

COLD WEATHER CONCRETING

BEST PRACTICES QUICK GUIDE FOR CONTRACTORS



Cold weather conditions exist when the air temperature has fallen to, or is expected to fall below, 40°F during the protection period (ACI 306). It slows hydration, extends set times, and puts fresh concrete at risk of freezing before it gains strength. Early-fall and late-spring nights can qualify, too.

NOV DEC JAN FEB MAR APR
TYPICAL MICHIGAN COLD WEATHER SEASON

KEY NUMBERS

40°F

Air temperature that triggers cold weather practices

55°F

Minimum concrete temp as placed (sections under 12 in.)

50°F

Minimum concrete temp to maintain for at least 3 days

500 psi

Strength needed before concrete can survive a single freeze

75%

Design strength before protection comes off (3,000 of 4,000 psi)

PLAN & PREP

- ▶ Check the full forecast: look at overnight lows for the entire protection period, not just pour day.
- ▶ Protection on site first: have blankets, poly, straw, and/or heaters on site before the first truck arrives.
- ▶ Schedule wisely: pour early in the day. Avoid late-day placements that won't set before overnight freezing.
- ▶ Right-size the pour: keep placements small enough for the crew to finish and cover before temperatures fall.
- ▶ Never place on frozen ground: subgrade must be at least 40°F and within 20°F of the concrete temperature. Thaw with ground heaters or blankets.
- ▶ Clear everything: remove snow, ice, and frost from forms, reinforcement, and subgrade before placing..

MIX DESIGN

- ▶ Speed up strength gain: add cement, substitute Type III, or use an accelerator meeting ASTM C494 (Type C or E). Use non-chloride accelerators with reinforcing steel or embedded metal.
- ▶ Watch SCMs: fly ash and slag cement slow hydration. Adjust with your supplier.
- ▶ Keep air in: entrained air is still required for freeze-thaw durability. Maintain $w/cm \leq 0.45$.
- ▶ Heated materials: heated water or aggregates keep delivered concrete in the 55–70°F range. Hotter is not always better: it costs slump and raises cracking risk.

BEFORE YOU POUR

- ☐ 3-day forecast lows checked
- ☐ Subgrade 40°F+, no frost
- ☐ Blankets & heaters on site
- ☐ Cold weather mix confirmed
- ☐ Thermometer on hand
- ☐ Crew sized to finish & cover

PLACEMENT & FINISHING

- ▶ Check temperature at the truck: test and record concrete temperature (ASTM C1064) on every load.
- ▶ Expect a longer window: set times stretch in the cold. Wait for bleed water to evaporate; never finish it in.
- ▶ No shortcuts: don't add water at the site or dust dry cement to speed up finishing.
- ▶ Vent heaters outside: exhaust from fuel-fired heaters in an enclosure carbonates the fresh surface, leaving it soft and dusting.

PROTECTION & CURING

- ▶ Cure immediately: begin curing within 30 minutes of texturing. Curing compound (ASTM C309) is not frost protection; check the product's minimum application temperature.
- ▶ Cover right away: insulated blankets, straw, or heated enclosures keep concrete at 50°F or above for at least 3 days.
- ▶ Edges and corners first: keep blankets in full contact and double up at edges and corners, where heat is lost fastest.
- ▶ Monitor: check and record temperature under the blankets daily.
- ▶ Remove gradually: limit the temperature drop to 50°F in the first 24 hours after protection ends to avoid thermal cracking.

FOR YOUR CUSTOMERS: TIPS FOR THE FIRST WINTER

- ▶ No deicers the first winter. Use sand for traction.
- ▶ After that, never use magnesium or calcium chloride, fertilizer, or water-softener salt.
- ▶ Apply a silane/siloxane penetrating sealer 30+ days after placement once any C309 compound has worn off. (Reminder, the concrete must be completely dry and check the application temperatures of the sealer),

References: ACI PRC-306 Guide to Cold Weather Concreting; ACI 308R Guide to External Curing; MCA Exterior Concrete Finisher Manual.

For more information, please visit our website at

www.miconcrete.org/cold-weather-concreting