

Joint Sealant vs Joint Filler

Introduction

Semi-Rigid Joint Fillers and Joint Sealants are two very similar-sounding materials. While regularly associated with one another, they have very different physical properties and intended applications. This technical brief will discuss some of the key differences in these categories of materials and will explain why a semi-rigid joint filler is the correct choice for commercial, industrial, and polished concrete floors.

Flexible joint sealants have some key differences when compared to semi-rigid fillers. The primary function of a flexible joint sealant is to expand and contract with the concrete and keep the joints sealed off from dust, water, and other contaminants. These sealants are often used in exterior concrete joints and in interior expansion joints (around columns and where the concrete slab meets the inside of the exterior wall). Joint sealants are designed to be very soft, typically 25-40 on the Shore "A" scale, and do not offer any protection from heavy fork truck or cart traffic. To achieve the desired expansion, these materials must be installed extremely shallow, generally just half the width of the joint. This means a ¼" wide joint might only be filled 1/8" deep. When installed deeper, they quickly begin to lose their physical properties.

A soft, shallowly installed sealant offers no protection to the adjacent edges of the joint. When a hard wheeled cart or equipment rolls over a soft sealant, the sealant deflects, causing the wheel to come into contact with the fragile joint shoulder. The result is that the concrete is now damaged, and will continue to spall and deteriorate each time it occurs.

History

This led to the development of the semi-rigid joint filler back in the late 1970s. The goal was to achieve a joint filler material capable of offering protection to the joint edges from heavy transitional loads while being able to handle minimal joint expansion and contraction without causing internal out of joint cracking in the slab. The first semi-rigid fillers were made from epoxies. This was a big improvement over polyurethane sealants for joint protection and could accommodate slightly more movement than rigid epoxy fillers being used at the time. In the early 90s, the development of semi-rigid polyurea joint fillers emerged. With Shore A hardness levels ranging from 45-95, polyurea joint fillers offer the best of both worlds. The ability to handle fork truck traffic without deflecting, along with greater elongation to accommodate joint movement quickly made polyurea the preferred choice for semi-rigid joint fillers. For the typical warehouse or industrial environment, a joint filler with a Shore "A" hardness of 85 such as Hi-Tech System's PE85MI has become the industry standard.

Installation

As crucial as the hardness is, it is equally important that the material be installed at the proper depth. Unlike sealants, semi-rigid joint fillers should be installed at a minimum of one-inch depth. This allows for proper side wall adhesion to prevent "push down" from occurring from heavy transitional loads. Saw-cut joints are generally cut at 25% of slab depth. A full-depth fill (meaning full depth of the saw cut or 2 inches minimum in construction joints) is recommended to provide proper joint shoulder protection in facilities with multiple fork trucks. For facilities with a single fork truck and light to medium weight hard wheel cart traffic, a 1" minimum depth fill is recommended.

Due to the similarities in name and their proximity of usage, there is sometimes confusion surrounding the correct times to specify a joint sealant or a semi-rigid joint filler. Contributing to this, some manufacturers and suppliers will sometimes imply more expansion or elongation than the joint filler is capable of accommodating. For better or worse, elongation percentage has become an industry-standard measurement included on every joint fill tech data sheet. With concrete expansion and contraction joints expanding laterally from side to side, the elongation length wise does not tell you very much about how the material will perform. Keep in mind in order for the softer sealants to achieve their higher expansion, they must be installed at a depth less than the width of the joint itself. Needs to be installed at full depth fill and it leads to the following question. How can a semi rigid joint filler installed full depth offer expansion similar to an ultra soft sealant installed at 1/8" to ¼" depth? The short answer is, they can't. Its just not possible for a material to be both soft enough to accommodate extreme expansion and contraction while remaining hard enough to support forklift and equipment traffic.

It is also important to not go too far in the other direction and use a material that is too rigid to fill the joint. Using rigid materials like crack and spall repair products is not recommended for filling joints as they essentially end up welding the slab together. The result is out-of-joint cracking that is visible at the slab surface because the joints are not able to move.

The bottom line is that if you are filling a joint that will see any hard-wheeled traffic or heavy transitional loads, a semi-rigid joint filler is the best material for the application and will result in a longer-lasting floor. The American Concrete Institute agrees as they recommend ONLY semi-rigid joint fillers be used for saw cut joints in their "GUIDE TO CONCRETE FLOOR AND SLAB CONSTRUCTION".