



GYPSUM CONSTRUCTION TROUBLESHOOTING GUIDE FASTENERS

1. SCOPE

The purpose of this document is to serve as a guide for identifying common interior wall construction and finishing problems, list probable causes, typical corrective actions and tips for prevention.

2. TERMINOLOGY

The following definitions are applicable to this document.

coat (n): Paint varnish or lacquer applied to a surface in a single application (one layer) to form a properly distributed film when dry. - **ASTM**

critical lighting (adj): A condition whereby interior surfaces are flooded by natural or artificial lighting at an oblique angle; such as lighting from large expanses of windows, glass curtain walls, skylights, or surface-mounted light fixtures. - **ASTM**

gloss (adj): A subjective term used to describe the relative amount and nature of mirror like (specular) reflection. - **FSCT**

gypsum board (n): The generic name for a family of sheet products consisting of a noncombustible core primarily of gypsum, with paper surfacing. – **ASTM C11**

gypsum panel products (n): The general name for a family of sheet products consisting essentially of gypsum. – **ASTM C11**

inspection lighting: Inspection lighting shall be representative of normal lighting conditions in intensity and location.

joint photography (n): The shadowing of the finished joint areas through the surface decoration. Syn telegraphing. - **GA-214-07**

normal lighting conditions: Normal lighting conditions are described as those in place when the project is finished. This includes, but not limited to, design lighting (e.g. wall washers, spots and floods, etc) and natural lighting." - **PDCA**

normal viewing position: The normal viewing position shall be at any angle provided it is established at a minimum distance of five feet perpendicular from the surface to be viewed.

paint (n): Any pigmented liquid, liquefiable, or mastic composition designed for application to a substrate as a thin layer which is converted to an opaque solid film after application. Used for protection, decoration or identification, or to serve some functional purpose, such as filling or concealing surface irregularities. – **FSCT**

primer (n): First complete coat of paint applied in a painting system to an uncoated surface prior to application of an intermediate coat or topcoat. Note: A primer used in gypsum board construction is typically a paint material specifically formulated to fill the pores and minimize suction differences between gypsum-board surface paper, texture and/or the compound used on finished joints, angles, fastener heads, accessories, and over skim coatings.



properly painted surface (n): A surface that is uniform in appearance, color, and sheen. It is one that is free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, or insufficient coverage. It is a surface that is free of drips, spatters, spills, or overspray which a contractor's workforce may cause. Compliance to meeting the criteria of a "Properly painted surface" shall be determined when viewed without magnification at a distance of five feet or more under normal lighting conditions and from a normal viewing position. Note: A surface uniform in appearance, color, and sheen may not be achieved with a coat of primer or a single coat of topcoat. - **PDCA**

topcoat (n): The finish coat(s) of a coating system, formulated for appearance and/or environmental resistance. - **PDCA**

3. DESCRIPTION OF PROBLEM

DRYWALL CONSTRUCTION

Irregularities during the drywall construction and finishing process can occur. Invariably, unsatisfactory results show up first in the areas over joints or fastener heads. Improper application of either the board or joint treatment may be at fault, but other conditions existing on the job can be equally responsible for reducing the quality of the finished gypsum board surface.

To help identify a particular imperfection, what follows is a physical description of each problem along with a discussion of the common factors related to the unsatisfactory result(s). Also provided is a list that identifies possible causes for the irregularity, as well as some common remedies and preventions.

Fastener Imperfections - A common problem, which takes on many forms. May appear as darkening, localized cracking; a depression over fastener heads; pop or protrusion of the fastener or the surface area immediately surrounding the fastener. In new construction, fastener imperfections are usually caused by improper framing, wall movement, or improper fastener installation.

Joint Problems - Generally occur in a straight-line pattern and appear as ridges, depressions or blisters at the joints, or darkening over the joints or in adjacent panel areas. Imperfections may result from incorrect framing or joint treatment application, or fluctuating / changing environmental conditions during or after construction if remedial action has not been taken.

Loose Panels - Board does not have tight contact with framing, rattles when impacted or moves when pressure is applied to the surface. Typically caused by improper installation of panels, framing out of alignment or improper fastening.

Joint Cracking - Appears either directly over the long edge or butt ends of boards, or may appear along the edge of taped joints. Often caused by structural movement and/or hygrometric and thermal expansion and contraction, or by excessively fast drying of joint compounds.

Field Cracking - Usually appears as diagonal crack originating from a corner of a partition or intersection with structural elements. Also seen directly over a structural element in center of a partition. May originate from corners of doors, light fixtures and other weak areas in the surface created by penetration. Caused by movement described previously.

Angle Cracking - Appears directly in the apex of wall-ceiling or interior angles where partitions intersect. Also can appear as cracking at edge of joint reinforcing tape near surface intersections.



Can be caused by structural movement, improper application of joint compound in corner angle or excessive build-up of paint.

Bead Cracking - Shows up along edge of flange. Caused by improper bead attachment, faulty bead or joint compound application.

Wavy Surfaces - Boards are not flat but have a bowed or undulating surface. Caused by improper board fit, misaligned framing, hygrometric or thermal expansion due to fluctuating / changing environmental conditions during or after construction.

Board Sag - Occurs in ceilings, usually under high-humidity conditions. Caused by insufficient framing support for board; board too thin for span; poor job conditions; improperly installed or mislocated vapor retarder; use of unsupported insulation directly on ceiling panels; or improperly fitted panels.

Surface Problems - Fractured, damaged or crushed boards after installation may be caused by abuse or lumber shrinkage. Also, see Discoloration below.

Discoloration - Board surface has slight difference in color over joints, supports or fasteners. Caused by improper paint finishing, uneven soiling and darkening from aging or ultraviolet light.

Water Damage - Stains, paper bond failure, softness in board core or mildew growth are caused by sustained high humidity, standing water and improper protection from water leakage during transit and storage.



GYPSUM CONSTRUCTION TROUBLESHOOTING GUIDE FASTENERS

3.1 Puncturing of Face Paper

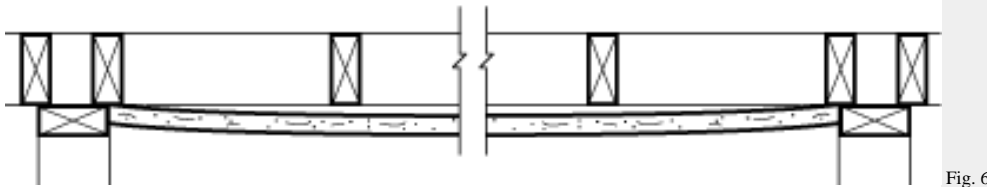


Fig. 6

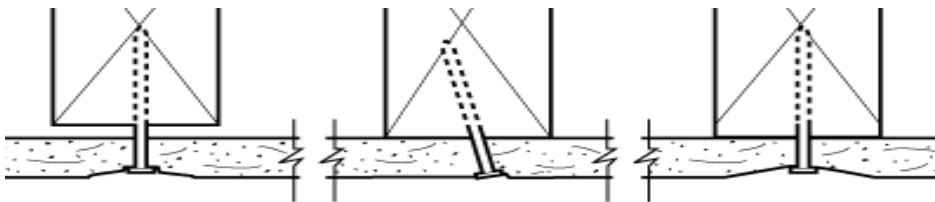


Fig. 7 & Fig. 8 (far right)

Cause: Poorly formed fasteners (nail heads / screws), careless installation, excessively dry face paper or soft core, lack of pressure during fastening (Fig. 6). Fasteners that puncture paper and shatter core of panel (Fig. 7) have very little grip on board.

Correction: Remove improperly driven fastener, hold panel tightly and properly drive new fastener.

Prevention: Correction of faulty framing (refer to GYPSUM CONSTRUCTION TROUBLESHOOTING GUIDE: FRAMING) and properly driven fasteners produce tight attachment with slight uniform dimple (Fig. 8). Fasteners (by design) bears onto paper and holds panel securely against framing member. Use proper fastener or adhesive application. Screws with specially contoured head are best fastener known to eliminate cutting and fracturing. If face paper becomes dry and brittle, its low moisture content may aggravate fastener issues.

3.2 Nails Loosened by Pounding Impacts

Cause: Applying panels to the second side of a partition can loosen nails on opposite side (lack of hand pressure during fastening). Particularly true when lightweight, soft lumber, undersized studs or furring are used.

Correction: Check panels for tightness on the partition side where panels were first applied. If looseness is detected, strike each nail head an additional hammer blow, being careful to not overdrive the nail.

Prevention: Use proper framing. Use Type W screws (for wood) or adhesive application.



3.3 Unseated Nails

Cause: Flexible or extremely hard framing members or furring does not permit nails to be properly driven. May result from undersized framing members, type of wood used, supports that exceed maximum allowable frame spacing or lack of hand pressure during fastening.

Correction: Replace nails with 1-1/4" Type W screws.

Prevention: Use proper framing, Type W screws or adhesive application. Apply pressure to hold panel tight against framing while driving fasteners.

3.4 Loose Screws

Cause: Using the wrong type screw for the application or an improperly adjusted screw gun results in a screw stripping or not seating properly.

Correction: Remove faulty fastener and replace with a properly driven screw.

Prevention: Use screws with combination high/low threads for greater resistance to stripping and pullout; set screw gun clutch to proper depth.

3.5 Nails Pop From Lumber Shrinkage

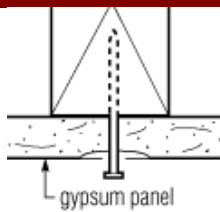


Fig. 9

Cause: Improper application, lumber shrinkage or a combination of both. With panels held reasonably tight against framing member and with proper-length nails, only severe shrinkage of the lumber normally will cause nail pops. But if nailed loosely, any inward pressure on panel will push nail head through its thin covering pad of compound. Pops resulting from 'nail creep' (movement of nail resulting from lumber shrinkage) occur when shrinkage of the wood framing exposes nail shank and consequently loosens panel. **Note:** Pops that occur after one month's heating or more are usually caused wholly or partly by wood shrinkage and should not be repaired until near end of heating season to minimize recurrence.

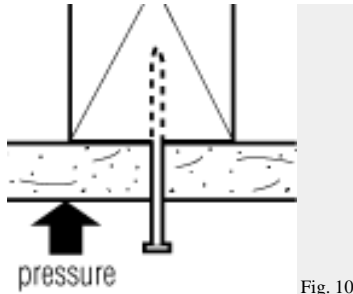
Correction: Repairs usually are necessary only for pops which protrude 0.005" or more from face of board (Fig. 9). Smaller protrusions may require repair if they occur in a smooth gloss surface or flat-painted surface under extreme lighting conditions. Those that appear before or during decoration should be repaired immediately. An often effective procedure for resetting a popped nail is to place a 4" broad knife over the nail and hit with hammer to seat flush with surface.

A more permanent method is to drive new nail or Type W screw about 1-1/2" from popped nail while applying sufficient pressure adjacent to nail head to bring panel in firm contact with framing. Strike popped nail lightly to seat it below surface of board. Remove loose compound, apply finish coats of compound and paint.

Prevention: Proper nail application; use of lumber meeting framing requirements; gypsum board attachment using Type W screws and/or by adhesive application.



3.6 Panels Loosely Fastened



Cause: Framing members are uneven because of misalignment or warping; lack of hand pressure on panel during fastening. Head of fastener alone cannot pull panel into firm contact with uneven members. Refer to GYPSUM CONSTRUCTION TROUBLESHOOTING GUIDE: GYPSUM BOARD and see 3.5 Improperly Fitted.

Correction: With nail attachment, during final blows of hammer, apply additional pressure with hand to panel adjacent to nail (Fig. 10) to bring panel into contact with framing.

Prevention: Correct framing imperfections before applying panels; for a more solid attachment, use 1-1/4" Type W screws or use adhesive method. Apply pressure to hold panel tightly against framing while driving fasteners.

3.7 Bulge Around Fastener

Cause: Overdriving fasteners, driving them with the wrong tool or failing to hold gypsum board firmly against framing while driving fasteners can puncture and bulge face paper and/or damage core of gypsum board. Left unrepaired, subsequent application of joint compound or texture finishes wets the punctured/torn board paper and can result in board bulging or swelling around fastener.

Correction: Drive screw fasteners close to damaged area, clean out damaged paper core, repair with a setting-type joint compound and refinish.

Prevention: Use correct tool and drive fasteners properly. Also, see 3.6, "Panels Loosely Fastened".



4. COMMENTS

Application - Industry experience demonstrates that an effective method for achieving a visually uniform surface for both the primer and topcoat is spray application immediately followed by back rolling or roller application using good roller techniques, such as finishing in one direction and using roller types and naps recommended by the paint manufacturer.

Environmental Conditions - Refer to Drywall Finishing Council recommendations in document titled, "Interior Job Condition Specifications for The Application of Drywall Joint Compounds, Drywall Textures, and Paint/Coatings".

Environmental Control - Temperature, humidity, and airflow should remain constant, and as close to occupancy conditions as possible. The potential for finishing and decorating problems is minimal when job environmental conditions match occupancy environmental conditions. Controlling and maintaining environmental conditions is key. Changes and/or fluctuations in temperature, humidity, and airflow can have a profound adverse effect.

Environmental Limitations / Considerations – All products shall be applied and maintained in accordance with manufacturers recommendations.

Gypsum-Board Preparation - To achieve the desired effect of texture finish over gypsum wallboard, the gypsum board substrate must be finished appropriately. Refer to Gypsum Association GA-214-07 titled "Recommended Levels of Gypsum Board Finish", NWCB "Recommended Levels For Finishing Of Gypsum Board", and/or equivalent.

Job Standard Specification - To improve communication, a job standard of the approved paint system shall be established to provide for a visual sample, constructed and finished in accordance with applicable project specifications. As a guideline, refer to PDCA P5-94 titled "Benchmark Sample Procedures for Paint and Other Coating Systems" for a detailed description.

Paint Selection - Manufacturers produce various paint grades and types. When the level of finish is selected, consult with the paint suppliers to determine the products that will produce the desired finish.

Project Standard Specification - A project standard of the approved wall and/or ceiling configurations shall be established to provide a visual sample constructed, finished, and decorated in accordance with applicable project specifications. As a guideline, refer to PDCA P5-94 titled, "Benchmark Sample Procedures For Paint and Other Coating Systems".

5. RESOURCES

ASTM. C11 Standard Terminology Relating to Gypsum and Related Building Materials and Systems, American Society for Testing and Materials, West Conshohocken PA

ASTM. C840-06 Standard Specifications for Application and Finishing of Gypsum Board. American Society for Testing and Materials, West Conshohocken, PA

DWFC. Interior Job Condition Specifications For The Application of Drywall Joint Compounds, Drywall Textures, and Paint/Coatings". Drywall Finishing Council, Incorporated. www.dwfc.org

DWFC. Method for Inspecting Joint Treated Gypsum Panel Surfaces, Drywall Finishing Council, Incorporated. www.dwfc.org



DWFC. Recommended Specification for Preparations of Gypsum Board Surfaces Prior To Texture Application, Drywall Finishing Council, Incorporated. www.dwfc.org

FSCT. Coatings Encyclopedic Dictionary. Federation of Societies for Coatings Technology, Blue Bell, PA

GA. GA-214-07 Recommended Levels of Gypsum Board Finish. Gypsum Association, Washington DC

GA. GA-216-07 Application and Finishing of Gypsum Panel Products. Gypsum Association, Washington DC

National Gypsum Company. ProForm Brand Drywall Finishing Products Construction Guide, National Gypsum Company, 2001 Rexford Road, Charlotte, NC, 28211, www.nationalgypsum.com

National Gypsum Company. National Gypsum Construction Guide, National Gypsum Company, 2001 Rexford Road, Charlotte, NC, 28211, www.nationalgypsum.com

PDCA. Glossary of Terms, Painting and Decorating Contractors of America, Fairfax VA

PDCA. Standard P4-94 Responsibilities for Inspection and Acceptance of Surface Prior to Painting and Decorating. Paint and Decorating Contractors of America.

PDCA. Standard P5-94. Benchmark Sample Procedures for Paint and Other Coating Systems. Painting and Decorating Contractors of America, Fairfax VA

USG. The Gypsum Construction Handbook H-17. USG Corporation, 550 West Adams Street, Chicago, IL, 60661, www.usg.com

USG. SA927 Gypsum Products – Panels and Accessories System Catalog, USG Corporation, 550 West Adams Street, Chicago, IL, 60661, www.usg.com

USG. USG SHEETROCK Brand Products - Installation and Application Guides, USG Corporation, 550 West Adams Street, Chicago, IL, 60661, www.usg.com

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