

Proof-Rolling of a Prepared Base

Q *Is there a standard specification that defines the method and acceptance criteria for proof-rolling of the prepared base for a slab-on-ground?*

A There is not a standard specification for proof-rolling. However, proof-rolling is required in Section 11—Industrial Floor Slabs, of ACI 301-20, “Specifications for Concrete Construction.”¹ Specifically, Section 11.3.1 instructs the contractor to “Proof-roll prepared base in accordance with Contract Documents,” and the corresponding note in the Mandatory Requirements Checklist instructs the specifier to “Specify proof-rolling procedure, method of acceptance, and corrective requirements if unacceptable material is identified. Refer to ACI 302.1R and 360R for guidance.”

ACI 360R-10, “Design of Slabs-on-Ground,”² also states: “There are no standards for proof-rolling, and quantitative assessment cannot be made from its use.” However, that document also indicates that “proof-rolling usually refers to driving a loaded vehicle in a grid pattern over the subgrade in an effort to locate soft and compressible areas at or near the surface. This should be a part of the quality assurance process for the soil-support system and should be documented in the project specifications.” ACI 302.1R-15, “Guide to Concrete Floor and Slab Construction,”³ also states that “In most cases, proof-rolling results are much more indicative of the soil-support system’s ability to withstand loading than from the results of in-place tests of moisture content or density.”

ACI 360R and ACI 302.1R provide recommendations for proof-rolling that can be developed into specification language. Their recommendations include:

- Proof-rolling should be observed and evaluated by the designer, the designer’s representative, or the owner’s geotechnical engineer;
- Use a loaded tandem-axle dump truck, a loaded concrete truck, a roller, or equivalent, in multiple passes using a preestablished grid pattern for proof-rolling;
- Take corrective action if rutting or pumping is greater than 1/2 in. (13 mm). Repeat proof-rolling to verify the corrective action;
- Proof-rolling can be used after stripping (before any fill is placed), after installing the fill, and after placing the base course; and
- Proof-rolling should be scheduled so that remedial work does not interfere with the construction schedule.

The following examples illustrate commonly used specifications for proof-rolling:

Example A: 100% proof-roll at least 1 day prior to slab placement, using a loaded, 40,000 lb (18,144 kg) gross vehicle weight (GVW) tandem-axle truck. Reconstitute any areas that pump or rut 1/2 in. (13 mm) or more. During slab placement, redress and reroll any areas as needed to maintain the plus tolerance on the specified slab thickness and minimize slab thickness variations resulting from ruts formed by equipment tires.

Example B: Proof-roll earthwork, base, or both to locate unstable areas. Use rollers that weigh 25 to 50 tons (23 to 45 tonnes). Perform proof-rolling as directed by the inspector. Adjust the load and tire inflation pressures within the range of the manufacturer’s charts or tables as directed. Make at least two passes with the proof-roller and offset each pass by no more than one tire width. Operate roller at a speed between 2 and 6 mph (3 to 10 km/h). If an unstable or nonuniform area is found, correct the area in accordance with the applicable specification item.

Example C: Proof-roll subgrade below building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades:

- Proof-roll with a loaded, 10-wheel, tandem-axle dump truck weighing at least 15 tons (14 tonnes);
- Completely proof-roll in one direction and repeat in the perpendicular direction. Limit vehicle speed to 3 mph (5 km/h); and
- Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by architect, and replace with compacted fill as directed.

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References

1. ACI Committee 320, “Specifications for Concrete Construction (ACI 301-20),” American Concrete Institute, Farmington Hills, MI, 2020, 69 pp.
2. ACI Committee 360, “Guide to Design of Slabs-on-Ground (ACI 360R-10),” American Concrete Institute, Farmington Hills, MI, 2010, 72 pp.
3. ACI Committee 302, “Guide to Concrete Floor and Slab Construction (ACI 302.1R-15),” American Concrete Institute, Farmington Hills, MI, 2015, 76 pp.