

The crucial role of Form Release Agents

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Concrete is the most commonly used material in construction, and it is used for a wide range of products, from large infrastructure elements to small residential works. To create precise and smooth concrete elements, contractors and concrete factories rely on formworks into which the concrete is poured. The challenge with formwork is ensuring that the concrete can be easily released from the form after hardening without damaging either the surface of the concrete or the formwork itself. This is where concrete release agents come into play.

Concrete release agents, also known as form release agents or mould release agents, are applied to the surfaces of formworks to prevent the adhesion of freshly poured concrete. These agents ensure that the hardened concrete can be separated from the form without compromising its structural integrity, surface finish, or appearance.

This article explores what concrete release agents are, their types, how they work, their benefits, and how to choose the right agent for each application.

What Are Concrete Release Agents?

Concrete release agents are chemicals that form a lubricating layer between the formwork and the freshly poured concrete. This layer facilitates the smooth removal from the formwork, prevents damage to the surface from the concrete, and preserves the life of the form. Without the use of release agents, concrete can bond to the form, which can lead to undesirable results such as rough finishes, pitted surfaces, or even concrete cracking upon the formwork's removal.

Release agents can be applied to various types of formwork, including steel, wood, plastic, and fibreglass, and their composition can vary depending on the intended application and formwork material.

In the past, contractors and concrete factories were forced to use waste oil as a release agent because there was no such thing as a specified release agent.

Master Builders Solutions has been a manufacturer and supplier of MasterFinish release agents since 1991. With a dedicated team of specialists in the lab and in the field, we always have the possibility to serve our customers with the right type of release agent. The application method plays an important role in the performance of release agents. A thin layer is sufficient for a good release. Master Builders Solutions have a dedicated and experienced team to support customers in choosing the right spraying solution.

How Do Concrete Release Agents Work?

The mechanism of concrete release agents depends on the type of agent used. In general, these agents work by creating a hydrophobic barrier between the formwork and the fresh concrete. This barrier prevents the concrete from adhering to the form, making it easier to remove the concrete from the form after hardening.

Modern form release agents contain additives that interact chemically with the lime in the concrete. This interaction produces a soap-like film that reduces friction between the form and the concrete, ensuring easy release. The chemical reaction also prevents the buildup of cement residue on the formwork, extending its lifespan.

In this article, in the January 2024 edition of CPI, you can see the concrete surface after using different types of release agents: <https://www.cpi-worldwide.com/journals/artikel/70725>

Types of Concrete Release Agents

Concrete release agents are classified into different categories based on their chemical composition and mode of action. The most common types include:

1. Mineral oil-based release Agents

Mineral oil-based release agents are some of the most common used in the industry: suitable for almost all production methods on jobsite and precast industry, they have a very good compatibility with all kinds of formwork and concrete types. Since 2015 these products are classified as hazardous and marked with a label for aspiration toxicity. Because of this, the acceptance of mineral oil -based products is declining.

2. Vegetable oil-based release Agents

These are environmentally friendly alternatives made of plant-based oils or other biodegradable substances. Vegetable oil-based release agents have gained popularity due to their lower environmental impact, especially now that sustainability has become a priority. They often perform as effectively as their petroleum-based counterparts while reducing environmental risk.

3. Solvent-based release agents

Solvent-based release agents are designed to improve the surface appearance of concrete elements. These products contain a high share of Volatile Organic Hydrocarbons (VOC). They reduce the viscosity of the basic release agent formulation and increase the spray ability at lower temperatures. After evaporation of the VOC, a thin film of release agent remains on the formwork. This film enables an easy demolding of architectural concrete. The counterpart of this is that VOCs are not environmentally friendly and are harmful in terms of occupational health.

4. Water-Based Release Agents/Emulsions



To achieve excellent concrete appearances without the use of VOCs, Master Builders Solutions launched MasterFinish RL-211 in the '90s, a vegetable oil-based emulsion as a release agent. This product has been very successful and is still a benchmark in the industry.

Water-based release agents are more environmentally friendly than oil-based alternatives. These agents typically use water as a carrier for other chemicals that act as release agents. Water-based products are ideal for applications that require low VOC emissions. The quality of the concrete surface is higher because of fewer pores and a more evenly coloured surface.

5. Special Release Agents: wax, machine protection

Wax release agents are for very complex form shapes and excesses where oil is not strong enough to prevent sticking to the form. Machine protection oils are for truck mixers and mixing equipment at concrete factories for easier daily cleaning.

The use of the **right concrete release agents** in construction offers several key advantages:

1. **High-quality surface finish:** The use of appropriate release agents ensures that the concrete surface is smooth and free from imperfections like bug holes, pores, or rough patches.
2. **Extended formwork lifespan:** Release agents prevent concrete from sticking to formwork, reducing wear and tear. This extends the life of the formwork and reduces cost.
3. **Environmental Benefits:** Many modern release agents, particularly water-based and vegetable oil-based options, have a lower environmental impact compared to traditional oil-based products. This can help construction projects to meet environmental regulations and sustainability goals.
4. **Healthier environment** for employees to work in.

Choosing the Right Release Agent

Selecting the right concrete release agent depends on several factors:

1. **Type of Formwork:** Different materials like wood, steel, or plastic require different types of release agents.
2. **Production method:** Dry concrete, self-compacting concrete, late demolding, instant demolding, shaking table technology, heated forms, battery form
3. **Desired Surface Finish:** Projects requiring a high-quality finish, such as architectural concrete or decorative work, may benefit from water-based release agents.
4. **EHS Considerations:** For green building projects or those looking to minimize VOC emissions, bio-based or water-based release agents are preferred.



5. Budget: While bio-based or specialty release agents can offer superior performance or environmental benefits, they may also come at a higher cost. Balancing performance and budget constraints is the key.

6. Spraying equipment: to apply the right amount of release agent it is essential to use suitable spraying equipment. Master Builders Solutions can advise what the right options are for different production methods. To prevent very dirt and unsafe workplace along with optimal performance, the right application method is important.

Conclusion

Concrete release agents play an essential role in modern construction, improving the quality of concrete surfaces and extending the life of formworks. With various types available, from mineral oil-based to vegetable oil-based and water-based, contractors have a wide range of options to select the needs of specific projects. By understanding the properties and benefits of each type, construction professionals can choose the best release agent for their applications, ensuring both efficient construction processes and high-quality concrete finishes.

The **MasterFinish** portfolio from Master Builders Solutions offers a wide range of form release agents for every possible production type, from mineral oil to vegetable oil and water-based products. With experienced experts in the field and in our laboratory, we help our customers select the right type of release agent for their application. Even tailor-made solutions are possible.

We offer our service at our customers site and advice their crew on how to apply the required amount release agent.

