



Performance and Practical Analysis of Tile flooring Work Using Adhesive

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ABSTRACT

The increasing demand for durable, aesthetic, and low-maintenance flooring solutions has led to the widespread use of ceramic and vitrified tiles in modern construction. This study focuses on the performance and practical execution of tile flooring using tile adhesive on prepared concrete surfaces. The research includes on-site observations of tile laying processes, adhesive application, surface preparation, and finishing techniques. Parameters such as bonding strength, surface finish, workability, alignment, and durability were evaluated. Results indicate that tile adhesive provides strong bonding, uniform finish, and efficient installation compared to traditional mortar methods. The study highlights the advantages of adhesive-based tile flooring in terms of speed, durability, and cost-effectiveness, making it a preferred choice in contemporary construction practices.

Keywords— Tiles, Flooring, Adhesive, Bond Strength, Surface Finish, Durability, Construction, Workability.

1. INTRODUCTION

Flooring plays a crucial role in determining the functionality, durability, safety, and aesthetics of any building structure. It directly affects user comfort, maintenance requirements, and the overall life span of the building. Among the various flooring materials available today, ceramic and vitrified tiles are widely preferred due to their high strength, low water absorption, resistance to wear and tear, and attractive appearance. In modern construction practices, vitrified tiles have gained significant importance because of their superior properties such as higher density, better load-bearing capacity, and enhanced resistance to stains and moisture compared to conventional ceramic tiles. These characteristics make them suitable for residential, commercial, and industrial applications.

Traditionally, tile installation was carried out using cement mortar as the bonding material. Although widely used, this method presents several challenges such as inconsistent bonding, uneven thickness, hollow sound formation, higher material consumption, and longer curing time. These issues can lead to defects like tile debonding, cracks, and reduced durability over time.

With advancements in construction technology, tile adhesives have emerged as a modern and efficient alternative to conventional mortar methods. Tile adhesives are polymer-modified materials specifically designed to provide strong bonding between tiles and the substrate. They ensure uniform thickness, better adhesion, reduced shrinkage, and faster installation. Additionally, adhesives minimize the chances of hollow tiles and improve overall surface finish.

The use of tile adhesive also enhances construction efficiency by reducing labor effort, saving time, and minimizing material wastage. Proper application techniques, including surface preparation, leveling of the base, correct adhesive mixing, and accurate tile placement, are essential to achieve optimal performance. Furthermore, maintaining proper alignment and spacing using tile spacers ensures a uniform and aesthetically pleasing finish.

This study focuses on the practical analysis of tile flooring work executed on-site using adhesive-based methods. It evaluates key performance parameters such as workability, bonding strength, surface finish, alignment accuracy, and durability under real construction conditions. The objective is to assess the effectiveness of tile adhesives compared to traditional methods and highlight their advantages in modern construction practices.

2. LITERATURE REVIEW

2.1 Tile Flooring Systems

Tiles are commonly used due to their durability, resistance to moisture, and ease of maintenance. Vitrified tiles offer higher strength and lower water absorption compared to ceramic tiles.

2.2 Traditional Tile Laying Methods

Cement mortar was traditionally used, but it often caused:

- Hollow tiles
- Poor bonding
- Uneven surfaces.

2.3 Tile Adhesives

Tile adhesives (like polymer-modified adhesives) provide:

- Strong bonding
- Uniform thickness
- Reduced cracking

2.4 Surface Preparation Importance

Proper base preparation ensures:

- Better adhesion
- Reduced tile failure
- Long-term durability

2.5 Research Gap

Limited practical studies focus on:

- On-site tile installation performance
- Comparison of adhesive vs traditional methods
- Real construction observations



Fig.2.1 Completed Tile Flooring Surface



Fig. 2.2 Tile Placement in Progress

3. METHODOLOGY

3.1 Site Selection

The study was conducted at an active residential construction site in Maharashtra, where tile flooring work was being executed using modern adhesive-based techniques. The site was selected due to the ongoing flooring activities, availability of skilled labor, and use of standardized materials such as vitrified tiles and branded tile adhesive.

The flooring area consisted of a prepared concrete base with leveling work already completed. The site conditions provided a realistic environment to observe practical challenges, workmanship quality, and performance of materials under actual construction conditions.

3.2 Materials Used

The following materials were used during the tile flooring process:

- Tiles: Vitrified floor tiles of standard size, selected for their high strength, low porosity, and smooth finish.
- Adhesive: Polymer-modified tile adhesive (Gresbond by Kajaria), known for its strong bonding properties and ease of application.
- Base Surface: Cement concrete flooring with a leveling layer to ensure evenness.
- Water: Clean potable water used for mixing adhesive to achieve proper consistency.

The selection of these materials was based on their widespread usage in modern construction and their compatibility with adhesive-based tile installation

3.3 Tile Layering Procedure

The tile installation process was carried out systematically in multiple stages to ensure quality and durability.

3.3.1 Surface Preparation

- The concrete base surface was thoroughly cleaned to remove dust, dirt, grease, and loose particles.
- Surface level was checked using leveling tools, and uneven areas were corrected to avoid tile misalignment.
- Minor depressions and irregularities were filled to create a uniform base.
- The surface was slightly moistened to control excessive water absorption and improve adhesive bonding.

Proper surface preparation ensured strong adhesion and minimized the chances of tile failure.

3.3.2 Adhesive Preparation

- Tile adhesive powder was mixed with a controlled amount of water as per manufacturer guidelines.
- The mixture was stirred manually until a smooth, lump-free paste was obtained.
- Adequate mixing ensured proper consistency, workability, and bonding strength.

The prepared adhesive was used within the recommended time to maintain effectiveness.

3.3.3 Tile Placement

- Adhesive was applied evenly on the base using a trowel to achieve uniform thickness.
- Tiles were carefully placed over the adhesive bed and pressed gently to ensure proper contact.
- Alignment was maintained using straight edges and visual checks.
- Tile spacers were used to maintain consistent gaps between tiles for uniform joint spacing. This process ensured proper leveling, alignment, and aesthetic appearance.

3.4 Cutting and Fitting

- Tiles were cut using a tile cutting machine to fit edges, corners, and boundary areas.
- Precision cutting was carried out to avoid gaps and ensure proper fitting near walls and obstacles. Special attention was given to maintaining symmetry and alignment in edge areas.

3.5 Finishing

- The surface was checked for level differences and corrected immediately.
- Excess adhesive on tile surfaces and joints was cleaned before hardening.
- Final alignment and spacing were verified.
- The flooring was left undisturbed for initial setting, followed by natural curing.

3.6 Analysis

Compare performance of crusher sand plaster with conventional river sand plaster.

Evaluate based on practical parameters: cost, availability, workability, finish quality, and durability.

Highlight sustainability benefits of using crusher sand in real construction and conditions.

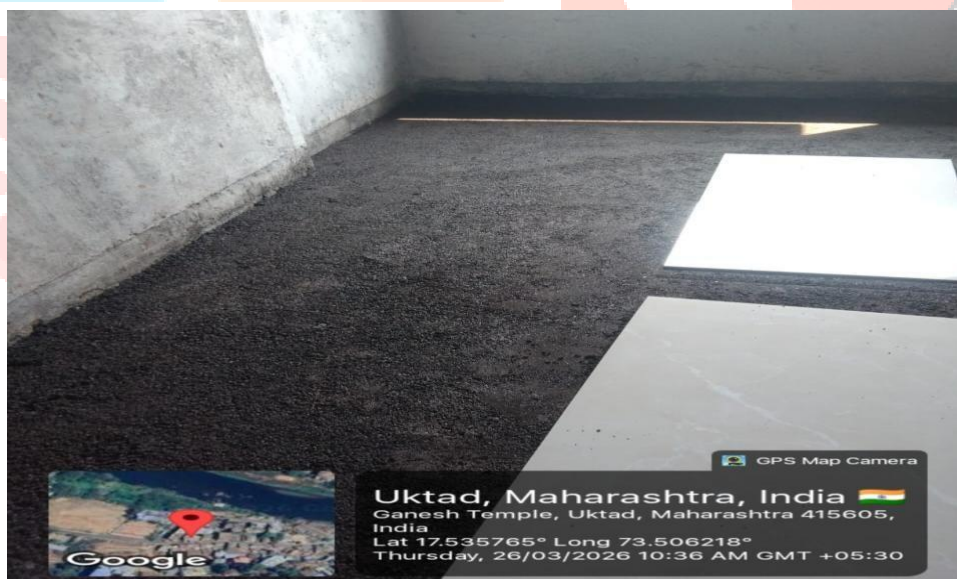


Fig.3.1 Placement in Progress.



Fig. 3.2 Base Preparation.

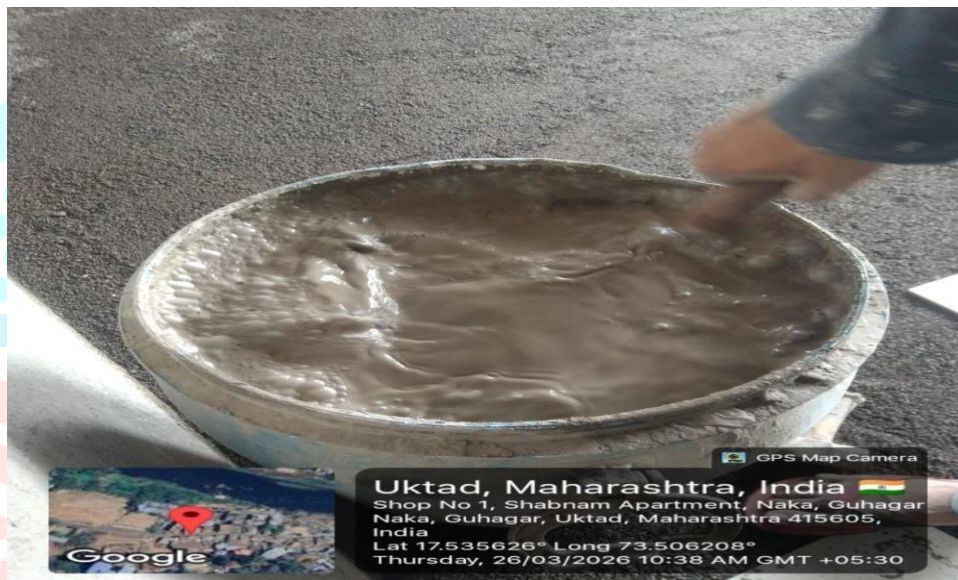


Fig. 3.3. Adhesive Mixing.

4. RESULT AND DISCUSSION

4.1 Workability and Application

Observation: The tile adhesive was found to be easy to mix and apply. It achieved a smooth, lump-free consistency with minimal effort during mixing. The adhesive spread uniformly over the surface using a trowel.

Discussion: The improved workability of tile adhesive is due to its polymer-modified composition, which enhances its plasticity and handling characteristics. Compared to traditional cement mortar, adhesive requires less effort for mixing and application. The smooth consistency allows uniform spreading, reducing voids beneath tiles and improving overall installation quality. However, slightly careful water proportioning is necessary to maintain the desired consistency control to avoid shrinkage cracks.

4.2.Surface Finish Observation: The finished tile surface appeared smooth, glossy, and uniform, with no visible unevenness or lippage between adjacent tiles.

Discussion: The use of tile adhesive ensured uniform thickness across the flooring, resulting in a level and aesthetically pleasing surface. Unlike mortar, which can create uneven bedding due to manual inconsistencies, adhesive provides controlled application. This leads to better tile alignment and enhances the visual appeal of the flooring. The absence of surface defects indicates proper installation practices and material performance.

4.3.Bond Strength

Observation Tiles were firmly bonded to the concrete base. Manual checks such as tapping did not produce hollow sounds, indicating proper adhesion.

Discussion: Tile adhesive demonstrated superior bonding strength due to its chemical composition, which promotes strong adhesion between tile and substrate. The thin-bed application ensures close contact, reducing air gaps and increasing bonding efficiency. Compared to traditional mortar, which may lead to weak bonding if not applied properly, adhesive significantly minimizes the risk of tile debonding and improves long-term stability.

4.4.Alignment and Leveling

Observation: Tiles were accurately aligned using spacers, and uniform gaps were maintained throughout the flooring. The overall level of the surface was consistent.

Discussion: Proper alignment and leveling are critical for both structural performance and aesthetics. The use of spacers and controlled adhesive thickness allowed precise tile placement. Adhesive-based installation provides better control over tile positioning compared to mortar, where uneven thickness can cause misalignment. This results in a professional finish with consistent joint spacing and minimal errors.

4.5.Cutting and Fitting

Observation: Tile cutting was carried out using a tile cutter machine, enabling precise shaping for edges, corners, and boundary areas

Discussion: Accurate cutting and fitting are essential to achieve a seamless flooring layout. The use of mechanical tile cutters ensured clean edges and proper fitting near walls and fixtures. This reduced material wastage and enhanced the overall appearance of the flooring. Proper fitting also prevents gaps and weak zones that could affect durability.

4.6.Durability

Observation: No immediate defects such as cracks, tile lifting, or surface damage were observed after installation..

Discussion: Tile adhesive contributes to improved durability by providing strong bonding and reducing shrinkage-related issues. The uniform adhesive layer minimizes stress concentrations and prevents the formation of hollow spaces beneath tiles. This enhances resistance to wear, load, and environmental factors. Compared to mortar-based methods, adhesive flooring is less prone to long-term defects such as debonding and cracking .

4.7. Cost and Sustainability

Observation: The installation process was faster compared to traditional mortar methods, with reduced labor effort and time consumption.

Discussion: Although tile adhesive may have a slightly higher material cost, it offers significant savings in terms of labor, time, and material wastage. Faster installation increases project efficiency and reduces overall construction time. Additionally, the reduced thickness of adhesive layers lowers material consumption. Therefore, adhesive-based tile flooring proves to be cost-effective in the long run

4.8. Summary of Findings

- Tile adhesive provides superior bonding strength compared to traditional mortar
- Ensures smooth, uniform, and aesthetically pleasing surface finish
- Enables faster and more efficient installation process
- Improves alignment accuracy and joint uniformity
- Reduces chances of tile failure, cracks, and debonding
- Minimizes material wastage and labor effort.

5. CONCLUSIONS

1. Tile adhesive-based flooring is more efficient than traditional methods.
2. It provides better bonding, durability, and surface finish.
3. Installation is faster and more accurate.
4. Proper surface preparation is essential for best results.
5. Tile flooring using adhesive is a modern, reliable, and cost-effective solution

6. REFERENCES

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