

What is the Appropriate Definition for Cold Weather?

Q. *I'm working on a specification for a project that will require cold weather concreting. When searching ACI documents for information on when cold weather provisions apply, I found two different definitions in documents written by ACI Committee 306, Cold Weather Concreting. Which definition should I use in the project specifications?*

A. Differing definitions of cold weather in ACI 306.1-90, "Standard Specification for Cold Weather Concreting,"¹ and ACI 306R-16, "Guide to Cold Weather Concreting,"² are a common source of confusion and dispute. The definition in ACI 306.1, developed over 30 years ago, is confusing and harder to enforce than the more recently developed definition in ACI 306R-16.

The definition in ACI 306.1-90, Section 1.2, states:

"Cold weather—a period when for more than three successive days the average daily outdoor temperature drops below 40°F. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. When temperatures above 50°F occur during more than half of any 24 hour duration, the period shall no longer be regarded as cold weather."

While the updated definition in ACI 306R-16, Section 2.2, states:

"cold weather—when air temperature has fallen to, or is expected to fall below, 40°F (4°C) during the protection period; protection period is defined as the time recommended to prevent concrete from being adversely affected by exposure to cold weather during construction."

There is never a dispute between these definitions in the dead of winter in a cold weather climate. Confusion between these definitions occurs when borderline cold weather conditions exist, typically as we are entering or exiting the cold weather season or for projects located in more moderate climates that may not experience detrimental low ambient temperature conditions on a regular basis. For example, at the time this Q&A was written, the projected 3-day temperature forecast in Winslow, AZ, USA, was:

- Day 1: high of 58°F (14°C)/low of 32°F (−2°C)—an average of 45°F (7°C);
- Day 2: high of 55°F (13°C)/low of 25°F (−4°C)—an average of 40°F (4°C); and
- Day 3: high of 62°F (16.7°C)/low of 29°F (−1.7°C)—an average of 45.5°F (7.5°C).

Do these conditions meet the ACI 306.1-90 specification definition for cold weather? Unfortunately, no.

Would we want to be "standin' on a corner in Winslow, Arizona 🎶"³ when our unprotected slab is exposed to freezing ambient temperatures at night? Definitely not! So, take it easy and use the updated definition.

The ACI 306.1-90 definition was an initial attempt at developing a specification definition for determining when cold weather protection should apply. Cohorts of ACI Committee 306 have since updated the definition for cold weather to reduce cold weather protection risks in borderline conditions, simplify clarity for when cold weather protection and associated costs should apply, and make cold weather provisions easier to enforce. Both definitions have the same intent; however, the updated definition reduces risk and is easier to understand/implement. Disputes/issues between the two definitions commonly occur because the original definition still exists in a specification document with mandatory language, while the recently updated definition exists in the ACI 306R-16 guide, not written in mandatory language.

It is recommended that specifiers developing new construction documents modify the ACI 306.1-90 cold weather definition specification language to reflect the updated cold weather definition recommended in the more recently published guide. If contractors are presented with plans and specifications that include the old ACI 306.1-90 definition for cold weather, the safest way to address the definition conflict would be to state that the updated definition will apply as part of a bid proposal. If the definition conflict is not addressed by the bid proposal, it is recommended that contractors submit a request for information (RFI) to the design team, seeking clarification of the definition and requesting that the project use the updated ACI 306R-16 guide definition for cold weather.

References

1. ACI Committee 306, "Standard Specification for Cold Weather Concreting (ACI 306.1-90) (Reapproved 2002)," American Concrete Institute, Farmington Hills, MI, 1990, 5 pp.
2. ACI Committee 306, "Guide to Cold Weather Concreting (ACI 306R-16)," American Concrete Institute, Farmington Hills, MI, 2016, 24 pp.
3. The Eagles, "Take It Easy," released May 1972.

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