

# PROPER APPLICATION OF RELEASE AGENTS

## TECH NOTES



**R**elease agents, when properly used, aid in the stripping process, assist in producing sound defect-free concrete surfaces, simplify form cleaning and increase the working life of quality form surfaces. There are two main categories of form release agents:

- **Barrier** – those that provide a physical barrier between the form and the concrete (such as petroleum-based products, soaps, synthetic resins, waxes)
- **Reactive** – those containing fatty acids or other ingredients that react with the free lime in fresh concrete to produce a metallic soap interface between the form and the concrete (such as proprietary products and vegetable oils that are typically found in petroleum-based carrying agent products).



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## APPLYING RELEASE AGENTS

**R**elease agents should be applied to a clean form before the reinforcement has been placed to reduce the likelihood of inadvertently applying it to the reinforcement. If the release agent does come in contact with reinforcement it should be wiped clean before placing the concrete.

When applying a release agent it is best to follow the manufacturer's instructions. When too much form release is used, it is not only wasteful and inefficient, but it leads to a number of other associated problems with the finished product. He who holds the wand determines the amount of material being applied, so proper training is crucial. As a rule of thumb, remember: **Less is better**. The amount needed to affectively coat a form is only about 0.005 inches thick. The actual cover thickness will depend on the application method and viscosity of the product, which is related to the ambient temperature. Typically, the colder it is in the plant, the thicker, or more viscous, the release agent will be. The warmer it is the plant, the thinner, or less viscous, it will be. Different measures can be taken during the application process to account for changes in material temperature (viscosity) throughout the year.

### SPRAYING

Spraying is probably the most efficient and common method for applying release agents. Keep the wand moving when applying form release. Broad nozzle/flat spray tips have been found to give the thinnest and most uniform cover. It should be noted that as the temperature drops and viscosity increases, the spraying pressure should be increased and the nozzle orifice size reduced. As temperatures rise, reduce pressure and increase nozzle size. It is a good practice to soak or mop up any puddles that may have formed



at the bottom of the form. Remember: Less is better. Only through experience and training will you learn what works best for your plant's production line.

**CAUTION:** Fatty acids will react with brass, bronze, aluminum, grey ductile and malleable iron and mild steel, as well as some petroleum-based products used for making blockouts and other embedded items. It is best to use stainless steel, nickel or plastic for your spraying systems and to test for possible reaction of embedded materials prior to full implementation.

### SWABBING AND PAINTING

Swabbing and painting by hand is an acceptable application method, with the benefit of eliminating the majority of airborne particulate. On the negative side, applications tend to be thicker than necessary, leading to wasted material and the potential for additional problems.

### WIPING

Wiping is often the method of choice for architectural precasters concerned with a blemish-free surface. Wiping on release agents with a sponge or rag will normally result in the thinnest coating, but it is very labor intensive.

## DIPPING

Automated dipping systems are fast, labor efficient and ensure complete coverage. Excess material will usually drip back into a holding tank, reducing material waste. The application coat is often thicker than necessary, however, again creating the potential for future problems.

## SEASONING

Reactive form release agents, the most commonly used release agents in precast and pipe production, typically contain fatty acids. Fatty acids are mild acids composed of animal fats and vegetable oils. These fatty acids have a natural affinity for metal. They react with metal to form a protective barrier, which is a coating of metallic oleate. This process is known as seasoning. This protective layer prevents further application of fatty acids from migrating to the metal of the form and allows the fatty acid to remain on the surface of the form to react with the free lime on the surface of the casting. Seasoning serves two purposes. First, it enhances the easy separation of the form from the castings. Second, it enables free air to rise more easily on the vertical surfaces of the castings, resulting in fewer surface defects. Seasoning of forms is a very basic requirement to help minimize the amount of labor involved when forms are stripped or pipes are tipped out. If forms, pallets and headers are properly maintained, labor cost and better looking castings are the end result.

New forms, pallets and headers will frequently arrive with a protective coating on them to help prevent rusting in transit or until the forms are sold and delivered. In order to season these forms, the protective coating can be removed with solvents or



grinding and the form release applied liberally, allowing it to set for a minimum of four hours. A 24-hour period is better, as it allows more seasoning to take place. Also, forms that are exposed to the sun will season more quickly, as higher temperatures increase the reactivity with the metal forms and rings.

## CARE OF FORMS AND RINGS

At times, you may be storing forms inside or outside for short or long periods of time. Release agents can be used to protect this vital equipment from damage. For short-term or long-term storage, a good quality VOC-compliant petroleum solvent-based form release can be used by applying a liberal coating on the form. If the forms are stored outside, even for a short period of time, a quick walk-by is often necessary to ensure that the form release has not washed off from rain. If any evidence of rust is present, apply another coat of the form release on the forms and rings as quickly as



possible. A biodegradable form release is preferred, as over-application is desired and some of the material will end up on the ground.

## IDENTIFYING POTENTIAL PROBLEMS

Concrete is a highly variable material because it is comprised of raw materials that potentially have a lot of variability. It is often difficult to pinpoint exactly what causes a problem because it may be a combination of a number of factors. The following are two examples of common problems often associated with excessive form release agent coverage.

- **Staining** has been linked to the use of excessive release agents and the use of dirty forms. Dirt, dust, rust or grease can easily be transferred from a dirty form to the finished surface of the concrete product. Once a form has been properly cleaned and coated with release agent, proper measures should be taken to minimize the potential for dust and debris to collect on the form before casting.
- **Excessive bugholes** occur when barrier-type release agents are applied too heavily. Barrier-type release agents tend to encapsulate free air along the vertical sidewalls, which leads to surface defects. In contrast, the metallic soap formed when using a reactive release agent allows the free air on the vertical walls to rise more easily to the surface. Proper vibration practices also reduce bugholes. The potential for bugholes and staining can be reduced by selecting an application method that produces the thinnest coat of release agent in accordance with the manufacturer's recommendations. Release agent should not be allowed to collect and pool in the forms. Applying a thin coat, wiping up puddles and avoiding contact with reinforcing steel greatly improves the odds of producing a defect-free concrete product.

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