

# WORKING WITH REBAR, CONCRETE, FORMS AND EQUIPMENT

## Concrete and Rebar Hazards

Concrete can pose a safety and health hazard. It is important to know these hazards and how to prevent them from injuring you or a fellow worker.

### Hazards

- The most common ingredient in concrete is cement. Skin contact with cement can cause severe burns.
- When dust particles are breathed in during cutting or chipping, this can pose many health issues including occupational asthma, lung disease, and increased risk of heart attack.
- Concrete is incredibly heavy, one cubic meter weighs more than a pickup truck. This creates a hazard during material handling and when hoisting using cranes or booms.
- Rebar is sharp and can cut or impale workers if they strike against or fall onto it.
- Wet concrete conducts electricity. If a source of electricity, such as a power tool, comes in contact with wet concrete, electrocution may occur.



### Prevention

- Always wear gloves, eye protection, and other prescribed personal protective equipment.
- If skin is in contact with concrete, wash the area thoroughly.

- Follow your company's safe lifting practices when manually handling concrete.
- Never ride in concrete buckets or work under a concrete bucket that is suspended from a crane or boom.
- When placing and securing reinforcing steel in walls, always use fall protection devices.
- Rebar that is vertically protruding is extremely hazardous. Fall protection in these areas is essential to protect against falls.
- When using powered equipment, make sure control switches automatically shut off when your hands are removed from the handles. Never by-pass or disable the automatic shut off with tie downs or any other method.
- Ensure ready-mix truck wheels are blocked and the brakes are set to prevent movement when discharging concrete on a slope.
- Always check hand and power equipment to ensure it is in safe working condition before use. Replace or repair all defective equipment.

## **Formwork and Shoring**

Formwork is a structure, usually temporary, used to contain poured concrete and to mould it to the required dimensions and support the concrete until it is able to support itself. Risks related to formwork and shoring can be fatal. Proper design, erection, and dismantling of formwork and shoring will protect employees from the associated risks.

Unstable formwork and shoring can injure and even kill you and others working below it. Some hazards related to formwork and shoring include:

- Collapse of partial or finished formwork.
- Working at heights.
- Manual material handling and awkward posture.
- Falling materials and components.
- Struck against components.
- Struck by moving machinery and components or tools.
- Electrical contact.

Most failures are caused by:

- Not having an engineer design the formwork and shoring.
- Not erecting, dismantling, shoring or reshoring according to the engineer's specifications and design drawings.
- Not using sufficient bracing.
- No inspection carried out during erection of formwork and shoring and before pouring the concrete.
- Premature removal of shores.
- Overloading or wrong sequence of loading.

When formwork and shoring is used more than 10 above the ground level, as an employer, you must:

- Ensure that [formwork](#) and [shoring](#) is designed by an engineer and is erected according to the engineer's design drawings.
- Ensure that the design drawings include the following:
  - Identify the components for manufactured formwork and shoring.
  - The size, grade and specifications of materials to be used, if the formwork and shoring are to be constructed on the project site.
  - The design loads for the formwork and shoring, and detail the bracing and external ties required to adequately support the design loads.
  - The attachment points for rigging and hoisting, if the formwork and shoring are to be moved as a unit.
  - Set out the erection instructions specified by the manufacturer or the engineer.
  - The method, sequence and the rate of pouring concrete.
  - The signature and seal of the engineer.
- Keep the design drawings on the project site and make them available to an inspector on request.
- Erect, support and brace the formwork and shoring so it can withstand all loads and forces likely to be applied to it without exceeding the allowable loads established by the engineer and without causing uplifting, sliding, overturning or lateral displacement of the system.
- Ensure that the engineer or a competent person designated by the employer inspect the formwork and shoring and authorizes the pour in writing before concrete is poured.
- Keep the written authorization of concrete pour on the project site and make available to an officer on request.
- Not remove the formwork and shoring unless the concrete is strong enough to support itself and any loads that may be applied to it or the concrete is adequately reshored.

When formwork and shoring is used up to 10 above the ground level, as an employer, you must:

- Erect, support and brace it so it is capable of withstanding all loads and forces likely to be applied to it.

The contractor's employees must:

- Be trained to use formwork and shoring including erection and dismantling methods.
- Follow the engineer's design drawings when erecting or dismantling formwork and shoring and reshoring.

- Wear personal protective equipment to protect you from falling objects, falls, and prevent contact with machinery, components or tools.
- Follow safe work procedures when loading, unloading, erecting and dismantling formwork and shoring.
- Be aware of all the hazards and risks associated with formwork, shoring, equipment and machinery.
- Always use mechanical means to handle heavy components of formwork and shoring.

## Concrete Safety

The BCA field inspector is responsible to make concrete test cylinders. These cylinders are part of the construction inspection report for the verification that the compressive strength meets the project specifications.

Typically the inspector will take samples per ASTM C172. Samples should be taken from the middle of the load. The wet concrete is loaded into a wheelbarrow or bucket that the inspector performs a series of test and the making of the concrete test cylinders.

Fresh concrete can cause severe chemical burns to skin and eyes. When working with concrete use rubber work boots, gloves, protective eyeglasses and clothing. Do not let concrete or other cement based products soak into your clothing or skin. Wash your skin promptly after contact with concrete with clean water. If fresh concrete gets into your eyes, flush immediately and repeatedly with water. If redness or blurring occurs contact a doctor or urgent care facility.



Concrete, cylinders and test equipment are heavy. Make sure that proper lifting techniques are employed. You should ask the contractor to provide assistance if the equipment or cylinders need to be moved.

- Fall protection trigger heights must be observed at all times:

**2 stories or 30' whichever is less:** Connecting structural steel (Iron workers)  
**20':** Most roofing work  
**15':** Panelized roof systems, residential framing and roofing activities, work on 4" nominal or wider structural members and other than connecting steel (iron workers)  
**7 ½':** Work on unprotected platforms, scaffolds, or edges of structures (within 6')  
**6':** Work with rebar/ or similar projections (rod busters)

- Structural wood framing workers working near a leading edge must be protected from falls of 15' or more by one or more of these:  
Guardrails; Safety Nets; Personal Fall Protection System; Parapets at least 24" high; Fall Protection Plan
- Most roofing work requires fall protection over 20'.
- Work on residential tract homes requires fall protection over 15'.
- 100% tie-off (protection from falls at all times, even when moving from point to point) must be provided while using personal fall protection. Sometimes this may require using two lanyards.  
Note: Point to point travel on rebar is allowed without fall protection for heights up to 24 feet.
- In steel erection work, iron workers must use personal fall protection where fall distance exceeds:
  - 30', while performing structural steel connecting work
  - 15', while performing work other than connecting
- In metal decking work, workers must be protected from falls of 15' or more by one or more of these:  
Guardrails; Safety Nets; Personal Fall Protection; Fall Protection Plan
- Workplace must be kept in good housekeeping order and free of debris and tripping hazards.
- Knots should never be tied in lanyards or rope grabs.