



FEMA

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MEMORANDUM FOR: Write Your Own (WYO) Principal Coordinators and the National Flood Insurance Program (NFIP) Direct Servicing Agent


FROM: James A. Sadler, CPCU, AIC
Director of Claims
Federal Insurance and Mitigation Agency

SUBJECT: Claims Guidance - Structural Drying and Other Related Items

The purpose of this bulletin is to provide claims guidance regarding coverage for structural drying under the Standard Flood Insurance Policy (SFIP). This paper assumes some knowledge on the part of the reader, but reference to the glossary and other addenda can be helpful.

The SFIP pays the cost to repair damage that is a direct physical loss by or from flood, as flood is defined in the SFIP, to the policyholder's insured property. To the extent that structural drying of the policyholder's insured building meets this test, the claim for building drying may be paid. The SFIP will not pay for claims to dry building components that are typically removed due to the poor quality of the flood water – removal of carpet and drywall appropriate to the flooding is a typical example.

Building materials are typically porous, and when in contact with flood water the more porous materials may not be salvageable. Building materials that are salvageable are less porous so less water is absorbed; however, because of this characteristic, the absorbed moisture does not pass through the material easily, making salvageable building materials generally difficult to dry. Water on the surface of material with low porosity quickly evaporates; however, because air movement cannot reach inside the material, a different approach to the removal of the absorbed water held inside material (bound water) is more effective than previous approaches. This method (drying bound water after removing unsalvageable building materials) emphasizes a specific type of dehumidification equipment, a changing approach to the utilization of air movement, and an increased role of temperature.

Evaporating water within salvageable building material can be best accomplished by increasing the vapor pressure differential, which is the force created between the moisture in the affected material compared to the amount of water vapor removed in the affected air. When the outdoor environment or the building's HVAC system is insufficient for drying, the most effective means to increase vapor pressure differential is with low grain refrigerant (LGR) or desiccant type dehumidifiers, which are capable of removing a significant amount of moisture from

the affected air. The drying process can be aided by elevating the temperature of affected material with the introduction of low controlled heat; this will promote the release of moisture bound inside the material so it can be drawn into the affected air and removed by dehumidification. While initially some high velocity air movement from centrifugal fans may be needed to help evaporate surface and free water when it is present, the emphasis for the greater volume of air movement from axial fans is most effective to complete the drying process (see: Figure 1).

Before mechanical drying is initiated, non-salvageable building and contents items should be removed, salvageable building material should be cleaned and treated against mold and mildew, and the affected components of the building's main electrical and HVAC systems should be restored and sanitized. Separation of the affected area from unaffected areas should be re-established if required prior to tear-out. Once accomplished, mechanical drying can commence. These costs may be included in flood insurance claims estimate by one of the following methods:

1. Square foot (SF) allowance – when rented equipment or professional services are not involved, a SF allowance to dry can be considered. Such allowance would represent the usage and costs of operating the HVAC system beyond the typical seasonal use and for fans, dehumidifiers or space heaters the insured may use. Reasonable adjustments should be applied if drying non-living spaces or areas of a building with no climate control.
2. When drying services are performed and the submission of an itemized invoice is not supported with a properly completed “drying log,” consideration for the duration, type, and number of equipment should follow these guidelines once a reasonable attempt to verify the quantity and type of equipment is made:

Duration – drying should be performed for 1, 2, or 3 days based on the degree of saturation at the onset of drying. Consider the following factors:

- The length of time flood water remained inside the building;
- The reasonable period unsalvageable materials remained installed; and
- The length of time after the removal of unsalvageable building items, building clean-up and sanitizing was performed, to the start of mechanical drying.

Dehumidifiers – capacity is based on the quantity of material saturated by bound water:

- In climate-controlled areas, the following formulas should be used with the respective dehumidifier type in order to determine the amount of dehumidification capacity necessary:
 - o Low Grain Refrigerant (LGR) unit: volume of the affected area in cubic feet ÷ 50 = the required AHAM pints.
 - o Desiccant unit: volume of the affected area in cubic feet ÷ 60 x 2 = required CFM.
 - o When both type of dehumidifiers are utilized in the same affected area, the combined capacity of all the units should not exceed the capacity determined of one formula.
 - o Standard or conventional refrigerant units should not be considered.

- For interior building areas with minimal saturated material or with limited climate control, e.g., an unfinished basement or cellar, dehumidification capacity should be reduced.
- For areas of a building exposed to soil or outdoor conditions, e.g., crawlspaces, attached garages, or attached utility and storage rooms, dehumidification should not be considered.
- Ducting (flex or plastic lay-flat) may be utilized with desiccant units.

Air movers (see Figure 2 and 3):

- The number of air movers on day one (one day duration) should be based on the following:
 - Elapsed time between the completion of building tear-out, cleaning and sanitizing, to the start of mechanical drying;
 - Presence of affected salvageable material:
 - Exposed perimeter wall sheathing – one air mover per 16 LF
 - Salvageable floors – at least one air mover per room or closet;
 - With interior wall removal:
 - The elimination of the one air mover per room or closet criteria
 - Requires a greater emphasis on the volume of air movement
 - Total size of the affected area;
- When drying surface, free and bound water:
 - Two-day duration – quantity equals 50% of the day 1 total number of air movers
 - Three-day duration – sum of air movers for day 2 and 3 equals number for day 1
- When drying bound water only – the number of air movers per day should remain the same
- In crawlspace areas the number of air movers should be less than in finished living spaces, but at least one air mover per enclosed area; but the total number of air movers should not be more than 50% of the total number of vented openings.
- Low amperage axial fans are more effective in moving a greater volume of air.
- Larger high amperage axial fan types are more effective in larger open areas.
- Centrifugal fans are best for velocity air movement across wet flat surfaces.

Plastic Containment barriers – if utilized over an existing interior wall or door opening, or over a porous or poorly sealed interior door, but not over an existing exterior door or window.

3. When drying services are performed and a properly completed “drying log” is submitted along with the itemized invoice, the insurer and their claim representative should take into consideration the number of drying equipment units validated by the drying log for the drying duration presented. The following charges can also be considered:
 - Supplemental heaters;
 - High-pressure axial fans with ducting when utilizing low controlled heat; and
 - Labor for initial assessment and setup, daily monitoring, and final takedown; all other labor allowances are considered included

What is a drying log? It is a record of daily temperature and relative humidity readings of both indoor and outdoor air, plus moisture readings and the recorded location of affected and unaffected building materials, as well as the drying goal and dry standard for the affected materials. The properly completed drying log, an industry standard, should also include a moisture map, the daily operating status of the building's HVAC system and all the instruments and equipment used by the technician.

Water Mitigation Review: In cases where the drying charges submitted with a drying log are beyond the parameters described under Method 2 presented above, the claim review process should include an independent review of the charges by a qualified third party; however, the reviewer's recommendation should never supersede the terms, conditions and limitations of the SFIP or other FEMA claim guidance.

Other related issues:

1. Water extraction – It is important that the estimated unit price for water extraction reflect what is actually required, such as when extracting water with a pump, hose and periodic monitoring, as in “pump-out”; this is a different task with a different cost compared to performing water extraction manually using a wet vacuum or specialized extraction equipment when salvaging structural building material. When flood water is extracted to aid the removal of carpet and padding, it is included in its removal unit price; when it is used during the course of cleanup, as in the removal of spent cleaning water, it is included in the cleanup unit price.
2. Other equipment – When generators, negative air movers, air filtering equipment, personal protection equipment, and any other equipment and associated labor are needed for the removal of damaged building material, cleaning, or the application of mildewcide (when it is directly caused by or from flood), they are considered included in the unit price for material removal, cleaning, or mildewcide application.
3. Sealers and preservatives – When a claim includes drying a salvageable item, the charge to apply a sealer or preservative on the same item is not allowed unless there is documentation that the sealer or preservative was applied before the loss.
4. Temporary power – When a building's electrical system is not operable the charge for a generator to power drying equipment is not allowed. Generators used to power large desiccant dehumidifiers may be considered when the capacity of dehumidification is validated and a properly completed drying log is provided. When the building's power supply is considered insufficient and a generator and auxiliary distribution equipment is needed to power drying equipment, a charge may be allowed under specific circumstances. In such cases the insurer should be contacted immediately to discuss the circumstances involved and third-party review should be considered early in these rare commercial claims.

5. Drying prior to building's HVAC restoration – Mechanical drying should not be performed prior to tear out, clean up, sanitizing treatment and the full restoration of the HVAC system. However, when mechanical drying is performed prior to the full restoration of the HVAC all charges for temporary climate control or any subsequent charges for cleaning, sanitizing, or drying are not covered and cannot be paid.
6. Extraneous equipment charges – The cost to clean, sanitize, or maintain equipment after usage is included in its unit price.
7. Overhead and profit – A contractor's allowance for overhead and profit is applicable only when a properly completed drying log is submitted, the contractor either hired or performed the services, and it is reasonable that the contractor's responsibility and oversight were necessary with the services.
8. Non-covered items – The SFIP does not cover the cost to dry building material (1) that has been claimed in a removal and replacement allowance, (2) not directly damaged by flood, (3) that is an exterior item in direct contact with the elements, (4) excluded items, such as those in a basement or below the lowest elevated floor of a Post-FIRM elevated building, or (5) when the cost of drying an item is more than the value of the item.

NOTE: This document is not an industry standard for drying technicians, nor is it a guide to structurally dry a building.

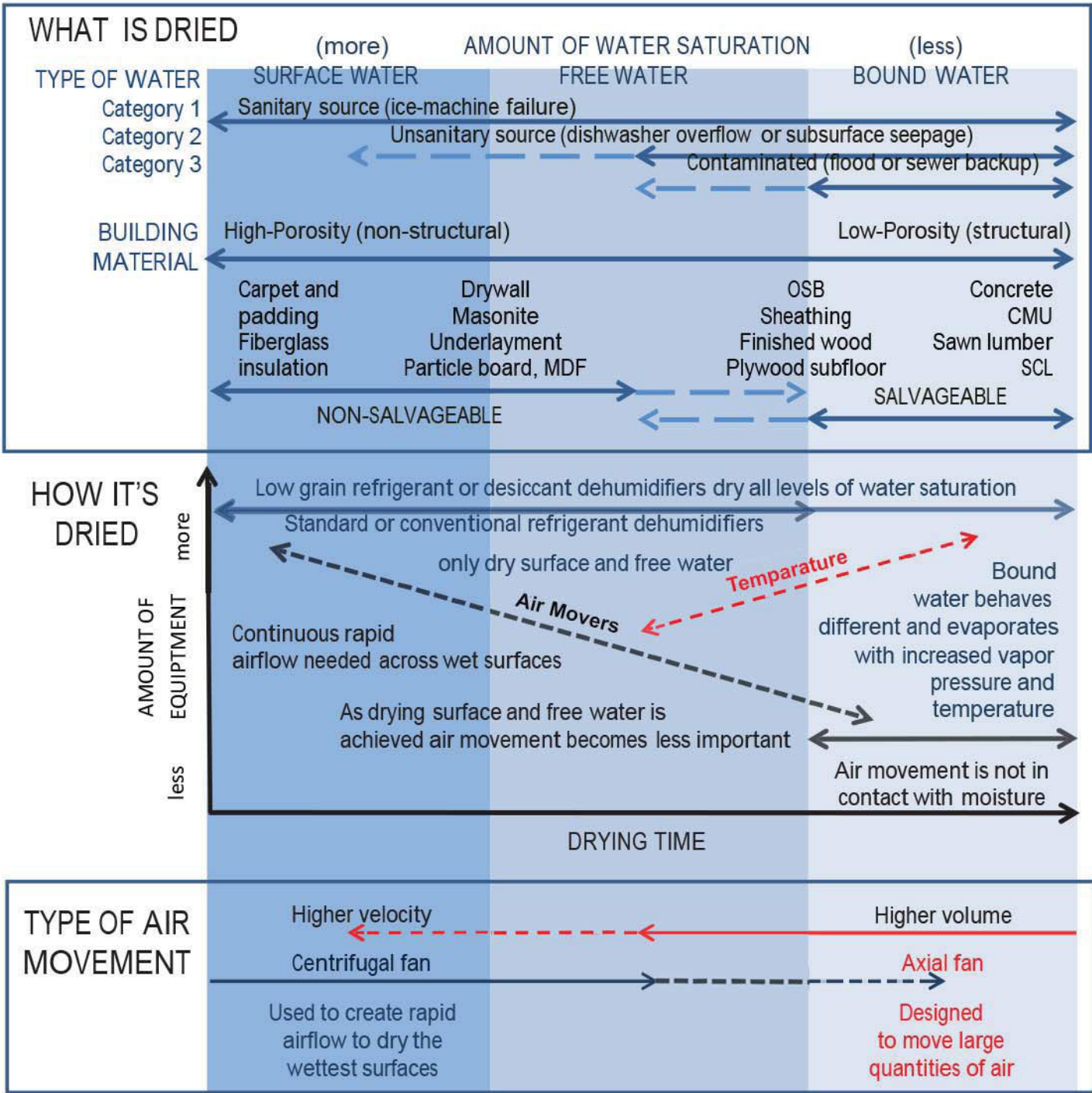
Any questions regarding this guidance should be forwarded through the designated point of contact within your organization then directed to Dan Thorne at Anthony.Thorne@fema.dhs.gov.

Once again we ask for your cooperation.

Suggested Routing: WYO Vendors, Claims, IBHS, Government Technical Representatives, Independent Adjusting Firms

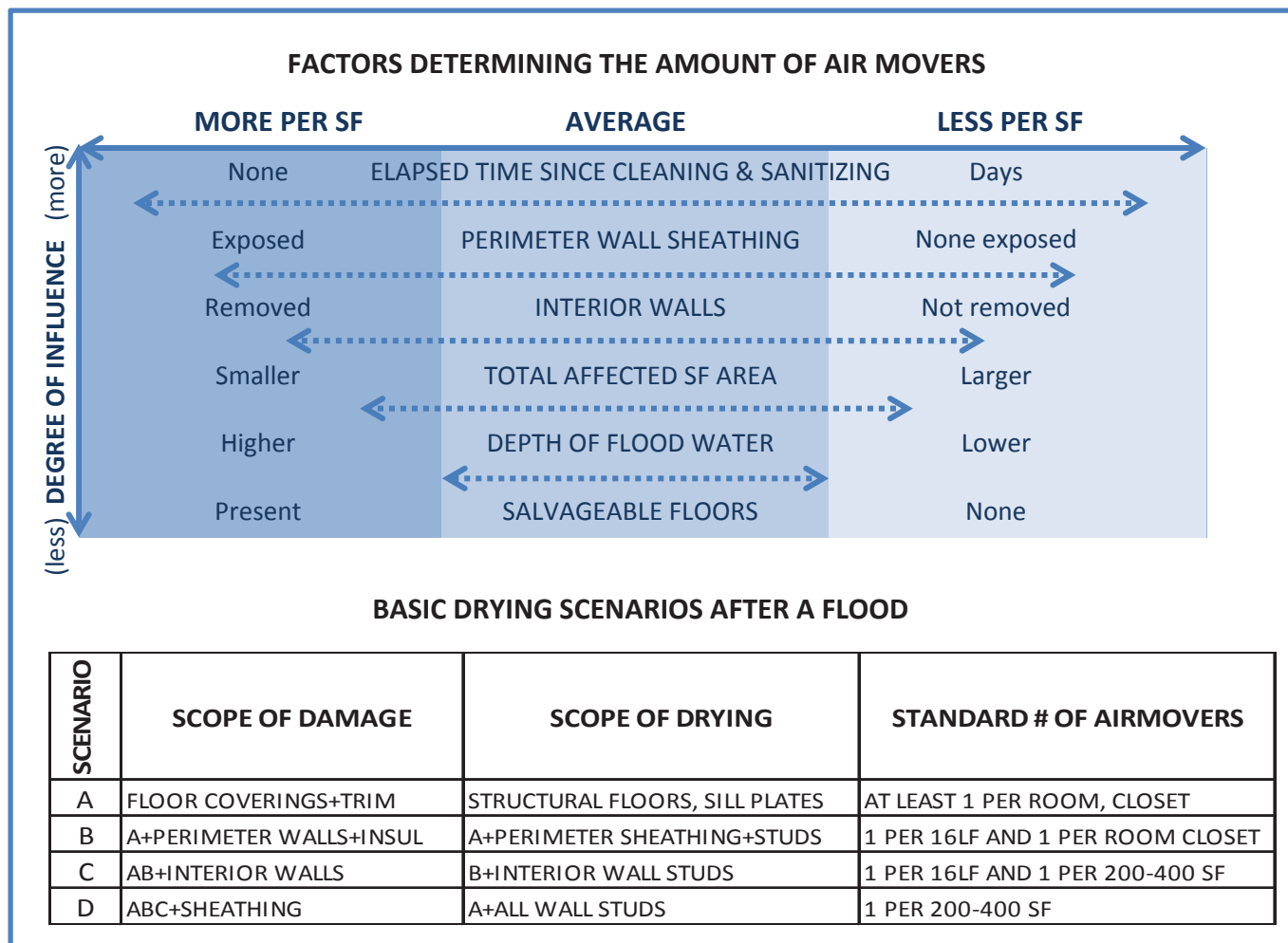
(FIGURE 1)

For coverage under the SFIP the scope to dry a flood damaged building is typically limited to drying “bound water,” water which is held inside salvageable structural material. Salvageable material does hold some “free water,” water that is absorbed below the surface into the open spaces of pores. But after the removal of unsalvageable building items, cleaning and treating against mold and mildew, and the removal of spent cleaning water, any residual water left on the surface or absorbed into pores will quickly evaporate.



In some losses flood-related subsurface seepage may be considered “category 2” by the restorer. In such instances drying non-structural building material may be possible.

(FIGURE 2)

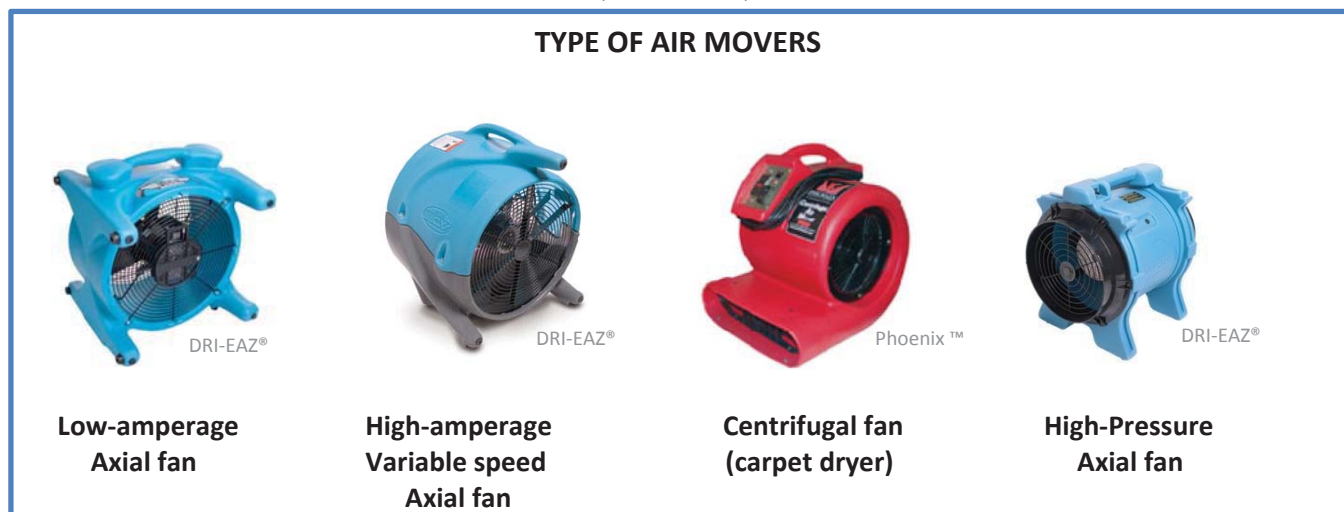


**GUIDE TO INITIAL (DAY 1) QUANTITY OF AIR MOVER
BASED ON DRYING SCENARIO AND SIZE OF TOTAL AFFECTED AREA (DWELLING)
(Assumes no elapsed time after building tear out, cleaning, and sanitizing)**

SCENARIO	PER SQUARE FOOT QUANTITY OF AIR MOVER BASED ON TOTAL AFFECTED AREA				
	600 SF / 100 LF	1200 SF / 140 LF	1800 SF / 175 LF	2400 SF / 200 LF	3000 SF / 225 LF
A	60 SF	75 SF	85 SF	92.5 SF	100 SF
B	60 SF	75 SF	85 SF	92.5 SF	100 SF
C	65 SF	90 SF	106 SF	124 SF	140 SF
D	200 SF	250 SF	300 SF	350 SF	400 SF

When mechanical drying begins a brief # of days after final cleaning and sanitizing, the “per square foot” amount should be adjusted accordingly (up to +50%). In cases when drying starts a considerable time after, the entire invoice should be referred for an independent review.

(FIGURE 3)



EXAMPLE DRYING PROJECT
(surface, free and bound water)

Duration	Day 1	Day 2	Day 3	Total	Average
Actual	12	7	5	24	8
Estimate	8	8	8	24	8
Wrong	12	12	12	36	12

EXAMPLE DRYING PROJECT
(bound water only)

Actual	5	5	5	15	5
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GLOSSARY OF USEFUL TERMS

Affected air – the space within in a room or building which is influenced by or can influence the moisture content level of material inside that room or building.

AHAM (Association of Home Appliance Manufacturers) – an industry association which publishes test results for water removal performance of dehumidifiers manufactured in the United States. Performance is tested in an environment at 80°F and 60% RH for 24 hours.

Bound water – water absorbed and chemically held within a material; in wood it is water absorbed into the wall structure of cells.

Category of Water – the degree of which water is contaminated - category 1 water is from a sanitary source, category 2 water is from a source containing a significant degree of contamination, category 3 water is water from a grossly contaminated source; category 1 or 2 water can deteriorate if left in building material for a period of time.

CFM (cubic feet per minute) – a unit of measurement for the volume of airflow which is used to determine the amount of air exchanged during a period time.

Condensation – the process which water vapor forms into a liquid on surfaces when moist air is in contact with cooler surfaces.

Conventional refrigerant dehumidifier – a drying equipment unit which employs air movement over a cold surface that forces the condensation of water vapor; the dried air is then heated and circulated into the affected air to collect more moisture. Conventional refrigerant units can remove water vapor from air down to 55 GPP.

Dehumidification – the process which removes moisture from air.

Desiccant dehumidifier – a drying equipment unit which employs air movement through a moisture absorbing medium which to pull moisture from air. Desiccant units can remove water vapor from air down to zero GPP.

Dew point (DP) – the temperature which air becomes saturated and water vapor condenses to a liquid.

Dry Goal – the target moisture level for affected materials which require drying.

Dry Standard – the moisture content level of unaffected materials or known dry materials in an affected building, which are used to establish a drying goal for affected material which require drying.

Drying chamber – an area enclosed or created for the purpose of promoting effective drying.

Equilibrium moisture content (EMC) – the condition of a material at which it is stabilized due to the existing moisture content of the affected air; the condition at which moisture in a material neither increases nor decreases.

Evaporation – the process which changes liquid water to a gas (water vapor).

Free water – absorbed water located within the open spaces of pores of a material.

Grains per pound (GPP) – a unit of measurement of the amount of water vapor in one pound of air (humidity ratio).

Institute of Inspection, Cleaning, and Restoration Certification (IICRC) - The IICRC is a certification and standard-setting non-profit organization for the inspection, cleaning and restoration industries, which publishes the “*S500 - Standard and Reference Guide for Professional Water Damage Restoration*” an ANSI approved procedural standard used by the water restorative industry.

Low grain refrigerant (LGR) dehumidifier – a drying equipment unit which employs air-movement over a cold surface and a pre-cooling device, which forces the condensation of water vapor to a greater degree of efficiency in drier air conditions, compared to a conventional or standard dehumidifier. LGR units can remove water vapor from air down to 34 GPP.

Moisture content (MC) – the percentage or weight of moisture in a material compared to the weight of that material when completely dry.

Moisture map – a floor plan sketched of the affected area with the locations of moisture readings of affected and unaffected building material, recorded at least daily over the course of a drying project.

Negative air pressure – condition created by removing the air from the affected area which to create infiltration, the process which draws in outside air into the affected area.

Permeability – the rate of which moisture passes through a material.

Porosity – the degree of which a material is porous or contains pores, openings or holes.

Preservative – a compound applied to the surface of salvageable material to suppress the growth of fungus, mold, and or mildew, or to prevent the infestation of wood-boring insects.

Psychrometric chart – a graph diagram showing the relationship between temperature, relative humidity, grains per pound, dew point and vapor pressure.

Relative Humidity (RH) – the percent of moisture in the air by volume at a specific temperature.

Secondary damage – the unwanted and irreversible change to an unaffected area of a building or to unaffected material, from the effects of excessive moisture, dehumidification, air movement, or heat

Standard of care – the practice recognized by industry which is most common to reasonable and prudent members of that trade that demonstrates being qualified and competent.

Standard refrigerant dehumidifier – see conventional refrigerant dehumidifier

Surface water – moisture found on the outermost layer of a material.

Vapor pressure – the force exerted by a gas (water vapor) onto its surrounding environment.

EXAMPLE CLAIM USING METHOD (2)

- Single floor on concrete slab; affected area is 50 x 40
- Flood water in the building for 24 hours, interior water 24 inches
- Professional drying started on the 5th day after building tear-out, cleaning and sanitizing against mold and mildew; there is no drying log
- Insurance estimate will include the removal and replacement of perimeter and interior wall coverings are removed to 4 foot level; all wall studs and exterior sheathing are exposed
- Assume drying scenario “C”

DURATION – Drying started within 5 days after tear-out, cleaning and sanitizing – allow 2 days for drying bound water

AIR MOVERS – For two day duration, day 2 – 50% of the # of airmovers for Day 1

Day 1	2000 ÷ 135 SF =	15	
Day 2		8	
<u>Day 3</u>		<u>0</u>	
Total		23	(average 12.5 per day or 1 per 174/sf)

DEHUMIDIFIER (LGR) - 2000 SF X 8 foot ceilings ÷ 50 factor = 320 pint per day (ppd) needed

Standard size	70 X 3 =	210 ppd for 2 days
Large size	130 X 1 =	<u>130 ppd</u> for 2 days
Total		340 ppd

EXAMPLE DEHUMIDIFIER SIZES AND CAPACITY RATING

LGR

STANDARD SIZE 70 PPD

LARGE SIZE 130 PPD

EXTRA-LARGE SIZE 170 PPD

DESSICANT

STANDARD SIZE 385 CUBIC FEET PER MINUTE (CFM) or (116 PPD)

LARGE SIZE 900 CFM (344 PPD)

STANDARD TRAILER MOUNTED 1800 CFM (1000 PPD)

LARGE TRAILER MOUNTED 4800 CFM (3032 PPD)

(See estimating software for a particular unit item's specification)

NOTE: When the amount of dehumidification equipment invoiced is within an arm's reach of the amount calculated by the suggested formula used by the claims representative, it is acceptable to honor the difference on the insurance claim. This difference can be due the availability of the equipment at hand; however, when the difference is significant (greater than 10%-15%), the excessive invoiced dehumidification capacity should not be considered.