

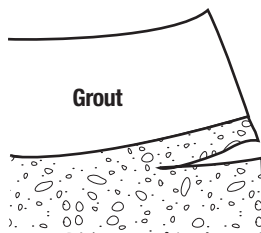
Edgelifting in Epoxy Grouts

Causes and Prevention

Edgelifting is a term generally used to refer to horizontal cracks around the edges and corners of grouted foundations (see Figure 1). The crack starts on the vertical concrete surface just below the grout/concrete interface and may extend back under the grout from 2–6" (51–152 mm). This cracking is usually accompanied by slight upward movement at the edge. This movement is called “edgelifting” or “curling.”

The initial cracking occurs when the shear stress near the concrete/grout interface exceeds the strength of the concrete. The shear stresses are a result of a combination of factors. When the grout cures there is a certain level of trapped stress caused by the combination of the curing shrinkage and the exotherm of the grout. Additional stresses occur as the grout and foundation undergo thermal cycling. Stresses created during thermal cycling are caused by uneven heating and cooling in various parts of the structure and by differences between the coefficient of thermal expansion of the grout and the concrete.

FIGURE 1



The potential for edgelifting is increased by these factors:

1. High maximum curing temperatures increase the stress that causes edgelifting. Conditions contributing to high maximum curing temperatures include: pouring large amounts of grout in one pour, placing the grout at high ambient temperatures without taking precautions to reduce the exotherm or using an epoxy grout that is not designed for large pours.
2. Large temperature swings will increase the tendency to edgelift by increasing the effects of the differential coefficient of expansion. In cold weather the grout will tend to curl up as it tries to shrink more than the concrete.
3. Wide overpours and long grout lengths have a greater tendency to edgelift.
4. Low concrete strength or inadequate surface preparation increases the tendency to edgelift since the poor quality concrete will fail at lower stress levels than good quality concrete.
5. Grout that has been placed with less than the manufacturer's specified amount of aggregate has an increased tendency to edgelift. There are two reasons for this tendency. First, the exotherm of the grout will be higher than intended, and second, the coefficient of thermal expansion will be higher than expected.

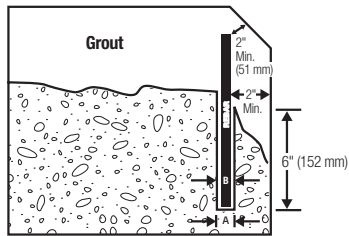
The following precautions can be taken to minimize edgelifting:

1. The concrete surface should be prepared by chipping down to sound concrete (3,500 psi [24 MPa] minimum compressive strength). Loose and broken pieces must be removed. The surface should be dry and dust-free before the grout is poured.
2. Where possible, the edges of the concrete foundation should be chamfered at least 2–4" (51–102 mm) at approximately a 45° angle.
3. The overpour should be reduced to a practical minimum. When large overpours cannot be eliminated, the overpours should be “tied” to the foundation with dowels or wickets.
4. Eliminate sharp corners in the grout to reduce stress concentration at the corners. Chamfer the edge of the grout corners by 1–2" (25–51 mm) using chamfer strips on the forms.
5. Do not deviate from the manufacturer's specifications for placement temperature limits, and do not leave out more aggregate than is suggested by the manufacturer.

Procedures for using dowels or wickets to prevent edgelifting:

1. Dowels should be preplaced at strategic locations around the base of the concrete as shown in Figure 2. The dowels are similar to the vertical reinforcing steel described earlier and are installed in the same way.
2. Wickets provide the strongest anchor between the grout and the concrete base. They are made from U-shaped pieces of rod or rebar and are installed as shown in Figure 3. If wickets are not used, dowels should be utilized instead.

FIGURE 2



A = 1" (25 mm) larger than rebar diameter
B = 1/2" (13 mm) diameter min. 3/4" (19 mm) recommended

FIGURE 3

