

Using Concrete in Cold Weather



Additional care must be taken when placing concrete in cold weather. If young concrete is allowed to cool below freezing point it may be damaged to such an extent that it will be unfit for use. It should be noted that even if temperatures do not drop below zero the concrete will develop strength significantly slower than during the warmer ambient temperatures.

The following is advice on practical measures that need to be implemented when concreting in cold weather.

Two different temperatures have to be considered when working with concrete in cold weather, firstly the ambient air temperature and secondly the concrete temperature at time of delivery.

The following advice makes it clear as to which is being referred to, it is very important not to confuse the two.

If freshly placed concrete cools below 0°C the water in the mix will freeze and expand. This could damage the concrete so much that it becomes useless and has to be removed.

However, provided the concrete is able first to reach strength of about 2 N/mm², it is likely to resist this disruptive expansion. For most mixes this strength is achieved within 48 hours if the concrete is kept at or above 5°C. However, even after the concrete has reached 2 N/mm² low temperatures will slow down the strength development.

The aim therefore, during cold weather, must be to keep the concrete warm (above 5°C) for the first 48 hours and then ensure that the strength is permitted to develop, albeit at a lower rate.

The severity of the weather determines the precautions that need to be taken. For the purposes of concreting, cold weather can be divided into the following three categories:

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Ambient temperature below 5°C but no frost.

If the temperature is low but does not drop below freezing there is minimal risk that the concrete will be permanently damaged but it will take longer to develop strength and set.

It is important that formwork is not removed too soon otherwise there is a risk that corners and arises could be knocked off and that concrete in beams and suspended slabs may be too weak to carry its own weight and may collapse.

It is impossible to give definitive rules as to how long formwork should be left in place as the rate of gain of strength depends on many factors outside Ronez control, including the ambient temperature.

Minor frost at night.

Fresh concrete must be prevented from freezing so all freshly placed concrete must be protected as soon as practicable. The temperature of concrete at time of delivery should not be less than 5°C.

There will be occasions when Ronez cannot guarantee this temperature at delivery and you will need to decide whether you can adequately protect the concrete in these circumstances if you wish to proceed placing concreting.

Necessary protection includes frost blankets and insulated formwork. Timber formwork by itself often offers sufficient insulation and, when used for beams, columns and walls, the only additional precaution necessary is to cover the exposed surfaces with insulating material or erect temporary covers and provide heating with space heaters.

Prior to placing – ensure that sub-bases, formwork, reinforcement and any transporting or placing equipment is free from ice and snow.

Severe frost day and night.

Heated concrete is not available from Ronez so it is advisable to delay concreting until the ambient temperature has risen above 2°C.

If young concrete is allowed to cool below freezing point it may be damaged to such an extent that it will be unfit for use.

It should also be noted that even if temperatures do not drop below zero the concrete will develop strength at a greatly reduced rate and initial setting will be significantly slower.

For Further advice please contact the Technical team.

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