WATER RESTORATION

Dehumidification

INTRODUCTION

Dehumidification is the process of removing moisture from the air. Once moisture has evaporated from the structure and contents, it must be removed from the air by exhausting to the outside or by use of dehumidifiers. Failure to properly dehumidify the air can result in substantial secondary damage and pose a health risk due to the likelihood of increased microbial growth.

Dehumidification may be accomplished by means of an open (AKA natural) system or using a closed (AKA mechanical) system. The open system uses outside air to replace humid air in the affected area. The closed system uses Low Grain Refrigerant (LGR) dehumidifiers or sometimes desiccant dehumidifiers. Combination systems are also used.

OPEN AIR OR NATURAL DEHUMIDIFICATION

This is simply the exchange of humid inside air with drier outside air. If used without additional drying equipment, this method has limited usefulness, especially if the outside conditions are warm and humid.

Open doors and windows to promote ventilation and air flow can dry a structure if the outside air is sufficiently dry. A restorer can increase the air flow through the use of specialized fans to move additional air. This can be accomplished with **Air Movers** and **Axial Fans.**

Open drying systems work great along with the *tes* (Thermal Energy System) accelerated drying system. When *tes* is operating, the very humid inside air is exhausted to the outside and replaced by make-up air. In this way it is possible to remove hundreds of gallons of water vapor per day.

CLOSED OR MECHANICAL DEHUMIDIFICATION

This is used when an open drying system is impractical and an accelerated drying system such as tes is not available. Air movers and/or axial fan are used to promote evaporation and mechanical dehumidifiers are used to remove the moisture from the air.

There are two broad classifications of dehumidifiers, refrigerants and desiccants.

Refrigerant Dehumidifiers – Refrigerants work on the basis of condensation. Water condenses from the moist air flowing across cool coils. Basic refrigerants are effective above 40% RH and 68ºF. Below this temperature the coils may ice over significantly slowing dehumidification. Icing can be prevented by the use dehumidifiers with a hot gas bypass system. However, these dehumidifiers are still inefficient below 68ºF.

Low Grain Refrigerant (LGR) dehumidifiers are able to continue removing water even when the humidity is below 40%. In the early stages of a restoration job, either type of dehumidifier will work well. In the later stages of the job when the humidity is lower LGRs continue drying when conventional refrigerants lose efficiency. Because they can get the air drier than conventional refrigerant dehumidifiers, LGRs are favored by restorers by a wide margin.

Refrigerant dehumidifiers work best between 70ºF and 90ºF. During the early stages of a job, they will remove more moisture in the upper end of that range. Later in the job when there is less humidity in the air they are best operated in the lower portion of that range. An exception to this rule is the Phoenix 200HT dehumidifier which can operate effectively up to 105ºF.

Desiccant Dehumidifiers – Desiccants work by absorbing water from the air passing through it. Silica gel is the medium that is most frequently used to absorb the moisture. Desiccants will remove a similar amount of moisture regardless of the temperature. They can also continue drying until humidity has been reduced to less than 10%.

The moisture that has been absorbed by the desiccant must be purged by heat. For this reason, desiccant dehumidifiers normally have two streams of air flowing through them. The process air is the damp air from the structure that is being dried and returned to the structure. Reaction air refers to the heated air that is used to dry the silica gel. This air is exhausted to the outside.

Desiccants range in size from compact units used to dry small but hard to dry areas to large mobile units transported by trucks.

Accessories Needed

Water Claw Extraction Tools
Type: *Extraction Tools*
Highlights: *Extract water and chemical from carpet, backing and pad.*

Carpet Wand
Type: *Wand*
Highlights: *For surface extraction of water from carpet fibers.*

Air Movers or Axial Fans
Type: *High Volume Air Movers*
Highlights: *Creates air movement to speed drying.*

SurveyMaster, Hygrometer and Moisture Meters
Description: *Moisture Detector Tools*
Purpose: *Aids in psychrometry to monitor moisture content, relative humidity and dew point.*

Moisture Probe
Description: *Moisture Detector*
Purpose: *Locate migration of water in carpet backing and pad.*

Psychrometric Calculator
Purpose: *Determine humidity quickly to dictate equipment needs.*

Equipment Needed

Olympus Portable
Description: *Portable Extractor*
Purpose: *Provides heat, pressure and vacuum in a portable unit.*

Phoenix 200 Max or 200 Ht or Driair LGR 2000 or Evolution Dehumidifier
Description: *LGR Dehumidifier*
Purpose: *Removes moisture from the air to speed up drying and prevent secondary damage.*

DriTec Pro150 or 150C Desiccant
Description: *Compact Dehumidifier*
Purpose: *Removes moisture by absorption. Can be used in conditions where refrigerants may not be practical.*

Hydro-X Xtreme Xtractor & Vacuum Pac
Description: *Extraction Tool*
Purpose: *Removes excess water from carpet, backing and pad, while still in place.*

Determining Dehumidifier Requirements
Determine the number of cubic Feet in the area to be dried. This chart shows the number of pints of dehumidifier capacity required per cubic foot. Capacity is according to AHAM rating. Divide by the number in the chart below to determine the minimum amount of dehumidification required. This may change based on conditions. Technicians should exercise discretion and common sense when deviating from the chart.

Type of Dehumidifier	Class 1	Class 2	Class 3	Class 4
Conventional Refrigerant	70 pts/CF	35 pts/CF	25 pts/CF	N/A
Low Grain Refrigerant	70 pts/CF	40 pts/CF	30 pts/CF	70 pts/CF
Desiccant	1 ACH	2 ACH	3 ACH	1 ACH

Pts/CF means pints per cubic foot of air space in the area to be dried. ACH stands for Air Changes per Hour based on process air flow through a desiccant dehumidifier.

EXAMPLE – 2000 sq. ft. with 8' ceilings equals 16,000 cubic feet. On a class 2 loss using LGR dehumidifier, divide 16,000 by 40 = 400 pints of dehumidification required. This could be provided by 3 Phoenix 200 dehumidifiers or 6 to 7 Evolution dehumidifiers.

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NOTE – Bridgepoint also provides Technical Guides on other aspects of water damage restoration. Topics include "Extraction", "Top Down Drying", "Structural Drying", "Accelerated Structural Drying", and handling category 1, 2 and 3 water losses.

HELPFUL HINTS – It is important to understand the science of psychrometry in order to perform dehumidification. You need to understand how to use a **Thermohygrometer** to read temperature and relative humidity (RH). Knowing this will dictate the procedure you will follow and the type and amount of equipment you will need.

Temperature has an inverse effect on relative humidity. As the temperature increases, more water can remain in the vapor state. This reduces RH and encouranges drying. In some cases it may be necessary to provide indirect heat to raise the temperature of the area you are trying to dry.

QuickGuide

PROCEDURE

CLOSED DRYING SYSTEM

1. Eliminate the incoming water source.
2. Remove excess moisture using water extraction principles.
3. Determine the type and amount of equipment needed for the job. Document and monitor the progress. Change the amount of equipment in accordance with the results of your monitoring.
4. Install type and amount of equipment needed for job (airmovers, dehumidifiers, etc.).
5. Repeat testing of moisture and RH until structure is dry.

PRODUCTS NEEDED

- **Water Claw Tools**
- **Carpet Wand**
- **Air Movers / Axial Fans**
- **Surveymaster / Hygrometer / Moisture Meter**
- **Moisture Probe**
- **Psychrometric Calculator**
- **Olympus Portable Extractor**
- **Hydro-X Xtreme Xtractor**
- **Xtreme Xtractor Vac Pak**
- **Truckmount**
- **Phoenix 200 MAx or 200HT Dehumidifier**

Other Resources

IICRC S500 Water Damage Restoration Standards
IICRC Water Damage Restoration Tech Class
Bridgepoint Website www.bridgepoint.com
Your local Bridgepoint or Interlink Supply distributor. Call 1-800-660-5803