Questions in this column were asked by users of ACI documents and have been answered by ACI staff or by a member or members of ACI technical committees. The answers do not represent the official position of an ACI committee. Comments should be sent to rex.donahey@concrete.org.
Tolerances for placement of the shoring system are typically included in the general drawing notes prepared by the shoring specialty engineer. For soldier piles, assume a tolerance of 2 in. (away from the structure) and zero tolerance for mislocated substrate encroaching on the nominal design thickness of the structural concrete foundation walls.

In most cases, where several levels of substrate below grade require waterproofing, the waterproofing consultant should also certify the waterproofing installation is acceptable before accepting the substrate and starting the concrete scope.

Waterproofing Substrate for Foundation Mat Reinforcing Steel

On some projects, a protection slab or protection board is specified to protect a waterproofing membrane from damage during installation of reinforcing steel and other follow-on work installed by multiple trades. On other projects, the mat slab reinforcing steel is placed directly on top of the waterproofing membrane substrate. Despite all good intentions, damage to the membrane substrate inevitably occurs when reinforcing steel bars are placed production-style on schedule-driven projects.

Suggest writing a qualification clause in bid proposal letters that excludes the cost of such “trade damage” and instead request the owner carry an allowance to cover repairs of incidental (and inevitable) damage to the waterproofing membrane substrate. If this approach is unsuccessful, suggest photographing the entire surface of the waterproofing membrane prior to accepting the substrate and then carefully monitoring the work of all trades (reinforcement, electrical, plumbing) who can possibly contribute damage. Because the costs to repair waterproofing substrate can quickly escalate, this topic should be discussed with all parties—including the waterproofing inspector—during the preconstruction conference and before the concrete contractor accepts the substrate.

Metal Deck Substrate: Structural Steel Buildings

According to ACI 117-10, Section 4.4.1, there is no tolerance requirement for the location of the top of the concrete slab placed on a metal deck substrate. This is one work scope where almost all the slab formwork (that is, the sheet metal surfaces defining the soffits and slab edges) is installed by others. Responsibility and risk associated with tolerances for slab-edge locations, opening sizes/locations, and other substrate features are also shifted outside of the concrete contractor’s scope.

In some cases, the timing of acceptance of a metal deck substrate by the concrete contractor can come into play, especially in the case of multistory buildings. Consider the case of the American Society of Concrete Contractors (ASCC) member who bid a multistory project under the assumption that the floors would be placed using a 25% fly ash mixture during the summer. After schedule delays pushed the work into the winter, the member’s labor costs to install the work increased dramatically. The low ambient temperature, combined with the shade created by overhead structural steel and metal decks, resulted in slow setting times and forced finishing crews to be on-site far longer than had been anticipated for a summer placement. Although the concrete contractor accepted the substrate, the company also requested a change order to cover costs associated with crew overtime and accelerating admixture, using “ASCC Position Statement #15: Setting Time Expectations for Hard-Trowel Finishing” as justification.

Other issues that can arise during placement on metal deck substrates should be neutralized during bid time, long in advance of the work. For example, design callouts in many project specifications require metal deck panels to be vented, apparently based on an assumption that allowing mixing water to drip through the deck will reduce slab moisture content and reduce the delay required prior to the application of flooring materials. A position statement issued by the Steel Deck Institute (SDI) explains that, in most cases, vented deck is not required. Further, the statement indicates that slabs on metal deck should be considered to behave like slabs-on-ground placed on vapor barriers when assessing potential moisture issues. For the concrete contractor, vented deck adds labor costs to the project for cleanup during and after placements. It is in the owner’s best interest for the concrete contractor to question the need for this substrate item early, during the bid process.

References


Thanks to Jim Klinger, Concrete Construction Specialist, American Society of Concrete Contractors, St. Louis, MO, USA, for providing the answer to this question (based on Klinger, J., “Getting the Record Straight on Substrate,” published in the May 2021 edition of ASCC’s newsletter The Voice).