

RIIMPO317F

Conduct roller operations

Learner Guide



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1.1 Introduction



This course is based on the unit of competency **RIIMPO317F Conduct Roller Operations**.

This course covers roller operations in the civil construction industry and will look at:

- Planning and preparing for operations.
- Routine checks.
- Using attachments.
- Operating the roller.
- Maintaining the roller.

The different types of rollers and which roller is best equipped for different activities will also be discussed.

1.1.1 What is a Roller?

A roller is a self-propelled or towed machine used for the primary purpose of compacting a variety of types of construction materials. It may be rubber tyred, smooth drum, padded drum or grid (open) face type.

A roller achieves compaction by one or more of the following methods:

- Static weight.
- Kneading.
- Vibration.
- Impact.

A grid roller is used to break down oversized construction materials.

Padded drums may include sheepfoot, padfoot, tamping foot or wedge foot.



1.1.1.1 Types and Applications of Rollers

The types of rollers you may use while working on a civil construction site are:

Self-Propelled Rollers	
	
Self-Propelled Pneumatic Tyred Roller Also known as rubber tyred roller. A roller type that is used to finish fresh sealed asphalt to produce a trafficked finish, and to bed down the asphalt or sealed surface. Spreads the compaction across the tyres and compacts the surface by pressing down on the surface with the weight of the roller and the rolling of the tyres.	Self-Propelled Smooth Drum Vibratory Roller Commonly identified as a basic roller.
	
Self-Propelled Padded Drum Vibratory Roller Rollers that are used for compaction and pulverising materials. They have a square or rectangular block attached to the drum of the roller in a pattern that enhances the ability of the roller to compact and pulverise the ground.	Self-Propelled Double Drum Vibratory Roller The drum vibrates at different speeds and frequencies to achieve greater compaction. At a half setting the vibrating is fast and achieves shallow compaction. At full setting the vibration is slower and achieves a much deeper compaction. A vibratory roller has an advantage over static rollers in that it can achieve greater compaction for the same weight machine.
	
Self-Propelled Smooth Drum Roller (Including 3 Pointers) Sometimes called static rollers. Used in a similar way as smooth drum rollers utilising the weight of the roller to compact materials.	

Towed Rollers



Towed Grid Roller

Used for breaking up rocky material while compacting the materials. These rollers are usually towed behind a tractor.



Towed Pneumatic Multi-Tyred Roller

A series of pneumatic or rubber tyres that kneads and smooths the surface



Towed Padded Drum Vibratory Roller

Commonly towed behind another item of machinery such as a grader or tractor. Used for multi-tasking and for keeping onsite costs down.

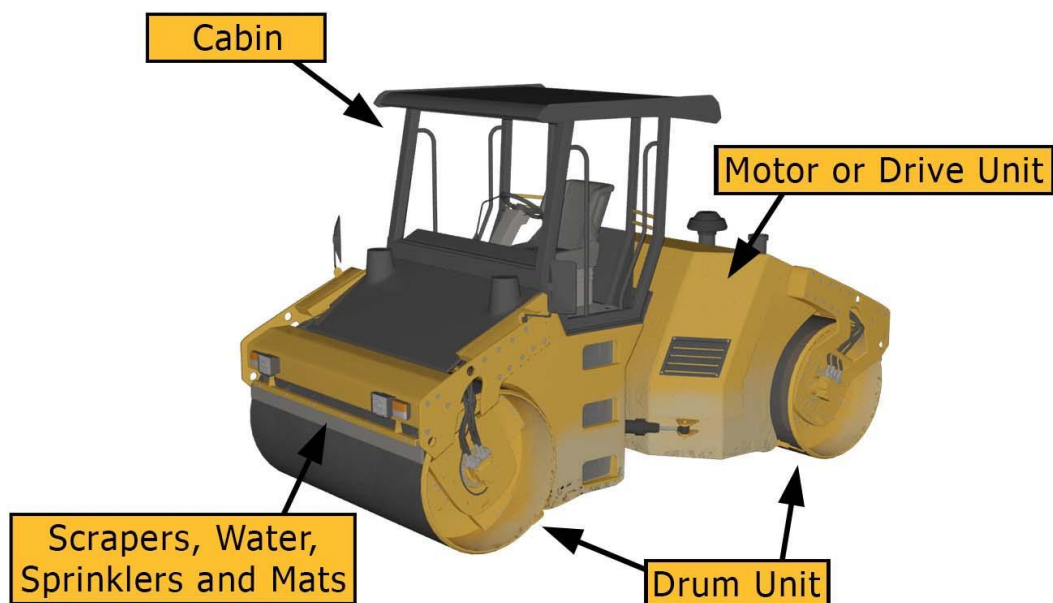


Towed Smooth Drum Vibratory Roller

This tow behind attachment is used to compact materials using vibration.

1.1.1.2 Roller Components

The following diagram and table explains the basic components of a roller.



Component	Description
Cabin	Part where operator sits and operates the machine. Controls include: joy stick or control levers, transmission controls, brakes, and emergency stop controls.
Motor or Drive Unit	Engine of the machine.
Drum Unit	Can be single drum, double drum or rubber tyre.
Scrapers, Water Sprinklers and Mats	Used to prevent hot asphalt from sticking to roller drums. May not be present on all rollers.

1.1.1.3 Roller Operations

On a civil construction worksite the primary task of the roller and roller operator is compaction of materials to the required amount.

When you are operating a roller you will be expected to:

- 1. Compact the materials to the required density.** Also known as percentage of compaction.
- 2. Comply with the roller pattern.** This pattern is generally half a drum overlap from the last pass, but may be different in specific circumstances. The required pattern will be told to you during a tool box meeting or other site meeting. If you are unsure of the required pattern, ask your team leader.
- 3. Seal and finish the surface.** This means you will be ensuring the final road surface is fit for purpose and safe to use. Generally a multi-tyred roller is used for this task.



You may be working with:

Earthworks	Base level materials or soil type materials.
Pavement	Depending on the location within Australia this could refer to the entire road area or may mean a concrete type surface.
Bitumen	The black, oil by-product that is mixed with an aggregate to create a road surface that is flexible, yet waterproof.
Asphalt	The name given to bitumen and aggregate mixture that is used to cover base levels to build a road.

Your roller pattern may vary and the type of roller you are operating will vary depending on the task you are doing and the material you are working with.

1.2 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.



1.2.1 Health & 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.

1.2.2 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:

Site Details

The information and safety requirements of the workplace environment (where you will be working).

Hazard Details

Any hazards in the work area or related to the work. This could also include instructions on how to handle dangerous or hazardous materials.

Task Details

Instructions of what the work is or what you will be doing. Also instructions on how to safely do the job.

Faulty Equipment Procedures

Isolation procedures to follow or forms to fill out.

Signage

Site signage tells you what equipment you need to have, or areas that are not safe to be in.

Emergency Procedures

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.

Equipment and Work Instructions

Details of how to operate plant and equipment and the sequence of work to be done.

1.2.3 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 work practices.
- Personal protective clothing and equipment.
- Safe use of tools and equipment.



1.3 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? Are there obstacles in the way? What are the ground conditions like? Is the site ready for your work to begin? Are there structures, workers, traffic or areas that you need to avoid?
- **The Weather** – Is there wind, rain or other bad weather? Is it too dark?
- **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 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 kind of material is being compacted? How much is there to work with? How long do you have to complete the work? Where will the work be done? Does the job need a special type of attachment?
- **Plant** – What type of plant will be used? How big is it? How much room does it need?
- **Attachments** – What equipment will you need to compact the load safely? Is the equipment available?
- **Communications** – How are you going to communicate with other workers?
- **Procedures and Rules** – Do you need any special permits or licences for the work? Are there site rules that affect the way you will do the work e.g. traffic control requirements?



1.3.1 Roller Operations Documentation

Examples of details that will be included in your operations documentation:

Operations Details	Use
The Pattern and Density of Compaction Requirements	To ensure the task meets specifications.
Sealing or Finishing Compaction Percentages	Is required for quality assurance and to meet task specifications.
The Type of Materials Being Compacted	This makes it easier to predict the amount of time needed to complete the task.
Earthworks Calculations	Best described as knowing the capacity of the machine, how much material it can compact in each pass, how many passes can be done in an hour or the length of the pass circuit.

Being able to access, interpret and apply the requirements of the documents is part of the job for any plant operator.

1.3.2 Reading and Checking Your Work Instructions



All work needs to follow worksite, environment and company safety procedures.

Procedures help to make sure that all work is done in a safe way, without damaging equipment or putting people in unsafe situations. They also help to make sure that work is done in the correct order and doesn't interrupt or get in the way of other work that is happening on the site. This is especially important in civil construction projects that need to be completed in a particular sequence.

Your work instructions will tell you the safest way to do the job, and the equipment that you will need to use. It is a good idea to check your work instructions with your boss or supervisor to make sure you know exactly what you need to do.

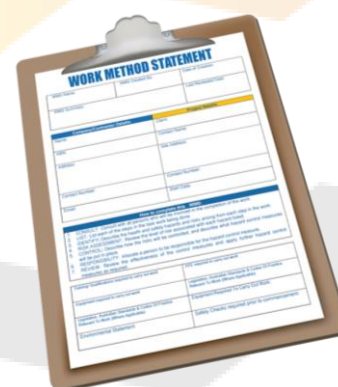
If you don't know where to get your instructions or you can't understand the language or civil construction terminology being used in them, you can ask your boss or supervisor. They will tell you where to find your work instructions and explain what they mean.

1.3.3 Work Method Statements

Many worksites require a work method statement before any work can start. A work method statement is a list of steps that outlines how a job will be done. It also includes 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).

Work method statements are a great tool for organising your work activities and making sure you have completed everything. They will also outline the details of all tools, equipment and coordination with other workers relating to your job. Make sure all of these are available and ready before you start.



1.3.4 Project Quality Requirements

Every civil construction project will have quality requirements. These outline when tasks need to be completed and the required standard of the work.

Your work instructions and plans or drawings will guide you, and help you to make sure you are achieving the quality standard for the project.

They can include:

- Project dimensions.
- Project tolerances.
- Standards of work.
- Material standards.



1.3.4.1 Plans, Drawings and Sketches

When looking for information or instructions for a civil construction project, you will come across plans, drawings and sketches. Examples of these are:



- Project plans.
- Site plans.
- Work plans.
- Project drawings.
- Sketches made to explain work that is happening on site.

Plans and drawings are useful because they can help you to get an overview of the site and the project as a whole. It can also be the best way to explain exactly what needs to be done.

You need to be familiar with the scale and symbols used in the plans and drawings so you can understand them properly. If you're not sure ask your supervisor or other site personnel for help.



1.3.5 Civil Construction Sequences

Civil construction projects are made up of a range of smaller tasks or activities. It is important that these are done in the right order for the project to go smoothly.

Here is a basic civil construction sequence from clearing the area through to preparing for road construction:

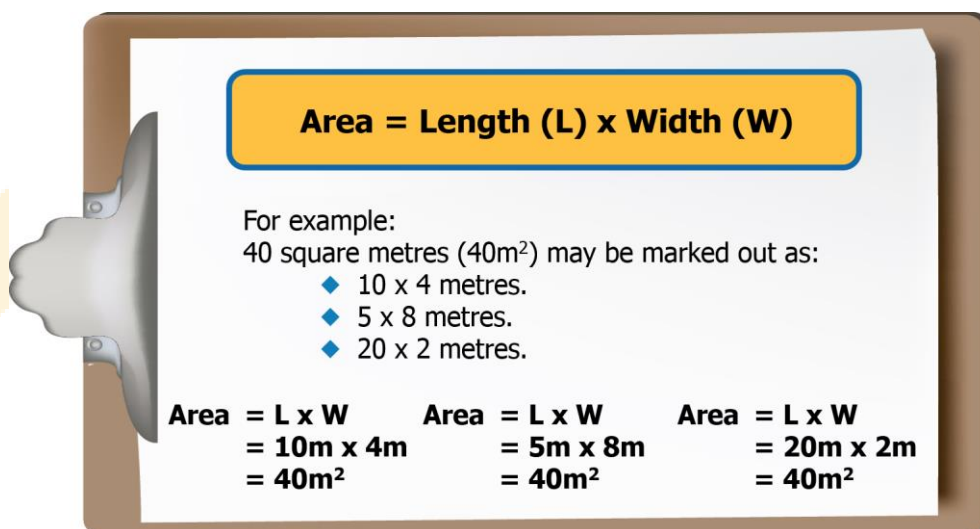


Earthmoving, drainage, subgrade level, compaction and any landscaping must be done after the area is cleared and before the base is prepared for road construction.

1.3.6 Basic Earthworks Calculations

As a roller operator, the main calculation you will need to be able to apply is for Area.

Area can be calculated using the following formula:



Area = Length (L) x Width (W)

For example:
40 square metres (40m²) may be marked out as:

- ◆ 10 x 4 metres.
- ◆ 5 x 8 metres.
- ◆ 20 x 2 metres.

Area = L x W	Area = L x W	Area = L x W
= 10m x 4m	= 5m x 8m	= 20m x 2m
= 40m²	= 40m²	= 40m²

1.3.7 Emergency Procedures

Emergency procedures will vary depending upon the worksite. These procedures could include:

- Emergency shutdown.
- Evacuation.
- First aid.
- Fire fighting.



1.3.7.1 Emergency Shutdown of Equipment



If there is a fire, emergency or accident you might need to use the emergency stop on the equipment you are using. This will turn the equipment off immediately. You can also use the emergency stop if the equipment stops working properly or you lose control of the equipment.

1.3.7.2 Evacuation



Things to remember are:

1. Keep calm.
2. Move away from the danger to a designated evacuation point, sometimes called an emergency assembly area.
3. Do not let other people into the area.
4. Call emergency services in accordance with workplace procedures and policies.

1.3.7.3 First Aid

First Aid is the quick care given to an injured or ill person. Every site will have a First Aid Officer.

If somebody needs first aid you must tell your supervisor or First Aid Officer. Do not try to give first aid if you have not been trained.



1.3.7.4 Fire Fighting Equipment

Fire fighting equipment on site could be anything from small fire extinguishers through to large water cannons. Different fire fighting equipment should be used for different types of fire. Always check the equipment for information on what type of fire it can be used on.



Steps for using a fire extinguisher:

1. Evacuate the area.
2. Isolate the area.
3. Call emergency services or other designated on site procedure.
4. If it is safe to do so, use an extinguisher to attempt to control the fire using the **PASS** system.

The **PASS** system:

P	Pull the pin.
A	Aim at the base of the fire.
S	Squeeze the trigger.
S	Sweep the base of the fire.

Contact your site emergency management team as soon as possible and call the fire brigade on **000**.

1.4 Hazard Identification & Control

Before you start work, you need to check for any hazards or dangers in the area. If you find a hazard or danger you need to do something to control it. This will help to make the workplace safer.

The best way to control hazards is to use a simple problem-solving approach:

1. Identify the problem (*What is the hazard?*).
2. Identify the cause of the problem (*What is causing the hazard?*).
3. Work out the different options that you have to solve the problem (*What can be done to eliminate or minimise the hazard as much as possible?*).
4. Choose the best option to solve the problem and apply it (*What is the best option to eliminate or minimise the hazard?*).
5. Check to see if the problem has been solved (*Has the hazard been eliminated or reduced to a safe level?*). If not, you will need to use additional, or better options for fixing the problem (controlling the hazard).



1.4.1 Identify Hazards



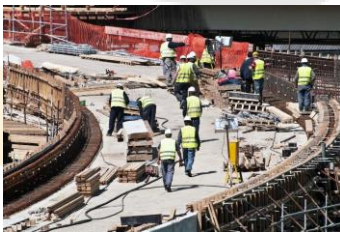
Part of your job is to look around to see if you can find any hazards before you start any work.

A **hazard** is a thing or situation that causes injury, harm or damage.

In hazardous working areas where permission is required to work, the operator must obtain the required permits, SWMS and contribute to risk assessment before the commencement of work.

When you start checking for hazards, make sure you look everywhere. A good way to do this is to check:

- Up high above your head.
- All around you at eye level.
- Down low on the ground (and also think about what is under the ground).



Some hazards you should check for in the work area:

- Overhead and underground services.
- Uneven, soft, slippery or unstable terrain.
- Trees.
- Fires.
- Bridges.
- Excavations.
- Buildings.
- Traffic.
- Embankments.
- Cuttings.
- Hazardous materials.
- Structures such as site offices and scaffolds.
- The weather and environment.
- Other workers or site visitors.
- Pedestrians and other public traffic.
- On site vehicles, plant, equipment and machinery.
- Poorly maintained or faulty equipment.
- Hazards from components of the roller.
- Road surface and edge solidity.
- Handling characteristics of the roller.
- Effects of the materials as you compact them.

- Chemical hazards such as fuel, chemicals, contaminants, gases or dusts.

1.4.2 Control Hazards

After you have found hazards or dangers you need to work out how bad they are:



1. What is the chance that the hazard will hurt someone or cause damage?
2. If it does happen, how bad will the injury or damage be?

Thinking about these things will help you to choose how to control the hazards. Hazards controls need to follow:



- Legislation (laws).
- Australian Standards.
- Codes of Practice.
- Manufacturers' specifications.
- Industry standards.

The best way to control hazards is to use the Hierarchy of Hazard Control. The hierarchy of hazard control is a range of options that can eliminate, or reduce the risk of hazards.

You start at the top of the list and see if you can take away (eliminate) the hazard or danger.

If you can't take it away you move down the list to see if you can swap it for something safer (substitution).

Keep working through the list until you find something that controls that hazard or danger.



This table shows you the 6 different types of controls in order from best to worst:

1.	Elimination	Completely remove the hazard. This is the best kind of hazard control.
2.	Substitution	Swap a dangerous work method or situation for one that is less dangerous.
3.	Isolation	Isolate or restrict access to the hazard. This includes using signage and barricades.
4.	Engineering Controls	Use equipment to lower the risk level.
5.	Administrative Controls	Site rules and policies attempt to control a hazard.
6.	Personal Protective Equipment	The least effective control. Use PPE while you carry out your work.



It is important to think about all of the options available when deciding on the best hazard controls. You may need to use more than 1 control measure to bring the risk level down to an acceptable level.

Check the situation after you have applied a control measure to see if more controls, or different controls are needed to make the job safe. If more controls are needed, make sure they are applied before you start or continue the work.

Talk to your supervisor or safety officer if you are not sure if it is safe enough to carry out your work. If you think the hazard is still too dangerous you should not try to do the work.

1.4.2.1 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.



It includes:

- **Head protection** – hard hats and helmets. A safety helmet must be worn whenever there is a possibility that the person could be struck on the head.
- **Foot protection** – non-slip work boots.
- **Hand protection** – gloves.
- **Eye protection** – goggles, visors or glasses.
- **Ear protection** – plugs or muffs. An ear protection must be worn when the noise could contribute to hearing loss (above 85DBA)
- **Breathing protection** – masks or respirators.
- **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 not in good condition, tag it and remove it from service. Then tell your supervisor about the problem and they will organise to repair or replace the PPE.



1.4.2.2 Traffic Control Barricades and Signage

In some cases you may need to isolate the work area. Set up barricades and signage to warn others that you are working in the area and that it is dangerous for them to come too close.

On worksites it is often necessary to control the movement of traffic around and through the site. To do this there are 2 different types of traffic management plans:

Traffic Management Plan

Deals with traffic moving through the site, i.e. traffic on public roads and members of the public.

Vehicle Management Plan

Deals with on-site vehicle movements, haul circuits and dump runs, and material routes.



In the traffic or vehicle management plan, signs and the distances between signs will be listed. Reading the plans will show you where particular signs need to be placed.

Signs and barriers may include:

- Danger or warning signs like speed limits, 'workmen ahead' or 'reduce speed'.
- Flashing lights.
- Barricades and fences.

1.4.3 Environmental Protection Requirements

Environmental protection requirements are part of every worksite. Make sure you check with your supervisor about what environmental issues need to be managed during your work.

All environmental details should be listed in an 'Environmental Management Plan' for the site. It can include details for:

- Waste management.
- Water quality protection.
- Noise control.
- Vibration control.
- Dust management.

The plan will outline the steps and processes needed to prevent or minimise damage to the environment through the use of machinery and equipment.



2.1 Choose and Check Plant and Equipment

Once you have confirmed your job requirements you need to choose the right equipment and attachments to get the job done. Rollers can be used to prepare areas for other work or to finish surfaces.



The type of roller you use will depend on:

- The type of material being compacted or worked.
- The size of the area you are working on.
- The finish (what the materials or area need to look like) required by the plan.

Information about technical capabilities and limits can be found in the operator manuals for each item.

It is not safe to operate plant, equipment or attachments beyond the manufacturer's specifications. This may cause the machinery to break and could also cause an accident.

2.1.1 Select a Roller Attachment

Attachments can be used to keep the roller cool, clean and able to function correctly. This is because the materials that a roller may be compacting could be very hot and sticky.

Once set, both asphalt and bitumen can be very difficult to remove from the drum, so it is best to avoid the materials sticking to the drum in the first place.



Some attachments used with a roller include:

Attachment	Description
Blade	This may be used to assist with levelling of the materials. It should be placed before the drum to level before rolling.
Scraper Bar	This is used to keep the drum free of debris or materials. They are commonly used on steel drummed rollers.
Spray Bar	This is a bar that sprays water onto the drum or wheels of the roller to keep the drum or the rubber wheels cool. It is particularly important when rolling asphalt and bitumen.
Wheel or Drum Broom	These are used to sweep materials from the drum or wheels. They are commonly used on rubber wheeled or multi-tyred rollers.
Drag Broom	This attachment is a broom that is pulled behind the roller. It is not a common attachment because most sweeping is done after the surface has had a chance to settle.
Padded Drum Attachment and Blade	In bitumen surfaces the padding is used to bed down the materials without shattering. They are often used to traffic the finished surface and ensure it is ready for vehicle movements.

If any attachments are used, ensure they meet the manufacturer's specifications and are approved for use with your roller. Any approved attachments should be listed in your operator's manual.

When selecting an attachment you have to work out if it is suitable for the tasks you need to complete by confirming:

- What the attachment is designed for.
- If it is an approved attachment that can be used with the roller you are operating.
- The manufacturer's requirements for the attachment.
- That you know how to use the attachment properly.

You will find this information in the operator's manual for the roller and the operator's manual for the attachment. Otherwise you may need to check the workplace equipment procedures for your site.



2.1.2 Fit and Remove Attachments



Once you have decided that the attachment is right, you need to attach it securely using approved attachment points and methods. Each attachment will have its own requirements for how and where it is fitted on the roller. You can find this information in the operator's manual or manufacturer's instructions.

Make sure you take appropriate safety precautions (such as releasing hydraulic pressures where needed) before fitting or removing attachments.

Fitting Attachments



- Make sure the bolts, nuts or connecting pins are correctly applied.
- Hydraulic hoses must be connected correctly.
- Water hoses must be connected to the appropriate reservoir. Water jets must face in the right direction.
- Scraper bars must be positioned to remove the debris without obstructing operations and the bar blade must be facing the drum or wheels.

Incorrectly fitted attachments can damage the roller or the worksite and could void any insurances or warranties on the vehicle.

Removing Attachments

- Ensure the attachment is safe to remove.
- Check for the temperature of the attachment and only remove it when the temperature is correct.
- Check that all hoses and points of the attachment have been undone before removing the attachment.
- Heavy attachments should be removed with good manual handling techniques. Use team lifts as much as possible.



2.2 Conduct Routine Checks

Before you use any piece of plant or equipment, you need to conduct routine checks to make sure it is safe to use. Check the machine logbook before you start your inspection to see if there are any faults that still need to be fixed before you can use the roller.

Also make sure you are wearing the correct PPE before you start checking the machine.

Routine checks are made up of:

Pre-Start Checks

Visual checks that are made before you start the equipment.

Operational Checks

Checks of all functions once the machine has been started.

Generally, routine checks are performed at the start of each day or shift.

You can use an inspection checklist to keep a record of the checks you have made.

2.2.1 Pre-Start Check

Pre-start checks are done before the engine is started. Walk around the roller and look for anything that is out of the ordinary.

Part or Component	What to Check For
Structure	Check the general condition of the roller. Look for any obvious signs of wear and tear. Check for oil or other fluid leaks.
Drums and Wheels	Check the drum condition and surface. Check the condition and air pressure of the tyres to make sure they are within the manufacturer's specifications. When checking the air pressure of water filled tyres on a roller, check the valve at the top of the wheel
Fluids and Lubrication	Check that the oils (engine, transmission, hydraulic) and fuel are at the right levels. Check that the water or other approved coolant is at the right level. Transmission fluid needs to be checked in accordance with the manufacturer's specifications. Check that parts are lubricated to ensure smooth operation.
Engine	Check condition and security of battery. Check electrolyte levels. Check for any obvious signs of damage or wear.
Hydraulic Rams and Hoses	Hydraulic rams and pressure hoses are checked for splits, leaks, fractures, bulges and bent piston rods.
Attachments and Ancillary Equipment	Check the condition and security of any attachments.
Decals and Signage	Check that all decals and signage are present on the machine.
Windows	Check that the windows are clean and you have good visibility from the operator's chair.
Cabin	Check that the seat and safety belt are in good condition. Check that the cabin is clean.
Service History and Logbook	Check the machine hour meter, manufacturer's recommendation and logbook to find out if the roller needs to be serviced. You can also check the instruments or computer for this information on later models.

For exact details on the components for the machine you are operating, check the operator's manual as different brands may have different requirements.

2.2.2 Operational Checks

Operational checks are made once the engine is started.



Climb to the operator's seat using 3 points of contact at all times (2 hands and 1 foot or 2 feet and 1 hand). This is the safest way to climb in and out of the roller.

Adjust the seat until comfortable and make sure you have maximum visibility. Secure your safety belt.

Start up the roller following the manufacturer's instructions.

You will need to let the engine idle for the required amount of time. Depending upon the individual machine this idle time could range from 3 to 10 minutes.

Controls and functions that need to be checked on the roller:

Part or Function	What to Check For
Gauges and Instruments	Check that all instruments are displaying properly and are not signalling any alarms or warnings.
Safety Devices	Test all lights and other warning devices.
Attachments	Check that the attachment is secured and connected to the roller properly. Check the condition of the attachment. Check that it works properly.
Drum	The vibratory or compaction system will need to be checked to make sure it is operating properly.
Travel, Turning and Brakes	Test all movements and brakes, including the emergency stopping device.
Ancillary Equipment	Test out all communications devices and any other systems or functions fitted.

Once you have finished your operational checks it is a good idea to check for external signs of oil or fluid leaks. It is common for the start-up process to cause a leak through hoses breaking.

2.2.3 Recording and Reporting Faults

Once all routine checks are finished, you will need to report any problems, faults, defects and damage that you found during the inspection so that they can be repaired and the machine and equipment are safe for you or the next operator to use.

Make sure the roller is tagged out (isolated from use) until the repairs have been made.

Record the details of the problem in a fault report or the roller logbook.



2.3 Operate the Roller



During civil construction roller operations you will need to:

1. Assess the materials you are working with.
2. Use the equipment safely within the technical specifications and limits.
3. Use the equipment for tasks that it is specifically designed for.
4. Continuously monitor and check for hazards.

It is important to coordinate your activities with other workers when you are planning and carrying out the work to make sure everyone knows:

- The work being completed.
- How, when and where you will be operating.
- What they need to do.

All workers on site must understand their own role and the roles of others before starting work. It helps to make sure work is done safely and efficiently.



Workers you may need to coordinate with include:

- Supervisors and management.
- Other plant and vehicle operators.
- Traffic controllers or other workers on the site.
- Team leaders.
- Site safety personnel.

2.3.1 Site Conditions

Site conditions, terrain and grades will affect the operation of the machine.



This in turn requires the operator to be able to change operational styles and techniques based on the prevailing conditions.

If the ground is rough or stony you should slow down accordingly to a safe speed.

When handling low viscous materials like mud, wet sand, etc., you must consider the following.

- There should be room for runoff.
- Safety hazards e.g. slips and fall, spilling out onto a road or into a water supply.

While compacting a large, sloped area it is best to perform rolling up and down the slope as opposed to across or diagonally across.

If you need to cross a ditch while in the roller you should approach and cross it slowly, and at an angle.

It would be appropriate to use a roller's guidance systems.

- When you have a large work area
- When working on narrow pass ways.

2.3.2 Assess Materials to be Compacted

You will need to assess the materials you are working with to figure out the best way to handle them. For example, clay is more cohesive and harder to roll than topsoil.

There may be different types of materials being handled at the worksite. They may include:

- Topsoil.
- Clays.
- Silts.
- Gravel.
- Mud.
- Stone.
- Rock, which might be:
 - Metamorphic.
 - Igneous.
 - Sedimentary.
- Blended materials.
- Organic materials.
- Bituminous mixes.



2.3.2.1 Soil Technology and Compaction

In civil construction, compaction is where materials are compressed (squashed) into a given space to achieve a set amount of stability in the soil.



During the compaction process, the amount of air spaces, voids and moisture trapped within the materials is squeezed out and more materials are pushed into the space.

Different types of soils compact in different ways. Some, like sand, will need to be mixed with other materials before any compaction activities could start.

Other materials, such as clay, will need to be at the correct moisture content (not too wet or too dry).

You will need to assess the type of materials to be compacted, the work area or circuit, and the grade of the site. This will help you determine if the machine you are operating is going to be able to achieve the level of compaction required.

Knowing the required compaction amount or percentage is essential to the process. You will be able to find the percentage of compaction that you need to reach in site plans, quality assurance plans, specifications or by speaking with your supervisor or site quality assurance officer.

If your machine is not able to achieve the level of compaction required, speak with your supervisor to develop a work pattern or plan which will achieve the percentage of compaction required.

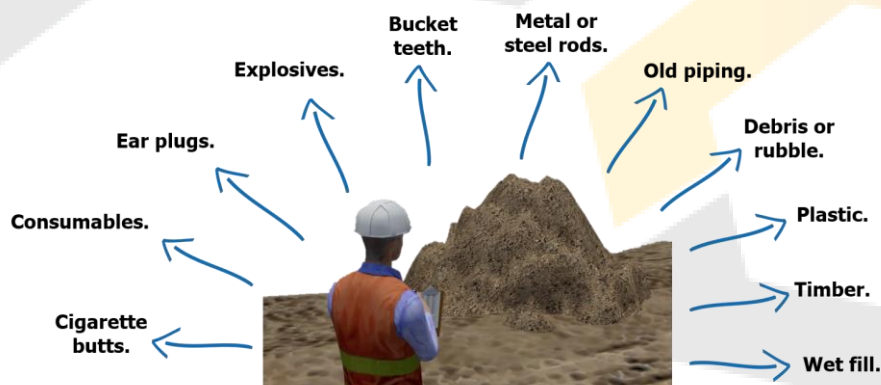


Every civil construction project has very detailed and explicit specifications which outline acceptable ranges for all aspects of the project, including compaction percentages, acceptable materials and acceptable moisture contents.

2.3.2.2 Identify, Remove or Manage Contaminants

During roller operations you may come across contaminants in the materials you are rolling or compacting. It is important that contaminants are removed or managed to make sure the final surface meets quality requirements.

Contaminants found in materials on a civil construction site could include:



Safely remove all contaminants from the area. If it is not safe to remove the contaminants you need to isolate the area and report the situation to your supervisor who will organise for the safe removal of the contaminants.

2.3.3 Safe Operating Techniques

To make sure your work is done in a safe way it is important to follow some basic safe operating techniques.

General safe operating techniques include:

- Continuously monitoring and checking for hazards, and warning other workers if there is danger.
- Making sure the roller is suitable for the ground conditions and to the task.
- Keeping to safe driving speeds for the conditions and terrain.
- Keeping the roller within tolerances and capacity.
- Keeping clear of holes or soft ground areas.
- Being careful when driving along the high side of a trench as it could cave in.
- Recognising defects or problems.
- Using the appropriate rolling or compacting techniques for the type of materials being compressed.
- Sticking with the rolling pattern established during site meetings.
- Keeping in constant communication with other personnel throughout your roller operations.



Report your progress on a regular basis to your supervisor and modify your work to meet any new project or quality requirements, or changing conditions.



The operator's manual will outline the limitations of the roller you are using. This will include information about:

- Safe operating speeds and techniques.
- Safe travel speeds.
- Monitoring systems and alarms.

Roller operators will usually use the following techniques to complete civil construction tasks:

- Levelling.
- Compacting.

Be aware of the limitations of a roller:

- Speed limitations
- Limitations in compacting steep slopes

- 2.3.4 Drive to the Work Area

Before compacting any surface the roller must be driven to the work area.



You should make sure that the route and direction of travel is clear and that you travel at a safe speed. Always check over both shoulders to ensure the direction of travel is clear before reversing.

Wherever possible, side hill travel should be avoided as there is a greater chance of turning the machine over.

If you must drive the roller down a sloping surface you should drive directly down the slope, not across or diagonally down. This will ensure the roller is as stable as possible.

On approach to downhill travel you should reduce the speed of the roller and select an appropriate gear for the grade.

During downhill travel always select a low gear to help control the descent. Often this is the same gear that would be used to climb the hill.

Be cautious when changing gears during uphill travel, especially when in a heavy roller. Missing a gear could result in you losing control of the roller.

If the roller does not have enough power to climb the incline, reverse back down the hill and select the correct gear to climb the hill.

DO NOT ever coast (put into a neutral gear and roll) the roller downhill.



2.3.5 Roller Techniques



Roller operators need to be able to identify and use techniques that help achieve the best possible results on the worksite.

Each site has specific design specifications that need to be met and roller operators are crucial to the finished project.

Some of the techniques which an operator could use to achieve the best possible result can include:

- Keeping to the roller pattern as accurately as possible.
- Travel at optimum speeds.
- Monitor the ground for potential hard or uneven surfaces.
- Accurately identifying if attachments are required to achieve the finished result.
- Selection of the appropriate gears for the slopes of the ground – low gear for steep slopes.
- Ensure smooth compaction through steady, even speed.



Some techniques that may be used include:

- **Roller Patterns** – following a designated pattern or path.
- **Roller Repetitions** – Rolling the same area a designated number of times. Generally between 3 and 6.
- **Team Rolling** – Having two rollers working together to continually roll a section. This can be helpful but edges may need special consideration to achieve the appropriate degree of compaction.



Techniques for operation cannot be learnt from a book. They are something that can only be done on the site. For further assistance, speak with other experienced operators or your trainer to demonstrate specific techniques.

2.3.5.1 Operate Attachments



Every piece of equipment has design limits and operational recommendations. Operating within these specifications, recommendations and design limits ensures you do not damage either the roller or the attachment.

2.3.5.2 Compacting

During the compacting process there are a number of important points to remember. You must:

- Work at a safe and acceptable speed.
- Use an appropriate path of travel and ensure direction of travel is clear.
- When using a blade, position it at the correct depth, level and angle.
- Use the correct roller patterns. Generally 3-6 passes will be made on each segment of the work area, offsetting each pass by half a roller width.
- Engage and disengage the compacting device when required for the materials being compacted.



The correct use of the drum controls will assist in achieving the required compaction outcomes. The quicker the vibration the lighter the compaction. The slower the vibration the heavier the compaction.



Rollers must work within the designated roller pattern for the site to ensure that compaction degrees are achieved as efficiently as possible.

Sometimes to achieve the compaction levels within the designated timeframes, multiple rollers will be used to compact the same area, each staggered slightly to achieve the required roller pattern.

If too much water is used on the soil being compacted, rolling will bring excess water to the surface and prevent the soil from being compacted properly.

2.3.5.3 Levelling Procedures

Levelling with your roller is the removal of lumps and bumps from the work area. Roller levelling helps to achieve appropriate gradients for the specifications.

When levelling, work to the designated grades in the required manner. This could include the type of levelling, the grade and slope, and the fall (for water to shed off).



In many cases GPS and laser control systems are now used to provide a more accurate finish to the work.

This eliminates the need to have a person standing close by ready to take levels (although this may still need to occur with some works).

Levelling equipment needs to be calibrated regularly and must be checked against site reference points such as pegs, benchmark points or other defined levels.

Levelling information and procedures will be discussed during your task briefings.

2.3.5.4 Road Works

When using a vibratory roller the first run against the kerb on uncompacted soil you should drive slowly without the vibrator.

Do not leave the vibrator on while the roller is not traveling or it will potentially sink into the ground.

Rolling operations on a road should begin on the kerbside and work in overlapping runs across towards the crown. All runs should overlap the previous run.

If cracks begin to appear after rolling with the vibrator on, perform another run with the vibrator off to remove the cracks. Always turn the vibrator off before stopping the roller.



2.3.5.5 Sealing and Finishing the Surface



Sealing and finishing is the last stage of road construction or maintenance and the roller is the last machine to move along the surface and complete the job. Once asphalt and aggregate has been deposited on the road the roller (usually a rubber tyre roller) forces the aggregate into the liquid asphalt without crushing it in the process.

Several passes are usually required to finish the surface properly and the roller should be driven slowly to get the best result. Rolling should stop once the asphalt has hardened to avoid damaging the bond between the aggregate and the asphalt. Hot asphalt increases the tyre pressure of a rubber tyred roller.

2.3.6 Monitoring Systems and Alarms

Each machine has its own set of alarms, monitoring systems and gauges to help you safely and efficiently operate it, and warn you if something is wrong. Each make and model of the same type of machine can be different so it is important that you are familiar with all of the systems for the equipment you are using. Check the operator's manual for a full list of devices, alarms and warnings.

Here are some examples of the gauges and warning systems that may be found on a roller:

- Engine oil pressure.
- Engine temperature.
- Hydraulic oil pressure.
- Hydraulic oil temperature.
- Electrics.
- Fuel.



Generally, alarms and warnings fit into 3 categories:

Warning Type	Category Description	Examples	What You Should Do
Category 1	These types of warnings let you know that the machine needs some attention, but it is still safe to operate.	• Low fuel. • Low system voltage.	Keep operating as long as it is safe to, and report the problem once you stop work.
Category 2	These warnings indicate that there is a problem caused by the way you are operating that may lead to problems with the equipment.	• Equipment is overheating. • Equipment is overloaded.	Change the way you are operating and if the problem is not fixed, stop operating and report the issue.
Category 3	This is the most serious warning level. Continuing to operate while this warning is sounding will cause damage to the machine.	• The park brake is on. • Low engine oil pressure.	Stop operating and shut down the equipment immediately. Report the problem straight away.

2.3.7 Adjust Techniques to Meet Changing Conditions

While you are working and rolling materials, the site will change.



Lighting Changes – Twilight is the time when your eyes might become more tired and difficult to focus. It could be more difficult to see the terrain and to judge distances. Set up temporary lighting where possible and go slowly.

Weather Conditions – Rain, sleet, snow, wind and humidity can all affect both your roller and the materials you are working with. Additional moisture from any source will change the composition of the materials, possibly making them heavier and slippery. This means you will not be able to level or compact as much and you will need to adjust the quantities you are dealing with in each run.

Changing Work Conditions – As more materials are moved around or removed from a site the work conditions may change. Materials that you are working with can change throughout a project. As you compact more or move onto other stages of the civil construction project preparing the road base you will be working with different materials, attachments and personnel.



2.3.8 Monitor and Check for Hazards

While you work it is important to always be on the lookout for new hazards, and to check that hazard controls are still in place and working effectively. This will help to ensure the safety of yourself, other personnel, plant and equipment.

Check the following things while you work:



Other Machines – At all times you need to know when other machines are working near the roller. Know and stick to your agreed speeds, travel paths or roads. Good communication between operators is essential to avoid collisions.

Personnel – Good communication is the key to working with other personnel. Be aware of people in the work area. Make sure they are not in danger and are a safe distance from the roller. If you are authorised, tell them to leave if they shouldn't be there, or call on someone who is authorised.

Operator Fatigue – Fatigue is one of the leading causes of accidents for operators of all types of vehicles and equipment.

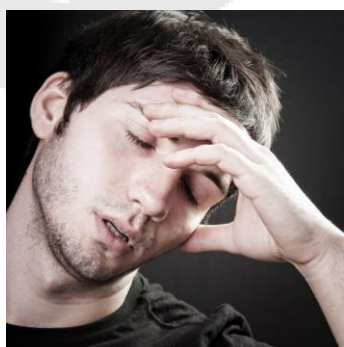
Fatigue can be caused by:



Warning signs that you are suffering fatigue include:

Category	Possible Warning Signs
Physical	• Slow reaction time. • Tiredness, yawning or sore eyes. • Headaches, stomach or other problems. • Micro sleeps (nodding off for a short period of time).
Mental	• Trouble concentrating and thinking clearly. • Shorter than normal attention span. • Boredom, irritability or lack of motivation.
Work	• Poor or careless performance. • Overlooking minor but potentially important details. • Lower levels of communication and cooperation with others.

It is very important that fatigue is managed properly. Here are some ways you can manage fatigue:



1. Get enough sleep.
2. Drink plenty of water.
3. Take regular breaks.
4. Keep a healthy diet.
5. Keep a reasonable level of fitness.

Talk to your boss or supervisor about breaking up boring or monotonous tasks or rotating the work you are doing with other workers if possible.

2.3.8.1 Reporting Hazards



Any hazard or environmental issue that you identify during your work will need to be reported. If you have taken any action you will also need to report those details. This could include written or verbal reports.

Your worksite may have standard paperwork that needs to be filled out, for example:

- Hazard report forms.
- Work method statements.
- Other reports or documents.

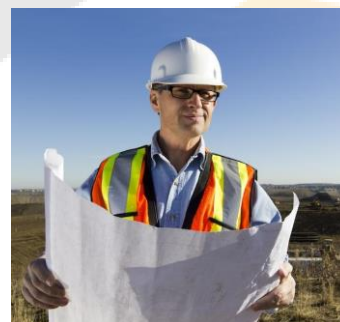
2.3.9 Checking Completed Work

The key to completing tasks efficiently is good time management and knowing how to use your equipment properly.

Once you have completed your work you will need to check it against:

- Your work instructions and project plans and drawings.
- Project quality requirements and timelines.

Speak to your supervisor when the work is completed to see if there are any other tasks that need to be done to complete the job.



3.1 Park and Shut Down the Roller

Once all tasks are complete and the work for the day is done, it is important that you park and shut down the roller.

Every piece of machinery has slightly different park and shutdown procedures. For the exact procedure for the machine you are operating, check the operator's manual.



3.1.1 Parking the Roller

The roller needs to be parked in a safe way that will allow easy access to the vehicle.

Safe parking practices include:



- Stop the roller on a flat level surface in the designated area and keep the access points clear.
- Park the roller away from overhangs, excavations, access ways and tidal or flood areas.
- Keep the roller away from refuelling sites and areas when parking to prepare for maintenance. This keeps the rest of the machines on the site able to access the fuel.
- Apply locks and brakes.
- Move attachments into the shutdown position. Make the attachments safe in the way needed for the worksite.



If the roller **MUST** be parked on a public access way, lights, signs and barricades should be erected to warn people.

3.1.2 Shutting Down the Roller

Shutdown procedures include:

- Cooling the engine before shutting it down. Dependent upon the vehicle but commonly the same amount of time as the engine warm up time.
- Monitor controlled lowering of temperatures and pressures.
- Walk around the machine looking for any signs of damage or faults that may have occurred during the task.
- Secure the vehicle and use any applicable lock out or isolation devices and remove the keys. This will prevent any unauthorised use or movement of the roller.
- Ensure equipment is correctly stowed in accordance with site and manufacturers requirements.

Any problems found during the shutdown procedures need to be documented in the way required by the worksite.



3.1.3 Post-Operational Checks

Post-operational checks need to be done to make sure the roller is ready for the next operator.

General maintenance activities are done to keep all plant and equipment working safely for longer.

As part of your job as a roller operator, you need to inspect your machine to find and report any faults or damage that may have occurred during your work activities.



Your inspection should include:

Visual Inspection of the Machine	Physically looking for anything odd, wrong, broken, or damaged.
Visual Inspection of the Environment	Is any fluid leaking?
Signals	Alarms, lights, electronic indicators showing that something may be wrong.
Gauges	Showing temperatures and the levels of fuel, oil and other fluids.



Post-operational checks should include all of the things you look for when conducting pre-start checks. For example:

- Fluid levels.
- Condition of drum or tyres.
- Hydraulics (rams, hoses and connections).
- Structure and attachments for damage or wear.

3.1.3.1 Reporting Faults

Once a fault has been found, it needs to be reported and fixed.

Most sites have a fault report form that you will need to fill out with the details. The form will generally need the machinery or equipment make and model numbers, the site identification numbers, the type of fault and the person reporting the fault.

You also need to make sure the roller is tagged out (isolated from use) until the repairs have been made. This will stop anybody from using it before it has been repaired.

Some sites will have a verbal system of reporting where you speak with a supervisor who then documents the fault, while others may require the operator to organise repairs of the fault directly.



3.2 Prepare the Roller for Relocation

The roller will need to be prepared before it can be moved from site to site.

Some issues in moving the roller to another worksite may include:

- Cross-contamination between sites.
- Hazards from loose or detached parts.
- Movement of the roller in transit.

Before relocating the roller you may need to do some or all of the following things:



- Clean the roller thoroughly.
- Clean any attachments going with the roller.
- Empty the fuel tank (if practical).
- Secure all moving parts.
- Remove and store any attachments going to the new site.
- Make sure all connectors are secure and locked.

3.2.1 Relocate the Roller

Moving a roller between worksites is normally done on a float (trailer), as most rollers are too slow and heavy to move on the road. Any transport must comply with:

- Codes of practice.
- Traffic management requirements.
- Site regulations.
- Traffic codes and road rules.

Be careful when loading the roller onto the transport and use a spotter to help guide the roller up and down the ramps.



Once on board the roller must be securely locked down to prevent any movement.

If a roller is being moved across a public road ensure that all traffic rules are obeyed, traffic is stopped to allow the roller to move without other traffic, making sure that an approved traffic management plan and escort vehicles are in place.

Expect significant damage to road surfaces if a pad foot roller of any kind is moved across a sealed surface.

3.3 Clean the Roller and Carry Out Routine Maintenance



It may not be practical to clean the roller after every use but you should clean it thoroughly as often as possible. Mud and other contaminants left for long periods will eventually damage the machine.

Cleaning is also a good way to do an even closer inspection of the roller, and may highlight issues you didn't see during the walk-around inspections.

Cleaning will need to be done in a designated area to avoid any negative impact on the environment or contamination of the site.

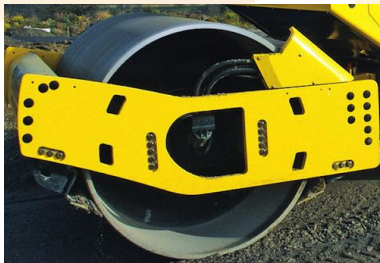
3.3.1 Carry Out Maintenance Tasks

Before carrying out any routine maintenance and minor repairs make sure you have all of the tools and equipment you will need to finish the job.

When conducting maintenance activities it is important to keep people in the area safe by using barricades or fences if necessary and locking out machines.

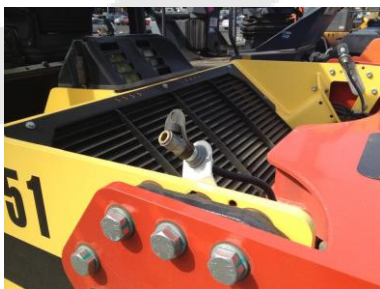
Tasks should be completed within designated areas and others should be informed of what you are doing.

You should conduct servicing, maintenance and housekeeping tasks to ensure the roller stays at its operating capacity for as long as possible.



Maintenance activities could include:

- Air filters – should be checked daily in dusty conditions. Clean or replace them as necessary.
- Greasing or lubricating attachments.
- Checking drum parts and replacing them as needed.
- Battery checks – clean the battery, check electrolyte levels. Ensure we remove the earth/negative battery clamp when changing the battery.
- Fuel and other fluids – check and maintain levels.
- Refuelling.
- Recording and reporting of faults through workplace procedures.



You will also need to coordinate with mechanics, maintenance supervisors or other site workers to ensure the vehicle is serviced at regular programmed intervals.

3.3.2 Vehicle Refuelling Procedures

All refuelling of equipment needs to be done in line with safety procedures and workplace instructions.



Some sites may have refuelling areas for plant and machinery set up to make sure any spills or incidents can be contained without causing damage to the environment. Spill response procedures need to be clear and spill kits available to manage any incident.

Other sites use a service truck or fuel tanker that travels to each machine to refuel. On these sites it is very important that all procedures are followed to avoid any incidents (such as fires in a coal mine environment) or damage to the environment. For example, there may be site rules against refuelling plant and equipment near a waterway or sensitive area.

Refuelling can be a dangerous activity, so it is important that you know and understand the correct procedures and techniques. If you are not sure what to do, speak with your supervisor.

These are some general guidelines for refuelling plant and equipment. Always check the procedure for your work site before any refuelling is done.

- Park the machine in an appropriate location or within a bunded area. This contains any environmentally sensitive fluids or spills from entering and causing damage to the environment.
- Shut down the machine and apply all brakes and isolations.
- Leave the cabin, or if company procedures do not allow this make sure you do not restart the machine until you have permission from the refuelling operator.
- If you are responsible for refuelling the machine make sure you have the right PPE on before you start. This may include safety glasses, face shields, gloves or other approved gear.
- Activate the fuel pump correctly and make sure all safety procedures are followed.
- Shut down the fuel pump once the machine has been refuelled.
- Roll up or safely tidy all fuel lines or hoses.



3.3.3 Processing Maintenance Records

Most sites have workplace forms, logbooks or checklists for writing down details of all machine maintenance work.

They are used to record the history of the machinery and equipment so that all operations and any problems can be monitored.

They are also a way of making sure that all repairs and maintenance are done correctly and on time.



Written maintenance records for your roller may include:

- Inspection checklists.
- Fault reports.
- Fuel, oil, hydraulic and other fluid usage.
- Service manuals or logbooks.
- Repair request forms.
- Part requisition forms.

You will usually need to include details like the roller make and model number, site identification numbers, the type of maintenance carried out, the repairs or replacements that were done and the person who did the work.

Follow your site record keeping and reporting procedures. If in doubt about completing and processing written maintenance records, talk to your supervisor or an experienced worker.

Once all maintenance tasks or minor repairs are completed and the paperwork is signed off you can return the roller to service. This means it is safe and ready to use.

Notify your supervisor or other authorised personnel that the equipment is ready to be used again.



3.4 Clean Up After Operations

Once all of your roller tasks are finished, you will need to clean up the site. This includes removing any tools and equipment that have been used.



3.4.1 Clearing the Work Area

In clearing your work area you will be carrying out housekeeping activities. Housekeeping procedures on your site may include:



- Eliminating or controlling any potential hazards. Your duty of care means you shouldn't leave a possible source of danger or accident for others.
- Using the correct PPE – Make sure you use appropriate PPE when dealing with waste or possible hazardous materials as you clear up. For example, chemicals used for cleaning can be dangerous unless used correctly.
- Removing any hazard controls that are no longer needed, e.g. temporary fences, barricades and signage.
- Recycling or disposing of materials to carry out site clean-up tasks, e.g. construction materials, stockpiled materials, stones, rocks, gravel and bituminous mixes, paper and site rubbish – Put any waste materials in the bins provided, and recycle where possible, in line with the site plans for environmental management or waste disposal.
- Packing up, maintaining and storing plant, equipment and tools.

Good housekeeping will help you to see any problems or hazards on the worksite. This will help you to make sure the working environment is safe.

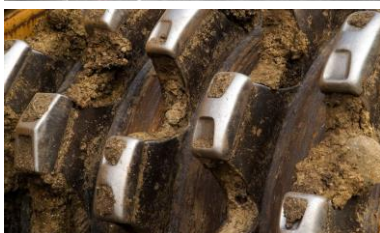
It is your responsibility to clean up after your work activities and not leave it to someone else to do.

3.4.2 Cleaning, Checking and Maintaining Equipment



All tools, equipment and attachments must be kept in good working order. This means cleaning, checking, maintaining and storing them correctly, by following worksite procedures and manufacturers' guidelines.

Clean all items by removing dirt, mud, moisture or other contaminants.



While you are cleaning, check each item for damage or wear and tear. If anything is wrong report it, repair it, or have it fixed by a qualified person.

Tools, equipment and attachments need to be maintained in line with manufacturers' recommendations or your worksite procedures.

Maintenance could involve the greasing of metal surfaces or lubricating moving parts.

3.4.2.1 Cleaning and Storing Attachments

Once an attachment has been removed it should be cleaned, inspected for wear or damage and maintained according to the manufacturer's instructions and site requirements.

Most equipment will have specified storage areas and requirements so make sure you know where and what these are before you detach heavy attachments. This will allow you to offload the attachment where it is meant to be and minimise heavy lifting or handling.

Be careful when you are cleaning and maintaining attachments. They may be sharp or hot so make sure you are wearing PPE whenever handling them.



3.5 Process Written Records

Site record keeping procedures keep the site running smoothly.

Part of your role will include completing and processing records for your roller and the tasks that you have completed.

As well as the maintenance records you have filled in, some other records, reports and paperwork that may be needed include:

- Logs – supply logs, work activity logs, training logs, usage or driver logs.
- Shift documents – end of shift, end of process.
- Fault reports.
- Hazard reports.
- Incident reports – accident forms, incident reports or environmental incident reports.



It is important that you keep detailed records of all your activities, especially any problems you had during your shift. You may need to explain what you saw, or what you did at a later time.

Make sure you keep notes about what happened and what you did to fix it. This includes faulty or broken equipment, operational issues (mistakes or not following procedures correctly for some reason) and any other unusual things.