Chapter

3.2

Cold weather working

This chapter gives guidance on meeting the Technical Requirements for cold weather working.

Figure reference table

Figure Reference Table 3.2			
Fig No	**Title/Description**	**Clause**	**Page**
Figure 1	Protection from frost	3.2.3	2
Figure 2	Protection from frost	3.2.4	2
Figure 3	Protection from frost	3.2.5	3

3.2.1 Compliance

Also see: Chapter 2.1

Cold weather working shall comply with the Technical Requirements.

Sitework which complies with the guidance in this chapter will generally be acceptable.

3.2.2 External conditions

Also see: Meteorological Office

Allowance shall be made for cold weather conditions during construction.

Work should be planned in advance, and account taken of site and climatic conditions either by:

- stopping work, or
- taking adequate precautions.

The following conditions should be considered when scheduling work:

- wind (this can create a cooling effect which can reduce temperatures further ie, affecting the curing of concrete and mortar)
- shade (in particular, high trees or adjacent buildings can block low winter sun and reduce temperatures further)
- valleys (sites in valleys are susceptible to increased risk of frost).

Where air temperature is below, or likely to fall below, 2°C, work should not proceed unless the precautions detailed in this chapter are adopted.

A thermometer should be sited in the shade and used to indicate if temperatures are rising or falling.

3.2.3 Materials

Materials shall be adequately protected against cold weather.

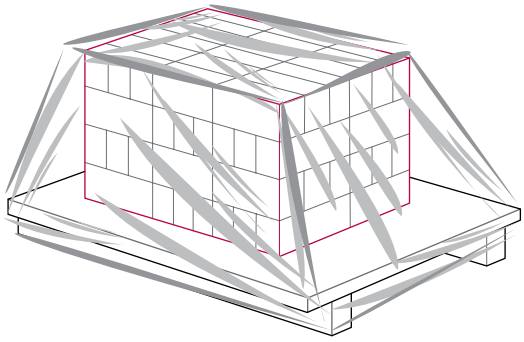
Materials should:

- not be used if frozen
- be protected using appropriate covers to prevent damage by snow, ice, frost or damp.

Appropriate covers should be provided for bricks and blocks, sand, aggregates and cement, to prevent them from becoming saturated and damaged by frost.

Where it is necessary to continue building during longer periods of colder weather, heaters should be used to protect materials.

Figure 1: Protection from frost



3.2.4 Concreting

Also see: BS EN 13670 & the National Structural Concrete Specification

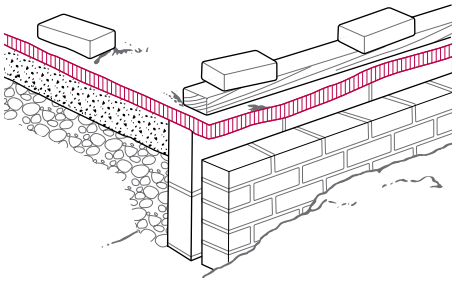
Concrete shall not be placed in cold weather unless suitable precautions are taken.

The minimum temperature of ready-mixed concrete when delivered should be 5°C, in accordance with BS EN 206.

When concreting is undertaken during colder weather, curing periods should be adjusted according to environmental conditions. Concrete should:

- be covered to maintain the temperature above freezing, and heated if necessary
- not be placed where the ground, oversite or the surfaces that will be in contact with the concrete are frozen
- be placed with caution where small quantities of fresh concrete are against a large volume of hardened concrete which is at a lower temperature.

Figure 2: Protection from frost



Where slight overnight frosts are expected, 50mm of insulation held down firmly at the edges should be used to help protect oversite concrete. Where very severe frosts are expected, insulation alone is inadequate and heating should be provided.

Site-mixed concrete

If the air temperature drops to 2°C, concrete work should not proceed unless:

- the ground into which the concrete is to be placed is not frozen
- the aggregate temperature is above 2°C
- the aggregate is free of frost and snow
- the water for mixing is heated, but not above 60°C (cement should not be heated)
- the cast concrete can be properly protected, taking account of the cross-sectional area and location.

In prolonged or very severe cold weather:

- covers will not stop severe frost penetrating the aggregate
- where work is to continue, it may be necessary to steam heat aggregates or to use hot air blowers below covers
- heating the mixing water cannot be relied upon to thaw frozen aggregates, and very cold aggregate can still remain frozen.

3.2.5 Masonry

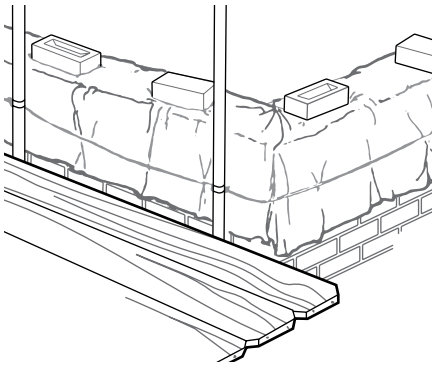
Also see: Chapter 6.1

Masonry shall not be laid in cold weather unless suitable precautions are taken.

When laying masonry in cold weather:

- brickwork and blockwork should not be built when the air temperature is below 3°C and falling
- work can resume when the temperature is 1°C and rising with the expectation the temperature will exceed 3°C
- materials which have been damaged by frost or are frozen should not be used
- additional covers and insulation will be necessary at very low temperatures
- polyethylene covers should be used to provide protection and prevent work from becoming saturated (an air gap between the masonry and the covers will enable new masonry to cure)
- where very severe frosts are expected, heaters may be required
- protection against frost may be required for up to six days, depending on the severity of the conditions.

Figure 3: Protection from frost



3.2.6 Rendering, plastering and screeding

Also see: Chapter 6.11

Rendering, plastering and screeding shall not be carried out in cold weather unless suitable precautions are taken.

Rendering, plastering and screeding should not be carried out if there is frost on the structure.

Where warm air heaters are used to warm the structure before screeding and plastering takes place, they should:

- keep the temperature of the structure above freezing during the curing period
- not produce water vapour (the building should be ventilated to disperse moisture)
- be placed in the room a day before plastering is to start
- be used for longer following a prolonged cold period (as ground floors and walls near to floor level may be slow to respond)
- continue heating for at least 48 hours after completion of the work but not be excessive (to avoid damage to screeds, plaster finishes and woodwork).

Render should not be applied if:

- the temperature is below, or likely to fall below, 2°C (temperatures should be checked throughout the day on a thermometer)
- backgrounds are saturated or frozen, or
- there is a possibility that new work will be subjected to frost before it has set.

3.2.7 Admixtures

Admixtures shall be used correctly and in accordance with the manufacturer's recommendations.

When using admixtures:

- accelerators may assist the mortar or concrete to set before temperatures fall (admixtures do not prevent frost damage to uncured concrete or mortar)
- plasticisers can entrain air during mixing to provide frost resistance to mature mortar and concrete
- in cold weather, retarding agents should not be used as they can increase the setting times of cement
- in cold weather, bonding agents may be ineffective
- those containing calcium chloride should be avoided.

3.2.8 Painting

Also see: Chapter 9.5

Painting shall not be carried out when there is a risk of damage due to cold weather.

Paint should not be applied:

- on surfaces affected by damp, frost or condensation
- where the air temperature is below, or likely to fall below, 2°C
- when condensation, snow or rain is likely to affect paintwork before it is dry.

3.2.9 Further information

- *BS EN 13670:2009 Execution of concrete structures*
- *The National Structural Concrete Specification (4th Edition, April 2010)*

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