

Winter Construction



Pre-conditions

Preparation

Self-inspection

Execution



This **work instruction** is designed for use in detailed planning and preparation of work on construction projects. With thorough planning high levels of personal safety and optimal work apportionment can be achieved at the same time as the work can be organized efficiently and cost effectively.

Explanation

For projects that extend over a winter, the contractor should observe the following:

1. Take into account the winter = cold, darkness, rain, wind, etc. the design of the building site's layout. Consideration should be given to, among other things:
 - Walkways - as short as possible
 - Transport routes
 - Material depots
 - Protection of labour and property etc.
 - Scaffolding - With protection of precipitation and wind?
 - Worker protection devices

2. Consider additional measures, for example:
 - Transportations
 - Heating and drying so that the building is not damaged by cold
 - Maintenance of permanent heating system
 - Snow removal and slip prevention
 - Snow removal for sub-contractors

Safety — Risk assessment

Work activity & Problem	P	C	Risk= P*C	Action
Icy routes at the workplace = Twisting or fall injuries	10	15	150	Regular shovelling and gritting

Probability = P
 Consequence = C
 Risk = P * C

Assessment of probability

P = 0,1	Very unlikely	(<1 times/10 years)
P = 1	Unlikely	(1 times/10 years)
P = 3	Low probability	(1 times/3 years)
P = 10	Relative probability	(1 times/year)
P = 30	Probable	(1 times/month)

Assessment of consequences

C=0,5	Trifle	
C=1	Tiny	(1 - 2 days sick leave)
C=5	Small	(3 - 7 days sick leave)
C=15	Tactile	(8 - 29 - " -)
C=70	Severe	(30-299 - " -)
C=500	Very severe	(>300 - " -)

Text from the Working Environment Authority's brochure Safer Construction Work

Protection against the elements § 64

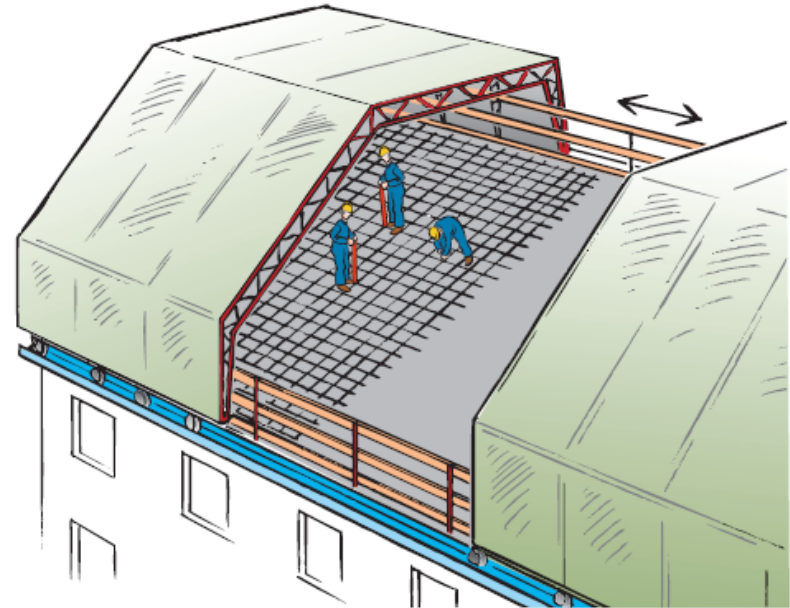
When working outdoors, workers should be protected from the weather, etc. that may adversely affect their health and safety. It may include high winds, excessive heat or cold, heavy or freezing rain or heavy snowfall. A good measure is covering of the workplace with a weatherproofing structure.

It is important that the weatherproofing structure is strong enough, properly dimensioned and securely secured against the snow and wind loads to which it may be exposed.

Even prolonged or intense exposure to the sun can be dangerous. Also keep in mind the risk of lightning strikes.

Personal protective equipment § 71

Safety helmets and protective footwear should be used unless it is clearly unnecessary. Other personal protective equipment such as eye protection, hearing protection and gloves should be worn when required.



Equipment and materials

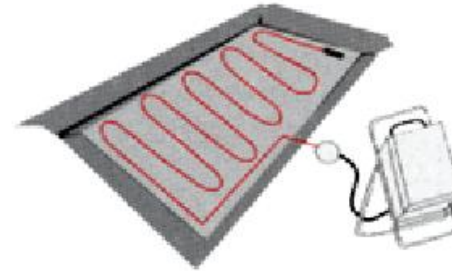
Equipment:

- Tractors
- Snowblower
- Ground warming aggregate
- Heat tunnel
- Electric heating Mat
- High pressure steam boiler
- Steam Generator
- Warm air aggregate
- Air heaters
- Radiant Heaters
- Heating cables in concrete
- Heating mats

Materials:

- Tarpaulins
- Temporary structures for weather protection
- Cover mats for frost protection
- Electricity, oil or LPG
- Additives
- Warm Concrete, hot concrete
- Formwork insulation

Värmemattor, tillsatsvärme där det önskas



Before excavation work begins, the following should be checked:

- The ground's sensitivity to freezing before excavation starts.
- Water table in relation to the foundation level. High groundwater in freezing-sensitive soil increases the risk of frost-lift.
- Measure the level of the shaft bottom and make sure the terrace surfaces are frost-free after excavation and before initiating formworking and concreting.
- Protect, when necessary, the terrace surfaces from frost and precipitation with protective matting..

Weather Forecast

- Contact the Weather Service and see the Swedish Construction Federation's circular

Procurements

For procurement: Require that suppliers to deliver free of snow and ice. Snow and ice melting from non cleaned elements can cause damage to materials, etc.

Check suppliers of winter gear to ensure prompt delivery, for example:

- Tarpaulins
- Shelters, façade cladding
- Air heaters, heat through infra-red radiation
- Heating cables including knowledge of them
- Cover carpets, electric heating mats

Self-inspection 1(2)
Template & instructions

No	Check	Method or equipment	Frequency	Result	Date Signature	Deviation/Remedy Approval/Non-A
1	The requirements of the contract					
2	Necessary winter roads and depots					
3	Requirements for suppliers of snow and ice-free materials					
4	Conditions for employees on the site with regard to climate protection					
5	Alert providers of climate - material					
6	Responsibility for coverage of the base of the excavation					
7						
8						
9						
10						
11						

Snow removal

- Tractor
- Snow blower
- Equipment
- Snow tips or removal of snow
- The application of sand or salt
- ...

Heating

- Electricity, oil or LPG-powered air heaters
- Electric or LPG-fueled radiant heaters
- Heating cable in concrete formwork
- ...

Lighting

- Lighting columns
- Cable laying in poles, pipes in the ground, etc.
- Junction Closets
- ...



Weather protection

- Tarpaulins
- Superstructures or the like for weather protection
- Cover mats on the ground to protect from freezing

Thawing etc

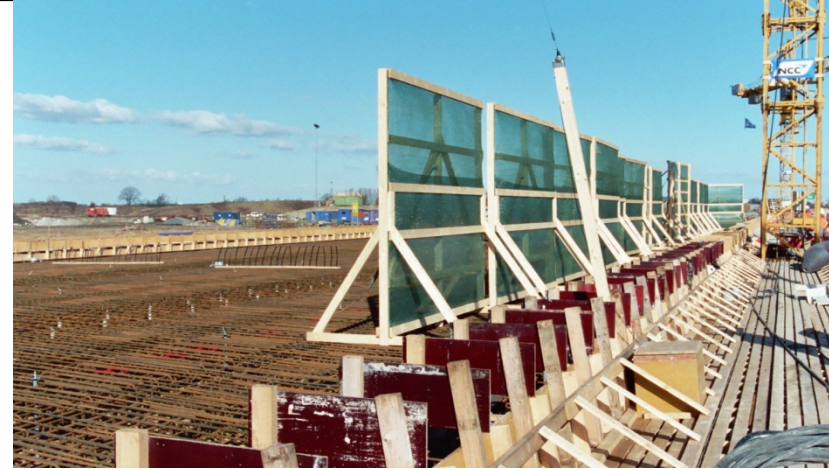
- Thawing aggregate
- Heat tunnel
- Electric heating mat
- High pressure steam boiler
- Electricity , LPG or gasoline-powered steam generator
- Dehumidification units

Earthworks

- Proactive protection
- Shaft
- Backfill
- Overlying construction work

Masonry

- To be observed during bricklaying and plastering (see next page)



Concreting in cold weather

Remember to:

- ***Be prepared for rapid changes of wind and temperature***
- ***There can be large differences in temperature between day and night***
- ***It may be cold even in Autumn and Spring***
- ***10 degrees and below can cause problems with the achieving of proper concrete strength***

Tip according CEMENTA/Heidelberg Cement Group

- Thin structures are at greater risk for cooling than designs with large concrete volume
- Preserve the concrete heat from factory
- Strong winds increase the risk of cooling
- Cover the freshly poured concrete surfaces quickly and also protect against formwork cooling
- Calculate the expected cooling of the "Cementation" during the casting stage of the curing. Provides graphs for concrete temperature growth over time for various structures.

Plan:

- Admixtures
- Warm Concrete, hot concrete
- Type of Insulation and pre-heating
- Finishing - observing