



## GYPSUM CONSTRUCTION TROUBLESHOOTING GUIDE FRAMING

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### 1. SCOPE

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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.

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### 2. TERMINOLOGY

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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**

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### 3. DESCRIPTION OF PROBLEM

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#### **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 FRAMING

### 3.1 Members Out of Alignment

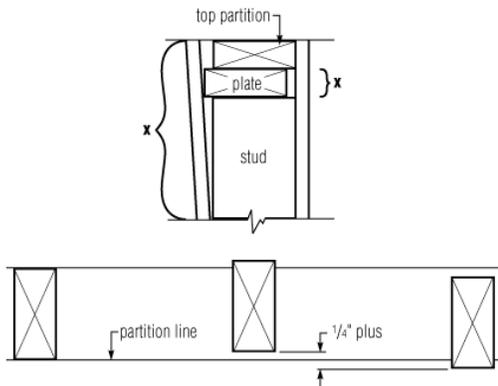


Fig. 2

**Cause:** Due to misaligned top plate and stud, hammering at points “X” (Fig. 2) as panels are applied on both sides of partition will probably result in nail heads puncturing paper or cracking board. Framing members more than 1/4” out of alignment with adjacent members makes it difficult to bring panels into firm contact with all nailing surfaces.

**Correction:** Remove or drive in problem fasteners and only drive new fasteners into members in solid contact with board.

**Prevention:** Check alignment of studs, joists, headers, blocking and plates before applying panels, and correct before proceeding. Straighten badly bowed or crowned members. Shim out flush with adjoining surfaces. Use adhesive attachment.

### 3.2 Members Twisted

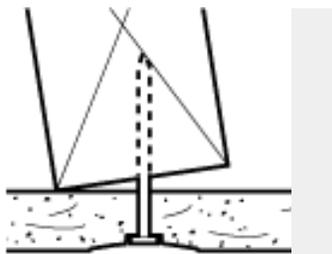


Fig. 3

**Cause:** Framing members have not been properly squared with plates, presenting angular nailing surface (Fig. 3). When panels are applied, there is danger of puncturing paper with fastener heads or of reverse twisting of member as it dries out, with consequent loosening of board and probable fastener pops. Warped or wet dimension lumber may contribute to deformity.

**Correction:** When moisture content in framing has stabilized after one heating season, remove problem fasteners and re-fasten with carefully driven Type W screws.

**Prevention:** Align all twisted framing members before board application.



## 3.3 Protrusions

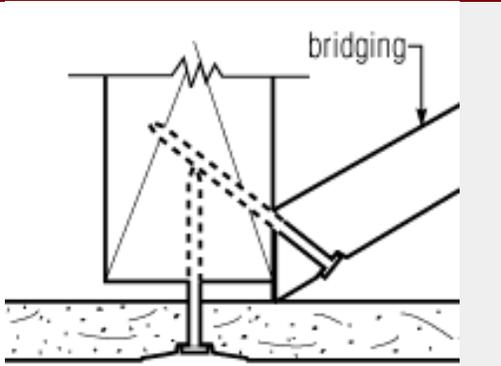


Fig. 4

**Cause:** Bridging, headers, fire stops or mechanical lines have been installed improperly so as to project beyond face of framing, preventing panels from contacting nail surface (Fig. 4). Result will be loose board, and fasteners driven in area of protrusion will probably puncture face paper.

**Correction and Prevention:** Same as for Framing— See “3.2 Members Twisted”.

## 3.4 STEEL – Panel Edges Out of Alignment

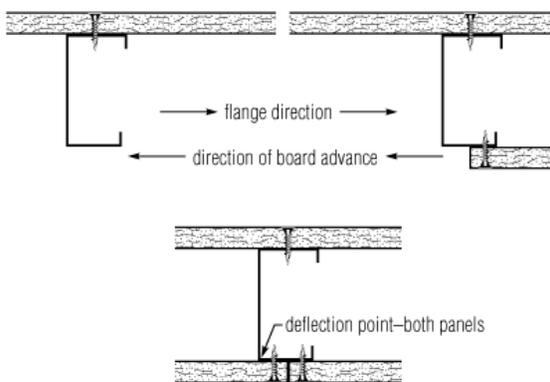


Fig. 5—Correct Application

**Cause:** Improper placement of steel studs or advancing in the wrong direction when installing panels can cause misalignment of panel edges and give the appearance of ridging when finished.

**Correction:** Fill and feather out joint with joint treatment.

**Prevention:** Install steel studs with all flanges pointed in the same direction. Then install panels by advancing in the direction opposite the flange direction (Fig. 5).



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## 4. COMMENTS

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**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".

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## 5. RESOURCES

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**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](http://www.dwfc.org)

**DWFC.** Method for Inspecting Joint Treated Gypsum Panel Surfaces, Drywall Finishing Council, Incorporated. [www.dwfc.org](http://www.dwfc.org)



**DWFC.** Recommended Specification for Preparations of Gypsum Board Surfaces Prior To Texture Application, Drywall Finishing Council, Incorporated. [www.dwfc.org](http://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](http://www.nationalgypsum.com)

**National Gypsum Company.** National Gypsum Construction Guide, National Gypsum Company, 2001 Rexford Road, Charlotte, NC, 28211, [www.nationalgypsum.com](http://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](http://www.usg.com)

**USG.** SA927 Gypsum Products – Panels and Accessories System Catalog, USG Corporation, 550 West Adams Street, Chicago, IL, 60661, [www.usg.com](http://www.usg.com)

**USG.** USG SHEETROCK Brand Products - Installation and Application Guides, USG Corporation, 550 West Adams Street, Chicago, IL, 60661, [www.usg.com](http://www.usg.com)

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