Association of British Insurers

# WATER & FLOOD DAMAGE RESTORATION

## Moisture Detection, Drying and Strip-Out

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## Acknowledgements

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# Introduction

There are many factors to consider when assessing the scope of works necessary to reinstate a property which has suffered water or flood damage. While operational, policy cover, pricing and policyholder-led requirements are important, the key objective of this document is to concentrate on high-level damage management and restoration industry based activities.

The recovery, restoration and reinstatement approach adopted by the insurer and their supply chain will impact on consumer satisfaction, cost and claim life cycle. There will be, for a number of reasons, variations in the procedure, however, following some key principles can help ensure the most appropriate solution is provided. Those actively involved in the management of the claim (on-site in particular), and those carrying out recovery, drying, restoration and reinstatement works should understand and consider the following:

- Obtain a precise knowledge of the incident damage and the ramifications of such damage.
- Maintain an understanding of the building, the materials used in its construction, and how they will react to the damage and subsequent decontamination, drying and restoration techniques applied.
- Consider any pre-existing building defects which should be factored into the response.
- Complete a robust and comprehensive damage investigation.
- Before undertaking significant building material strip-out and evaluating alternative options (such as innovative drying) the following factors should be considered:
  - cost - strip-out, reinstatement and alternative accommodation;
  - overall claim lifecycle;
  - consumer impact.
- Ensure the drying methodology and equipment used is particular to the incident and the property construction. Those offering drying services should maintain a varied ‘toolbox’ in terms of both approach and equipment used.
- Applying comprehensive moisture measurement techniques, and in certain claims, multiple devices and differing tests will often be needed.

## Understanding the Incident

An understanding of the incident, which has resulted in water damage, should be established before on-site investigations commence. This should include investigation of the following, all of which have an influence on the remedial works that will be required.

**Source of Water and Contamination Risks**
Water may contain chemical or biological contaminants posing hazards to health.

**Duration of Incident**
The length of time that standing water is present will impact on building materials that suffer.

**Depth of Water**
Higher water levels will increase moisture penetration into building materials and the potential for structural damage (due to water pressure) should be considered and investigated.

**Time Elapsed since Incident**
Secondary damage may occur if there is a significant delay in commencing restoration and drying works. Secondary damage may also involve increased moisture penetration, and the onset of mould/fungal growth, in areas that were not originally affected.

## Understanding the Building

Knowledge of construction methods and materials used in the building is an important part of the assessment process, including:

**Previous Incident History (if applicable)**
A property that has previously suffered water damage may have been repaired using materials that differ from those originally present. Resilience measures such as waterproofed sand and cement renders may have been applied in place of original wall plasters.

**Age**
The age of a property and any alterations can give a good indication of construction methods and the building materials likely to have been used.

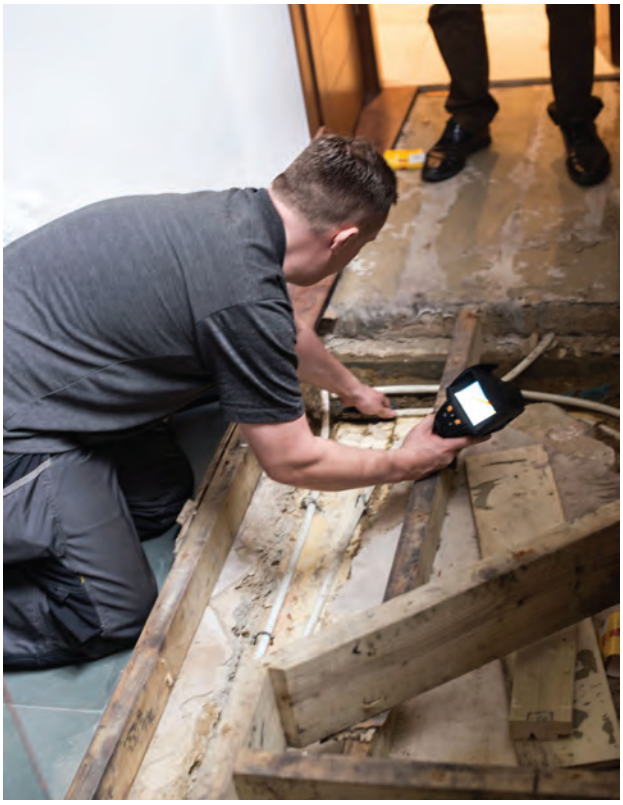
**Listed Status**
Properties of historical significance may have listed status to protect original features. A conservation officer from the local authority and in some circumstances English Heritage may need to be consulted before any potential strip-out and reinstatement works are carried out.

The English heritage website has further information on listed properties, and can be found at: https://www.historicengland.org.uk/listing/

**General Construction Type and Materials Used**
Identifying construction types and materials will assist in determining the most appropriate drying methodology and drying goals. Issues to consider include:

- Solid (non-cavity) wall structures may be affected by inherent damp issues, therefore, impacting on standard drying aims and objectives.
- Wall and floor voids will need inspection to check for residual water, debris, contamination and affected insulation materials.
- Historical timber framed structures should be dried with particular care.

**Alterations and Additions**
Extensions and additions to buildings may use different construction methods and materials as compared to the original structure. This may impact on the restoration, drying and recovery solution.



## Pre-existing Damage and Complications

Any pre-existing damp issues should be fully understood and taken into account, particularly when moisture measurements are taken and drying goals are set. *BRE Digest 245 Rising Damp in Walls (2007)* could be useful in helping to diagnose damp in buildings. Pre-existing damp issues could include:

- Penetrating damp;
- Rising damp (rising groundwater);
- Condensation;
- Internal pipework conditions;
- Guttering and drainage state of repair;
- Plus a variation of potential general building defects and maintenance issues.

## Investigation and Assessment of Affected Structures and Materials

Investigations should establish the following:

- The materials used.
- Whether insulation products are present beneath floors and behind wall and ceiling structures.
- Whether standing water and (or) moisture is present within voids and (or) cavities.
- The type and likely effectiveness of structural damp proofing (if present).
- Whether pre-existing issues have resulted in timber decay.
- The likely presence of pipes and services within wall and floor structures including under-floor heating systems.
- Whether impermeable wall and floor finishes are present.
- Whether structural damage has occurred as a result of the incident.
- The moisture content of all relevant materials.
- Whether there are any asbestos containing materials (ACM) present that may require testing and evaluating.

## Strip-Out

The wider industry's approach to internal building material strip-out and subsequent reinstatement works can vary and there is currently no standard practice adopted throughout the property insurance industry and its supply chains. Some companies and individuals favour significant internal building demolition (sometimes referred to as 'Hard Strip-Out), whereas others adopt a more light touch and remove very little (sometimes referred to as 'Soft Strip-Out).

It is accepted that Hard Strip-Out is required in some circumstances, however, it is important to note that other options (such as innovative and specialist drying techniques in conjunction with Soft Strip-Out) are available and these options will, in the vast majority of cases, negate the need for significant Hard Strip-Out.

When assessing whether or not significant Hard Strip-Out is required, the following should be considered:

- potential for substantial consequential loss;
- extension of claim life cycle;
- increased claims cost in general;
- more claim 'touches' and 'dead periods';
- extended time out of the property in alternative accommodation/premises;
- the knock-on effect for individuals, children and families, the vulnerable and/or the business owner.

The decision to strip-out a material depends on a number of factors such as the type of incident, duration, and category of water involved. Information gathered during the initial inspection should be used to determine which materials require removal either as the result of permanent damage sustained, or the inability to effectively facilitate drying.

Note: The prompt incorporation of the Stabilisation Phase, as part of the overall recovery and restoration process, will in many situations reduce the need for hard strip-out and stop the occurrence of secondary damage. The removal of saturated carpets, contents, laminates etc should be completed as part of the stabilisation process.  The strip-out of certain finishes, fixtures and fittings in listed properties may require permission from the Local Council's Conservation Officer. It is also important to ensure the electrics (and appropriate amp) are reinstated as soon as is possible.

**Internal Finishes**
Removal of wall and floor finishes may be required if they are clearly damaged, or considered to be impermeable and likely to inhibit the drying of structural materials beneath.

Some floor finishes may also be present, which, in effect, form part of the property's damp-proofing capability (for example, thermoplastic tiles and bitumen coatings beneath wooden block floors).

### Wall Plasters and Renders

The decision to remove wall plasters and renders after a water damage should only be taken after the following have been considered.

- The duration of the incident.
- Whether plaster/render remains well bonded to the substrate.
- Whether tests have confirmed that the substrate is significantly wet at depth.
- Whether removal would cause significant damage to the substrate.
- Whether the plaster/render will form a barrier and as such inhibit drying.
- Whether removal of an impervious finish would be sufficient preparation to allow efficient drying.
- Whether the removal of the affected material would involve significant associated reinstatement costs i.e. plumbing, rewiring, re-fixing of attached joinery and other fixtures and fittings.
- Whether the wall plaster/render is part of a waterproofing system that might have an associated guarantee.
- Whether removal may cause significant loss in the structural integrity of the wall.
- Whether tests have confirmed that the substrate has suffered foul and (or) contaminated water penetration at depth.

### Floors

Structures including suspended timber floors, floating insulated screeds, cementitious screeds/slabs may require removal in the following circumstances.

- If assessed as being structurally compromised.
- If considered to have been significantly affected by foul and (or) contaminated water.
- To gain access to a void beneath. Partial/minimal removal is often achievable when adopting certain drying measures.

In the majority of circumstances the full removal/disposal of floor boards and joists is not necessary as these items can often be successfully decontaminated, cleaned, dried and restored. Partial (minimal) removal can be implemented therefore enabling effective (where appropriate) decontamination, drying and remediation works to be completed in both voids and substrates. As part of the decision on what is appropriate, the cost of removal/disposal versus restoration along with impact to claim lifecycle should be assessed.

## Managing Customer Expectations

Customer perception may be that hard strip-out is required if:

- The neighbour's property is subject to significant strip-out.
- The property has previously suffered water damage and customer expects the same level of strip-out as previous incident.

Reducing strip out can speed up the overall reinstatement programme and get people home faster.

## Drying Project Management

For further, and more detailed, technical commentary on water damage in general and drying project management in particular, please refer to PAS 64:2013 and the BDMA Standards 2011.

**PAS 64:2013 (Mitigation and recovery of water damaged buildings**
Code of Practice). This document was developed in collaboration with the British Standards Institution (BSI); it provides guidance for the restoration of a water-damaged building from the time of the incident to the point at which repair and reinstatement works can commence. http://shop.bsigroup.com/tail?pid=000000000030179634

**BDMA Standards 2011**
The main BDMA Standards document is designed to provide guidance and recommended best practice for those who work in the damage management sector and the wider related insurance industry.
www.bdma.org.uk

# Drying Methodology and Equipment

Mitigating water damage by using effective drying solutions is an important part of the total recovery process and selecting the most appropriate technique is the mark of a professional water damage technician. Examples of methodologies and equipment commonly used will follow, however please note, the list is not a comprehensive commentary and for further detail please refer to PAS 64:2013, BDMA Standards 2011, manufacturers and equipment suppliers, training providers, the supplier carrying out the works and the technician adopting the drying regime.

Extensive research and development, manufacture, investment, and the adoption of a more comprehensive mix of innovative drying equipment and solutions, has resulted in significantly reduced  UK based average drying times over recent years.

### Open Drying

Ventilation is increased within a building, which can be done by simply opening windows. For this to work the outside air should be warmer and drier than the inside air. Open drying is adopted as part of some drying regimes and must never be viewed as a replacement for mechanical drying.

### Closed Drying

All windows and doors are shut and air movement/dehumidification/heating (on occasion) equipment is installed to remove the evaporated moisture and control the indoor environment.

### Combination Drying

The use of an open drying system is combined with the application of mechanical dehumidification, on occasion accelerated heating, and air movement equipment.

### Air Exchange and Heat Drying

Equipment is used to increase the temperature of the indoor air helping to improve the rate of evaporation from wet structural materials. Warm air is typically heated and circulated using specialised machinery, the heated air absorbs the evaporated water from wet structural materials, and is then either pumped out of the building or captured in dehumidifiers for example. These systems are often described as ‘portable’ (i.e. smaller units placed in the property) or ‘trailer mounted’ where they remain external to the property.

### Refrigerant Dehumidifiers

Internal air is cooled below its dew point, which results in condensation appearing on the dehumidifier’s internal evaporation coils. Water is then collected and removed from the area being dried, either by automatically pumping it away from the machine and out of the property, or the water is stored in containers which are subsequently removed by hand. Additional heat and (or) heating equipment may be required where ambient air temperatures are not at a level which enables optimal refrigerant performance.

**1** https://masassets.blob.core.windows.net/cms/files/000/000/390/original/MAS_A5_YPITTC0001E_May2016_W.pdf

### Desiccant Dehumidifiers

Damp internal air is blown through a desiccant material, which removes moisture by direct absorption and vapour pressure differences. The machine has two outlets, one which blows very dry air back into the building and a second, which blows very wet air out of the building.

### Convectant Dehumidifiers

Room temperature is increased by re-circulating the room's air through the machine's heating system. Once the internal air has reached a pre-defined temperature and (or) the relative/specific humidity reaches certain required levels, the machine switches to exhaust mode expelling wet air to the outside.

### Air Movement Equipment

Increasing air movement over the surface of a wet structural material encourages evaporation, and is considered important early on in the process. Air movement also creates a turbulence effect within the area being dried, which can make drying equipment and techniques more effective.  Air movement should be adjusted through the drying cycle.

### Heating Equipment

When the normal heating system in a building does not work or is insufficient, a secondary heat source may be needed. The adoption of this methodology is put in place to achieve both the required drying conditions and to accelerate the evaporation of moisture from the structure. Heating systems may also be used to target specific building materials, which inherently take longer to dry. It should be noted that heating alone is not a viable proposition (as uncontrolled evaporation can lead to secondary damage) and the incorporation of heat should always be used in conjunction with other drying related techniques.

### Target Drying

Sometimes a saturated section of wall or floor is the only area that has been damaged. If so, it may be preferable to only dry the air close to the affected area. This is done by containing the saturated area through the use of plastic sheeting or specially designed materials, which are then connected to appropriate and specifically designed air movement and dehumidification equipment – in effect a micro-climate is created. Target drying systems can also be effective in larger affected areas and are often used when drying out very dense/low permeance and slow drying building materials. A number of further products (for example, 'Matts' and 'Cells') have been designed which carry out specific target drying activities in concert with specifically designed air movement and dehumidification equipment.

### Injection Drying

Sometimes used when drying water damaged building materials, voids and (or) insulation in floors and walls. Similar to many other drying processes, these systems enable areas that would normally require strip-out, to be successfully dried without any minimal removal of building materials. The process works on the basis of dry air being forced/pumped through the material or into voids within the construction envelope.

### Remote Accelerated Drying

is a system that has been designed to remotely monitor the drying phase and progress throughout. The equipment can be programmed to adopt accelerated drying during periods when the property is not occupied or when the policyholder, and others living/working in the property, are not in situ. These systems, in some circumstances, have the ability to maximise certain drying regimes at times pertinent to the occupiers.

# Moisture Measurement

Moisture measurement forms an integral part of the recovery, drying; restoration and reinstatement process and its significance should not be underestimated. The measurement of moisture will influence the scope of works considering it informs what drying regime should be adopted and what level of strip-out is necessary. It is important that this activity is carried out correctly, and by a trained technician, as the initial testing programme and the subsequent drying goals set, will impact on the customer and have a significant bearing on both claim life cycle and overall cost.

### Initial Assessment

Non-invasive moisture meter readings should be taken in all affected areas to establish the initial extent of damage and water ingress. Further non-invasive readings should be taken in non-affected materials so control/norm measurements and parameters can be both established and subsequently recorded. These readings must factor in various environmental conditions including the permeance of the material, activities carried out within the property, the primary purpose of the property, the building construction type and age, the possibility of hidden water/moisture in voids and insulation, the existence of water/vapour barriers, the temperature, the Relative Humidity, and therefore, the Specific Humidity.

Where the presence of moisture below the surface is suspected, in-depth readings (using more invasive methods), should always be taken.

### Setting Drying Goals for Structural Materials

The aim of the drying programme should be to return all building materials to their pre-incident condition. Known parameters for different material types can be useful in setting drying goals and any pre-existing complications and damage must also be considered.

### Final Moisture Readings

A period of time (length will be dependent on a number of factors) should be allowed to ensure building materials reach a normal equilibrium once drying goals appear to have been achieved.

## Moisture Measurement Equipment and Methodology

The list below is typical of moisture measurement equipment held and associated tests that are carried out by professional water damage technicians. As with drying equipment, there are many varying types of moisture measurement devices, which are developed and manufactured through a range of companies.

- Radio Wave
- Resistance
- Capacitance
- Surface & Probe
- Thermo Hygrometers
- Humidity Boxes & Sleeves
- Calcium Carbide
- Remote Monitoring Systems
- Borescope
- Thermal Imaging

Most of the techniques highlighted will have multi-function capabilities; some of the multi-function capabilities adopt invasive type testing, whereas others use non-invasive measures. It is essential when testing moisture within a property that all techniques and multi-function capability is considered. In the majority of water damage scenarios, more than one technique/piece of equipment/test may be needed.

## Applicable British Standards

Moisture measurement procedure in the following standards can be applied to concrete floor slabs and a variation of floor screeds.

**BS8201:2011**
Code of practice for installation of flooring of wood and wood based panels.

**BS8203:2001+ A1:2009**
Code of practice for installation of resilient floor coverings.

Damage management and restoration activity procedure can be reviewed through the following document.

**BS12999**
Damage Management, is the code of practice for the organization and management of the stabilization, mitigation and restoration of properties, contents, facilities and assets following incident damage. www.bdma.org.uk

Copies of varying British Standards can be purchased on-line at the BSI Shop - http://shop.bsigroup.com/Navigate-by/Standards/

# Conclusion

The role and activity of a water damage professional is an integral part of the overall solution and helps to add value that is afforded to the insurer, the consumer, communities and businesses throughout. The skill-set and knowledge base required to provide the very best solution is both substantial and varied.  Significant levels of training and experience form an essential part of being able to provide a tailored response. A tailored approach helps to guarantee that policyholder specific needs are met, while at the same time ensuring that the claim life cycle and overall costs are kept to a minimum and/or are within agreed parameters.

This document has highlighted some of the many areas that will require consideration when recovery and restoration activity is applied to a wide range of water damage related claims. Common disciplines and practices are evident in all water damage scenarios, however, it is important that the response is professionally and uniquely designed, considering that no two claims are identical.

Maintaining a varied toolbox of equipment and products, along with adopting varied methodologies and approaches is necessary when managing water claims and mitigating damage. With the development, manufacture, investment and greater use of more sophisticated moisture measuring, monitoring equipment and drying techniques, the level of hard strip out can be reduced resulting in lower claims costs and improved customer outcomes.

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