ISSUE 1

Special Considerations When Using Epoxy Grout on Outdoor Installations

THE Foundation Report ©

Technology from the Leaders in Foundation Repair and Regrouting

Because epoxy grout and concrete absorb and dissipate heat rather slowly, cyclic temperatures between day and night cause uneven thermal expansion or contraction at various levels in the foundation. Uneven thermal expansion produces stresses that can exceed the strength of the weak link in the system. The weak link is usually the tensile strength of the concrete. In **Figure 1** the system is at thermal equilibrium and there are no stresses. In **Figure 2,** during the cooling cycle, the top portion of the grout contracts more than the lower surface.

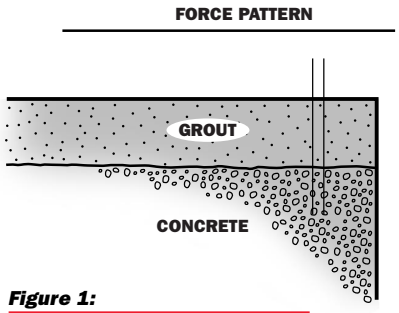


Figure 1:
The system at thermal equilibrium

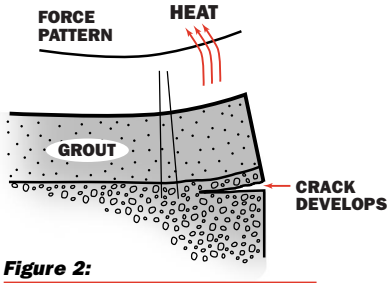


Figure 2:
The system during the cooling cycle

This gradient in temperature causes stresses that promote the curling of the epoxy at the corners. Because the tensile strength of the concrete is much lower than that of the epoxy, the concrete fails by cracking at the corner where the stress is the greatest. Typically the following day, as illustrated in **Figure 3,** during the heating cycle, the stress pattern reverses and any cracks created during cooling close up. The cycle is repeated as time progresses, and

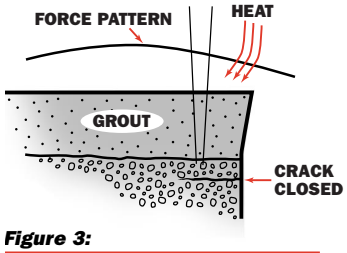


Figure 3:
The system during the heating cycle

each day the crack proceeds a little more until it eventually works its way to the edge of the equipment. Such cracks seldom cause a failure of the grout under the equipment. They do, however, provide a path for oil penetration to the concrete below. The thicker the grout, the greater the tendency for such cracks to develop. These cracks, which are the same as in the sketch in **Figure 4** illustrating an oblique view, can be virtually eliminated by utilizing one of the design techniques illustrated in **Figures 5, 6,and 7.**

The basis for these designs is the transfer of stress from the corners of the foundations. In other words, if a crack never gets started, it cannot proceed. The solution

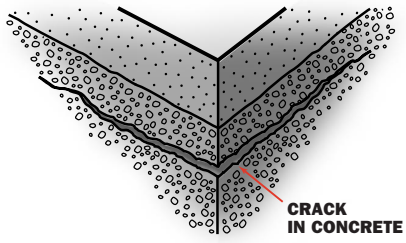


Figure 4:
An oblique view to corner cracking in foundation

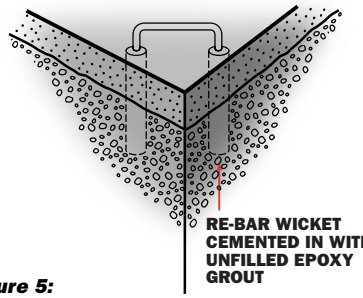


Figure 5:

shown in **Figure 5** transfers the stress from tensile stress at the corners to internal shear. The solution shown in **Figure 6** also transfers the stress to shear by utilizing the area on the back side of the key.

The solution shown in **Figure 7** changes the cross-section dimensions of the shoulder, making a relatively inflexible configuration.

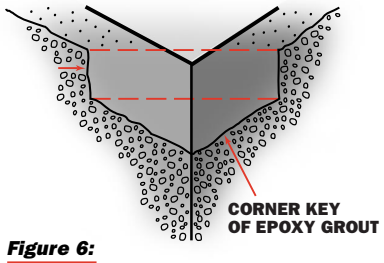


Figure 6:

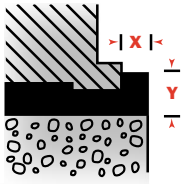


Figure 7:
Changing dimensions of shoulder to X less than Y

Reprints of this and other reports are available. For more information or recommendations on specific repairs, please call or write:

Adhesive Services Company

The Foundation Specialists

P.O. Box 40907
Houston, Texas 77240-0907
713.896.0526
Fax: 713.896.1003

www.adhesiveservices.com