

A Review on Drywall Construction

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Abstract: The drywall construction technique is the technique in which the wall is made with an assembly of steel struts and gypsum panel boards. Drywall is used to make interior walls as partition and ceilings. Use of this system is increasing everyday as drywall construction has its own benefits. This type of construction is suitable for all commercial and residential projects. This paper will present drywall constructions highlighting its components and installation processes.

Index Terms: Drywall, Building construction, Gypsum, Masonry, Sustainable construction

I. INTRODUCTION

The drywall technique is generally used for partition walls. Drywall is also known as plasterboard, wallboard, gypsum board, or gyprock panel wall. The principle of drywall technique is based on the panel made of gyprock sandwiched between two thick paper sheets.

A drywall panel is made of calcium sulfate dehydrate. Plaster is mixed with paper, asbestos, fiberglass, or in combinations of these materials. Plasticizers, foaming agent and various additives are used to reduce flammability, water absorption. The drywall technique is time and labor-saving. Drywall system is a good replacement for brick and mortar construction.

- High performance lightweight partition system.
- GI frame, encased with Gypsum Plasterboards on either side
- Supported with drywall screws
- Joints are taped and finished with gypsum jointing compound

II. LITERATURE REVIEW

1. Jonas Silvestre Medeiros, Murilo Blanco Mello, “A comparative study between drywall and masonry partitions in concrete framework buildings” (2016)

Objective of this paper is to compare most common building partition wall construction method in Brazil that is Gypsum walls and masonry block walls. They also studied cost comparison between both. Author suggested having technical publications about wastes, productivity and detail methods to calculate reduction of direct and indirect costs. They also suggest creating a national institute training program for installers for best planning and practices.

2. Karina Condeixa, Eduardo Qualharini, Dieter Boer, Assed Haddad, “An Inquiry into the life cycle of systems of inner walls: Comparison of Masonry and Drywall” (2015)

This paper studies a methodology named Life Cycle Assessment to investigate impacts regarding product or service during the life cycle. They studies masonry and drywall system in a Brazilian scenario, and calculated effects of climate change by the transport of materials of the system. The result of this study highlights the weakness of both construction systems. Environmental load can be reduced by improving the weaknesses in the life cycle of both systems.

3. Dhiren Paghdar, Neeraj Sharma, Hiren Rathod, “A Review o Drywall construction technique in reference of sustainable development” (2013)

Aim of this research is to study the overall system of drywall in the viewpoint of sustainable development. Study also shows the development of Indian construction industry for new techniques. This study concluded that drywall system has great importance in sustainable credits as well it has may benefits like reduction in construction time and cost, eco-friendly construction material, faster and quality development, etc.

4. J. Norgaard, M. A. Othuman Mydin, “Drywall thermal properties exposed to high temperatures and fire condition” (2013)

This paper is a review of relevant literature on fire resistance of drywall system. It investigated that there is a need of one particular methodology to identification of thermal properties of drywall product which can helps to manufacturers. It also suggests numerical analysis procedure is the correct method and it gives experimental results of temperature development in drywall.

III. DETAILS

Components of Drywall-



Fig No. 1: Components of Drywall

1. Plasterboard

Plasterboard is of three types mainly: fire-resistant board, normal gypsum board, moisture resistant boards. Fire-resistant boards are used at the common areas like entrance lobby, a common wall between two flats. Moisture resistant gypsum board or designed to provide better moisture resistance.

The thickness of the plasterboard is 12.7 mm, generally board size used is 6'X4' or 8'X4', these sizes may vary according to design and manufactured according to demand by contacting manufacturing company. The weight of the board is generally 8kg/m².

2. Rockwool

Rockwool is an insulation material which is formed by spinning and drawing molten mineral or rock material .such as slag and ceramics. The application of Rockwool is for thermal insulation, filtration, and hydroponic growth medium. It is used as an insulating material that is placed between the panels.

3. Metal beads

A bead is a long and drawn-out impression, which is impressed to increase stiffness in metal sheets or plates. Depending on the work piece size and material thickness, the ratio of length, width and imprint depth must be adjusted to obtain the maximum strengthening effect. Beads can only withstand the forces acting on it optimally if the correct size ratio is established in relation to the sheet or plate size.

4. Studs

Various kinds of studs used to frame window door openings, it includes king stud, trimmer or jack, cripple stud, post or column. For drywall assemblies it is suggested to limit deflection to $L/240$ (L = length of the span) and to never exceed $L/120$ ($L/180$ in some codes).

5. Rockwool holding clip

Clip and rail systems are now becoming a popular approach for a more thermally efficient cladding support system. It can support all types of cladding. This generally includes board and lap cladding that is installed by using standard nail/screw fasteners, stucco/adhered veneers, stone veneers, and a wide range of metal, glass, and composite cladding systems each with unique support conditions.

6. Drywall screws

Drywall screws have become the standard fastener for securing full or partial sheets of drywall to wall studs or ceiling joists. Drywall Screw Lengths

1/4-inch drywall: 1-inch to 1 1/4-inch drywall screws used

1/2-inch drywall: 1 1/4-inch or 1 5/8-inch drywall screws used

5/8-inch drywall: 1 5/8-inch or 2-inch drywall screws used

7. Drywall joint tape

Drywall tape creates a physical bond/adherence between adjacent sheets of drywall. Although the bond does not contribute to the structural support of the drywall sheets, the bond reduces the movement and cracking of the sheets.

Processes involved in construction

1. Framing:

First of all, lines are marked on floor as per architectural plan. With reference to that linings, GI studs of width 75cm is fixed vertically keeping 10mm gap between wall and slab. Main aim of framing is to support gypsum boards, Electrical fittings and rockwool. Framing is done with the help of screws. Electricals boards along with pipes also fixed while framing. After framing is over, quality of installed framing is checked by respective clause.

2. Hanging:

Before hanging gypsum boards, quality of boards has to be checked by following ways

- Diagonal check
- Bend in board
- Linings of boards whether it is straight or in zigzag pattern
- Paper coat on board also has to check

Use screw gun to attach the drywall to the wall studs. Before starting to attach panels, skirting sized baffle panels to cut and fix at the bottom to support skirting tiles. In the beginning, attach boards on one side on frame. Start these needle point screws drilled to fix boards into the middle of panel at a convenient height. Once the first screw is in place, put in the rest, from the centre of the panel towards outside. Drive the screws 16 inches apart and into all of the studs.

After attaching one side, place thermal resistant rockwool of same width as that of studs, in between frames. Rockwool holding clips are used for fixing. Then installation of final sheet of gypsum is attached on another side.

3. Finishing:

Drywall finishing is the end process of drywall installation. To get even surface level, finishing to be done. It starts from leveling the corners using metal beads. Metal beads are of different types according to the corners. Beads to fix at corners by using screws.

For joint finishing, tape and joint compounds are used. Provisions for joints finishing has already given to every gypsum board in the form of small grove so that thickness of joint tape and compound matches the final surface level. Following steps are generally follows

- Cover the screws and joints with joint compound of 4 inch wide layer using 6 inch knife
- Apply drywall tape to all joints
- Smooth the tape with drywall knife
- Cover outside corners with joint compound
- Allow the compound to dry for about 24 hours
- Sand the first coat of joint compound by using 180 or 220 grit sandpaper
- Apply second and third coat of joint compound

After finishing, paint, wallpaper or texture can be done on drywall.

IV. CONCLUSION

The paper has provided a review of the drywall construction system, focusing on components and installation process. This technique is widely used for a long time but even though not adopted in small scale projects in the Indian construction industry. Adoption of this technique saves cost and time; it also increases carpet area as wall thickness is less as well as it has many sustainable benefits.

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