Concrete Basics

Isolation and expansion joints

Slabs on grade may contract, expand, or settle under service conditions. If these movements are restrained, slabs can crack or buckle (Fig. 1). Isolation joints in interior slabs on grade allow horizontal and vertical movement between the slab and adjoining structures such as walls, columns, or equipment bases.

Isolation joints

To form isolation joints at walls, attach preformed joint filler to the wall, extending it through the full depth of the slab but not above the top surface. You can attach the filler to the wall with concrete nails. In some cases, specifications require removing the top of the preformed filler and caulking the joint with an elastomeric sealant. To simplify this step, some manufacturers make joint fillers with removable top portions. For lightly loaded slabs, such as residential basement floors, you can use two or more layers of roofing felt instead of the preformed joint filler, and no sealant is needed.

To isolate columns from floor slabs, use diamond or circular blockouts. Diamond blockouts (see photo) are typically formed with wood forms, which are erected before the floor is placed. After workers place the floor and the columns are carrying full dead load, strip the wood forms, attach preformed joint filler, and then place concrete in the diamond. You can use similar procedures for circular blockouts, which are usually formed with disposable fiber tubes or leave-in-place steel forms.

As an alternative to blockouts, you can install pinwheel joints. For these joints, simply wrap columns with a premolded joint filler and cut staggered contraction joints as shown.
with a premolded joint filler and cut staggered contraction joints, as shown in Figure 2.

Expansion joints
Several publications from the American Concrete Institute and American Concrete Pavement Association discourage the use of internal expansion joints in parking lots, pavements, and sidewalks. Expansion joints are recommended for use only to separate sidewalks from driveways, driveways from garage slabs, pavements from bridges or other fixed objects, and parking lot slabs from light-standard foundations, planters, and buildings. The rationale is that once concrete dries and shrinks, any subsequent expansion can be accommodated by closing of the contraction joints.

However, many cities require expansion joints in sidewalks to prevent blowups caused by thermal expansion. Specified spacing of such joints may range from 25 to 100 feet. Experienced sidewalk contractors recommend cutting the specified spacing in half when concrete is placed in cool, late-fall weather. If concrete is placed at 50°F and later reaches temperatures as high as 100°F, a 100-foot-long section can expand more than \( \frac{3}{8} \) inch, which is enough to cause a blowup if the contraction joints can’t accommodate the expansion.

References