RESTORATION INTEL • FIELD TECHNICAL AID

Structural Drying Systems: Drying-Zone Target Card & Critical Psychrometric Rules

Current version — Oct 31, 2026
Update history: restorationintel.com/structural-drying-systems-psychrometrics-lgr-desiccant-guide/

CORE PROFESSIONAL DRYING MANDATE

In an active professional dryout, hold the drying zone **below 50% RH**, use **GPP as the primary progress metric**, and drive all affected materials to **within 2% to 4% of dry-standard reference readings**. Outdoor air is a tool only when outdoor GPP is favorable (<40 GPP). Equipment placement by formula without psychrometric monitoring is equipment rental, not structural drying.

1. MASTER PSYCHROMETRIC TARGET & DECISION MATRIX

METRIC	TARGET & OPERATING RANGE	ACTION IF MISSED / FAILURE MODE
Drying-Zone RH	**Below 50% RH** in the active drying chamber. **>60% RH**: Mold amplification risk rises on wet porous surfaces. **>70% RH**: Evaporation from materials slows significantly even with airflow.	Add dehumidification capacity or reduce open-air infiltration load immediately. Do not wait it out — mold clock runs continuously.
Drying-Zone Temp	**70°F to 90°F** (IICRC S500 standard working range for refrigerant-based equipment). Warmer air holds more moisture, maintaining vapor pressure differential.	**<45°F**: LGR coils ice over / stall out. Switch toward desiccant. **>90°F**: Risk of equipment thermal trip; stress on interior finishes.
GPP (Grains / Lb)	**Primary progress metric.** Must fall day-over-day. Measures actual moisture mass removed (7,000 grains = 1 lb water). Independent of temperature.	**RH Trick Alert:** Heating a wet room lowers RH without removing water. If GPP is flat or rising, moisture mass has NOT left the space.
Dehumidifier Delta	**15 to 30+ GPP** healthy working delta (Inlet GPP minus Outlet GPP). Confirms unit is actively condensing/adsorbing water vapor.	**<5 GPP Fail Rule:** Unit is not removing meaningful moisture. Triage: undersized unit, fouled coils/filters, or chamber at unit floor.
Equipment Floor	**LGR:** Effective down to 20–25 GPP (45°F–100°F). **Desiccant:** Effective below 10 GPP; works down to 0°F (Class 4 / dense substrates).	Conventional refrigerant stalls at ~50–60 GPP. Leaving an LGR in a Class 4 hardwood or sub-45°F crawlspace fight stalls claim progress.
Material Goal	All designated monitoring points driven to **within 2% to 4%** of dry-standard reference (measured on unaffected matching material).	**Never pull equipment on "feels dry".** Surface may feel dry while core retains water, causing secondary decay and rejected claims.

2. OUTDOOR-AIR VENTILATION DECISION TABLE (IICRC S500 APPENDIX B)

WEATHER CLASS	OUTDOOR CONDITIONS	DRYING CHAMBER IMPACT	MANDATORY FIELD ACTION
FAVORABLE	**Below 40 GPP** (Dew point <43°F)	Outdoor air is drier than indoor air; assists moisture egress.	**Open / Ventilate:** Introduction of outside air accelerates drying.
NEUTRAL	**40 to 60 GPP** (Dew point 43°F to 53°F)	Minimal moisture removal impact; risks variable chamber load.	**Rely on Dehumidifiers:** Close windows; run closed-loop mechanical drying.
UNFAVORABLE	**Above 60 GPP** (Dew point >53°F)	Outdoor air is moisture-laden; opening introduces water vapor.	**STRICTLY CLOSE & SEAL:** Lock building envelope. Opening windows adds load!

WARNING — OUTDOOR AIR TRAP: Introducing outside air during unfavorable weather (>60 GPP) directly compromises the drying envelope. Every cubic foot of air entering the chamber adds moisture grains that your dehumidifiers must extract before structural materials can release bound water.

3. VAPOR-PRESSURE DIFFERENTIAL & PRESSURIZATION MECHANICS

THE PHYSICAL ENGINE OF DRYING

Moisture moves from **high vapor pressure to low vapor pressure**. Wet building assemblies represent the high vapor pressure side; conditioned chamber air represents the low vapor pressure side. Air movers thin the boundary layer above wet materials. Dehumidifiers continuously extract moisture from room air so the vapor pressure gradient does not collapse.

SYSTEM ELEMENT	PHYSICAL FUNCTION	FIELD PROTOCOL & ERROR PREVENTION
High-Pressure Source	Wet building materials (drywall, framing, subfloor, slab).	Measure core moisture content with calibrated pin meters; establish unaffected baseline reference.
Boundary Layer Thinning	Air movers direct high-velocity airflow across wet surfaces.	Place fans at **5° to 45° angle** to the wall in a continuous **rotational vortex**. Opposing fans cancel airflow.
Low-Pressure Sink	Dehumidifier dry air output continuously depresses ambient GPP.	Maintain inlet-to-outlet delta **>15 GPP**. Size to chamber volume and class divisor using AHAM ratings.
Pressurization Short-Circuit	Uncontrolled positive pressure pushes moist air into cavities or adjacent floors.	**Fix:** Install poly containment barriers, balance airflow paths, and map daily psychrometrics. Never point fans at random.

4. DAILY MONITORING PROTOCOL & ADJUSTER-DEFENSIBLE CHECKPOINTS

TIMELINE	EXPECTED PSYCHROMETRIC MILESTONE	REQUIRED FIELD ADJUSTMENTS
Day 1 to Day 2	GPP should decline measurably. Material MC may remain elevated while free surface water evaporates into the air column.	Verify all dehumidifier deltas (>15 GPP). If GPP is flat or rising, check building envelope seal and outdoor GPP immediately.
Day 2 to Day 3	Material moisture content must begin downward trajectory. Chamber GPP continues dropping toward low-humidity range.	**If MC is flat:** Undersized system, unresolved source, or boundary layer stagnation. Add air movers or dehumidification capacity.
Day 3 to Day 5	Standard Class 1 and Class 2 losses approach drying goal. Class 3 losses typically reach goal on Day 5–7.	Track all monitoring points against dry standard. Remove individual air movers only from verified dry zones to concentrate on wet pockets.
Class 4 / Dense	Hardwood floors, crawlspaces, plaster, and concrete slabs may require 10 to 14 days of specialized sub-20 GPP drying.	LGRs stall at 20–25 GPP. Deploy desiccants and Injectidry floor mat systems. Verify concrete slabs with ASTM F2170 in-situ probes.

5. FIELD EQUIPMENT TRIAGE & RELEASE RULES

- **When to Add Equipment:** (1) Flat material moisture readings on Day 2 or 3 following proper extraction; (2) Chamber GPP not declining 24 hours post-deployment; (3) Dehumidifier delta <5 GPP under warm, humid ambient conditions.
- **When to Remove Equipment:** 100% of designated monitoring points test within 2% to 4% of dry-standard reference material. Final readings recorded in writing. *Never release based on visual appearance or surface touch.*
- **Wall Cavity Triage Threshold:** Framing >19% MC or drywall >1% above ambient that fails to decline after 24 hours of surface airflow requires cavity injection tubes or 12"–24" flood cuts. Category 2/3 water always mandates flood cuts.
- **Concrete Flooring Reinstallation:** Do not reinstall flooring until ASTM F2170 in-situ probes read 75%–80% RH at 40% slab depth.