The Elements of Drywall Nailing

Nail-popping is the Main Cause of Your Callbacks—And It Can be Minimized by Good Nailing Practices

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There are several methods for attaching gypsum board products to wood framing. However, the fact remains that nailing is the most simple, economical, and widely used attachment method, and will continue to be for several years to come for the average wall and ceiling contractor.

Nailing gypsum wallboard has only one basic problem; but its magnitude is such that recognition of the problem and the desire to eliminate it cannot be overemphasized. “Nail-popping,” the protrusion of a nail beyond the face of the wallboard, resulting from the nail either not being properly driven or the wood framing not being sufficiently dry at the time the wallboard is installed, is the No. 1 cause of callbacks. Elimination of these callbacks is your No. 1 objective.

The Nail Itself . . .

Extension of a nail head only 5/1000 of an inch beyond the surface of the wall board will result in a visible and objectionable nail-pop. This is only 1/100 the thickness of a 1/2 in. gypsum wallboard, which will give you an idea of the degree of movement it is necessary to eliminate. As mentioned previously, there are two major causes of this defect. Only 50% of nailing defects result directly from lumber shrinkage. The factors that not only cause the other 50% of defects, but, in many cases, aggravate those pops caused by lumber shrinkage, deal with board application. Ten pitfalls must be avoided in gypsum wallboard application to avoid costly call-backs.

1. Face paper fracture at nail heads.
2. Lack of adequate pressure on board during nailing.
3. Board improperly fitted or wedged into place.
4. Nailing from ends or edges towards center.
5. Framing members out of alignment.
6. Twisted framing. Continued
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7. Improperly aligned studs, plates, heads or joists.
8. Wallboard applied over protrusions.
10. Bowed studs and improperly placed joists or trusses.

These ten points on application procedure, in general, are simple, straightforward, and easily understood. Reducing nailpopping due to lumber shrinkage is another matter. A great percentage of the lumber appearing on the market today has a moisture content of 17% or over. A drop in moisture content of over 6% will cause sufficient shrinkage to increase the projection of the nail enough to create a visible and objectionable pop.

- The amount of increased projection due to shrinkage is directly proportional to the depth of penetration of the nail in the wood.
- The amount of projection due to lumber shrinkage is not increased by nail coatings intimately bonded to the nail shanks, such as galvanizing, plating, or etching, but the resistance to popping is decreased by cement coating, paint, and other coatings that are not intimately bonded to the nail shanks. This is the reason some gypsum wallboard manufacturers specify bright nails in place of cement coated nails.
- Threading or other similar deformation of the nail shank increases the nail holding power. Tapering a nail shank is detrimental. Also, tapered threading has no value.
- The amount of projection is not affected to a significant extent by nail diameter. The nail diameter does affect the drivability (its resistance to bending, etc.). Nail diameter is often determined by the nail design (shank formation, and head design).
- Use of nails with higher holding power, such as threaded or ring nails, or etched nails, to allow use of a shorter nail without sacrifice of holding power, helps protrusion resistance. Decreasing penetration from 7/8" to 5/8" will reduce popping over 50%. There is usually less change in moisture content and consequently, less shrinkage in the outer area of a framing member, due to the fact that lumber dries from the outside-in. In short, deformed shank nails aren’t the total solution.
- Cyclic heat changes inside a house after occupancy will not, in itself, cause popping trouble. Usually the cyclic changes are not of sufficient magnitude to cause popping.

Having touched briefly on two important factors in proper nailing, application procedure and the nail itself, there are several important factors or
suggestions that you can keep in mind on your next job that will pay high dividends.

One is to know the moisture content and the quality of the lumber you use. You can determine moisture content by means of a good moisture meter. If the lumber has more than 12% moisture, there will be shrinkage in service sufficient to cause nail popping. Allowance of a maximum time period between closure of the house, heating and finished nailing of the wallboard, preferably a minimum of 5 to 10 days, will usually result in a marked improvement in the dryness of the outer layer of the wood member that receives the nail and reduce the opportunity for nail defects. Use the shortest nail that will properly do the job. The purpose of the GWB-54 nail type specified by the Gypsum Association is to reduce nail popping caused by lumber shrinkage. This specification is based on reduced penetration without sacrifice of other nailing qualities. Remember that over 50% of nail defects are due to improper application. You can’t always blame the product and the assembly.

### Less Nails . . .

A sure way of having less nailing defects is to use less nails. This can be accomplished by several means.

One is the use of combination adhesive-nail application recommended by gypsum wallboard manufacturers. Their recommendations are based on proven experience and extensive trials. Remember, less nails means less trouble spots. Adhesive-nail-on accomplishes one thing: less nails.

Another method of reduced nails is by “floating” interior angles. In this method of application, certain nails are eliminated in all interior angles, both at the horizontal angle where ceiling and sidewalls meet, and in the vertical angle where sidewalls intersect. The “floating” interior angle application method may be used with conventional nailing or double nailing. It requires that boards fit snugly at interior angles. This method essentially involves elimination of the nail in the angle where the ceiling board or top course of wallboard on the wall is at right angles to the framing, and one board overlaps the other, holding it in place. In these cases, the first nail is placed 7 inches out from the angle in the ceiling board, and 8 inches down from the angle in the top course of board on the wall. This method is also applicable to interior vertical angles at wall intersections where there is a nailing member within 8 inches of the intersection. Again, the primary purpose of this method is reduction of nails at critical nailing areas.

Satisfactory application of gypsum wall board by nailing can be accomplished if good nailing practices are followed, and it is up to the gypsum wallboard industry, both manufacturers and contractors, to promote proper nailing and thereby improve gypsum drywall construction.