

Tipping floors require tough toppings

Exacting topping installation and timely maintenance and repair of concrete tipping floors keep waste facilities operating smoothly

BY WILLIAM S. PHELAN
AND MOORMAN L. SCOTT

After collection, solid waste is usually dumped on what are called tipping floors at facilities such as transfer stations, balers, and incinerators. Vehicles tip the garbage onto the floor and bulldozers or front end loaders push or scrape the material into pits. All this dumping, pushing, and scraping subjects floors to extreme abrasive forces of impact and attrition.

Conventional concrete floors lose the top inch of their surface in a few months under these harsh conditions. High-strength toppings and shake-on hardeners using mineral aggregates such as traprock, emery, or quartz break down quickly under impact because the aggregates are too brittle (see bar graph). Metallic shake-on hardeners can resist impact, but not for long because the hardened layer is only 1/8 inch thick. Only metallic toppings, installed at 1- to 2-inch thicknesses, can withstand the daily abuse tipping floors receive.

Picking the product

Tipping floors require the toughest of materials properly installed by competent contractors. Choose a metallic topping based on the product's successful record on similar projects. Metallic toppings are designed to achieve more than 12,000-psi compressive strength in 28 days at a screedable consistency. This strength must occur at the top surface.

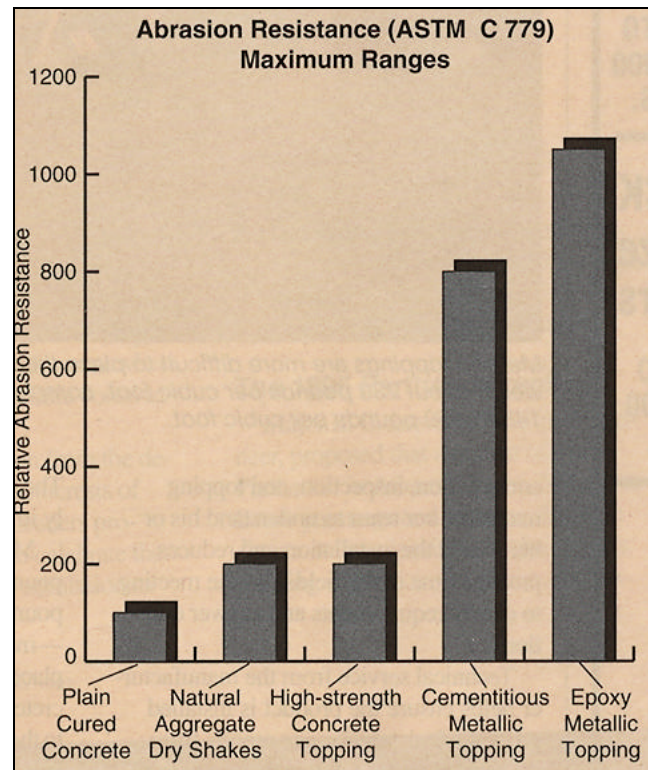
Cementitious metallic toppings are ready to use about 4 days after placement; they'll have reached

about 10,000 psi at this age. Epoxy metallic toppings can be ready for use after 36 hours if placed at 70°F or higher temperatures. Epoxy metallic toppings, though, cost about twice as much as cementitious metallic toppings at the same thickness; however, they can be applied at a minimum of 1/8 inch and have about 30% more relative abrasion resistance.

These toppings must be installed in accordance with the manufacturer's instructions. Any omission in the installation process results in a weakness that will cause the tipping floor to fail. And recurring repairs require too much downtime. Garbage collection and handling is a daily routine that can't be postponed.

Meeting before construction

A preinstallation meeting allows each member of the design, construction, inspection, and topping manufacturer team to understand



Only cementitious and epoxy metallic toppings provide enough abrasion resistance for concrete tipping floors in solid waste facilities. Epoxy metallic toppings cost twice as much as cementitious metallic toppings but have about 30% more abrasion resistance. Your choice depends on the amount of abuse the surface receives. This graph measures grinding resistance only.

his or her role in the installation and reduces practice time in the field. Use the meeting to clarify requirements and answer questions.

Technical service from the manufacturer helps ensure the product is installed properly. Insist on service reports from the service representative that include approvals of the various stages of the preparation for placement.



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Metallic toppings are more difficult to place than conventional concretes. They weigh about 230 pounds per cubic foot, compared with conventional concrete at 145 to 150 pounds per cubic foot.

Installing the floor

Before topping is placed, the base slab must have the correct surface texture or profile. An error in preparing the base slab texture or choosing the bonding agent could cause bond failure. The rough texture needed can be produced with a shotblaster or a grooving machine. Don't use sawed tooth blades on the grooving machine because they create too sharp a profile.

Bonding agent choice depends on the age of the concrete slab. For new slabs, wait about a week after placement then use a latex-based bonding grout so that water remaining in the concrete doesn't cause the bond to fail. For older slabs use an epoxy adhesive.

The topping mix also must be properly proportioned and mixed to avoid variations in slump, workability, and setting time that cause difficulties in finishing. The top surface quality can be significantly impaired by poor finishing.

Metallic toppings weigh about 230 pounds per cubic foot—that's about 80 pounds more than conventional concrete—making the toppings more difficult to place and finish than conventional concrete. Using a disk float helps bring water

to the surface if the topping is setting up too fast. At the preinstallation meeting, make sure a disk float will be available onsite; it isn't always needed, but when it is, it's the only equipment that's heavy enough to do the job on such a dense material.



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Proper 7-day curing for metallic toppings requires a double coat of high-solids curing material. If temperatures may fall below 50°F, use insulating blankets on the surface.

Inspecting the slab's condition

Even metallic toppings wear away eventually, usually in areas that receive higher than normal amounts of scraping and gouging. When the topping is gone, base concrete is subjected to the scraping and gouging and wears quickly, exposing reinforcing steel that may then be hooked by equipment and bent or even ripped from the slab. Everyone notices the floor problem when this happens. But by then, unfortunately, extensive repairs are needed.

To avoid expensive major repairs, owners should require a floor auditing program from one of the project participants—usually the topping manufacturer. The manufacturer agrees to inspect the floor quarterly on a washdown day. This is the only day available for inspection. When the floor topping has been worn down to a predetermined percentage of its thickness, repair procedures agreed upon earlier should be implemented.

In facilities with heavy tonnage dumped and large equipment used, repair might be needed after 1 year of service. In facilities with smaller equipment and lesser tonnage, the tipping floors may need repair after 3 years. Either way, after about one-third the thickness of the floor in general is worn away, repairs should be made. Gouges or small worn areas can be patch-repaired on an as-needed basis. 

William S. Phelan is senior vice president of marketing and technical services for RPM The Euclid Chemical Co., East Brunswick, NJ, and Moorman L. Scott, P.E., is vice president of RPM The Euclid Chemical Co., Cleveland, OH.

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