

A Comprehensive Review on the Comparison Between Plasterboard (Drywall) Systems and Conventional Brick Masonry in Building Construction

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Abstract

The construction industry has undergone significant technological transformations aimed at improving productivity, reducing costs, and increasing sustainability. Among these innovations, plasterboard (drywall) systems have emerged as an alternative to conventional brick masonry for vertical partitions. This review article presents a comprehensive comparative analysis between plasterboard systems and traditional brick masonry, focusing on structural performance, economic viability, construction speed, environmental impact, thermal and acoustic behavior, durability, and practical application in the Brazilian context. The study synthesizes technical literature, normative standards, and cost analyses to evaluate the advantages and limitations of both systems. Results indicate that while conventional masonry remains widely used due to its mechanical resistance and cultural acceptance, plasterboard systems offer significant benefits in terms of construction speed, reduced structural load, material efficiency, and design flexibility. The review concludes that the selection between systems should consider project-specific requirements, environmental conditions, and cost-benefit analysis, rather than relying solely on traditional practices.

Keywords: construction systems; plasterboard; drywall; brick masonry; building materials; cost-benefit analysis.

1. Introduction

The Brazilian construction sector has historically relied on conventional brick masonry as the dominant method for vertical enclosure systems, representing approximately 99% of residential and commercial buildings

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. Clay bricks, concrete blocks, and ceramic blocks have shaped architectural identity since colonial times, offering durability and structural robustness.

However, the growing demand for faster construction, cost reduction, sustainability, and improved technical performance has stimulated the adoption of alternative systems. Among these, plasterboard systems—commonly known as drywall—have gained increasing attention.

The debate surrounding plaster versus traditional masonry is particularly relevant in contemporary construction, where optimization of time, cost control, and performance efficiency are essential. While masonry is associated with strength and permanence, plasterboard systems introduce flexibility, precision, and reduced material consumption.

This review aims to provide a structured and critical comparison between plasterboard and conventional brick masonry systems, analyzing historical development, technical performance, economic implications, and future perspectives.

2. Historical Development of Construction Systems

2.1 Evolution of Brick Masonry

Brick construction dates back thousands of years and remains one of the most consolidated building techniques worldwide. In Brazil, early bricks were handcrafted using clay, straw, lime, and mud, later fired in kilns to increase mechanical resistance.

Over time, brick technology evolved into:

- Solid clay bricks
- Hollow ceramic bricks
- Concrete blocks
- Ecological interlocking bricks

These systems became standardized under Brazilian technical regulations (ABNT NBR standards)

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Brick masonry became dominant due to:

- Availability of raw materials
- Simplicity of production
- High compressive strength

- Cultural familiarity among labor forces

However, masonry systems present limitations such as high structural weight, longer execution time, and significant water consumption during construction.

2.2 Emergence of Plasterboard (Drywall) Systems

Plasterboard systems emerged in the early 20th century and were consolidated in Europe and North America as dry construction techniques.

Drywall consists of:

- Gypsum core
- Cardboard facing layers
- Galvanized steel profiles
- Insulating materials (glass wool, rock wool)

The system gained popularity in Brazil during the late 20th century due to its:

- Rapid installation
- Reduced debris generation
- Lightweight characteristics
- Design versatility

Unlike masonry, drywall construction does not require water-based mortars during assembly, classifying it as a dry system.

3. Technical Characteristics of Brick Masonry

3.1 Types of Bricks

The main types used in Brazil include:

- Hollow ceramic bricks (Baiano type)
- Solid clay bricks
- Decorative hollow bricks (Cobogó)
- Ecological compressed soil-cement bricks

Each type presents different compressive strengths, thermal properties, and cost structures.

3.2 Advantages of Masonry

- High mechanical resistance
- Impact durability
- Good acoustic insulation (due to mass effect)
- Fire resistance
- Cultural acceptance

3.3 Limitations

- Higher construction time
- Greater labor demand
- Moisture absorption risk
- Heavy structural load
- Increased mortar consumption
- More construction waste

Masonry construction requires plastering (chapisco and emboço layers), which significantly increases material and labor costs

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4. Technical Characteristics of Plasterboard Systems

4.1 Composition and Types

Drywall panels are classified according to application:

- Standard (ST – white)
- Moisture-resistant (RU – green)
- Fire-resistant (RF – pink)

Moisture-resistant panels include silicone additives and fungicides, while fire-resistant boards incorporate fiberglass reinforcement.

4.2 Structural Behavior

Although often perceived as fragile, drywall systems are engineered to:

- Support distributed loads
- Withstand impacts within normative limits
- Provide fire resistance up to 90 minutes (with appropriate boards)

However, reinforcement is required for heavy loads such as marble countertops or cabinets.

5. Economic Comparison

Based on cost analyses

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, masonry systems may appear cheaper per material unit, but total construction cost includes:

- Labor
- Mortar application
- Plastering layers
- Extended construction time

Drywall systems typically show:

- Lower labor cost
- Faster execution
- Reduced waste
- Lower structural load (reducing foundation costs)

Although initial drywall material cost per square meter may be higher, total project cost can be lower when time and productivity are considered.

6. Construction Speed and Productivity

One of the most significant advantages of drywall systems is construction speed.

Key productivity factors include:

- Pre-manufactured panels

- Screw-based assembly
- No curing time
- Minimal debris
- Simplified logistics

Masonry construction requires:

- Mortar preparation
- Curing periods
- Alignment corrections
- Multiple finishing layers

Drywall reduces project timelines considerably, making it advantageous for large-scale developments.

7. Thermal and Acoustic Performance

7.1 Masonry

Brick walls provide thermal inertia due to mass. However, insulation performance depends on wall thickness.

7.2 Drywall

Drywall systems allow insertion of:

- Glass wool
- Rock wool
- Thermal insulation layers

This configuration may outperform masonry in acoustic insulation when properly designed.

8. Environmental Considerations

Drywall presents sustainability advantages:

- Reduced water use
- Lower waste generation

- Recyclable materials
- Lower transportation energy (lighter weight)

Masonry involves:

- Clay extraction
- High-temperature kiln firing
- Greater material mass

However, gypsum production also consumes energy, requiring lifecycle analysis for accurate comparison.

9. Design Flexibility and Architectural Innovation

Drywall systems enable:

- Curved walls
- Recessed lighting
- Integrated shelving
- Modular partitions
- Easier renovations

Masonry is less adaptable for remodeling due to demolition requirements.

10. Durability and Maintenance

Masonry systems demonstrate:

- Higher impact resistance
- Greater tolerance to humidity

Drywall requires:

- Proper waterproofing
- Correct load reinforcement
- Protection in high-humidity areas

Nevertheless, drywall allows easier repair of electrical and hydraulic systems.

11. Safety and Fire Performance

Fire-resistant drywall panels can delay fire spread for up to 90 minutes when properly installed.

Masonry also offers high fire resistance but may require additional coatings depending on material composition.

12. Comparative Analysis Summary

Criterion Brick Masonry Plasterboard (Drywall)

Construction Speed	Slow	Fast
Structural Weight	High	Low
Flexibility	Limited	High
Cost Efficiency	Moderate	High (overall)
Impact Resistance	High	Moderate
Waste Generation	High	Low
Thermal Insulation	Moderate	High (with insulation)
Acoustic Insulation	Good	Excellent (with filling)
Remodeling Ease	Low	High

13. Final Considerations

This review demonstrates that plasterboard systems represent a technologically advanced alternative to conventional brick masonry in modern construction.

While masonry remains advantageous for structural robustness and high-impact resistance, drywall systems offer significant improvements in:

- Speed of execution
- Material efficiency
- Architectural flexibility
- Reduced environmental impact
- Cost optimization

The choice between systems should be based on:

- Project typology
- Environmental conditions
- Budget constraints
- Required mechanical resistance
- Long-term maintenance considerations

In contemporary construction, hybrid systems—combining masonry for structural elements and drywall for partitions—are increasingly adopted to maximize performance and cost efficiency.

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