damp is not an issue.
- External plasterwork is in a reasonable condition and there are no signs of penetrating dampness.
- There is a kitchen extract fan present but it is taped and blocked over by the tenants. The reason given for this was they believe an excessive amount of cold and wind was entering the property through this opening.
- There is a mechanical extract fan present in the bathroom, however, it is vented through a tile vent that is situated high up the roof. This is resulting in the vapour condensing prior to

its escape from the building and droplets are falling back down through the unit and onto the bathroom floor.

- The windows in the property are of a poor standard and at a minimum the seals will need replacing to prevent heat loss in this area.
- There are substantial levels of black mould visible in the bedrooms and bathroom along with a general damp smell.
- The tenant complained of ongoing instances of mould on clothes and shoes in the bedroom wardrobes.
- The Relative Humidity in the apartment at the time of the survey was 75.4% (The ideal range is from 40%-60%).
- Roof vents are present to provide attic ventilation

Recommended Remedial Action

- There is a large amount of condensation issues within the property and a lack of adequate ventilation is a large contributing factor to this. An attic mounted "Positive input ventilation unit" fitted in the attic above the hallway is the best method of providing adequate ventilation to a house under 2000 ft². This unit takes in air from the attic and gently releases it into the property thus creating a positive pressure inside the property which forces existing air within the property from inside to outside. This air pressurization ensures that the air is constantly being renewed and replaced on an ongoing basis.
- Fit new High capacity mechanical extractor fan to the bathroom, Nuair (or equivalent). This unit will remove up to 15 litres of air per second which meets current best practice. This fan has its own built in humidistat which turns the unit on once the humidity levels in the room reaches 50%.

The current fan is vented through a ventilation tile in the roof, however, it is too high up the roof and therefore the fan is not powerful enough to remove the vapour from the duct before it condenses and droplets run back down the duct.

The best method to rectify this is to re locate the vent tile to an area lower down the roof.

- The current mould needs to be cleaned with a chemical degreaser and further treatment using a ULV fogger is then undertaken. This ensures all current mould and the resulting spores are eradicated.
- The extractor fan in the Kitchen will need to be reopened and the ventilation tile will also need to be relocated to an area lower down the roof.
- The internal temperature needs to be maintained at 18-20 degrees Celsius.
- In general terms, the property appears to be in reasonable structural repair, however, it would benefit from small things such as minimising drying clothes internally where possible

and ensuring that no excess clutter builds up which may inhibit the flow of air through the house.

Trialled Sempatap Thermal



Before

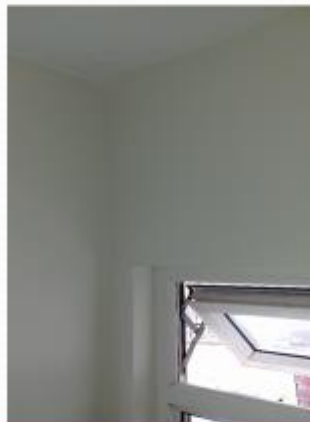


After

Inducoat Trials



Before



After





About INDUCOAT®

Made in Holland.
Experts in Woodwork, Wooden Claps, Bicycles and Anti-Mold Paints

The Dutch Anti-Mould coating specialist

The primary focus of Inducoat is manufacturing and applying proven and cost effective anti-mould paint systems. Inducoat has been delivering this promise for over 40 years – winning the recognition of being the preferred supplier of anti-mould coatings to leading Dutch housing estates, commercial premises and leading professionals. Inducoat is also the ONLY anti-mould coatings manufacturer to receive a CTGB number accreditation by the Dutch Board for the Authorisation of Pesticide Products and Biocides. The sanitary, register and unconditionally proven Anti Inducoat anti-mould products are safe and fully effective and full Inducoat manufacturing life complies to the entire international regulations, ranging from REACH to GOR901.

References

The Inducoat FPM20 anti-mould paint has been tested under the severest conditions and against the highest competitors, worldwide. Building structural engineering often is the cause of the growth of the mould – issues such as lack of ventilation, damp, poor maintenance or missing a cold bridge for example can benefit from a simple and effective anti-mould coating. It's just not always possible (technical, financial) to avoid the building structure. A white anti-mould paint can help prevent the growth of mould, often for many years. Hence, the reference base of Inducoat covers typically of clients which are responsible for housing estates, hospitals, care homes, in the food industry and clients with ISO-C* standards choose Inducoat FPM20 as their preferred anti-mould coating.

Get in touch with the Dutch

Global Pesticide Services Inc. based in Flanders, United Kingdom, is the international representative for Inducoat B.V. Please do not hesitate to contact their team to see your operation can benefit from the world's highest level, the Dutch anti-mould standard!



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