



Drywall Cracking and Crowning (DCC) Problems in Arid Environments

Cracks in drywall can occur for a variety of reasons including ground settlement, building movement, out-of-level bearing conditions, deflection of supporting members and partition separation (refer to the TTB Partition Separation for more information on this). One particular type of drywall cracking and crowning (DCC) occurs when gypsum board is forced together and pulled apart during alternating periods of humid and dry conditions.¹ Seasonal extremes in humidity occur primarily in the arid states of Arizona, Nevada, Colorado, Texas and California. These areas have reported higher incidences of DCC in finished structures. Similar cases of DCC have also been reported in the arid regions of Australia and New Zealand.

Based on research WTCA has performed, we have observed:

- Lumber and drywall expand and contract with changes in humidity. However, calculations show lumber shrinkage/expansion caused by seasonal changes in humidity is tiny and insufficient to cause DCC in standard construction. For example, in Las Vegas the equilibrium moisture content (EMC) of wood varies from 8.5% in January to 4.0% in June.² Under these conditions, the amount of shrinkage between two wood fasteners spaced 12 inches apart would be 0.00325 inches, the thickness of a piece of paper.³



Drywall crowning at the ceiling



Drywall cracking at the ceiling

- Lumber moisture content in finished structures is roughly 8% in arid parts of the country compared to 12% in the rest of the country.
- A good construction practice is to allow framing to reach an EMC of 19% or less before finishing the interior. Use a moisture meter to measure EMC if necessary.
- DCC rarely exists in commercial projects that have a design professional involved, regardless of the structural framing – wood, steel or concrete.
- The occurrence of DCC is unpredictable in nature, but the following recommendations will help avoid it.

How to Avoid Drywall Cracking and Crowning (DCC)

The Gypsum Association (www.gypsum.org) and the Drywall Finishing Council (www.dwfc.org) provide these recommendations on drywall installation:

- Gypsum board must be thoroughly dry and at ambient temperature before application. ⁴
- The relative humidity within the structure must be controlled before, during and after gypsum board application. ⁴
- Provide extra ventilation for any activities that create high humidity after the gypsum board application, such as pouring concrete basement floors. ⁴
- In cold weather, inside temperature shall be maintained between 50°F and 70°F. When portable heaters are used, the extra humidity they produce must be properly ventilated. ⁴
- Concrete surfaces that form part of any interior space (e.g., slabs-on-grade, basement slabs, basement walls, gypcrete applications) must be aged at least 60 days prior to the application of drywall joint compounds, drywall textures, paints or coatings. ⁵
- Drywall attachment must always proceed from the center of the panel to the ends and edges. Drywall must not be attached at the corners first and then left to hang prior to the field being attached. ⁴
- A control joint or intermediate blocking must be installed where framing members change direction. ⁴

- Control joints in interior ceilings without perimeter relief must be installed so that linear dimensions do not exceed 30 ft. and total area between control joints does not exceed 900 sq.ft. ⁴
- Preventative measures are little more than common sense practices. Special attention to the use and placement of control joints and maintaining recommended environmental conditions before, during, and after application are all important factors in minimizing the effects of extreme weather conditions. ⁶
- Failure to observe these requirements, particularly in areas outside the gypsum industry recommendations regarding temperature, humidity and gypsum moisture content conditions, will virtually guarantee finish performance problems. ⁴

For more information, refer to:

¹ *Repair of Gypsum Board Joint Ridging GA-221-00, Gypsum Association*

² *Wood Handbook, 1999. U.S.D.A Forest Service, Forest Products Laboratory*

³ *Western Lumber Product Use Manual, Western Wood Products Association*

⁴ *Application and Finishing of Gypsum Board GA-216-00, Gypsum Association*

⁵ *Interior Drywall Specifications, Drywall Finishing Council*

⁶ *Joint Treatment under Extreme Weather Conditions GA-236-00, Gypsum Association*

⁷ *Recommended Levels of Gypsum Board Finish GA-214-96, Gypsum Association*

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