

TWO DAY COURSE: TECHNICIAN LEVEL



VERSION 1.6

Day 1

Core Module

Complaints Procedures
Customer Care
Ethics and Business Practice
Health and Safety
Insurance Policies and Conditions

General Module

Triage
Damage Limitation
Transportation, Moving, and Packing
Use of Chemicals

Water Module

Water Damage Limitation
Drying Equipment and Usage
Moisture Measurement
Drying Buildings and Contents
Microbiological Surveying after Black Water
Microbiology and Water Damage



The Questions You Want Answered Today:

1:

2:

3:

4:

5:

Blue Team

Section 1

Digital Thermo Hygrometer & Speedy Meter

Use and interpretation of a Digital Thermo Hygrometer

- Digital thermo hygrometers measure temperature and humidity.
- You will find this tool can give you general indications of the conditions within the property, and it is often useful to compare it with the outside conditions. By doing this you may discover that a suitable drying program can include ventilation, where excess moisture from within the property can move to the outside.
- Ventilation can assist drying when the external moisture levels are lower than the internal. You will need to be able to understand psychrometry to be able to decide this. Psychrometry is branch of physics that explains the relationships between moist air, water vapour pressure and temperature.
- It will also enable you to measure conditions within materials or voids. By measuring the ERH (Equilibrium Relative Humidity) you will gain knowledge of the moisture content of other materials in that environment.
- It is important to remember that in a room the general conditions you measure with the thermo hygrometer are only a part of the picture.
- You could have acceptable levels of humidity and temperature within a property but still have problem areas with damp materials where moisture is trapped behind decorative finishes or boarding.
- You can use the readings for temperature and humidity and, with the psychrometric chart, determine the specific humidity.
- Remember, this is the instrument with wide international acceptance as the preferred method for measuring moisture levels in dense materials such as concrete



Use and interpretation of a Speedy Meter

- The Speedy Meter method involves taking a small quantity of the material, crushing it and mixing it with calcium carbide, which then reacts with the moisture content to release a gas.
- This occurs within a small sealed chamber where the pressure of the gas produced indicates the amount of water present within the material.
- This method is regarded as being very accurate, giving an actual percentage moisture content. Knowledge and experience is required to interpret these values.
- Make sure that a COSHH risk assessment has been carried out and acted on in relation to your use of calcium carbide.



Other Moisture Measuring Processes:

- Laboratory Analysis of sample materials can be used to measure moisture content in various materials. Materials are removed and weighed before and after drying in a laboratory oven. The weight loss after oven drying is the amount of water that was held within that material.

Red Team

Section 1

Radio Wave Moisture Meter & Resistance Moisture Meter

Use and interpretation of the Radio Wave Moisture Meter

- A radio wave generated by the meter passes into the material and subsurface readings will be obtained to a nominal depth of 10mm
- A sensor housed within the body of the meter is placed against the surface of the material.
- Radiometers work by measuring variation in radio transmission and can be useful for comparing different areas of the same material.
- Comparative readings can be taken to map the extent to which excess moisture has spread through the material being tested. However, these readings should only be taken as comparisons with various areas of the same material. They are less precise than other meters, but useful for general surveying and identifying problem areas.
- One advantage of these meters is that they are non-penetrating so they leave no marks on the surface of materials being tested.
- The function of these meters is to take comparative readings in the same materials during an initial survey of water damage.
- You will normally use other more reliable moisture measurement methods in addition to the radio meter to complete your survey.



Use and interpretation of a Resistance Moisture Meter

- The conductance moisture meter (Resistance Meter) is a penetrating meter.
- An electric current is passed between two needle probes which are placed on or pushed into the material.
- The electrical resistance of the material, which is affected by the presence of the moisture, is measured and is shown by digital readout, by flashing lights or by variable tone.
- These meters are calibrated to give accurate readings in softwood and reading in other materials is measured in WME, [Wood Moisture Equivalent]. A reading below 18% in softwood is regarded as a safe level at which mould and fungi cannot grow. Under normal conditions a typical moisture content reading for softwood within the built environment would be in the region of 10% or 12%.
- Readings at greater depth can be taken by attaching a range of accessories such as insulated extending probes or by using hammer electrodes that can be driven beneath the surface of softwood.
- Care must be taken to ensure that you are not misled by reading the open 'air dry' surface. In a drying environment the surface of a material may dry quite quickly, but it may take longer for the subsurface material to dry.
- Remember, this instrument is only completely reliable on softwood, and may sometimes give false high readings in concrete and similar materials.
- The presence of metals or high concentrations of mineral salts beneath the surface may result in false high readings being obtained.



Other Moisture Measuring Processes:

- **Data recording devices** (including Remote Monitoring) can measure and record atmospheric conditions for an extended period of time which provides useful to the technician. This equipment can keep a record of the whole drying process, providing valuable supporting data and/or reports to justify decisions made.
- **Thermal imaging** can be very useful and this method will reveal areas of lower temperature, which may indicate dampness.

Blue Team

Section 2

Heat Energy & Drying Wet Buildings

- To heat 1 gram of water by 1 degree Centigrade requires 4 watts of power for 1 second.
- When you set up a controlled drying programme you are encouraging a **'phase change'**. The objective is to convert liquid water into its gaseous form. The resulting water vapour can then be removed from the air by a dehumidifier, either by condensing or by venting to the outside.
- The energy required for evaporation of a liquid is known as the **'Latent Heat of Vaporisation'**.
- In severely affected properties every part of the building that is wet will **soak up heat energy from the surrounding atmosphere as water evaporates**. This tends to **cool the building** and arrest the drying process unless external energy is introduced. It is important to be aware of this simple science. Materials cool when water evaporates, just **like your skin when you sweat**.
- To supply enough energy to replace this heat loss in order to progress the drying technician can employ a variety of methods.
 - They can **localise the output of warm dry air** from the dehumidifier by tenting wet surfaces.
 - They can use **infrared heaters** directed at wet surfaces.
 - The **building's heating system** can help and should normally be activated, running 24 hours, to assist by adding heat energy.
 - Another option is to use **microwave** energy to provide heat.

- Others will use **trailer-mounted equipment** that will produce massive amounts of heat energy to maintain a building's temperature as it dries. These units can dry a building **within a few days** rather than weeks or months by providing enough heat and large amounts of warm low humidity conditions to encourage evaporation and accelerate drying.



Drying Wet Buildings

Creating a balanced drying system

- A **balanced drying system** is established when water extraction from the air (by dehumidifier or other means) has sufficient capacity to remove water vapour produced as materials dry out.
- This may be more specifically described as **the equalisation of evaporation and dehumidification**. An ideal drying situation exists when the rate of evaporation of moisture contained in structure and contents is equal to or slightly less than the rate of moisture removal or dehumidification.

Air moving fans are a very important tool to speed drying by disturbing the damp, '**boundary layer**' air close to the wet surface. There are a number of different designs that you can use.

- Remember to ask yourself, when using a blower on a wet surface: **'Where will the water go to as the surface dries?'**



Water Extraction Equipment such as Dehumidifiers reduce the relative humidity by extracting moisture from the air.

There are two main types of Dehumidifiers in use.

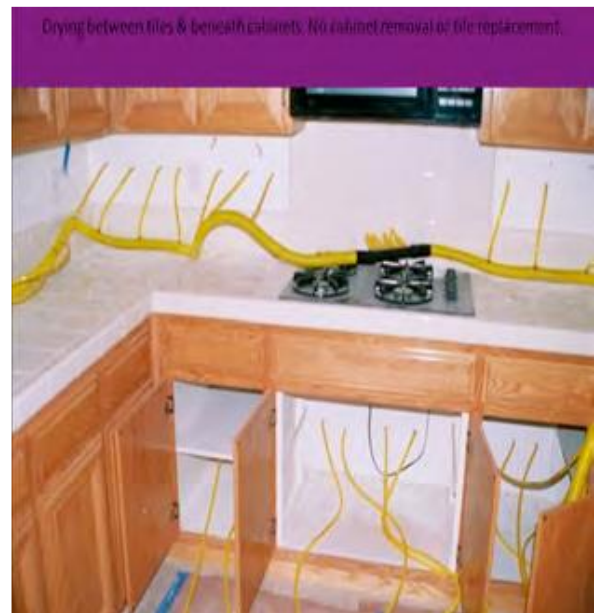
- **The refrigerant or condensing dryer, which** draws moisture laden air across a cold surface causing water vapour to condense. The cold surface is produced by a refrigerant system and the condensed water is then collected in a container or pumped to a drain. These units are very efficient in terms of electrical consumption.
- The **desiccant or adsorption dryer** works by withdrawing moisture from the air onto an adsorbent media producing very dry air to promote evaporation from wet surfaces and warm wet air, which needs to be exhausted to the outside or further condensed.
- Most **Refrigerant Dehumidifiers** do not work well at **lower temperatures** (below 15°C) and also will not work well at **higher temperatures** (above 30°C). However desiccant dehumidifiers will work at **very low temperatures** and have the added advantage of being able to deliver **very low moisture content air**, which can be useful when drying mass materials. In these cases, this dry air can be delivered under a polythene envelope to create a **microclimate on the surface** of the damp material, (sometimes referred to as 'enveloping' or 'tenting').
- **Desiccant Dehumidifiers** work by adsorption of moisture from the air into a desiccant material. This material is capable of adsorbing moisture and, when heated, releasing it again. Air is drawn into the machine and passes over a **revolving wheel filled with the desiccant material**, commonly a silica compound. Water is captured in the desiccant material as air passes through it. As the wheel rotates a second heated flow of air passes through the desiccant material releasing the moisture from the wheel and the warm wet air resulting is exhausted from the machine usually taken by pipe to the outside of the building.



Because these units usually require venting to the outside of the building there can sometimes be difficulties in deploying them because of problems with building **security** if windows need to be left ajar. (Some desiccant dehumidifiers can avoid the need for this by having an attached condensing unit).

Specialist Water Extraction Methods

- **Injection drying** is a specialist method that uses equipment to deliver air through small holes into building voids to release trapped moisture.
 - These can be useful for drying behind plasterboard or panelling to avoid costly and destructive structural dismantling that would otherwise be required to release trapped moisture.
 - The input air for the system could either be ambient air from the room or air directly from a dehumidifier, especially a desiccant. Alternatively, adaptors to fans can allow air to be forced behind panelling through gaps or purpose drilled holes, often after removal of skirting boards.



Injection drying releasing trapped moisture while tea drinking continues



Red Team

Section 2

Moisture Levels & Establishing a Satisfactory Level

Moisture Levels

Buildings in normal occupation are 'dry'

- All building materials contain moisture to some degree. This will be higher in a newly built property due to the process of construction (e.g. the water added to mortar, plaster or concrete). As the new building dries out the stable moisture content of materials is determined by the ambient conditions, where the property is sited and the conditions produced by use of the building – for example, washing and cooking.
- When the building experiences a **water damage incident** the conditions within the property become very abnormal. The **moisture content rises sharply** and unless prompt action is taken to restore conditions to normal, irreversible damage may occur.
- **Remember**, it's not straightforward to determine what a safe normal moisture level in a building is.

Water vapour moves through the air

- **Water vapour is a gas** and gases always move from areas of higher pressure to areas of lower pressure. So, the water vapour in the air will move very quickly through the property to other rooms where the concentration is less. If these rooms are cold and unventilated high humidity conditions could occur that will lead to **mould growth**. This means that one or two severely affected rooms can, indirectly, affect the whole house unless dealt with promptly.



Remember, there is **no defined and precise "dry & safe" condition** for properties - a competent person needs to **make a judgement**, based on a range of measurements and factors.

Establishing a Satisfactory Moisture Level

- Moisture levels in most materials can be accurately measured so you should be able to decide, from these measurements, if you have reached a satisfactory moisture level.
- However, a satisfactory moisture level depends on:
 - **Pre-existing building conditions and defects**
 - **What will be applied over the surface**
- For most building materials an appropriate moisture level is a point where rot will not occur in the material, mould will not grow and materials in contact with the surface will not deteriorate. This applies to any material in equilibrium with it (e.g. skirting boards attached to a wall will reach equilibrium with the moisture content of the wall surface).
- Some surface covering materials are moisture sensitive so they may be easily damaged by moisture. If these materials are to be installed after your drying you will need to dry to a lower level to prevent damage. Examples of such materials are:
 - The **adhesives** used to bond vinyl floor-covering to concrete screeds are very sensitive to moisture and require drying below a specific moisture level – see British Standard 8203 2001
 - **Timber floor boarding**, which can be adversely affected by elevated moisture levels in the sub floor which can result in distortion of the boards
 - **Laminate flooring**
 - **Impermeable** wallpapers and paints
- Your overall objective is to return the property to its pre-incident condition, however this may not be easy to identify. It is important to compare moisture readings in the same materials in similar areas, where the property has not been affected by the incident. However, be aware that materials remote from an incident may have picked up moisture from the air if high humidity has existed for some days.
- As construction and methods of building regulations have evolved more modern buildings will remain 'dry' in normal circumstances.

Older property – without damp proof courses, constructed of stone or clay, or with solid as opposed to cavity walls for example – will never be as dry as those constructed to modern building standards. This applies to both drying limitations and the general inadvisability of using impermeable decorations – such as vinyl wallpaper or certain types of paint.

The Importance of removing the liquid water from a property

- It is extremely important to **remove as much liquid water as possible** from the flooded building. To rely on evaporation is too slow and energy hungry
- The simplest, first and most important action is to pump or vacuum up laying water
- Some of these vacuums contain pumps that allow continuous operation which avoids the need to stop vacuuming work while you empty the vacuum tank manually, and can allow much faster water extraction
- Powerful vacuums are also available in vehicle mounted systems powered by petrol or diesel engines
- Submersible pumps can be safely immersed in water pumping large amounts very quickly and some can handle debris without blocking. Submersible pumps can be very useful for clearing water from basement/cellar areas.
- Also remember there are special tools that allow you to squeeze water out of carpeting at the same time as vacuuming. These tools can dramatically increase the amount of water extracted from carpeting.
- Electrically powered wet vacuums are capable of picking up water into a recovery tank. These will be used along with a range of tools including floor wands and hand-held tools. The equipment is designed to be safely used with water, especially the low voltage (110 volts) models and ones fitted with a Residual Current Device (RCD).



Questions a BDMA Technician might be asked

- What meter did you use?
- What readings did you get?
- What will happen if we don't take off the render/plaster?
- Would targeted drying be helpful in this situation?
- When the incident was triaged what actions were decided upon?
- What reasons do you have for suggesting this?
- What other solutions have you considered?

Further Information

Meters in Action

The concrete floor is dry, has never been flooded, and has a sound damp proof membrane.



The meter on the left is being used in “resistance meter mode” and could be thought to indicate that the floor is damp (at 23% compared to a “dry” WME reading of less than 18%). Because we know that this floor is dry it is a false high reading.

Correct interpretation of this reading - further investigation is required with a reliable measuring method

The meter in the centre is measuring equilibrium relative humidity (ERH) within the concrete and showing a reading of 72.9%RH. This shows the floor to be acceptably dry.

Correct interpretation of this reading this is a reliable and an internationally acceptable measuring method for dense materials.

The meter on the right is in “radio meter” mode. It could be misinterpreted that the floor is still wet as the reading with this Protimeter Radio Meter is over 200.

Correct interpretation of this reading- further investigation is required with a reliable measuring method.

Speed of evaporation of a wet surface.
kg/h for a 100 m² wet surface.

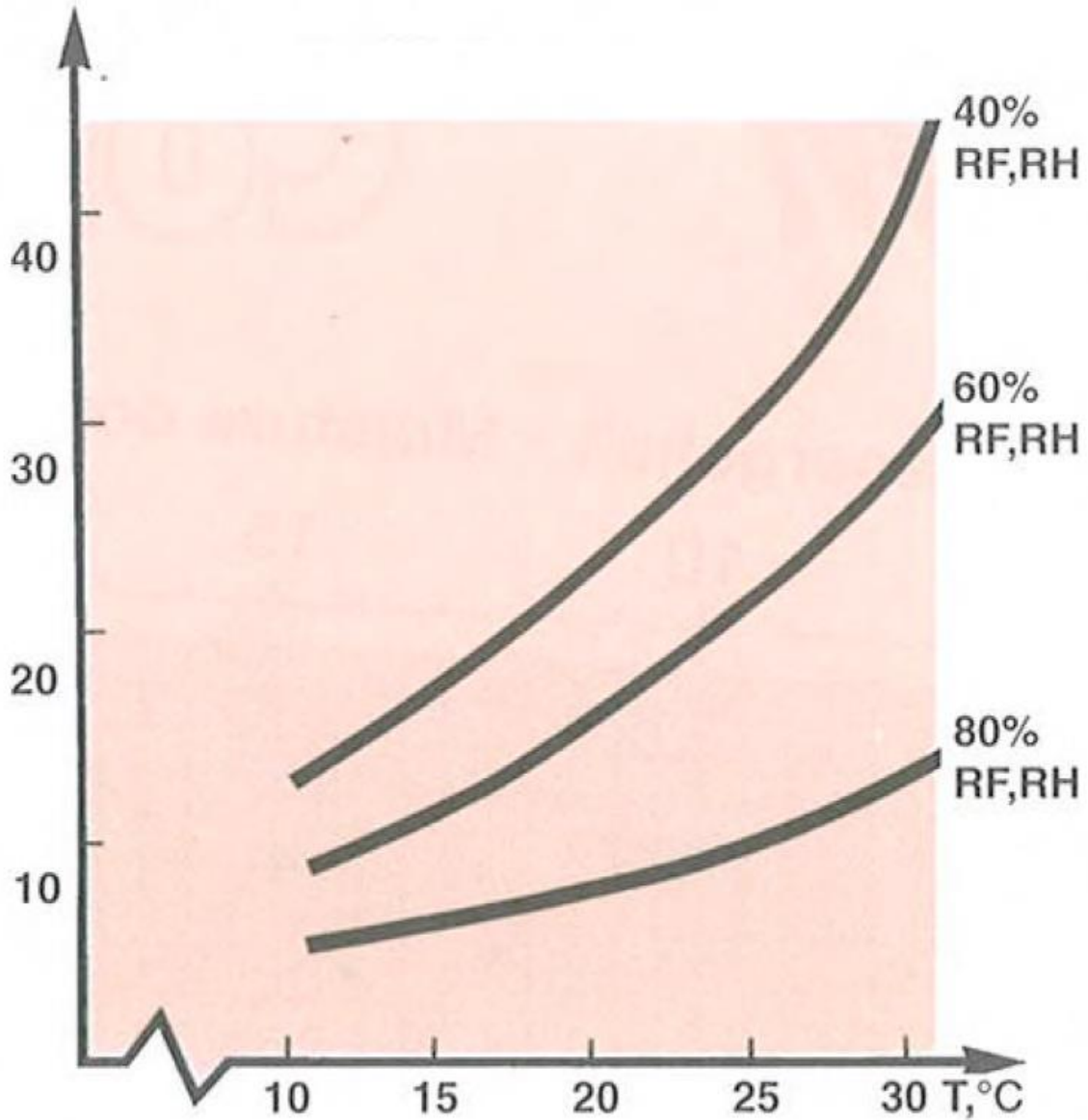


Image © Corroventa---Sweden

The Corrogram Psychrometric Chart

Drying technicians can use this chart together with a digital thermo hygrometer to reach an understanding of the relationship between Temperature, Relative Humidity, Specific Humidity and Dew point values obtained from use of the instrument.

Temperature values on the chart are shown as horizontal lines. Relative humidity values are shown as curved lines

The bottom curved line showing 100% RH is instrumental in determining dew point temperatures

A scale showing Specific humidity values is found at the top of the chart.

A scale showing Vapour pressure is shown as a horizontal line at the bottom of the chart.

To determine Specific Humidity from temperature and relative humidity readings (Assume as an example 50% RH and 20°C)

Locate the 20°C (horizontal) line on the chart.

Locate 50% RH (curved) line on the chart.

Follow the vertical line that passes through this intersection to the top of the chart and read off the SH value in grams per kilogram (7.5g/kg).

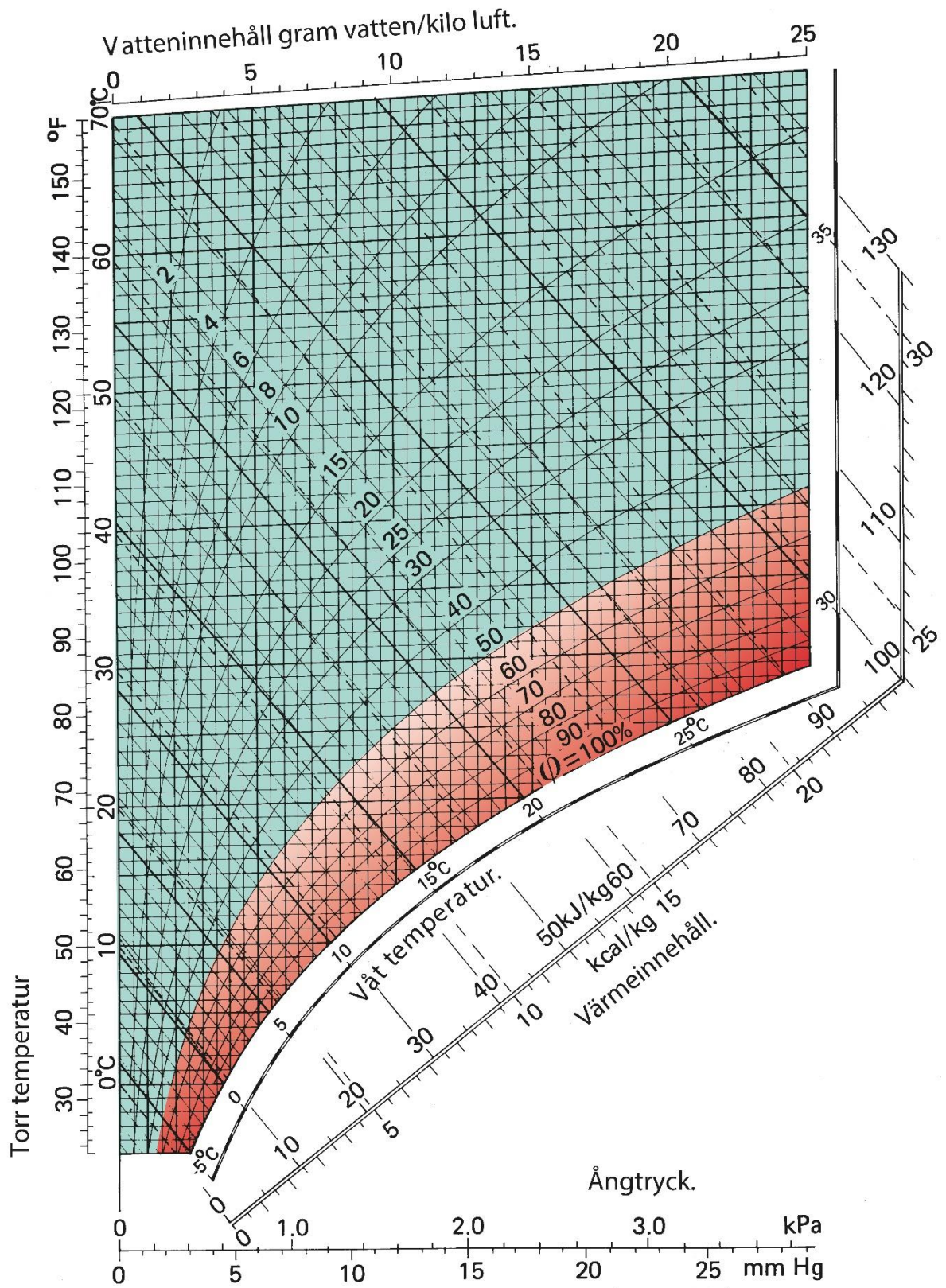
To determine vapour pressure for the same values, follow the vertical line used to determine SH to a point at the bottom of the chart where the vapour pressure line is intersected and obtain a reading (10mmHg)

From this you can see demonstrated the direct correlation between SH and DP. The higher the SH value (the more actual moisture present in the air) the higher the vapour pressure exerted.

To determine the dew point temperature reading for the same values (50%RH and 20°C) proceed as before to the point of intersection of Temp and RH.

Follow the vertical line of intersection downwards to the point where it intersects the final curved line (100%RH)

From this second intersection point follow the horizontal line to the left of the chart and read the dew point temperature value (12°C).



When to strip out?

For Stripping Out

Increases drying where covering materials would have slowed, meaning the humidity in property returns to normal levels faster

Removal of contaminated materials reducing need to clean, or some materials that cannot be cleaned after a black water ingress

The materials may have been contaminated with odours that would be unacceptable to the occupiers

It avoids the risk of missing hidden damage/ mould present

Can save a lot of wasted time trying to dry something that will not dry satisfactorily

Some low permeance materials may also have to be removed in order to allow moisture trapped behind to be released.

Skirting boards, door frames have to be stripped out to allow full cleaning following black water ingress

Plaster has 'blown' or gone 'live' and so needs to be removed and replaced.

A strip out is peace of mind that there will be no re-occurring issue or contamination for the homeowner

If laminate floor has blown & de-laminated and water has got underneath, it will be unable to be repaired

Against Stripping Out

Costs will be kept down if the property does not need stripping out (no labour, materials or disposal costs)

Cause the premises to be uninhabitable creating further cost

Significantly increase the time it takes to complete work resulting in increased overall costs for the job with delays in tradesmen and associated alternative accommodation (or BI) costs

May be very difficult to obtain matching materials if originals are removed

Can hugely impact the customer in their health and wellbeing by being away from their home unnecessarily or for an extended period -

Can be very upsetting for owners where they see their home being stripped

If building is listed it may be illegal without permission. Some modern buildings warranties are voided if they are changed or altered

Sustainability - it is better to retain as much as possible, rather than strip out and replace

Asbestos may get unnecessarily disturbed

Strip out could result in Damp proofing or other membranes being damaged or breached or resilient features being removed

Target drying methods such as tenting/ enveloping can also be used to assist drying problem areas instead of stripping out

Knowledge Review 1

1. BS8600 states that it is desirable to receive 'Complaints'. This is in order that:

A. Anyone upsetting a customer can be identified and swiftly disciplined.

B. The BS Authorities need to assess the numbers of complaints received nationally.

C. Complaints can be satisfactorily resolved, and useful information obtained which enable the company's performance to be improved.

2. According to BS8600 customers should:

A. Make a complaint in writing.

B. Only contact Company Offices on a specified time during the week.

C. Use any form of communication with which they feel comfortable to register a complaint.

3. Complaints of a serious nature requiring urgent attention may:

A. Involve issues of Health and Safety.

B. Contain an accusation of dishonesty theft or fraud.

C. Allege that someone has been grossly negligent.

D. Any of the above.

E. None of the above.

4. In the aftermath of a fire or flood incident the principle concern of the business owner/manager is:

- A. Will the premises need redecorating?
- B. Will the staff have to come in to work or stay at home?
- C. Can the business continue trading?

5. When working on business premises you may be expected to conform to certain codes of practice. List three such “House Rules” you might expect to encounter.

- 1.
- 2.
- 3.

6. Which of the following best describes the ethical position of the Restorer?

- A. To do as much work as possible on each incident we attend.
- B. To carry out the minimum of work on each incident in order not to inconvenience other trades people.
- C. To only carry out work which we consider to be necessary as a direct result of the incident.

7. Which of these is correct?

- A. Your employer has sole responsibility for your safety while you are at work.
- B. You have sole responsibility for your safety while you are at work.
- C. Failure to comply with the Health and Safety at Work Act is a criminal offence but this only applies to employers.
- D. Responsibilities under the Health and Safety at Work Act are shared by both Employers and Employees, and either may be liable to prosecution if they fail to comply with its conditions.

8. List the five steps to Risk Assessment

- 1.
- 2.
- 3.
- 4.
- 5.

9. What is the correct title for the chemical information sheets used to explain the properties of every chemical used in the workplace?

- A. Chemical properties information sheet.
- B. Health risks from chemicals information sheets.
- C. The Safety Data Sheet.
- D. The Health and Safety at Work sheets [Chemicals].

10. Which of the following Health and Safety legislation applies specifically to work equipment?

- A. The Factories Act.
- B. PUWER.
- C. The Health and Safety at Work Act.

11. What is an ACM?

- A. Area of Crumbling Masonry
- B. Architectural Conservation Measures
- C. Asbestos Containing Material

12. Where might you find ACM's in the built environment?

- A. In relatively few clearly identifiable locations
- B. Almost anywhere in buildings erected before the year 2000
- C. Often overlaid and hidden by other materials or decorative finishes
- D. Only in coverings sprayed onto ceilings or steelwork.

13. Which of the following is unlikely to be covered by the type of property damage insurance we normally encounter?

- A. Leak from domestic plumbing or appliances such as dishwashers and washing machines.
- B. Age related damage to a roof.
- C. Damage to internal decorations as a result of a fire.
- D. Deterioration to a cob wall due to a leaking roof that has been ongoing for a number of years.

14. The loss adjuster's normal role is to:

- A. Help the customer to make as large a claim as possible.
- B. Make sure the incident is covered by the policy and agree a settlement with the policyholder within the terms of the policy cover.
- C. Make sure the claim is kept as low as possible.

15. Water Damage Technicians should be obsessed with:

- A. Extracting water
- B. Preventing secondary damage
- C. Lifting carpets.

16. When dealing with a black water incident which of these actions would you think is the most important.

- A. Immediate installation of dehumidifiers
- B. Thorough multi cleaning of all affected areas
- C. Immediate installation of air movers

17. What actions might you take to control humidity within a property?

- A. Remove saturated carpets and rugs from within the property
- B. Open all the windows
- C. Install dehumidifiers and air movers
- D. A and C
- E. B and C

18. Clearing up following a black water incident is sometimes referred to as Multi cleaning. Does this mean:

- A. A multitude of items are cleaned
- B. Many people were involved in the work
- C. The affected area may require to be cleaned several times

19. When installing a drying system, it must be balanced. Does this mean:

- A. A system that heats the air to lower the humidity
- B. A system that increases air movement to promote evaporation of absorbed water.
- C. A system where the rate of evaporation from wet materials is matched by the rate of removal of water from the air.

20. 'Safe' moisture levels in materials are reached:

- A. When the technician decides they look dry
- B. When a resistance meter reading of less than 20% is observed
- C. Depends on the material being tested and its position within the structure

21. Which of these statements is correct? Radio meter readings are:

- A. Accurate to a depth of 10mm in all materials
- B. Can give comparative readings throughout areas of the same material.
- C. Can be relied on to tell you when "safe" moisture levels have been reached.

22. Damage may occur to building materials following water ingress because:

- A. These materials normally have no water content at all
- B. The moisture content within the materials rises to an abnormally high level
- C. Water will dissolve many building materials.

23. If testing for levels of microbiological activity after decontamination of black water situations should you attempt to:

- A. Achieve a completely sterile result.
- B. Aim to achieve a result within an identified range.
- C. Not be too concerned whatever the result as this is not your responsibility.

24. Which of these statements is incorrect?

- A. As temperature increases Relative Humidity falls
- B. As temperature drops Relative Humidity rises
- C. If temperature falls low enough condensation will occur.
- D. None of the above.

25. Specific Humidity readings provide information on which of the following?

- A. Whether the air in a room is capable of holding more water vapour
- B. Whether the air in a room is capable of holding less water vapour
- C. Exactly how much moisture is present in the air.

26. What humidity level is sufficient to stimulate or promote mould growth?

- A. 50 - 60%
- B. Less than 50%
- C. More than 75%

27. When measuring in solid materials accurate measurements of moisture content may be obtained by using:

- A. Which additional type of meter that employs a strongly hygroscopic chemical and a pressure vessel?
 - B. What is the Chemical employed?
 - C. It is the most accurate device we know so why isn't it used every time we measure moisture content?
- A.
 - B.
 - C.

28. Remediating Water Damage:

- A. Involves few significant hazards and low levels of risk
- B. May involve serious hazards to health
- C. Is covered by three generic Risk Assessments produced by the H & S Executive.

29. An Understanding of Psychrometry is:

- A. Not really something that concerns me as long as I have experience in modern construction
- B. Knowing how different drying equipment works
- C. Enables Technicians to monitor and interpret moisture levels within the built environment and take effective steps to return structures to their pre-incident condition following water damage.

30. WME Stands for:

- A. Water Measuring Equipment
- B. Wood Moisture measuring Equipment
- C. Water Metering Equipment
- D. Wood Moisture Equivalent

Knowledge Review 1

Answers:

1.C	PREPARED TO	21. B
	AMEND	
2.C	ASSESSMENTS AS	22. B
	JOBS PROGRESS.]	
3.D		23. B
4.C	9.C	24. D
	10.B	
5. [VARIOUS	11. C	25. C
ANSWERS IE: WEAR A		
HARD HAT, NO ENTRY	12. B C	26. C
- - -]		
6.C	13. B D	27. [A CARBIDE
		METER or SPEEDY
7.D	14. B	METER, B CALCIUM
		CARBIDE, C VERY
		INVASIVE]
8.[1/ IDENTIFY	15. B	28. B
HAZARDS, 2 WHO		
CAN BE HARMED AND	16. B	29. C
IN WHAT WAY?, 3/		
QUANTIFY THE RISK	17. D	30. D
,AND, ARE CONTROL		
MEASURES REQUIRED	18. C	
? 4/ RECORD ALL		
SIGNIFICANT	19. C	
FINDINGS, 5/ BE	20. C	

Day 2

General Module

Buildings Electrical Wiring

Buildings Heating, Ventilation, Air Conditioning, and Plumbing systems

Buildings various structural systems

Permeance

Historical and Listed Buildings

Odour Control

Fire Module

Fires Classification

Fires potential for Secondary Damage

Recognise Appropriate Techniques and Methods for the removal of Smoke Contamination

Appreciate when Smoke Odour Treatments are required and the Effective Methods available



The Questions You Want Answered Today:

1:

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Section 3

A

Section 3

Categorisation of Fires

Observe smoke and fire types to predict contamination

Some fires, but not all, can be categorised in the following way:

Fast Burn - Small simple particles.

Slow Burn - Large complex particles, more staining, odour.

What Burnt? - Plastics, protein, natural materials, manmade materials?

What are the ramifications of different types of fires?

- **Slow burning fires**

- A typical slow burning fire is an incident when the mains incoming electrical supply is overloaded or has a poor connection.
- Gradually the surrounding materials start to smoulder and burn.
- These fires start slowly and as they are often in cupboards where the supply of oxygen is restricted.
- The smoke produced will contain a **higher proportion of aerosols** and these will often find a way to get into building cavities by following the cable runs.
- This can be a problem as **odour** can be difficult to treat in the inaccessible places.
- To the untrained eye these types of fire residues **look minor**, with less obvious light brown staining.



- **Fast burning fires**

- Fast burning fires, such as a kitchen fat fire, can produce huge amounts of **dry black residues**.
- To the untrained eye these types of fire residues look severe, with very obvious heavy deposits.
- However, in some cases these deposits can be simply removed as they leave a dry residue.
- Remember these deposits are light and **can float in the air and so re-deposit on areas already cleaned**.
- For this reason, it is important to organise environmental controls, such as **air scrubbers, and to start work by vacuuming of ALL surfaces**.



○

Successful removal of fire residues depends on two factors:

- The characteristics of the residues.
- The nature of the surface that retains it.

B

Section 3

Protein Fires

- Protein fires do not always involve ignition.
- They produce yellow/light brown residues that are relatively hard to see.
- These incidents produce a semi-transparent film of condensed protein and/or amino acids, which is one of the more challenging odour and severe restoration problems
- Typically, if meat is heated and decomposes then vapours are released which will condense on adjacent surfaces.
- These fires are very difficult to deal with, as the contamination is usually not clearly visible.
- The most successful approach is to start in the worst affected room (usually the kitchen) and strip it of all contents that may contain odour, clean the structure and then re-assess.
- You will usually find that you can reduce the odour eventually in this first room and any remaining odour in adjacent rooms will then need attention.
 - Contents items that are likely to attract and hold onto protein odours are paper and plastic food packaging, plastic kitchenware and of course food items that have been exposed.
- You might hope that painted surfaces will respond to cleaning. However, emulsion paint can sometimes become impregnated with this unpleasant odour, and redecoration may be essential. Wallpaper so affected will also normally have to be stripped.
- It will be hard to identify the final scope of work on the first visit.
 - The residue is hard to see, and because of odour drift from one area to another it will not be easy to identify the full scope on the first visit.



Staining potential of fire residues

- This staining will usually have formed during the fire. In some cases, you will notice that it becomes **harder to remove as time passes**.
- Prompt action to remove the residue may make your job easier and the results more successful.

C

Section 3

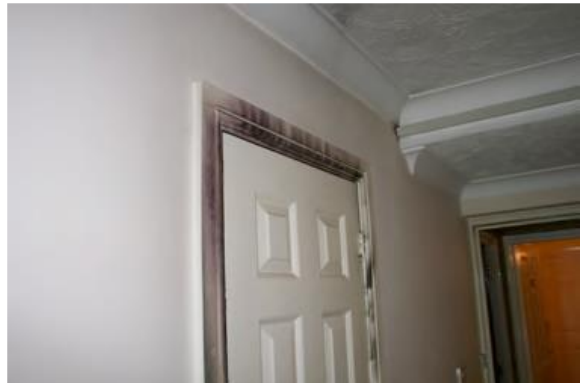
Predictable Behaviour of Smoke

Smoke Behaviour is affected by:

- Temperature of smoke.
- Temperature of surrounding areas.
- Existing patterns of air flow.
- General arrangement of the space and its contents.
- Ionisation of smoke particles

Typical contamination points in a building are:

- Doorways.
- Enclosed spaces.
- Exterior surfaces.
- Horizontal surfaces
- Areas where convection occurs.



High & Low Pressure Movement

- The laws of physics dictate that gases move from high to low pressure areas in an attempt to reach equilibrium.
- When **hot, high pressure smoke** enters a room the smoke can be sucked into the lower pressure, cooler environment of drawers or cupboards.
- This is why contamination within drawers and cupboards is often greater than customers expect to see.



The Importance of the Heat Gradient

- Hot gases rise and this applies to smoke as well.
- You may already have noticed that fire residues are heavier in the upper parts of rooms.
- You may often see a **line around the walls**, and above this line the contamination is heavy, below it can almost seem as if there is no contamination.
- You need to take this into account when you are making decisions. For example, when looking at books in a **tall bookcase**, make sure you look at each shelf individually as the lower the shelf the less contamination there will be.
- Taking this detailed approach will make sure that your restoration is more successful.



Soot Particles can be Ionised

- Smoke particles tend to be ionised but plastic polymers produce more strongly ionised particles than natural materials such as wood & paper.
- When plastic polymers and rubber, and sometimes fuel oil, burn, they can produce a large amount of charged particles. These charged particles, also known as ionised particles, will become attached to surfaces with the opposite charge. Surfaces with identical charge will repel them.
- This explains why nail heads, which were invisible before the incident, can attract a disproportionate amount of soot and the optical illusion this creates can make it appear that the nail heads are protruding. This is not the case, just that they are disproportionately contaminated because of electrostatic attraction. There is an electrostatic attraction of charged soot to the nail.

D

Section 3

Triage Assessment for Water Damage in Fire Situations

- You will normally find that you have **limited resources available** in the first hours dealing with an incident therefore your actions need to be **prioritised**.
- You can prioritise by carrying out a triage immediately following your risk assessment.
- Water damage following a fire is often overlooked. Three sources of water:
 1. Extinguishment water.
 2. Damage to Main Services.
 3. Water Vapour.
- By carrying out a triage assessment you will identify the items that need your urgent attention.
- Your triage assessment will identify three categories of items:
 1. **At Risk of Secondary Damage – these items require urgent attention.**
 2. **Beyond Economic Restoration (BER) – these are a lower priority as these items are already ruined.**
 3. **No Risk of Secondary Damage – these do not need urgent attention, and should be attended to after the urgent items have been dealt with.**



You will see that if you carry out a triage assessment you will more easily see what to do first, what is most urgent.

Applying the triage process to water damage

- One of the key benefits you deliver to your customers is that you are able to take prompt action to minimise secondary damage. To make sure you can deliver on this you need to prioritise the work you do in the first hours or days on site.
- In order to correctly identify items at risk you will need to use your moisture measuring equipment to enable you to decide the full extent of water penetration.

Some points to consider:

- **Water trapped behind panelling or boarding** – investigate any areas where you think water may have become trapped behind.
- Panelling or pipe boxing – these are the
- areas where mould could quickly grow.
- **Water trapped in floor insulation or void**
- consider how the floor is constructed – does it have insulation and could water be trapped there?
- Water trapped **behind or beneath impermeable surfaces** – such as vinyl
- wallpaper or tiling.



When there are **carpet grippers** it's possible for water to track around the edge of a room between carpet grippers and the wall. If this occurs it could lead to a section of saturated carpet on the far side of the room which could remain undiscovered if your survey, with moisture meters, was not thorough.

E

Section 3

Basic Triage Assessments in simple Fire Damage situations

First carry out and act on the risk assessment and deal with safety matters.

To make a triage assessment you need to **walk through the entire affected property** to make a visual categorisation of the fire type.

- Firstly - **The Items at Risk** - note anything that is at risk of secondary damage.
 - These items will require your urgent attention.
 - Examples will be **metallic fittings, electronic and electrical items, wet items, plastic finishes such as on appliances and UPVC windows.**
- Secondly - **The Items Not Restorable** - note the items that are beyond economic restoration.
 - These do not require urgent attention as they are already ruined.
- Thirdly – **The Items Restorable** - note items that you expect to be restorable and will not suffer from further damage.
- Finally, start to **take action** with items that would otherwise suffer from secondary damage.



- A person who is not familiar with fire damage may spend the first hours clearing total loss debris – usually this is not the best approach even though, to the customer, it could seem the better option.
- Spending time on this at the start of a job could deflect resources from mitigation of secondary damage elsewhere.
- However also consider that one difficulty with fire damage is that the debris can be rich in **hydrochloric acid**. If you measure high chloride levels on metal it could then make debris removal a higher priority action. This is because the hydrochloric acid is being released, potentially re-contaminating your work.



- The same principle can apply to odours. You may in some circumstances need to protect your initial work from these sources of re-contamination by odour off-gassing from debris.

Of course, you must make sure that any urgent action you take is **cost effective** – some items may be at risk of further damage but have a low replacement value.

Section 4

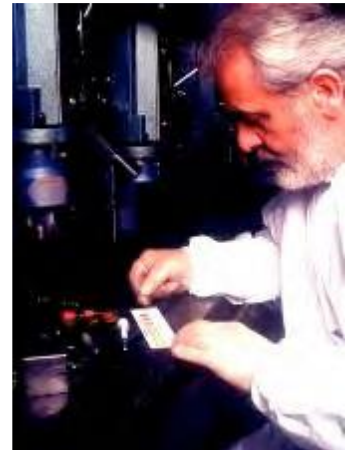
A

Section 4

Corrosive Nature of some Fire Residues

Only **some fire residues contain acids** and are corrosive, as these will cause rusting/oxidation damage to metals.

- Some materials produce huge amounts of acids when they burn.
- Some materials don't produce any acids when they burn.
- So please remember – not all fire residues contain acids – testing for chloride levels can help decide if there is a corrosion risk.



Damage Potential for Electronics

Some fire residues contain acid and electronics are particularly vulnerable to damage from the acidic residues.

The damage to electronics can be from:

- Corrosion.
- Residues that conduct electricity, causing short circuits.

If you know that valuable electronics are at risk you can prevent damage by:

- Reducing the relative humidity (RH) in the property to below 60% which will start to slow corrosion.
- You may find that tenting equipment at risk and introducing dry air will enable lower RH values to be maintained, as it can be hard to reduce the RH in the whole of a damaged building.
- Remember that below 30% RH there will be an increased risk of static electricity, causing damage to electronic components.
- Protecting circuits from moisture with a water dispersant coating – specialist knowledge required.
- Prompt decontamination – specialist knowledge required.

- Computers can contain data that might be worth more than the hardware and the owner may need a specialist data recovery service if they don't have adequate backup. If insurers are involved, check carefully to ensure the cost of data retrieval is covered.



Damage potential for UPVC and plastic laminates

- Both UPVC and plastic laminates can become stained by strong acid residues.
- If strong acid residues are suspected then make sure that all these items are cleaned promptly to remove the damaging residues.
- Don't wait until there is obvious staining as this can make restoration much harder or even impossible.
- This includes many plastic finish baths, shower panels and kitchen units. The staining and discolouration may become irreversible.
-

Corrosive actions on steel

- Industrial steel framed buildings are at risk of ongoing secondary damage when high levels of acidic residues are detected after a fire.
- Hydrochloric acid is persistently corrosive and will continue to erode metal for some time following the incident unless promptly neutralised.
- The metal used in cladding is only a few millimetres in thickness and may exhibit signs of pinhole corrosion some months after the event.
- Prompt actions to lower the relative humidity and detailed cleaning, with an appropriate neutraliser, are essential to prevent such deterioration.

B

Section 4

Remove Fire Residues

Fire residues can contaminate everything and we are asked if it can be removed along with the odours that are produced.

Damage Management technicians play an important part in reducing the environmental impact of fire damage events by successfully restoring contents, which reduces the amount that goes to landfill, or by re-cycling. As long as our customers have their items returned to pre-incident condition we are able to demonstrate a very cost-effective solution.

The key elements to successful fire damage restoration

- The most important starting point is to roughly classify the fire and the type of residue we have to deal with.
- Take careful note of how loose the residue is, and if the odour is strong and persistent.
- As you will already know some loose fire residues can look dark and may indeed be a heavy thick layer, but even in these cases they can be relatively easy to remove. Other residues are more difficult.
- Note whether the odour is persistent. Ask yourself, “Has it been a smouldering fire, starved of oxygen?” These fires typically produce wet greasy odours and a type of staining which is hard to remove.

The importance of the triage process for contents

All contents items should be carefully considered for restoration. To be able to make this assessment you need to have an idea of the replacement cost. In some cases, you will need to check with the owner or seek specialist advice. An example is with collectibles, where the market value can be much higher than expected.



- Your chances of restoring contents items will be greater if you make an initial triage assessment to identify any items that are at risk of secondary damage.
- Take prompt action with these items to prevent this damage and increase your success.
- During this inspection note the different levels of contamination and the effect this may have on the restorability of the items affected. For example, note that books on the upper shelves of a bookcase may be far more heavily contaminated than those on the lower shelves. They need to be assessed and dealt with separately.
- Remember that books can often be restored completely, CDs and DVDs may need opening up and the cases cleaned or replaced (the cases are inexpensive) and the discs washed.
- Remember that soft toys can usually be laundered, and that ultrasonic cleaning can make cost effective the cleaning of small items that would otherwise be uneconomic.
- Being skilled and able to remove fire residues from a wide variety of contents items is an essential part of our offering to our customers. Simply listing and dumping general contents is not in our long-term interest. It is our responsibility, if we are involved in fire damage restoration, to ensure that our service includes a wide range of competencies in removing fire residues.

C

Section 4

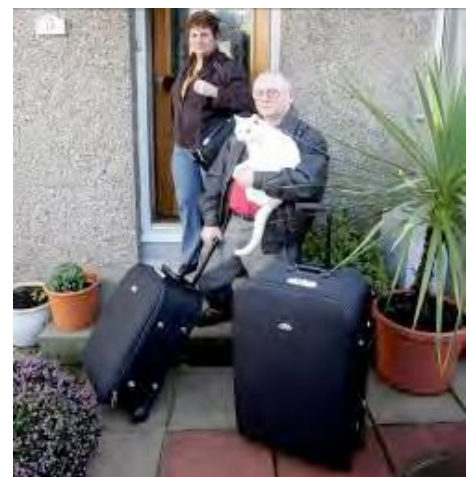
Business Interruption [BI] and Alternative Accommodation [AA]

When planning your work in the first few hours, it's also important for you to be aware of the insurer's potential responsibility for Business Interruption, Alternative Accommodation and other costs.

- Insurers are often responsible for alternative accommodation costs and business interruption costs.
- When you make a decision to carry out some damage limitation work to prevent an item being ruined, you need to also consider the implications of your actions on these other potential costs. For example, if you decide to dry a clean water affected carpet on site, but the only way you have of doing this would result in the business closing for a few days, you would need to look at the whole picture and ask, what would be the cost of business closure for this work.

Reducing Alternative Accommodation and Business Interruption expenses in a cost-effective way

- In a domestic property you may choose to prioritise action that will enable the property to continue to be used.
 - For example, you could take action to improve the **air quality by ventilation and air scrubbing**, and/or focus on making the kitchen, bedroom and bathroom available for use. This could take a higher priority than some damage limitation on low value items.



- Similarly, with a commercial property, you will also need to consider whether out of hours working, with its potentially higher cost, can be justified. Consider, as well, if you could help the business by taking action that will allow it to remain partially open.

Taking thoughtful and cooperative action to enable property owners to continue to use their buildings is an essential part of your work.

The value of test processing

The last thing you want to happen is to carry out a large amount of work and for this to be rejected by the owner. It is perfectly possible to remove fire residues successfully from a wide range of materials, and in many cases you will be able to predict the result in advance. However, if you have any doubts then test process a small sample and make sure the result is satisfactory before proceeding with the whole batch.



D

Section 4

Smoke Odour

Smoke odour elimination is not a precise science

- Everyone's **sense of smell is individual**, with wide variation between us. Whilst it is claimed women tend to have a more sensitive nose than men, both men's and women's sense of smell varies widely.
- Odours are partially linked to our memory and emotions, and in particular, the smell of fire can **trigger strong emotions**. This will especially be the case with a person who has experienced fear during a fire incident.
- Individuals vary in how they experience odour



Smoke odours cannot be measured

- There is **no instrument** that can measure the air specifically for the level of a smoke odour.
 - Smoke odours are made up of many complex chemicals. When you sense an odour, you are reacting to a gas, or a mixture of gases in the air, or tiny particles containing chemicals.
- You can measure the amount of a gas in the air but this says nothing about how much it smells. Some human noses can detect even minute amounts of some gases.
- Defining when you have successfully treated an odour is difficult, as odour perception will vary.
- If the property has been freshly ventilated this means that there will be less gas in the air for you to react to. This may change when it is again closed up.

Odours are a subjective experience

Many odours can be reduced or eliminated

- Remember – in the hours after a fire many odours are present as gases and these can **quickly disperse**.
- However, with some incidents, this **odour persists** and is not removed with ventilation alone.
- Techniques are available for reducing or eliminating the persistent smoke odours.
- While some odours are extremely persistent and may not be treatable in some materials.
- Typical problem odour fires are ones where combustion has been slowed by **oxygen starvation**. With these fires, the burning is less complete and more complicated chemicals are formed, some of which are highly odorous.
- **Protein fires** are also problematical and require special treatment because there is very little visible residue. These incidents produce a semi-transparent film of condensed protein and/or amino acids, which is one of the more challenging odour problems.

E

Section 4

Odour Reduction or Elimination

A persistent odour indicates an odour source or reservoir

- After the initial ventilation following a fire, any odour that is present will be a gas given off from some contaminated material. This is sometimes called 'off-gassing'.
 - If off-gassing is taking place then there must be a **source of contaminated material** from which the gas is being released.
- You will find it helpful in searching to eliminate odour to look for the source of the odour, and the material that is contaminated.
- Fogging is often part of an odour treatment programme



Four principles of smoke odour removal

- **Source removal** – these procedures involve the physical removal of fire residues and their odours. Examples of source removal include: demolition, vacuuming, washing, abrasive resurfacing, hot water extraction, scraping & removal of the affected contents. Odorous particles may be removed from ambient air by filtration, absorption & air exchange.
 - **Advantages** – removal of fire residues is permanent and minimises any environmental burden. The appearance of the surface is unchanged.
 - **Disadvantages** – residues are not always accessible, time constraints or cost factors may make source removal impractical.
- **Application of oxidisers** – oxidisers react with fire residues to eliminate their odours. Oxidisers may be applied in gaseous form (ozone) or in liquid mist, sprays or additives to cleaning solutions (hydrogen peroxide). They may be used to supplement source removal procedures.
 - **Advantages** – may provide swift, effective abatement of fire odours

- **Disadvantages** – not all fire residues respond to oxidation; oxidisers are bleaches and may be corrosive, or add new odours.
- **Use of counteractants** - a wide variety of products add scents, and other materials, formulated to modify fire odours of their perception. Odour counteractants are produced in solid, granular, gel & liquid form. They may be placed directly in odour areas, as well as sprayed, atomised or added to cleaning solutions.
 - **Advantages** – counteractants may resolve odour situations where source removal, or other processes are not feasible.
 - **Disadvantages** – may not be permanent. Their own scent may persist or leave residual odours.
- **Sealers or Encapsulants** – these are adhesives or coatings that block transmission of odour from fire residues. They are formulated from water extendable resins, latex or shellac, dissolved in water or in volatile solvents. They may be applied brush, roller or sprayer.
 - **Advantages** – sealers, or encapsulants, sometimes resolve odour problems that other procedures cannot handle, and also serve as a primer for paints.
 - **Disadvantages** – solvent odours may affect sensitive individuals and only temporarily mask smoke odours that later return. Sealers may change the appearance of unfinished framing & may prevent the application of other odour removal processes.
- **Musty odours indicate mould growth (past or present)**
- If you detect a musty odour you are reacting to off-gassing from mould, either alive or dead. A musty smell indicates the presence of mould.
- These musty odours are a natural product of mould or fungi.

Further Information

The passage of time and the effect on contents and structure

Within minutes

Acid soot residues cause plastics to yellow, small appliances located near the source of combustion discolour, highly porous materials [marble] discolour permanently.

Within hours

Acid residues stain grout in bathrooms; fibreglass bath fixtures yellow, metals tarnish, counter tops may yellow, finishes on kitchen appliances, particularly refrigerators, that extend into the heat line will yellow, furniture finishes may discolour.

Within days

In time, acid residues cause painted walls to discolour permanently; metal corrodes, p, and rusts; wood furniture requires refinishing; linoleum requires refinishing or replacement; clothing becomes soot stained; upholstery stains permanently.

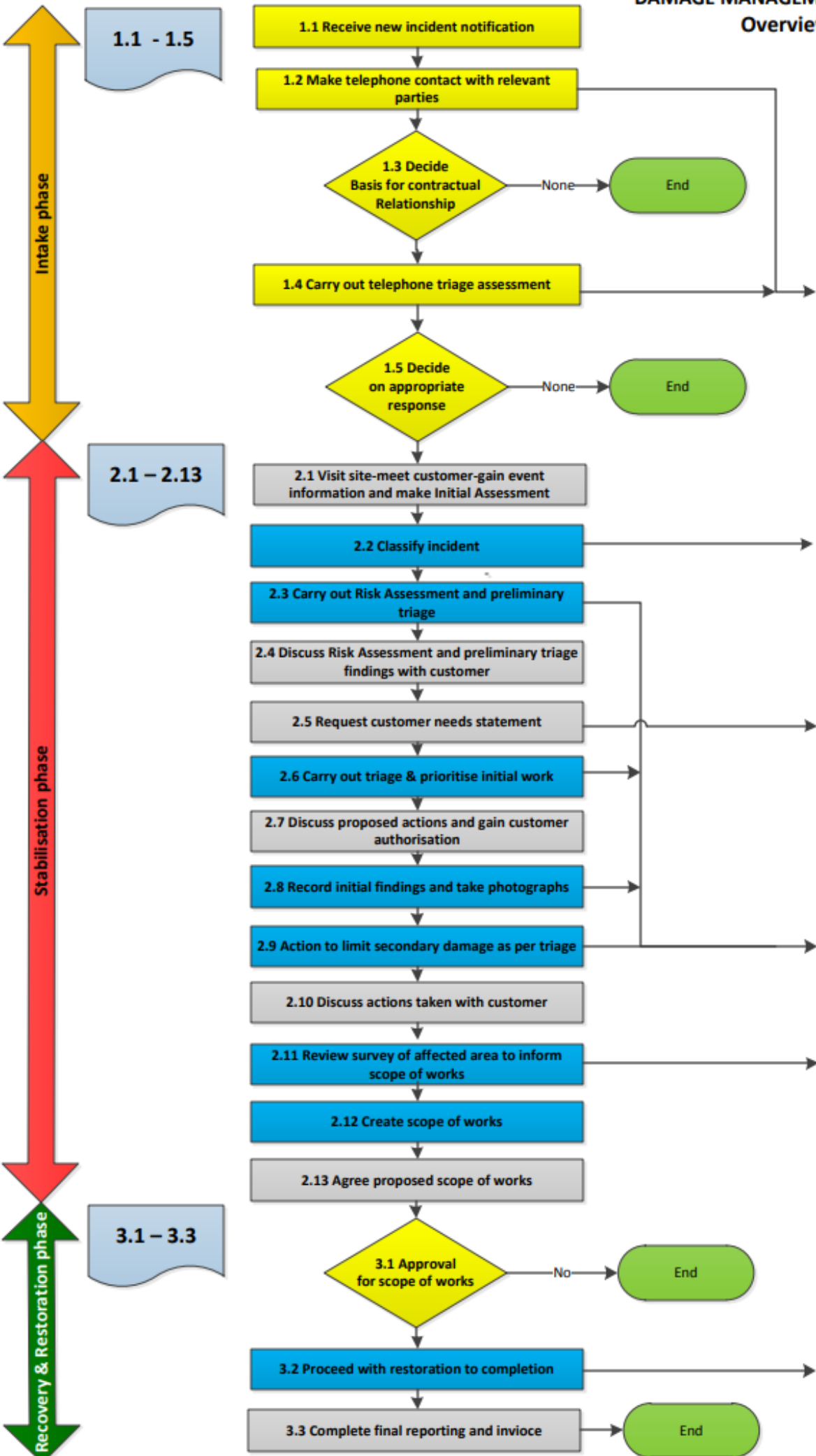
Within weeks

Durable carpet fibres may discolour permanently; silver plate is corroded permanently; glass, crystal, china may require replacement due to severe etching and pitting caused by prolonged exposure to acid soot residues.

Metal framed building components may be affected, and metal cladding and roofing sheets may suffer pin hole corrosion

Restoration costs escalate significantly!

DAMAGE MANAGEMENT INCIDENT Overview



Knowledge Review 2

1. A type of building you may commonly encounter has walls that consist of pairs of parallel walls with a cavity between them. What is the main function of the cavity?

- A. To provide greater strength to the structure
- B. To insulate the property
- C. To prevent transmission of external air borne moisture [rain sleet etc] to the interior wall surfaces.

2. Why does hot smoke force its way into the interiors of cupboards & appliances?

- A. Because there are always gaps & it just drifts in.
- B. It only goes in if there are large openings.
- C. The insides of these items are at normal room pressure. The hot smoke is at much higher pressure so it forces itself into these interiors.

3. Some fire residues are very acidic. What effect could this have on the contents of a property?

- A. Only metal items would be damaged, with possible corrosion.
- B. Some plastic items may become stained and corrosion may also occur to metal items.
- C. Most homes have very few things that would be harmed by acid residues.

4. Electrical wiring in residential properties has separate circuits. Which of the following is the most accurate description?

- A There is a separate circuit for each room running both lighting and power sockets.
- B. There is usually a separate single circuit for each floor supplying both power sockets and light fittings.
- C. There are separate lighting and power circuits.

5. Which of the following are examples of primary damage?

- A. Burnt roofing timbers.
- B. Corrosion from acidic residues.
- C. Mould growth following flooding.
- D. Heat damaged or wet electrical wiring.
- E. The yellowing of UPVC windows some days after a fire.

6. The primary benefit of carrying out a triage assessment is:

- A. That you will immediately identify the results of primary damage.
- B. That you can proceed in the most cost effective and ordered way to limit secondary damage.
- C. That you can identify all restorable items.

7. Which of the following lists identifies three different categories of fire which you are likely to commonly encounter?

- A. 1) Fast burning. 2) Oxygen rich. 3) Low odour.
- B. 1) Slow burning. 2) Oxygen starved. 3) High odour.
- C. 1) Protein fires. 2) Oxygen rich [fast burning]. 3) Oxygen starved [slow burning].

8. It is essential to be able to categorise fires because:

- A. It will demonstrate your knowledge of the subject to others.
- B. Knowing which category of fire you are facing will enable you to employ the most effective restoration procedures.
- C. You will need to use fewer chemicals during structural restoration.

9. Which of the following correctly describes the characteristics of an oxygen starved (slow burning) fire?

- A. Small simple particles, easily removed, few aerosols, low odour.
- B. Very obnoxious smell, few visible residues, severe odour retention problems.
- C. Incomplete combustion, large complex particles difficult to remove, strong evidence of aerosols, high odour.

10. Which of the following correctly describes the characteristics of a protein fire?

- A. Very simple particles, easily removed, few aerosols, low odour.
- B. Very obnoxious smell, few visible residues, severe odour retention problems.
- C. Incomplete combustion, large complex particles difficult to remove, strong evidence of aerosols, high odour.

11. Which of the following correctly describes the characteristics of an oxygen rich (fast burning) fire?

- A. Small simple particles, easily removed, few aerosols, low odour.
- B. Very obnoxious smell, few visible residues, severe odour retention problems.
- C. Incomplete combustion, large complex particles difficult to remove, strong evidence of aerosols, high odour.

12. Which of these statements is incorrect?

- A. The drier the residues the easier they are to clean.
- B. The wetter the residues the easier they are to clean.
- C. The most immediately detectable indication of a protein fire is an obnoxious smell.

13. A dehumidifier is incorporated in a HVAC system to;

- A. Help cool the air
- B. Remove excess water vapour
- C. Promote air movement.

14. The factors influencing smoke travel through a building are:

- A. Size, shape, age, colour, location of the building.
- B. The weather at the time of the fire, the wind speed, the building location, the height above sea level the materials that burnt.
- C. The temperature of the smoke, the temperature of the surrounding areas, the existing patterns of air flow, the arrangement of the space and its contents.
- D. None of the above.

15. If some electrical circuits are affected following an incident:

- A. The power company's fuse must be removed.
- B. The affected circuits can be isolated by a competent person switching off the appropriate circuit breaker at the distribution board, or removing the fused link, leaving the remaining circuits available for use.
- C. The meter will have to be read.

16. Which of the following is a correct statement?

- A. All parts of domestic plumbing systems contain fresh drinking water
- B. The system that provides hot water for washing and the building heating systems are combined and contain the same quality of water.
- C. Building heating system water remains in the pipes for months and usually contains anti corrosion chemicals.

17. Temporary power supplies:

- A. Usually consist of lots of separate trailing sockets.
- B. Are plugged into the nearest socket to the meter.
- C. Can be installed by anyone.
- D. Contain a safety circuit and sockets mounted on a single board and are wired directly into the meter.

18. What important calculation should be made prior to requesting a temporary supply?

- A. The size of the incoming mains cable
- B. The total power requirement of the equipment you propose to run from it
- C. The height at which the board should be from the floor
- D. The length of time the supply is needed for

19. Which of these precautions should you observe when using an extension lead?

- A. Make sure that only the amount of cable you need is unwound.
- B. Route the cable with care, taping down to avoid it becoming a trip hazard.
- C. Unwind the cable completely to prevent overheating.
- D. Ensure that equipment plugged into the lead does not exceed its stated capacity.

20. The three recommended methods of reducing the presence of lingering smoke contamination are:

- A. 1) Ventilation to the outside if safe to do so. 2) Air scrubbing. 3) Air washing.
- B. 1) Thorough washing of the structure and contents. 2) Forced air ventilation. 3) Wearing PPE.
- C. 1) Air brushing. 2) Low pressure water spray. 3) Fogging with peroxides.

21. The decontamination of loose dry soot is best accomplished by use of:

- A. A high volume air mover.
- B. A HEPA filter vacuum.
- C. An air scrubber.

22. Masking or sealing in odours is:

- A. Best practice.
- B. Not usually a permanent solution.
- C. Favoured because it offers a quick and cheap solution to odour problems.

23. Which of the following are true?

- A. Sometimes women have a keener sense of smell than men.
- B. Everyone's sense of smell is the same.
- C. Odours can be precisely measured.
- D. Because odours are impossible to measure and therefore impossible to define, it is sometimes very difficult to say decisively that they have been successfully treated.

24. Which of the following best describes correct damage limitation procedures following a fire?

- A. Thorough ventilation of the property opening all internal doors and windows, use of compressed air to blow contamination from hard to reach areas, cleaning all carpets at the end of the job, writing off all UPVC doors and windows, cleaning all polished wood with a strong alkaline solution.
- B. Fogging the property, removing all the contents, cleaning everything with an Acidic solution, writing off any affected carpets or upholstery, PA Testing all electrical items.
- C. Carry out Water Damage Limitation, Clean carpets and floor coverings, effect an improvement to environmental conditions by vacuuming loose particulates and air scrubbing, Control temperature and Humidity, Clean any items at risk of corrosion or staining, Cover carpets and upholstery to prevent recontamination.

25. Slow burning fires tend to be highly odorous because:

- A. Incomplete combustion leads to the formation of complex chemicals many of which are highly odorous.
- B. Slow burning fires produce complex aerosols and slow-moving smoke contamination easily absorbed into structure and contents.
- C. Both of the above.

26. Which of the following is correct? If you continue to smell an odour following the initial ventilation after a fire:

- A. You are probably imagining it.
- B. Contaminated material must be present acting as an odour reservoir and off-gassing is taking place.
- C. Some buildings always smell odd.

27. Which of the following best describes the three levels of electrical/electronic restoration?

- A. 1. Exterior wash with alkaline solution. 2. Remove casing and wash in alkaline solution. 3. Remove casing, wash all components in alkaline solution, P A Test and reassemble.
- B. 1. Exterior clean only. 2. Exterior clean and partial dismantling to permit interior examination and cleaning, reassembly and PA Test. 3. Exterior clean, dismantling for internal inspection and cleaning, removal and replacement of damaged components, PA Test and reassembly.
- C. 1. Vacuuming the exterior only. 2. Partial dismantling to permit vacuuming of the interior, reassemble and PA Test. 3 Fully dismantle, vacuum all components and return to manufacturers for replacement.

28. Invisible or inaccessible odour sources may be treated successfully by which of the following methods?

- A. Fogging with a suitable chemical via a thermal fogger.
- B. Releasing smoke pellets.
- C. Spraying with chlorine bleach.

29. When working on an historic or listed building following fire or flood incidents what should the contractor do?

- A. They should do whatever they normally do as long as the property owner says it's all right with them
- B. They should be prepared to seek advice before removing or disposing of any structural materials.
- C. They probably already know everything they need to know about what to do in these situations.

30. List the three phases of Damage Management recommended by the BDMA.

- A.
- B.
- C

31. List the three major concerns for all involved in Damage Management, from FNOL to the final conclusion of the Scope of Works.

- A.
- B.
- C.

Knowledge Review 2 Answers:

- | | | |
|--------|---------------|---|
| 1. C | 13. B | 25. C |
| 2. C | 14. C | 26. B |
| 3. B | 15. B | 27. B |
| 4. C | 16. C | 28. A |
| 5. A D | 17. D | 29. B |
| 6. B | 18. B | 30. [A INTAKE PHASE,
B STABILISATION
PHASE, C RESTORE
and RESTORATION
PHASE] |
| 7. C | 19. B C and D | |
| 8. B | 20. A | |
| 9. C | 21. B | 31. [A TOTAL
CLAIM COST, B TIME
or CLAIM LIFE CYCLE
C POSITIVE DEGREE
OF SATISFACTION.] |
| 10. B | 22. B | |
| 11. A | 23. A D | |
| 12. B | 24. C | |

Recommended Reading List

Lots of these resources can be accessed or downloaded for free online, are available to borrow in the national library catalogue (<https://www.gov.uk/search-library-catalogue>) or copies may be owned by your colleagues or employers.

Reading list

Customer Care Excellence. Sarah Cook: ISBN 0-749-45066-5
Principles of Health & Safety at work. Allan St John Holt, IOSH: ISBN-13: 978-1138855151
Dampness in Buildings. T.A. Oxley and E.G. Gobert: ISBN-13: 978-0750620598
Standard for the repair of buildings following flooding. CIRIA C623: ISBN 0-86017-623-1
Restorative Drying. Dri-eaz: ISBN 0-9776701-0-4
Flooding and Historic Buildings – Technical Advice Note, (English Heritage)
BS12999:2015

Periodicals / Magazines

The Standard (BDMA Quarterly Magazine)

Websites

Financial Conduct Authority (FCA): <https://www.fca.org.uk/> - FCA Handbook, Treating Customers Fairly (use search facility on FCA website)
Chartered Institute of Environmental Health – www.cieh.org
Chartered Insurance Institute – www.cii.co.uk
British Institute of Cleaning Science – www.bics.org.uk
Business Link – www.businesslink.org.uk