



STEEL UPDATE



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Why Construction Chemicals are the Need of the Hour

The construction industry is at a crossroads where traditional methods alone cannot meet the demands of modern infrastructure. With urbanisation, sustainability goals, and complex engineering challenges shaping the future, steel is celebrated for its strength, durability, and versatility. However, the effectiveness of steel in modern structures is greatly enhanced by the strategic use of construction chemicals. These chemicals, including adhesives, grouting compounds, anti-corrosive treatments, epoxies, sealants, and waterproofing solutions, are critical to ensure structural integrity, longevity, and sustainability.

Steel structures, like all building materials, face environmental and mechanical stresses that can compromise their integrity over time. Construction chemicals, such as epoxy coatings and anti-corrosive treatments, provide an effective solution to combat these challenges. They play a pivotal role in construction as a structural bonding agent, creating strong connections between steel and other materials like concrete and wood. This makes it ideal for structural joints and repair work and is widely used in coatings to protect surfaces from abrasion, moisture, and chemical exposure, significantly extending the lifespan of the structures. Its application in filling cracks and repairing damaged surfaces highlights its utility in restoration projects.

Sustainability is another critical factor driving the demand for construction chemicals. As the world shifts toward eco-friendly practices, these chemicals play a

pivotal role in reducing material wastage and energy consumption. For instance, high-performance adhesives minimise the need for excessive mechanical fasteners, leading to more efficient resource usage. Quick-curing adhesives also improve construction efficiency, making them a vital tool in modular and prefabricated building systems. Furthermore, specialised

adhesives are engineered to perform under challenging conditions, such as underwater environments or extreme temperatures. By integrating construction chemicals, builders and engineers can contribute to sustainability goals while maintaining the high-quality standards demanded by modern architecture.

Modern infrastructure projects require faster construction timelines without



compromising on quality. Construction chemicals, such as grouting compounds and advanced sealants, stabilise structures and enhance load-bearing capacity. They are commonly used to improve the stability of foundations, ensuring the safe transfer of loads. Precision applications, such as aligning heavy equipment in industrial and infrastructure projects, often rely on non-shrink grouts to maintain structural integrity.

Construction projects today must also adapt to changing climates and extreme weather conditions. Waterproofing solutions, thermal insulating coatings, and weather-resistant adhesives provide the resilience needed to endure heavy rains, scorching heat, and other environmental challenges. By incorporating these solutions, structures remain durable and functional, regardless of the environment. Similarly, precision grouting compounds strengthen foundations and fill voids in steel joints, ensuring long-term stability for high-load projects like dams and towers.

With technological advancements, construction chemicals are becoming smarter and more efficient. Innovations include self-healing coatings, low-VOC adhesives, and nanotechnology-based treatments that offer superior performance and environmental benefits. For architects, engineers, and builders, understanding and leveraging these solutions is key to achieving innovation, efficiency, and longevity in construction.

A new pinnacle: Tallest Building in India



credits: The Hindu Businessline

A city's skyline and urban story are both shaped by its tallest building. This towering landmark redefines the city's silhouette and stands as a symbol of its architectural prowess and ambition. Such structures often become iconic, drawing both residents and visitors alike. As of 2024, Mumbai's Lokhandwala Minerva holds the title of India's tallest completed building. However, once finished, the Palais Royale, also in Mumbai, is projected

to surpass it with an impressive height of 320 meters (1,050 feet), becoming India's tallest building. The tower, designed by the renowned firm Talati & Partners, symbolises the city's rapid urban development and architectural aspirations. Nestled in the upscale neighbourhood of Worli, Palais Royale is more than just a skyscraper; it's a marvel of engineering and luxury, rising gracefully over Mumbai's skyline and standing out as a beacon of modern India.

Tvasta Builds India's First 3D Printed Villa

India has reached a remarkable milestone in construction technology with the completion of its first 3D-printed villa. Developed by Chennai-based deep-tech startup Tvasta in collaboration with Godrej Properties, this innovative project sets a precedent for future sustainable building practices worldwide. Founded by IIT Madras alumni in 2016, Tvasta utilised advanced robotics and automation to bring this villa to life. Spanning 2,200 sq. ft., this G+1 villa was constructed on-site at Godrej Eden Estates in Pune using a specialised concrete 3D printer. 3D printing is a form of additive manufacturing used to construct three-dimensional objects by systematically



Credits: Vikas Singhal

layering material under precise computer control, enabling efficient and innovative building techniques.

By leveraging 3D printing technology, which constructs structures layer by layer, the project achieved a groundbreaking reduction in construction time, completing the villa in just four months; an impressive feat compared to traditional methods. A

key sustainability feature is the integration of recycled materials, minimising environmental impact. Additionally, the 3D-printed walls enhance insulation, leading to lower energy consumption and reduced utility costs, developing as an indicator of its eco-friendly potential.

This villa represents more than just a technological breakthrough; it signifies a

shift towards more efficient construction methods. By eliminating traditional formwork, 3D printing allows for greater architectural flexibility, enabling intricate patterns and complex designs. Beyond design possibilities, the technology offers significant economic and environmental benefits, including a reduction in labour costs and material waste.

Construction Chemicals: Innovation and Excellence in the Building Industry

V Jayachandran Nair, *Business Development Manager, Fosroc India*

Different types of high-quality chemical products are now getting introduced in the construction sector, focusing on creating solutions that improve the performance and longevity of construction materials. These construction chemicals covers a wide range of construction applications such as:

- **Concrete Admixtures** - A variety of concrete admixtures designed to improve the workability, strength, and durability of concrete are there. These include accelerators, retarders, water-reducing agents, plasticizers, and superplasticizers. These admixtures are used in ready-mix concrete, precast concrete, and even in highly demanding applications like high-rise buildings, tunnels, and dams.

- **Repair and Rehabilitation Products** - A comprehensive range of products for the repair, protection, and rehabilitation of concrete structures. These include repair mortars, epoxy coatings, and surface treatments, which help restore the integrity of damaged buildings, bridges, and roads, extending their life span and enhancing their safety.

- **Waterproofing Solutions** - Waterproofing is crucial in construction, particularly in

areas exposed to harsh weather conditions or high moisture content. Such waterproofing systems include liquid-applied membranes, cementitious coatings, and sealing systems that ensure buildings and infrastructure are protected from water ingress.

- **Sealants and Jointing Systems** - A variety of sealants and jointing systems to manage the expansion and contraction of materials in buildings and infrastructure are available now. These include silicone, polyurethane, and polysulfide-based sealants used in applications such as window joints, expansion joints in roads, and airport pavements.

- **Flooring Solutions** - Flooring systems that are designed to be durable, easy to maintain, and resistant to chemicals, abrasion, and heavy traffic. These products are widely used in commercial, industrial, and residential sectors, providing reliable flooring for both interior and exterior applications.

- **Specialty Products** - Specialized products like concrete repair mortars, corrosion inhibitors, and admixtures for use in specific environments, such as offshore oil rigs and power plants also are common.

- **Tile Adhesives** - High-quality adhesives which are designed for tile installation, ensuring excellent adhesion to a wide range of surfaces, including floors and walls. These tile adhesives are formulated to be water-resistant, durable, and suitable for use in both internal and external applications, making them ideal for both residential and commercial spaces. **Key Features:** Water resistance, high strength, easy application, and flexibility. **Applications:** Bathroom and kitchen tiling, outdoor spaces, and commercial flooring.

- **Concrete Bonding Adhesives** - These provide effective solutions for bonding new concrete to old or existing concrete surfaces. These adhesives ensure a strong bond between the surfaces, helping to eliminate the need for mechanical bonding methods such as scarifying or grinding.

Key Application areas:

- **Infrastructure Projects** - Different construction chemicals are used in a wide range of infrastructure projects, including roads, bridges, tunnels, dams, and airports. Concrete admixtures, waterproofing

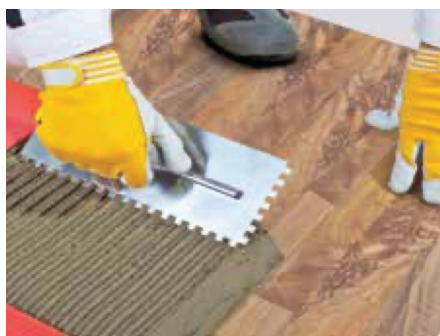


Image credit: www.fosroc.com

systems, and repair products ensure these structures are durable, safe, and resistant to environmental challenges.

• **Commercial and Residential Buildings** From skyscrapers to residential complexes, a wide range of products is applied in the construction of commercial and residential buildings. The solutions help improve the structural integrity, safety, and appearance of buildings while reducing the

long-term costs of maintenance and repair.

• **Marine and Offshore Structures** With a focus on corrosion resistance and long-lasting protection, there are specialized products for marine and offshore structures. These include anti-corrosion coatings, concrete repair systems, and protective treatments to ensure the integrity of structures exposed to harsh marine environments.

Fosroc Chemicals is now part of the Saint-Gobain Group, a global leader in designing, manufacturing, and distributing construction materials and solutions. The group is at the forefront of developing green construction chemicals that meet global sustainability standards, aligning with modern construction's push toward environmentally friendly and energy-efficient building practices.

Ask the Expert



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How do construction chemicals impact the safety and structural integrity of buildings, particularly in extreme weather conditions or high-risk environments?

Construction chemicals are essential for ensuring the safety and structural integrity of buildings, particularly in extreme weather conditions or high-risk environments.

A more detailed look at their influence is given below

1. **Improved Durability:** Waterproofing agents, sealants, and corrosion inhibitors protect building materials from moisture, chemicals, and environmental factors. This protection is crucial in areas prone to heavy rainfall, flooding, or high humidity, as it prevents deterioration and extends the lifespan of structures.

2. **Enhanced Structural Strength:** Concrete admixtures and other additives enhance the strength and flexibility of concrete, making it more resistant to cracking and structural failure under stress. This is particularly important in earthquake-prone regions or areas with heavy wind loads, where buildings must withstand significant forces. Adding more cement also improves concrete strength. Different special concrete are available in the market with addition of various chemicals to concrete.

3. **Thermal Insulation:** Insulating materials and coatings help maintain stable indoor temperatures, reducing the impact of

extreme heat or cold on the building's structure. This not only improves energy efficiency but also prevents thermal stress on building materials, which can lead to structural damage over time.

4. **Fire Resistance:** Fire-retardant chemicals can be added to building materials to enhance their resistance to fire. This provides crucial time for evacuation and reduces the risk of structural collapse during a fire, thereby protecting lives and property.

5. **Environmental Protection:** In high-risk environments, such as industrial areas, construction chemicals can protect buildings from chemical spills and other hazardous materials. This ensures the safety of occupants and the surrounding environment, preventing contamination and structural damage.

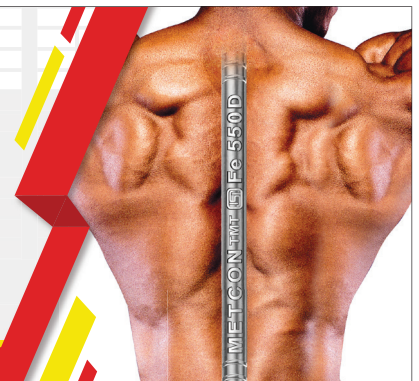
By incorporating these chemicals, buildings become more resilient and reliable, capable of withstanding various challenges posed by extreme weather and high-risk conditions. This ultimately contributes to the safety and longevity of the structures, providing peace of mind to occupants. Efficient use of construction chemicals generally saves resources and results in a better economy also.



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