

# CPCCSF2004

## Place and Fix Reinforcement

### Learner Guide Instructions

Who is this document for?

The learner.

What is in this document?

- Course information that matches the PowerPoint presentation.
- Review questions.
- Practical assessment instructions for learners.

What do you need to do before you use it for the first time?

1. Rebrand the document.
2. Review the document as part of your validation process.
3. Set the reading and test time limits that are highlighted in pink at the end of the document.

**See the 'Read Me First' document for a complete set of instructions on how to use these resources.**



# LEARNER GUIDE

# CPCCSF2004 Place and Fix Reinforcement Materials

<b>Learner Name:</b>	
<b>Learner ID:</b>	
<b>Learner Contact Number:</b>	
<b>Learner Email Address:</b>	
<b>Date Training Commenced:</b>	

## This Book Contains:

- Course Information.
- Review Questions.
- Practical Assessment overview and Instructions.

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Evaluation Copy Only

# 1.1 Introduction

This unit is based on the national unit of competency **CPCCSF2004 Place and Fix Reinforcement Materials**.

You will learn about:

- ◆ Planning and preparing for work.
- ◆ Placing and fixing reinforcement for concrete.
- ◆ Checking reinforcement and cleaning up.

You are required to complete the national unit of competency CPCCWHS2001 Apply WHS in the Construction Industry (or its equivalent) before beginning this course.



## 1.1.1 Concrete Reinforcement



Concrete is a cement mix with aggregates (sand, gravel, stones, crushed rock etc.) that help to make it stronger.

Concrete is extremely strong in compression. You can squeeze it and use it to support large amounts of weight. Unfortunately it's much weaker in tension. It cracks or snaps easily if you bend or stretch it. This is why it is important to reinforce it with steel.

Reinforced concrete is made by casting wet concrete around strong, steel reinforcing bars, tied together to make a cage or using mesh sheets resting on bar chairs. When the concrete sets and hardens around the bars or mesh the concrete holds together well in either tension or compression. Simply, the concrete resists squeezing (compressive strength), while the steel resists bending and stretching (providing the tensile strength).

The steel bars generally have ridges on them (called rebar or deformed bar) that anchor them firmly inside the concrete without any risk of slipping around inside it.

Steel is used to reinforce concrete because it expands and contracts in the heat and cold roughly as much as concrete itself, which means it won't crack the concrete that surrounds it.

## 1.1.2 Reinforcement Materials

Concrete is reinforced using steel bars, mesh and different types of fibres. Different reinforcement materials have different limitations so it is extremely important that you always use the type of reinforcement material specified in the plans. This includes making sure it is the correct size and installed correctly.

### Steel Reinforcement

Two types of steel reinforcement used are bars or mesh.

Bars are normally rebar (has raised notches), while mesh may be made from either smooth or rebar.

Mesh sheets may also be referred to as welded wire fabric (WWF) reinforcement.



Typical bar diameters:	Typical mesh sizes:
◆ 12mm	◆ SL42
◆ 16mm	◆ SL52
◆ 20mm	◆ SL62
◆ 24mm	◆ SL72
	◆ SL82

The SL stands for **S**quare mesh **L**ow Ductility and the numbers represent the nominal wire size (e.g. 4mm) and the wire spacing (e.g. 2 = 200mm).

Mesh comes in different shapes depending on the application. Examples are:

- ◆ Square mesh.
- ◆ Rectangular mesh.
- ◆ Trench mesh.
- ◆ Girder wrap mesh.



### Bar Chairs and Spacers



Reinforcement needs to be fixed in the right position to help control cracking. The reinforcement rests on **bar chairs** and must be securely fixed so it won't move when concrete is poured around it.

These bar chairs and spacers keep the bars and mesh at the correct depth and distance from each other and the formwork.

### Fibre Reinforcement

Synthetic fibres can be added to concrete to help minimise plastic shrinkage (concrete shrinks as it dries) and can reduce the presence of excessive bleed water (water rising to the surface of freshly poured concrete). However, synthetic fibres are not a replacement for mesh or bar reinforcement.

Synthetic fibres can:

- ◆ Improve concrete mix cohesion.
- ◆ Improve resistance to temperature changes.
- ◆ Improve impact and abrasion resistance.
- ◆ Increase resistance to plastic shrinkage during curing.
- ◆ Improve structural strength.
- ◆ Reduce crack widths and control the crack widths tightly.

Other fibre materials can be used including steel, glass and natural fibres depending on the job and concrete being used.

## Review Questions

1.

List three (3) types of reinforcement material.



1.

2.

3.

## 1.2 Confirm Work Instructions

Before starting work you need to confirm exactly what the job is. Steelfixing may involve reinforcing concrete for foundations, pits and slabs, columns, walls, stairs, plinths, kerbs, gutters, pathways and hard standings.

You will need to identify the area where reinforcement needs to be installed. Refer to the plans to identify the relevant formwork.



### 1.2.1 Work Instructions

You need to be clear about what work you will be doing. Make sure you have everything about the job written down before you start. This includes what you will be doing, how you will be doing it and what equipment you will be using.

Make sure you have all of the details about where you will be working. For example:



- ◆ **The Site** – Is there clear access for all equipment? What are the ground conditions like?
- ◆ **The Weather** – Is there wind, rain or other bad weather? Is it too dark?
- ◆ **Facilities and Services** – Are there power lines or underground services to think about?
- ◆ **Traffic** – Are there people, vehicles or other equipment in the area that you need to think about? Do you need to get them moved out of the area? Do you need to set up barriers or signs?
- ◆ **Hazards** – Are there dangerous materials to work around or think about? Will you be working close to underground services or other people?

You also need to make sure you have all of the details about the kind of work you will be doing:

- ◆ **The Task** – What area is being concreted? How much concrete will be needed? Does it need any special equipment?
- ◆ **Plant and Equipment** – What type of plant and equipment will be used? How much room does it need?
- ◆ **Communications** – How are you going to communicate with other workers?
- ◆ **Procedures and Rules** – Do you need any special permits or licences? Are there site rules that affect the way you will do the work?



Most construction jobs depend on a range of other requirements including:

- ◆ Regulatory and legislative requirements pertaining to the placement and fixing of reinforcement materials.
- ◆ Safe work procedures relating to the placement and fixing of reinforcement materials.
- ◆ Signage.
- ◆ Verbal, written and graphical instructions.
- ◆ Work bulletins.
- ◆ Work schedules, plans and specifications.

## 1.2.2 Work Method Statements

Many worksites require a work method statement before any high risk construction work can start. A work method statement is a list of steps that outlines how a job will be done and includes details for any hazards that occur at each step, and what you need to do about them.

These statements can also be known as Safe Work Method Statement (SWMS), Job Safety Analysis (JSA) or Safe Operating Procedure (SOP).

Make sure you understand all of the information in the work method statement before you start the work. It will help you to complete the work as safely as possible.





### 1.2.3 Safety Data Sheets

A Safety Data Sheet (SDS) is a detailed document outlining the risks and hazards associated with handling chemicals and other materials.

The SDS will contain details that can help you to identify:

<b>Basic Details of the Chemical or Material</b>	Name, type and identification number.
<b>Hazards Associated with the Material</b>	Whether it is flammable or corrosive.
<b>Safe Handling and Storage Procedures</b>	PPE to use, sealed containers or storage temperatures.
<b>Emergency Procedures</b>	What to do if the chemical or material gets out of hand.
<b>Disposal Procedures</b>	Suggestions for removing the chemical or material from the site.

It will be issued by the manufacturer and may or may not include material handling methods.

### 1.2.4 Plans and Specifications

Some of your work instructions might be given to you in drawings and sketches. You will need to get the information out of these and use it to do your job.

Project plans and drawings give you an overview of the site, for example:

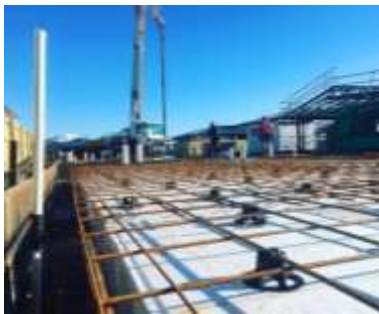
- ◆ Location of the site and earthworks in relation to the surrounding area.
- ◆ The position of structures, roads, access areas.
- ◆ Layout of drainage lines.
- ◆ Foundation details and landscaping features.

Before you start your work activities on the site, you need to identify the drawings and specifications that apply to the designated tasks. These drawings and specifications will normally be included in the site documentation and task instructions.



Types of drawings or plans that you may need to interpret and apply include:

Type of Drawing or Plan	Description
<b>Plan or Overhead View</b>	This looks at the work site from above. When looking at this view make sure you orientate in the right direction and that you are referring to the appropriate section for the reinforcement.
<b>Long Section</b>	This is the view from the side and often indicates gradients and relative heights. Make sure the scale of the section is accurate.
<b>Cross Section</b>	This is a slice through a particular point and may give details of where and how the reinforcement materials are to be installed.
<b>Structural Drawings</b>	These show the specific details for items such as foundations, footings and columns.



It is vital that reinforcement happens at the depth and location it is needed. Without the correct reinforcement, the structural integrity of the concrete is weakened and may not be able to perform the task it is being created for.

This is what makes steel the preferred reinforcement material. Once covered with concrete correctly, it will not warp, rust or decay. It will allow your project to maintain structural integrity for long periods of time.

Even in a small backyard concreting activity, structural integrity ensures the longevity of your work. In the construction industry this structural integrity is an even bigger concern to ensure the long term safety of your work.

### 1.2.4.1 Bar Bending Schedule

A Bar Bending Schedule is a comprehensive list that describes the location, mark, type, size, length and number, and bending details of each bar or fabric in a Reinforcement Drawing of a Structure.

Member	Bar mark	Type of steel	Bar diameter mm	Length of each bar (Method A) m	Number of members	Number of bars in each member	Total number	Total length m	Shape code (Optional)	Bending shape with dimensions
Slab 1	01	BST 500 S	28	3,60	1	10	10	36,00	00	
Slab 2	02	BST 500 S	28	3,94	1	20	20	78,80	11	
Corbel	04	BST 500 S	16	3,27	5	3	15	49,05	13	
Wall	05	BST 500 S	28	6,34	2	4	8	50,72	15	
Beam 1	06	BST 500 S	16	2,16	4	14	56	120,96	21	
Floor slab	14	BST 500 S	20	1,80	1	300	300	540,00		
Support pillar	17	BST 500 S	10	2,26	5	19	95	214,70		

NOTE 3D representation.

## 1.2.5 Quality Requirements



Every job needs to meet quality requirements to ensure that it will stand the test of time. Quality requirements may be outlined in a range of documents including:

- ◆ Australian standards.
- ◆ Internal company quality policy and standards.
- ◆ Manufacturer specifications.
- ◆ Workplace operations and procedures.

It is important to meet these quality requirements, especially in concrete work where structural integrity may be affected if the reinforcement is not installed or positioned properly.

All works performed must be compliant with Australian Standards and the National Construction Code (NCC). The NCC describes the minimum standards of safety, health, amenity, accessibility and sustainability of different building types. This may influence the materials used for the work and how the work is completed.

An engineer or other qualified person will have determined the requirements for the concrete work with consideration of the NCC, including reinforcement material, positioning and installation method. These will be detailed in your job plans or work instructions. You must follow these requirements at all times.

Concrete that is not adequately reinforced is prone to cracking which greatly reduces the strength and lifespan of the concrete.



## Review Questions

<b>2.</b>	What are three (3) details you need to know about the kind of work you will be doing?	<input type="checkbox"/>
1.		
2.		
3.		

**3.**

What is a work method statement?



**4.**

List four (4) things that a Safety Data Sheet (SDS) can help you identify.



1.

2.

3.

4.

**5.**

Why do you need to understand drawings and sketches?



**6.**

How can you make sure concrete work will stand the test of time?

**7.**

What does the National Construction Code describe?



## 1.3 Working Safely



You must follow all safety rules and instructions when performing any work. If you are not sure about what you should do, ask your boss or supervisor. They will tell you what you need to do and how to do it in a safe way.

### 1.3.1 Health and Safety Rules

Every workplace has to follow laws and rules to keep everyone safe. There are 4 main types:

- ◆ **Acts** – These are laws that you have to follow.
- ◆ **Regulations** – These explain what the law means.
- ◆ **Codes of Practice** – These are instructions on how to follow the law, based on industry standards.
- ◆ **Australian Standards** – These tell you what the minimum requirement is for a job, product or hazard.



Some states use OHS laws, and other states use WHS laws. They both talk about the same thing, but use different words or names for people. If you have any questions about safety rules you should talk to your boss or supervisor.

### 1.3.2 Operations Documentation

Before starting your work you need to make sure you have access to all operations documentation for the job. This will help you to do your work in the safest way and make sure all work is compliant.

Operations documentation includes:

<b>Site Details</b>	The information and safety requirements of the workplace environment (where you will be working).
<b>Hazard Details</b>	Any hazards in the work area or related to the work. This could also include instructions on how to handle dangerous or hazardous materials.
<b>Task Details</b>	Instructions of what the work is or what you will be doing (this can include diagrams or plans). Also instructions on how to safely do the job.
<b>Faulty Equipment Procedures</b>	Isolation procedures to follow or forms to fill out.
<b>Signage</b>	Site signage tells you what equipment you need to have, or areas that are not safe to be in.
<b>Emergency Procedures</b>	Instructions on what to do in emergency situations, for example if there is a fire, accident or emergency where evacuation or first aid is needed.
<b>Equipment and Work Instructions</b>	Details of how to operate plant and equipment and the sequence of work to be done.

### 1.3.3 How to Keep Everyone Safe

WHS law says that all companies and workers need to keep themselves and other people safe while they work. This is called a duty of care.

To keep yourself and other workers safe you need to:



- ◆ Follow your instructions.
- ◆ Follow all workplace rules.
- ◆ Make sure all equipment is safe to use.
- ◆ Carry out your work safely.
- ◆ Report any problems.

If you think something is dangerous tell your boss or supervisor as soon as possible.

Your worksite will also have instructions for working safely including:

- ◆ Emergency procedures, including using fire fighting equipment, first aid and evacuation.
- ◆ Handling hazardous materials.
- ◆ Safe operating procedures.
- ◆ Personal protective clothing and equipment.
- ◆ Safe use of tools and equipment.



Talk to your WHS representative or supervisor if you have any questions about legislative requirements relating to your work.

## Review Questions

<b>8.</b>	What are four (4) things included in operations documentation?	<input type="checkbox"/>
1.		
2.		
3.		
4.		

## 1.4 Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) is clothing and equipment designed to lower the chance of you being hurt on the job. It is required to enter most work sites.



## 1.4.1 Types of PPE

PPE may include:



- ◆ **Head protection** – hard hats and helmets.
- ◆ **Foot protection** – non-slip work boots.
- ◆ **Hand protection** – gloves.
- ◆ **Eye protection** – goggles, visors or glasses.
- ◆ **Ear protection** – plugs or muffs.
- ◆ **Hi-visibility clothing** – clothing that makes you stand out and lets other people know where you are.
- ◆ **Weather protection** – clothing that protects you from the sun or from the cold.

Make sure any PPE you are wearing is in good condition, fits well and is right for the job.

If you find any PPE that is faulty, tag it and remove it from service. Then tell your supervisor about the problem and they will organise to repair or replace the PPE.

## Review Questions

<b>9.</b>	What are three (3) examples of PPE you may be required to use on site?	<input type="checkbox"/>
1.		
2.		
3.		