

Preventing Mold by Keeping New Construction Dry

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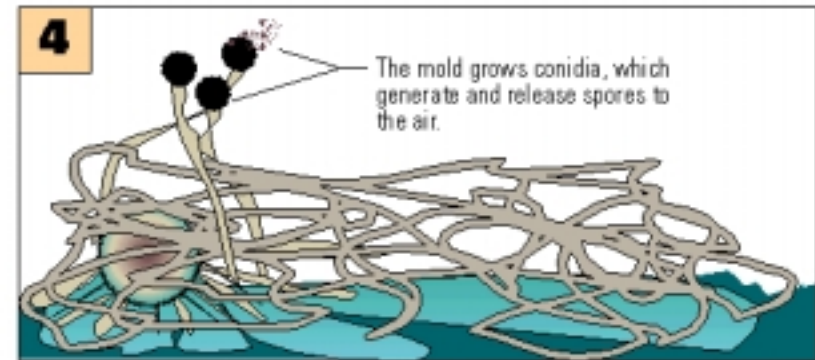
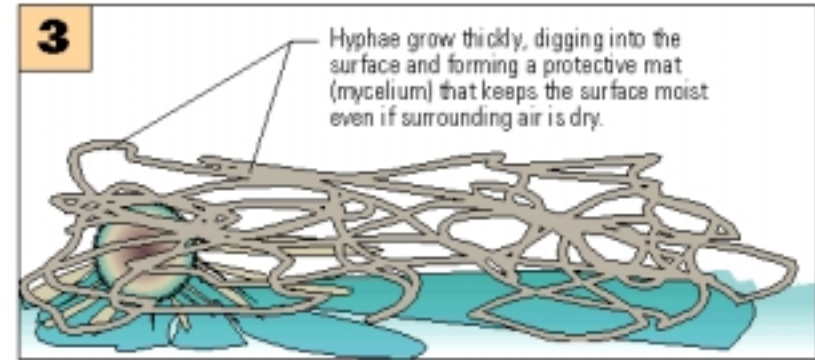
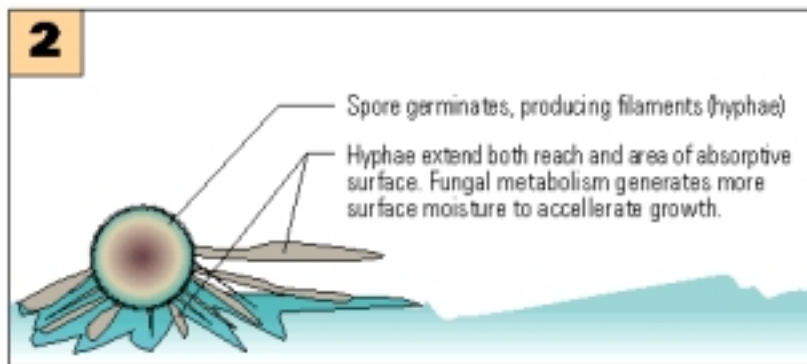
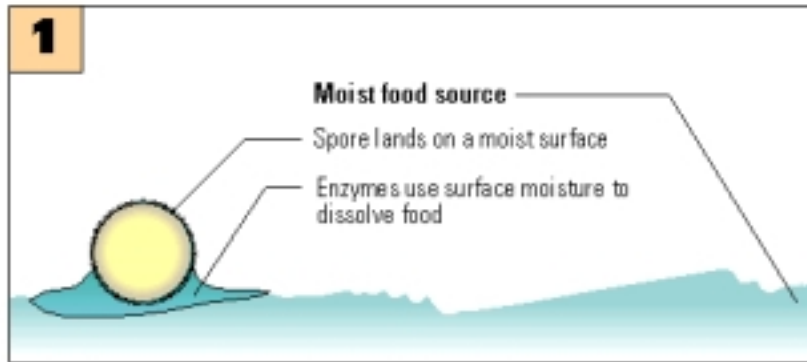
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- How mold grows, and how fast
- General drying procedures
- Material-specific considerations
- Removing mold



Mold Growth Cycle



How long before mold grows (in real-world situations)?

Horner et al, ASHRAE IAQ conference, Nov 2001

- After saturation, gypsum board and ceiling tile develop stages 3 and 4 growth within 48 to 72 hours

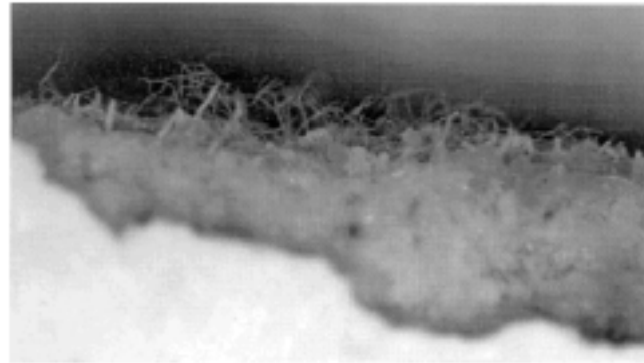


Figure 4 Mycelial development on edge of ceiling tile coupon (32% RH, 72 hours, approximately 15X).

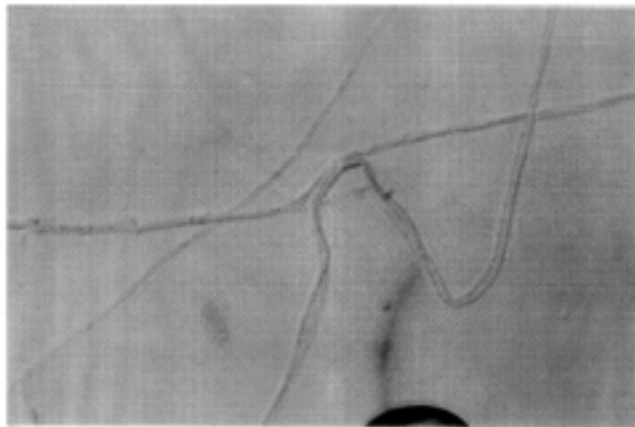


Figure 3 Branched mold hyphae on surface of gypsum wall board facing (32% RH, 48 hours, 1000X).

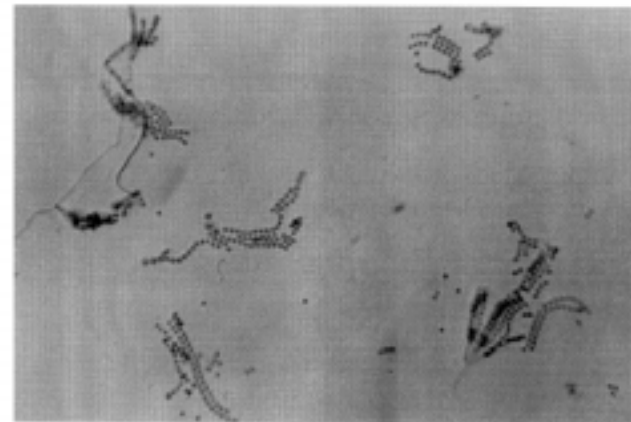


Figure 5 Penicillium conidiophores on gypsum wall board (52% RH, 72 hours, 400X).



Say a building or some material DID get wet now what?

- 1. Find moisture source and eliminate it
- 2. Enclose the wet area
- 3. Dry out the air inside the enclosure
- 4. Locate wet materials and measure their moisture content
- 5. Chase the moisture by constantly redirecting dry airflow
- 6. Validate dryness through moisture content measurements



1. Locate & stop sources of excess moisture

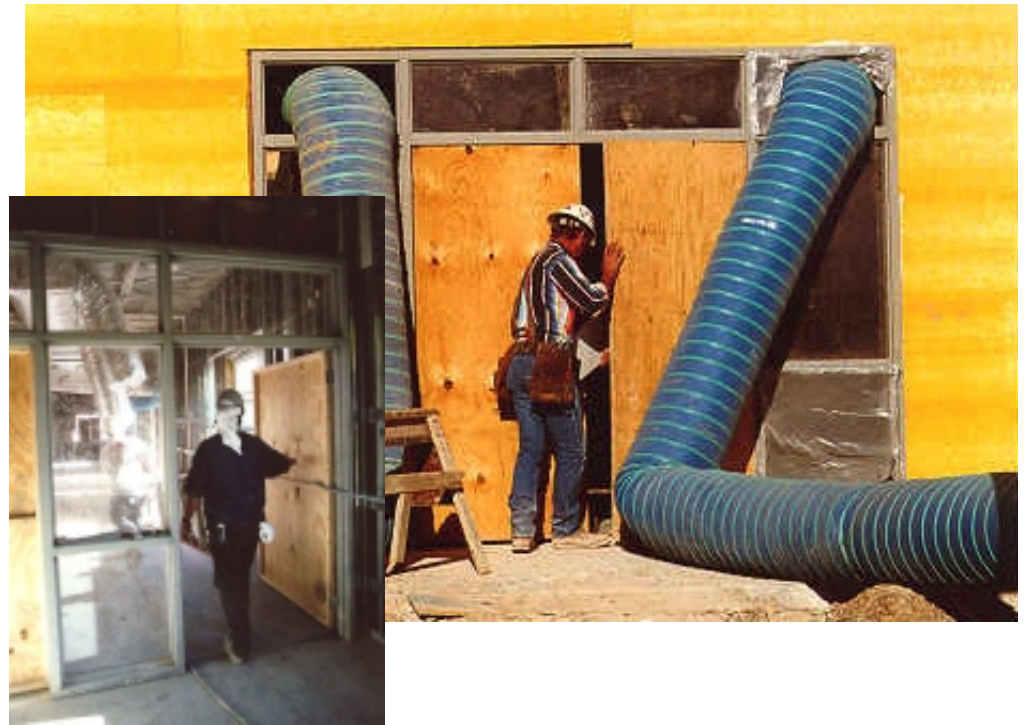
- **Liquid water (The most important and most common)**
 - Rain water or snow
 - Broken pipes or unconnected roof drains
 - Ground water
- **Humid air**
 - Springtime condensation on cold surfaces with a high thermal mass
 - Concrete floor slabs
 - Steel structure
 - Or... high humidity preventing normal drying of concrete, wallboard joints, etc.
- **Vapor diffusion out of saturated concrete or masonry**
 - Concrete slabs that remain wet after curing
 - Rain-soaked masonry or brick walls



2. Enclose the wet area



- Containment tarps
- Plywood doors (with springs!)



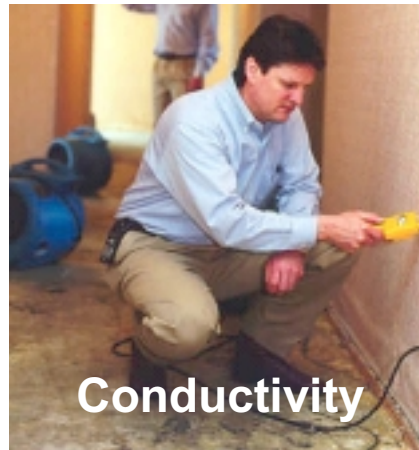
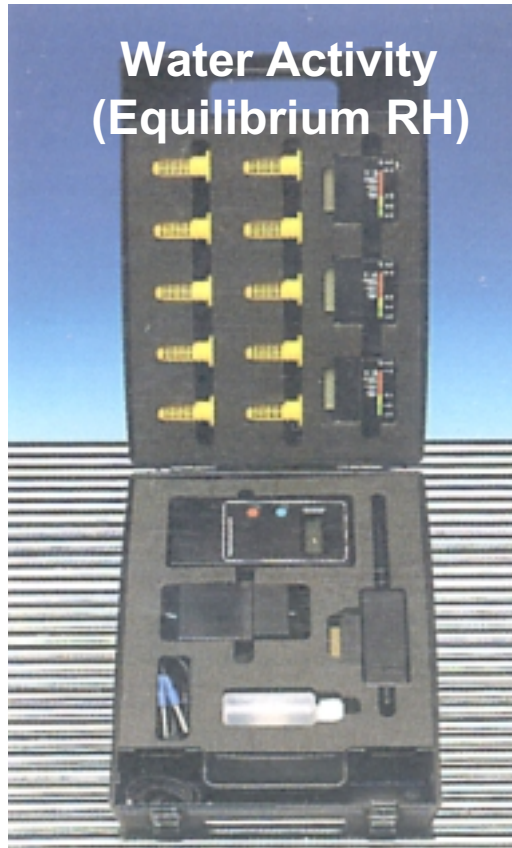
3. Dry out the air inside the enclosure



- **Portable desiccant dehumidifiers**
- **Layflat temporary duct work**



4. Locate wet materials and measure moisture content



5. Chase the moisture



1.

Constantly move the dry air to where it s most-needed



2.

Keep the air velocity high at the wet surfaces by re-positioning the air movers constantly



3.

Inject dry air into wet cavities



6. Validate dryness through measurement



Drying concrete to allow flooring installation



- **Target moisture content**
 - Typically use calcium chloride emission test
 - Target emission rate: less than 4 lbs/1000 ft²/24 hrs
- **Usual starting moisture –8-9 lbs**
- **Drying time: 3 to 6 weeks**



Conditioning wood flooring material before & during installation



- Target moisture = EMC of 50%rh
- Starting moisture = EMC 60 to 80%rh
- Drying time: less than 24 hours

Flooring systems allow movement, but specs require installation in the middle of annual rh range it avoids the problem above!



Gypsum wallboard joints

Drying Time For Taped Drywall Seams (hrs)							
		Air Temperature (°F)					
		40	50	60	70	80	90
Relative Humidity (% RH)	90	216	144	102	72	49	36
	80	114	78	54	38	27	19
	70	84	54	38	26	19	14
	60	60	42	29	20	14	10
	50	48	36	24	17	12	9
	40	43	29	20	14	10	7
	30	38	26	18	12	9	6
	20	34	24	16	11	8	6



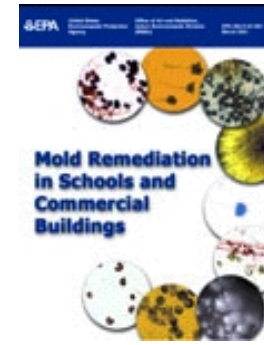
Construction drying costs and contractors

- **\$0.25 to \$1.00 ft²**
- **Finding and selecting contractors**
 - High-end water damage contractors have the tools - but not all are equal
 - Ask to see typical report - (make sure they actually measure moisture, not just rent equipment)
- **The good contractors:**
 - Visit the jobsite and provide not-to-exceed estimate, including equipment list
 - Measure and record target moisture for wet material
 - Provide air distribution and air movers in addition to dryers, and re-adjust positions based on moisture measurements
 - Provide drying report upon completion, including starting and ending moisture content values



Guidelines for getting rid of mold when it occurs

- **US EPA guidelines (Excellent, free download as PDF)**
 - www.epa.gov/iaq/molds/index.html
- **Under 10 ft²**
 - N-95 respirator, gloves and goggles
 - No containment required
- **10 to 100 ft²**
 - Limited or full protective equipment
 - Limited containment
- **Over 100 ft²**
 - Full personal protective equipment
 - Full negative air pressure containment



Summary

- **Construction drying saves money, keeps projects on-schedule and reduces potential for mold.**
- **The key to preventing mold is to keep things dry, and then dry materials that become wet.. and MEASURE the moisture content to be sure they are dry.**
- **Finding drying contractors is easy... but make sure you choose the one who MEASURES moisture rather than guessing.**

