Epoxy grouts are ideal for commercial kitchens and industrial facilities that have special sanitary requirements. However, not all epoxy grouts are created equal. This bulletin addresses the challenges that epoxy grouts face in the presence of oleic acid, a by-product of animal and vegetable fats and oils that can become concentrated when no-rinse cleaning practices are used.

A mystery of grout deterioration
When the tile industry first observed issues with significant grout joint deterioration back in the 1980s, many manufacturers of epoxy grouting materials began to suspect that the recently developed no-rinse cleaning agents may have been strong enough to chemically degrade the epoxy grouts on the market at that time. Another theory was that maintenance personnel might not be following the products’ dilution instructions. To test these ideas, some manufacturers placed cured samples of their grout into solutions of these no-rinse cleaning agents at various dilutions. However, after months of exposure, little or no degradation of the grout samples was observed.

Grout continued to deteriorate in commercial and industrial food-preparation areas, whether the grout was epoxy (ANSI A118.3), furan (ANSI A118.5) or cement-based (ANSI A118.6 and ANSI A118.7). A new theory emerged that a combination of factors might be causing the degradation. Typically, the first signs of grout discoloration did not occur until after a few months of use. But, the grout damage would quickly progress to complete deterioration in areas subjected to no-rinse applications, eventually leading to contamination of the entire installation once food residue fell into and under deteriorated grout joints.

Then, MAPEI introduced testing that showed how the factors of cooking oil and dwell time combined with no-rinse cleaning agents to rapidly and completely disintegrate the samples. That discovery led to further investigation into what might actually be happening with those installations. It appeared that deterioration could be related to cooking oil or other foods, such as meat, that contain oleic acid.

The normal concentration of oleic acid in cooking oils varies from 0.5% up to 2%, which is not strong enough to significantly deteriorate grout joints, even after long periods of time. However, when these oils and food products are combined with no-rinse cleaning practices and products, the oleic acid concentration can jump as high as 30%. Hydrogenated oils such as margarine, cottonseed oil and peanut oil show even higher concentrations of oleic acid. When such solutions are left to dwell on the surface of grout joints, significant deterioration occurs rapidly.

Independent testing indicates that epoxy grouts from all manufacturers are negatively impacted by exposure to these high concentrations of oleic acid. This exposure causes significant damage that continues at an increasing rate as the deterioration progresses. Naturally, the most severe degradation usually occurs where meat products are prepared or cooking oils are spilled. Heat from ovens or fryers will speed up chemical reactions, which can accelerate the degradation. On the other hand, areas that are not in the vicinity of ovens and deep fryers often show no grout degradation, even when the same no-rinse cleaners are used.

Strategies for grout protection
There are a number of strategies to reduce the potential for deteriorated grout:

Product selection
When selecting a grout, consider the amount of chemical and physical abuse expected for the installation. Common A118.3 epoxy grouts are typically not dense enough to stand up to the high oleic acid levels seen in no-rinse environments. Selecting a grout that can withstand the rigors of the environment is a best practice.

For added chemical resistance to no-rinse cleaning agents, MAPEI has developed a higher-performance, “industrial-grade,” epoxy-based grout that exceeds ANSI A118.3 epoxy grout specifications and some portions of ANSI A118.5 furan grout specifications. This grout, Kerapoxy® IEG CQ, has been benchmarked against other epoxy grouts and shows the best resistance to chemical attack. Classified as ISO 13007 classification RG, Kerapoxy IEG CQ represents the best grouting option for commercial and industrial food-preparation areas, due to its high-performance characteristics as a reaction resin grout.

Maintenance
Because deterioration typically requires three things (oleic acid, no-rinse cleaners, and dwell time), removing any of these three components will reduce the likelihood of issues considerably. If properly installed and maintained, tile and grout can last the life-cycle of the installation. MAPEI recommends the use of neutral-pH cleaning products, clean-water rinses and conventional methods of cleaning in a well-planned and well-implemented maintenance schedule. Removing fatty residue regularly with a neutral pH cleaner and a thorough rinse can be enough to keep an epoxy grouted floor in top condition for many years.

If no-rinse methods of cleaning are used, even industrial-grade epoxy grouts can eventually succumb to the deterioration caused by strong acidic concentrations that can develop in commercial kitchens and industrial food-preparation environments. Therefore, a daily clean-water rinse is suggested as part of the cleaning regimen to significantly extend the service life of industrial-grade epoxy grouts, including Kerapoxy IEG CQ.
Research

Due to the variety of no-rinse cleaners available on the market and the diverse cleaning methods used, the user may need to conduct testing to determine the suitability of specific products for the installation. If assistance is needed in testing the effects of specific contaminants or cleaners on the epoxy grout, please contact MAPEI's Technical Services Department. This will help to set more realistic expectations about product performance for a particular environment.

Additional information on this topic is also available from MAPEI's Technical Services Department.