The PUDLO Essential Guide to Cold Weather Concrete

How does cold weather affect concrete?

Low, especially freezing temperatures are harmful to concrete so additional measures must be taken when placing it in cold weather. Young concrete, if allowed to cool below freezing, may be damaged, therefore potentially making it unfit for use. If temperatures drop below zero the concrete will develop strength slower than that of concrete placed during warmer, ambient temperatures.

What practical measures need to be taken?

Two different temperatures need to be taken into consideration - ambient air temperature and concrete temperature. Provided that concrete is able to reach strength of about 2 N/mm^2, it is likely to resist disruptive expansion. For most concrete mixes, this strength is achieved in the first 48 hours, providing the concrete is kept above 5^0C. It is important to also remember that low temperatures will delay the development of concrete strength.

What happens if the temperature is low and no frost is present?

There is minimal risk to the concrete for premature damage if the temperature does not drop below freezing. It is vital that striking formwork is delayed as much as possible to allow the concrete to cool to avoid thermal shock. Striking formwork too early may result in the concrete being too weak to carry its own wait and it may collapse. Across the industry there are no exact rules as to when formwork should be struck as the rate of strength gain depends on many factors outside of the ready-mix concrete supplier's and PUDLO's control. These factors depend on, and are not limited to, concrete mix design, aggregate, reinforcement, formwork type, ambient temperature, etc. It is important to note that concretes containing ground granulated blastfurnace slag (GGBS) or pulverised fly ash (PFA) harden at a slower rate, therefore striking times should be extended.

What happens if minor frost at night is present?

Firstly, all freshly placed concrete should be placed on a surface that is free from ice and snow at a minimum temperature of 2^0C. Concrete should also be placed and protected as soon as possible onsite. The temperature of the concrete should be no less than 5^0C (preferably 10^0C).

What happens if there is severe frost during the day and at night?

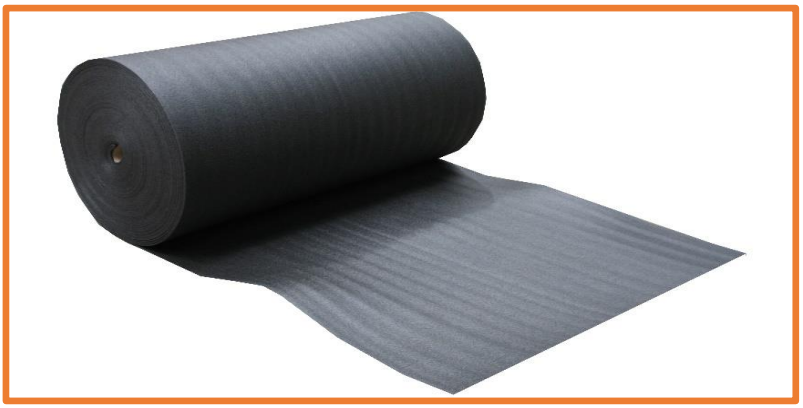
It is recommended that there is a requirement for heated concrete, preferably 10^0C at the time of delivery. Once the concrete has been placed and frost blankets deployed, hot air blowers can be used to give enough heat in conjunction with low tents of polythene or tarpaulin. Note: It is important that heaters are positioned to avoid the concrete being dried out. As standard, all concrete needs to be properly cured with a spray-on compound. DO NOT

What protection measures can be put in place?

There will be occasions when ready mixed concrete companies will be unable to guarantee temperature at delivery and the contractor will need to decide if they can adequately protect the concrete.

There are a number of different ways to protect the concrete. These include:

- Leaving formwork up for longer periods (timber formwork offers sufficient insulation). Steel formwork is a poor insulator; therefore, you should consider fixing insulated materials to the back of the formwork.
- Use frost blankets.
- Use foam mats.
- Erect temporary covers and provide heating with space heaters.



Part of the DB Group

Tel: 01954 780687
W: www.pudlo.com
E: sales@pudlo.com