Forklift Course Student Handbook.

Thanks to:
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2nd Edition.
COURSE AIM
To produce a Forklift Operator who has a sound understanding of the general principles of the operation of a counterweight forklift Truck and who can demonstrate safe operating practices in the work environment.

COURSE PLAN

- Introduction to Health and Safety in Employment Act 1992
- Legal requirements for operation of forklifts in public areas.
- Personal requirements
- Accident types
- Principles of operation (counterweight)
- Centres of Gravity
- Triangle of stability
- Factors affecting stability
- Load centres
- Identification of vehicle capacity
- Safe operating practices
- Exercises and theory tests
- Practical test.

COURSE OBJECTIVES
Given a test paper of 35 test questions, relating to safe operation of Forklift Trucks, answer correctly at least 28 (80%)

Given a Forklift Truck, a prepared circuit and task instructions, complete a practical, timed exercise involving manoeuvring and Stacking/destacking in confined areas without incurring more than 30 demerit points.
QUALITIES OF A GOOD DRIVER.

A  Attitude (Positive)
D  Defensive (in the way he/she operates the vehicle)
R  Responsible (Load/Passengers)
I  Initiative (Brains)
V  Versatile (Adaptable to change)
E  Enthusiasm (Interested)
R  Reliable

HEALTH AND SAFETY.

The principle object of the health and Safety in Employment Act 1992 (HSE Act) is to prevent harm to employees at work. To do this, it imposes duties on employers, employees, principles and others, and promotes excellent health and safety management by employers.

APPROVED CODES OF PRACTICE

These are recommended as means of compliance with the provisions of the Act and may include procedures which could be taken into account when deciding on the practical steps to be taken. Compliance with the code may be used in a Court as evidence of good practice.

EMPLOYERS’ DUTIES

Employers have the most duties to ensure the health and safety of employees. Employers have a general duty to take all practical steps to ensure all safety of employees while at work. In particular, they are required to take all practical steps to:

- Provide and maintain a safe working environment;
- Provide and maintain facilities for the safety and health of employees at work;
- Ensure that machinery and equipment are safe for employees;
- Ensure the working arrangements are not hazardous to employees; and
- Provide procedures to deal with emergencies that may arise while employees are at work.

Significant Hazards, those which might cause serious harm, must be identified in the workplace and the employer must take all practicable steps to eliminate, isolate or minimise these.
FORKLIFT HAZARDS MAY ARISE FROM THE MACHINE ITSELF, OR FROM THE WORK ENVIRONMENT.

The employer must notify all employees of:
- Emergency procedures;
- Hazards they may be exposed to;
- Hazards which may be created by the employee which could harm others;
- How to minimise hazards;
- The location of safety equipment;
- The results of any health and safety monitoring (however, your privacy may be protected).

EMPLOYERS TO INVOLVE EMPLOYEES IN THE DEVELOPMENT OF HEALTH AND SAFETY PROCEDURES

Employers must ensure that all employees have the opportunity to be fully involved in the development of procedures for the purpose of identifying hazards and dealing with significant hazards, or dealing with or reacting to emergencies or imminent dangers.

EMPLOYEES' DUTIES

If you are an employee, the Act imposes on you a responsibility for your own safety and health while at work. You must also ensure that your actions, or inactions, do not harm anyone else.

RECORDING AND NOTIFICATION OF ACCIDENTS

The HSE Act requires employers to keep a register of work-related accidents and serious harm. This includes every accident that harmed (or might have harmed):
- Any employee at work;
- Any person in a place of work controlled by the employer.

Employers are also required to investigate all accidents and near misses to determine whether they were caused by or arose from a significant hazard. Employers are required to notify serious harm that occurs to employees while at work to the Secretary of Labour (in practice the nearest OSH office) as soon as possible. In addition, the accident must also be notified in the form prescribed within seven days.
SERIOUS HARM ACCIDENTS

If a person suffers serious harm, the scene of the accident **MUST NOT** be disturbed unless to:

- Save life or render first aid;
- Maintain public access for essential services e.g. electricity and gas;
- Prevent serious damage or loss of property.

The OSH office will advise whether it wishes to investigate the accident and what action may be taken in the meantime.

**REPORT ALL ACCIDENTS, NO MATTER HOW MINOR, AND ALL NEAR-MISSES. THESE MIGHT INDICATE A HAZARD WHICH HAS NOT BEEN IDENTIFIED.**

**ROAD INJURY ACCIDENTS MUST BE REPORTED TO THE POLICE WITHIN 24 HOURS.**

LEGISLATION

There are various acts and legislation that have been formulated over the years to accommodate the safe and effective operation of forklift trucks. Some of these are:

- The Traffic Regulations 1976;
- Land Transport (Road User) Rule 2004;
- Land Transport (Driver Licensing) Rule 1999;
- Land Transport Act 1998
- Health and Safety in Employment act 1992

There are also Codes of Practice formed to help use these machines safely. These are:

- Safety Code for forklift truck operators No. 1.
- The Approved Code of Practice for training operators and Instructors of Powered Industrial Lift Trucks.

DRIVER LICENCES

To operate a forklift on any road, you must also hold the appropriate driver licence.

**For a forklift weighing 18,000kg or less (laden):**
Class 1 licence and F (Forklift) endorsement

**For a forklift weighing more than 18000kg (laden):**
Class 2 Licence and F endorsement.

**Definition**

A road is any street, motorway, beach, and any place to which the public have access, whether as of right or not. Also includes bridges, culverts, ferries, and fords forming part of a road or street or motorway and all sites at which vehicle may be weighed.
CAUSES OF ACCIDENTS.

CAUSES OF ACCIDENTS AND SERIOUS HARM INJURIES

- careless attitudes;
- taking short cuts;
- Inadequate or incorrect training;
- Starting new projects without hazard analysis;
- Staff are not fit for duty - alcohol, tiredness, stress;
- Lack of concentration and inattention;
- Ignoring or breaking the safety rules;
- Not using a forklift of the correct capacity.

Causes of accidents
Analysis of accidents reported to OSH indicates that the main causes of accidents are:

- Excessive speed;
- Not looking in the direction of travel
- Carrying/lifting passengers;
- Poor stacking procedures;
- Poor forklift maintenance;
- Inadequate operator training
- Exceeding the rated capacity of the forklift;
- Travelling with the load raised; and
- Getting on and off the forklift.

DAMAGE TO EQUIPMENT AND MATERIALS

Persistent damage to equipment and materials may indicate that several factors should be checked:

- Operator’s judgement of position, distance, height, space and speed.
- Sensitivity of and to forklift controls.
- Personal or health problems of the operator.

Accidents may cause substantial costs to the employer in downtime, loss of product and damaged plant. Forklift owners and managers should be aware that a trained forklift operator should reduce such costs by following safe operating practices.
FORKLIFT TERMINOLOGY

**CAPACITY:** The safe working capacity of the forklift. A nominal capacity is the machines base capacity and is generally referred to as a model number. The de-rated capacity, located on the load chart, gives the machines true ability and is expressed in terms of weight, load centre and height with the mast vertical.

**CENTRE OF GRAVITY:** The theoretical point where a forklift, any load, or combination of the two, is said to be balanced in all directions, or where the entire weight of the machine is said to be centred.

**CONTROLS:** Foot and hand operated devices utilised by the operator in the manoeuvring of the machine and/or load.

**COUNTERBALANCE:** Weights positioned, generally at the rear of the forklift, to prevent it from tipping forward when a load is lifted.

**FRONT AXLE:** The axle closest to the lifting device, being the drive, brake, major load carrying and controlling the sideways stability of the forklift.

**LOAD BACKREST:** The portion of the carriage or its extension, that for greater stability, the load should be positioned against.

**LOAD CENTRE:** The distance measured from the face of the forks to the centre of gravity of the load.

**LOAD RATING CHART:** Load chart/data plate is where the de-rated lifting capacity of the forklift can be located.

**MAST:** The frame on which the lifting device travels when the load is raised or lowered. Masts are raised by a chain link system on pulleys powered by hydraulic rams.

**REAR AXLE:** The steering axle. Whether an oscillating or single wheel, it has the same effect on the sideways stability of the forklift.

**SAFETY FRAME:** The frame or overhead guard fitted to protect the operator.
Types of Forklifts

LPG/Petrol counterbalance forklift

Has a standard internal combustion engine that runs on both LPG and Petrol. Not good for use in confined spaces or small indoor areas. Price for a new forklift of this type is $20,000 - $28,000 depending on the specifications.

Electric counter balance forklift

These run on a bank of rechargeable batteries. These are good for indoors and confined spaces. The cost of one of these forklifts new (based on a 2,500 kg capacity) is approx $40,000.

Counter balance reach truck

These are used in warehouse situations and are manually steered by the operator following in front or behind. The forks and mast move out from the machine (reach) to go into the pallet. The cost of one of these new is approximately $22,000.
FORKLIFT CONTROLS

The following illustration shows the controls of a forklift fitted with a torqflow transmission (torque converter).

Lift lever:

- Pulling this lever backward raises the forks.
- Pushing the lever forwards lowers the forks.
- Lift speed is controlled by the amount of movement of the lever and accelerator pedal effort.
- Lowering speed is controlled by the amount of movement of the lever. The accelerator pedal and engine speed have no effect on the lowering speed.
- The forks can be lowered while the engine is stopped.
**Tilt lever:**

- Pulling the lever backwards tilts the mast backwards towards the driving position.
- Pushing the lever forwards tilts the mast forward away from the driving position.
- Tilt speed is controlled by the amount of lever and accelerator movement.

Some forklifts have a single lever that controls all of the masts functions.

To tilt forward, you push the lever up and to the left at the same time.

To tilt backwards, you pull the lever down and to the right at the same time.

To raise the mast, you pull the lever down and to the left at the same time.

To lower the mast, to push the lever up and to the right at the same time.

With the single lever controlled machines, you can do two mast movements at the same time. For example:

If you want to tilt forward and lower the mast at the same time, just push the lever up.

If you want to raise the mast and tilt it back at the same time, just pull the lever down.

If you want to raise the mast and tilt it forward at the same time, just push the lever to the left.

If you want to tilt the mast back and lower it at the same time, just push the lever to the right.
**Side shift lever:**

Some forklifts are also fitted with an extra lever for side-shift. Side-shift allows you to move the forks left or right so as to engage an awkwardly placed pallet without having to further manoeuvre the machine.

Moving the lever forwards or backwards shifts the forks left or right.

Always centralise the forks before raising the load.

**Forward/Reverse lever (Torqflow)**

The lever shown is of the column type for forward and reverse.

Always stop the forklift before selecting forward or reverse direction.

**Parking Brake lever:**

Use the parking brake to hold the forklift stationary when parked.

NOTE: the parking brake only operates on the two front wheels.
FOOT CONTROLS

Torqflow transmission (Torque converter)

Forklifts with torqflow transmissions (torque converter) have similar foot controls to a manual vehicle, but in place of a clutch pedal, they have an inching pedal.

As you press the inching pedal oil pressure in the torque converter drops, allowing you to perform inching operation. Use this pedal to hold the forklift stationary while operating the hoist system at a higher rpm level.

The inching pedal must not be used on inclines or where engine braking is required.

Allow the engine rpm level to return to idle before releasing the inching pedal.

**NOTE:** When you press the inching pedal fully down it acts as a brake and should only be used for stacking and de-stacking

Brake pedal:

The brakes on a forklift operate only on the drive wheels (the two main front wheels). You should never apply the brakes suddenly. It should always be a gradual action to ensure you do not compromise the security of the load.

The brake should always be used to slow the forklift down, not the inching pedal.

Accelerator pedal:

The accelerator is the right hand foot pedal and will accelerate or decelerate the forklift. When using this pedal, use gradual movements to ensure no jerking or sudden movements.
Manual forklifts

If you are using a manual forklift, then the left side foot pedal will be a clutch pedal, not an inching pedal.

The clutch pedal is used the same way you would use your clutch pedal in a car. It needs smooth operation to ensure smooth take up of each gear to avoid shifting the load on your forks.
FORKLIFT STABILITY & DYNAMICS.

Forklifts are counter balanced and work on a see-saw principle.

The point of balance of the forklift is called the Fulcrum.

On a forklift, the fulcrum is the front axle (drive axle).

The weight of the forklift behind the front axle, balances the weight of the load on the forks.

Loads of an equal weight placed the same distance either side of the fulcrum will balance.

By increasing the weight of one of the loads, this will move the balancing point (Fulcrum).

If the fulcrum stays in the same place, then the beam will tilt down in the direction of the heavier load.

Centre of Gravity

The centre of gravity is the point in an object at which all of an objects weight is concentrated and is the balance point.

With some loads, the centre of gravity may change. Eg, a drum that is not full, will have a lower centre of gravity than a full drum.

With many loads, the centre of gravity may not be in the centre. These should be carried with the heaviest end of the load towards the backrest.
The centre of gravity on an unladen forklift lies at a point just behind and below the operator’s seat.

Both the forklift and any load it carries have an individual centre of gravity.

When a forklift lifts a load the two centres of gravity form a combined centre of gravity that is always placed somewhere between the two.

You need to understand how a forklift’s centre of gravity can become unsafe, resulting in a tip over.

Although most forklifts stand on 4 wheels the hinged rear axle makes the forklift behave as if it were standing on only 3 wheels.

This creates the ‘Stability Triangle’ that is used to determine a safe centre of gravity when operating a forklift.

The corners of the ‘Stability Triangle’ are formed by the centre of each front wheel and the centre of the rear axle.

The centre of gravity of a forklift must be kept within the ‘Stability Triangle’ or it will tip over.

A forklift’s centre of gravity can move outside the Stability Triangle in two directions:

- Longitudinally, or forwards and backwards, and
- Laterally, or sideways.

The load centre is the distance between the heel of the fork and the centre of gravity of the load. The safe working load is governed by this distance.

It is important when picking up a load that the load is hard against the backrest to reduce the load centre distance.

If the load is not against the backrest, this will increase the load centre distance and could cause the forklift to tip forward.
As you can see from this first picture, the load has been placed on the forks in a way that has increased the load centre causing the combined centre of gravity to move in front of the drive axle. In this circumstance, the forklift would tip forward.

In this picture, the forklift operator has stood the load up to reduce the load centre distance. This has moved the combined centre of gravity behind the drive axle (Fulcrum).

The combined centre of gravity of the forklift and the load can move.

As seen in this picture, when the load is raised, the combined centre of gravity raises as well.

The higher the combined centre of gravity is, the more unstable the forklift becomes. In this picture, the combined centre of gravity has raised with the load.

When the driver has tilted the mast forward, due to the combined centre of gravity being so high, it has moved quite a distance forward as the mast has gone forward.

This forklift would have tipped forward as well. If the combined centre of gravity was lower, it would not move as far forward as it has at the higher height.

A forklift is not as stable laterally as it is longitudinally. This is because of the narrow track of the wheels.

A forklift should never be driven sideways along or turned on an incline as it is easy for the combined centre of gravity to move outside the ‘Stability Triangle’.
The combined centre of gravity of the forklift and load can move outside of the ‘Stability Triangle’ if:

- The load is picked up on the tip of the forks;
- The load is tilted forward;
- The load is tilted too far back when raised;
- The load is wide, or
- Forklift movement causes the centre of gravity to shift.
FORKLIFT CAPACITY

Nominal Rated Capacity

The normal capacity of a forklift is normally shown on the model number of the forklift. i.e. Nissan 25 means 2500kg.

This lifting capacity will also coincide with a certain load centre, maybe 600mm. Every forklift should have a load rating chart attached to it so that the operator can determine to what height a load can be lifted.

It will also let the operator know what the maximum weight that can be lifted for that machine is.

Load rating charts come in various forms, depending on the machine. If attachments get fitted to a forklift, a new load rating chart needs to be issued for the machine as adding attachments lowers the lifting capacity of the machine.

On the load rating chart off the Nissan forklift, you will see that the fitted attachments are listed on the chart.

It is most important that you as an operator, know how to read these charts.

Now using this load rating chart, work out the following loads.

What weight can you lift to 4000mm at a 700mm load centre?

What height can you lift 1800kg at a 800mm load centre?

What height can you lift 1400kg at a 700mm load centre?
FORKLIFT ATTACHMENTS

Twin Pallet handler
These are used for lifting two pallets at a time. Can become very unstable if used for lifting one pallet at a time incorrectly.

Push Pull Unit
These are used for lifting loads that are not loaded on a pallet.

Carton Clamp
This applies sideways pressure to the load to hold it.

Carpet Pole
This is used for picking up rolls of carpet. It picks up from the middle of the carpet roll.

Bin Tipper
The whole fork assemble can rotate to allow it to empty the contents of the bin on the forks.

Squeeze Clamp Attachment
Used for picking up single drums. Should be used around the middle 1/3 of the drum.

Side Shift
Designed to move the forks to the left or right to make the positioning of the load between objects quicker.

Fork Extensions
These are commonly used to pick up two pallets at a time. This is usually done to load both sides of a truck at the same time from the same side.
**Jib Attachment**
Used for picking things up with a sling, like a crane.

**Paper Roll Clamp**
Used for picking up large rolls of industrial paper. Can also rotate.

**Work Platform**
These are used to lift personnel to heights to make repairs on machinery or plant. They must have a barrier at the back to stop anything falling into the mast area.

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**MAINTENANCE & INSPECTIONS**

**Pre-Start Checks**

The first thing you need to do is find out what your employer’s vehicle policy is.

All forklifts must be inspected before use on each shift.

You company should have a standard checklist similar to the one on this page, and it should be filled in and given to the appropriate person on completion.

It is most important that any faults that are found are rectified before the forklift is used.
**DAILY CHECKS**

At the start of each day, the following should be checked on your forklift:

- Fuel level and fuel leaks;
- Oil and water levels;
- Hydraulic oil levels and hoses and connections for damage or leaks;
- Battery fluid levels;
- Tyres for correct inflation and for damage;
- Warning devices;
- Controls;
- Steering;
- Brakes and
- Lift chains.

**REFUELLING**

Before refuelling your forklift, you need to determine the fuel that it runs on.

For most diesel powered forklifts, it is important that you do not run out of fuel as the engine will not start again as there will be air in the fuel system.

- **Petrol must not** be added to a diesel fuel tank.
- **Diesel must not** be added to a petrol fuel tank.

When refuelling petrol and diesel forklifts, take the following precautions:

- Stop the forklift, shut down the engine and apply the parking brake securely.
- Make sure there is no open flame near the area. Never smoke while refueling.
- Always vacate the driving seat while the forklift is being fueled.
- When fueling is finished make sure that the fuel cap is correctly secured. A loose cap can allow fuel to leak and cause a fire hazard.
- Do not start the engine until any spilt fuel has been cleaned up.

**Fitting a new LPG Cylinder**

1. Close the cylinder valve with the engine running.
2. Run the engine until it runs out of gas and stalls.
3. Unscrew the main hose coupling.
4. Release the connection straps and remove the cylinder.
5. Fit the new cylinder and secure in place.
6. Examine the main hose coupling and make sure the rubber sealing washer is in position.
7. Screw the main hose coupling onto the cylinder tight.
8. Very slowly open the cylinder valve to fill the system with fuel (takes 5-10 seconds). If the valve is opened too quickly the valve may automatically shut off and you will hear a “click”. **If this happens:**
9. Close the cylinder valve until you again hear a “click” as the valve opens.
10. Open the cylinder valve again very slowly.

**NOTE:** If the cylinder valve seems to be sticking, do not fiddle with the valve by sticking something into the valve as sub-freezing liquid gas under pressure will saturate the hand and may result in serious physical harm.

**IMPORTANT**
- [x] Pressure release valve must be at the top of the cylinder
- [x] Bayonet connection must be pointing away from the driver
- [x] Gloves must be used when changing cylinders

**Recharging Electric Forklifts**

When ever you recharge an electric forklift:
- [x] Turn off the motor and any lights that may be turned on.
- [x] Do not smoke; make sure there are no open flames nearby.
- [x] During the recharging process, batteries give off hydrogen gas. Make sure you recharge the forklift in a well ventilated area.
- [x] Batteries, when they are recharging, produce heat. Be sure to keep the compartment lid open.
- [x] Do not leave batteries partially discharged for more than a week.
- [x] Fully recharge the batteries if they are to remain unused for any length of time.
- [x] Recharge daily or at required frequency. Allow charger to complete full cycle and turn off before disconnecting battery plug.
- [x] Do not charge battery for short periods during normal shift.

**NOTE:** Always check the electrolyte levels after a full charge.
SAFE OPERATING PROCEDURES

When carrying a load with your forklift, you must always travel with the fork about 100 mm to 150 mm from the ground, but high enough to clear obstructions. In the event of brake failure, lower the load to the ground.

- Look in the direction of travel and keep a clear view of the way ahead. (If your vision is obscured, seek assistance).

Remember the effect of tailswing. To make a turn, drop the speed and take care that the tip of the fork (or load) or rear side of the machine does not touch or bump against any object or person nearby. The sideways speed of the rear of the forklift is 3 times the forward speed when turning.

- If a bulky load obscures forward vision, drive in reverse. However, the load must lead when travelling up gradients.
- Use a spotter when moving a bulky load up gradients.

Only carry loads that are supported by the carriage or backrest extension.

Always drive at a speed consistent with existing conditions. Slow down for wet or slippery surfaces.

- Keep a safe braking distance from the truck in front and never overtake when approaching cross roads or in blind areas.
When approaching crossings in aisles or gangways, slow down, sound horn, and if vision is obstructed keep well to the correct side of the aisle.

Because of the varying needs of industry, it is not practical to recommend driving on the left or right, but it is suggested that the broad principle of the Road Code be observed.

Passengers must not be permitted to ride on the forks or load or any other part of a fork-lift truck unless an approved passenger seat is fitted.

The use of a fork-lift as a hoist for personnel must not be permitted unless a work platform complying with NZ Standard 5426 has been fitted.

Do not run over loose objects. Stop the forklift truck, remove the objects (dunnage, etc) to the side of the aisle and report to the supervisor.

Avoid making fast starts, jerky stops, and quick turns, particularly if materials are being stacked at height.

Never attempt to handle loads that exceed the forklift truck’s rated capacity. This involves not only weight, but the load centre. Remember the allowable load to be carried is reduced if a high lift is involved (refer to the forklift truck load chart rating).

Never cross railway lines unless the lines have been recessed into the surface.

Cross lines diagonally.

Never use a forklift truck to tow or push railway cars or wagons.

Never park a forklift so that any part is closer than 2.5 metres from any railway line.

Never push on the point of one or both forks.

Never attach a tow rope to the mast to pull or drag loads.
Forks should always be driven well under the load, preferably for their full length. When travelling, the back of the load should be firmly located against the fork carriage or back-rest and the mast tilted back sufficiently to safeguard the load.

When a forklift truck is travelling without a load, its forks should be at least 150 mm above the ground.

Do not allow anyone to stand or walk under the elevated forks, whether or not a load is being carried.

Before moving off look around, and when clear, move off without inconveniencing other users of the aisle.

When traffic signs and signals are in use, learn and act upon them.

Where no traffic signs or signals exist, try to give clear indication of intention to other aisle users.

Drive carefully and slowly, especially when pedestrians are about.

**Ramps and Loading Docks**

Never drive over a bridge plate unless you are satisfied that it will support the weight of your forklift truck and load and it is securely fixed. Then drive over very slowly.

Before entering a truck, trailer, or railwagon, its brakes should be set and its wheels chocked. Semi-trailers must have fixed jacks to prevent upending.

A forklift truck must never be left on an incline.

When travelling on an incline and carrying a load, the load must always be on the uphill side of the forklift truck.

When travelling on an incline without a load, the forks must always be on the downhill side of the forklift truck.

On all gradients the mast must be tilted back sufficient to safeguard the load and the forks raised high enough to clear the ground.
Never stack on gradients.

**General**

Never remove a back-rest extension or overhead guard unless specifically authorised.

Never place arms, hands, legs, or head between the uprights of the mast or outside the limits of the forklift trucks body or cab (except when hand signalling a turn or other manoeuvres).

Never allow an engine-powered truck to remain stationary in confined spaces for long periods with its engine running. The build-up of fumes and gases can be dangerous.

When leaving the forklift truck ensure that the controls are at “neutral”, power is shut off, brakes applied, forks fully lowered, and the ignition key or starter switch key removed. (this helps prevent unauthorised people from using the machine).

Under no circumstances must additional counterweights be added to forklift trucks to increase their load capacity without prior reference to the manufacturer.

Do not fit extensions to forklift trucks unless their use is authorised. Only fork extensions of a design approved by the manufacturer may be used.

When flashing lights are fitted ensure that these are operating correctly, and horns are used only when necessary.

When a forklift truck or any part of its load has to be closer than **4 metres** to any live electrical wire or installation the Electrical supply Authority should be contacted.
In the event of a forklift truck contacting a power line:
- Stay where you are and keep others away;
- If possible, move the truck off the power line;
- If you must leave the truck, jump well clear. **DO NOT touch the truck – you may be killed.**

If the power line is broken:
- **DO NOT** get off the truck;
- Wait until the power is shut off before leaving the truck or allowing anyone to come near.

**BASIC STACKING RULES**

Approach the stack with the load low and tilted backward.

Slow down and stop at the face of the stack, reducing backward tilt to an amount just sufficient to stabilise the load. Handbrake on, gear lever in neutral.

Raise the load to the desired stacking height. The mast should almost be vertical with just a little bit of back tilt to stabilise the load.

When the load is clear of the top of the stack, move slowly forward.

When the load is over the stack, bring the mast to the vertical position and lower the load on to the stack.

When the load is securely stacked, lower the forks until free of the pallet or dunnage strips and withdraw by reversing the forklift truck. At this position slight forward tilt may be of assistance, otherwise it should seldom be necessary to use forward tilt.

When clear of the stack, tilt the mast backward and lower the forks to just above the ground level.
The stack should not be straightened out by pushing against the stack with the forks or the end of the forklift truck.

**BASIC DESTACKING RULES**

Halt at the face of the stack, bringing the mast to the vertical position.

Raise the forks to a position permitting clear entry into pallet or dunnage strips.

Slowly drive forward until the back-rest is against the load. Slight forward tilt may be of assistance at this stage.

Lift the load until clear of the stack and apply backward tilt just sufficient to stabilise the load.

When the load is clear of the top of the stack, move slowly backward to clear the face of the stack.

Lower the load to the correct carrying position, **before** applying further backward tilt.

Extreme care must be taken to avoid jerking when tilting a load forward or backward, especially when the load is at height.

**ADDITIONAL RULES FOR REACH TRUCKS**

Never drive a reach truck, whether laden or un-laden, with the reach mechanism extended.
Before operating the reach mechanism of the reach truck, make sure the brakes are applied.
Never allow anyone to step over the reach legs, or insert a limb between the mast and power unit, while the reach truck is being operated.
Do not use the reach movement by itself as a means of pushing or dragging loads into position.

Be sure that the load is raised just above the reach legs before retracting.

Drive with forks following you. Counterbalance leads

**BRIDGING PLATES**

A bridging plate is the ramp or bridge that goes from the loading dock onto the truck/rail wagon deck to enable the forklift to drive into it.

Never assume that any bridging plate is strong enough to support both the weight of your forklift and the weight of the load.

Before driving over a bridge plate, make sure the bridge plate is securely fastened and strong enough to support the weight of the forklift and the load.

**HOW MUCH DOES A FORKLIFT WEIGH? (TARE WEIGHT)**

For a forklift with a capacity of 2500 kg, the tare weight would be:

$$2500 + 1250 = 3750 \text{ kg.}$$

So next you need to add the weight of the load on to the forklift tare weight and this will give you the Gross Weight (Total Combined Weight).

You need to know this so you know if the bridge plate can take the weight of your forklift.
PICTORIAL PRACTICE QUESTIONS

Which forklift is travelling safely?

A  B  C

Which truck is parked safely?

A  B  C

Which forklift truck is overloaded? (Rated capacity 2000 kg at 500 mm)

A  B  C

Which one is using the ramp correctly?

A  B  C
Which driver is approaching the stack correctly?

Which one is driving toward the ramp safely?

These short-based forklift trucks are turning at full lock. The forward speed is 3 km/h, so the rear end swing will travel at:

Which driver has the safest load!
Which driver is carrying the load correctly?

Each load contains 1 tonne evenly distributed. Which forklift truck has most weight on its back wheel?

Which driver is travelling safely?

Which driver is carrying the load safely?
Which driver is approaching the ramp in the safest way?

Which is the correct clamping point for a steel drum if using a squeeze clamp attachment?

Which pair of forks is spaced correctly?

Forklift safety codes 1-4 and other safety information is downloadable free of charge from the Department of Labour Website:

www.osh.dol.govt.nz
CARBON MONOXIDE: INVISIBLE AND DEADLY

Introduction
Carbon monoxide is a common and deadly poison.
It has no smell, no taste, doesn’t irritate your nose, mouth or skin and it is invisible. It has caused serious illness and deaths at work – which are preventable.

It is impossible to detect carbon monoxide without the use of monitoring equipment. It’s also a very flammable gas in high concentrations, so as well as being a health hazard, it’s also a fire hazard.

To safely manage carbon monoxide hazards, it’s important to know what to look for and what to do.

If you are an employer, and carbon monoxide is a hazard in your workplace, this Fact sheet is for you.

How carbon monoxide affects the body
Carbon monoxide is easily absorbed through the lungs and damages the heart and brain.
Carbon monoxide travels through the bloodstream. It attaches to the red blood cells and stops them transporting oxygen to the body’s vital organs.

Symptoms of poisoning
The first symptoms of carbon monoxide poisoning are mild headaches and dizziness. Most people recover from this low-level exposure without permanent damage to their bodies.

But if exposure increases, this is what happens:

<table>
<thead>
<tr>
<th>Concentration of carbon monoxide in air</th>
<th>Exposure Limit(s) for New Zealand(^a) 8 hours at 25ppm</th>
<th>Symptoms that will occur if you exceed these Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>35ppm(^a)</td>
<td>60 minutes at 50ppm</td>
<td>Headaches and dizziness within six to eight hours of continual exposure</td>
</tr>
<tr>
<td>100ppm</td>
<td>30 minutes at 100ppm</td>
<td>Headache within two to three hours</td>
</tr>
<tr>
<td>200ppm</td>
<td>15 minutes at 200ppm</td>
<td>Headache within two to three hours; loss of judgement</td>
</tr>
<tr>
<td>400ppm</td>
<td>Exposure should not exceed 400ppm at any time during the day</td>
<td>Headache within one to two hours</td>
</tr>
<tr>
<td>800ppm</td>
<td></td>
<td>Headache, dizziness, nausea and convulsions within 45 minutes; unconscious within two hours</td>
</tr>
<tr>
<td>1,600ppm</td>
<td></td>
<td>Headache, accelerated heart rate, dizziness and nausea within 20 minutes; death in less than two hours</td>
</tr>
<tr>
<td>3,200ppm</td>
<td></td>
<td>Headache, dizziness and nausea within five to ten minutes; death within 30 minutes</td>
</tr>
<tr>
<td>6,400ppm</td>
<td></td>
<td>Headache and dizziness in one to two minutes; convulsions, breathing stops, and death in less than 20 minutes</td>
</tr>
<tr>
<td>12,800ppm</td>
<td></td>
<td>Unconsciousness after two to three breathes; death in less than three minutes</td>
</tr>
</tbody>
</table>

---


2. Carbon monoxide is measured in the atmosphere in parts per million [ppm] or as a concentration of the substance in the air.
Pregnancy
Carbon monoxide can be absorbed through the mother’s bloodstream into the foetus, where, depending on the amount of exposure, it may put the unborn baby at risk of brain damage and heart defects.

Where carbon monoxide can be found
Carbon monoxide comes from a range of sources, including emissions from:
- incompletely burned carbon-based material, e.g. wood, paper, fuel
- internal combustion engines (cars, trucks, forklifts, etc)
- kilns
- furnaces and fuel-powered boilers
- welding
- plastics moulding
- space heaters, oil or gas heaters
- fires and explosions.

How to safely manage carbon monoxide hazards
Eliminating the source of carbon monoxide is the best option. Examples are:
- use electric forklifts instead of fuel-powered forklifts
- move carbon monoxide-generating processes outside
- use hot water boilers instead of fuel-powered equipment.

Isolate or minimise carbon monoxide hazards by:
- installing ventilation in work areas that captures the contaminated air and extracts it safely outside
- using electrical or pneumatic tools instead of fuel-powered tools
- regularly tuning fuel-powered forklifts to ensure that carbon monoxide emissions are as low as possible.

Monitoring Employees and the Environment
If parts of the workplace have high carbon monoxide levels, employers are required to monitor the working environment and the employees. Remember – it’s impossible to detect carbon monoxide without equipment such as carbon monoxide alarms.

Regular blood testing may also be required, but employee consent is required first.

Make sure that employees know about the symptoms of carbon monoxide poisoning, so that they can keep themselves and their workmates safe.

What to do in an emergency
If someone at work seems to be affected by carbon monoxide poisoning, it’s important to ACT QUICKLY:
- make the situation safe by turning off the source
- if that’s impractical, ensure breathing apparatus is worn by rescuers
- get the affected person outside – if the person is unconscious, call 111
- if there’s no heartbeat, begin CPR.

Anyone who has been affected by carbon monoxide poisoning, even if they only have a headache, must see a doctor or go to the nearest hospital as soon as possible.
Appendix B

FACTSHEET

FORKLIFTS + CARBON MONOXIDE = A POTENTIALLY DEADLY COMBINATION

Introduction
Thousands of workplaces across New Zealand use forklifts to lift, lower and move things that people can’t move by themselves.
These workhorses, when powered by LPG, petrol or diesel, produce potentially deadly carbon monoxide gas.
It can quickly build up in indoor areas without adequate ventilation. People can be overcome without realising they have been exposed to it. Confusion, headaches, dizziness, and weakness may set in too quickly for affected people to save themselves.
Carbon monoxide poisoning can cause permanent brain damage. Even low levels of carbon monoxide can set off chest pains and heart attacks in people with heart problems.
Carbon monoxide can kill.

How carbon monoxide can harm you
Carbon monoxide is impossible to detect without proper equipment. This gas is so deadly because we don’t know if it’s around. It has no smell, no taste, it’s invisible and you can’t feel it if you breathe it in.
If you breathe in carbon monoxide, you might feel like you have the flu. You could feel weak and too confused to leave the area.
Symptoms (ranging from minor to very serious) include:
- headache
- dizziness
- nausea
- rapid breathing
- unconsciousness
- death.

How the work environment affects carbon monoxide exposure
If you use a fuel-powered forklift outside, where there’s lots of fresh air, any carbon monoxide produced by the forklift will go into the atmosphere without causing harm to anyone.

BUT: if you use a forklift inside:
- building with poor ventilation
- small building
- shipping container or covered truck trailer
- coldstore, chiller or freezer

- restricted/confined area
- ships hold, or other similar area
some carbon monoxide WILL be present in the air you breathe.

How to keep safe
Eliminate the source of carbon monoxide from the workplace by using electric-powered forklifts instead of fuel-powered forklifts.
Use carts, trolleys, palletizers or similar in rooms or buildings that are small, or have poor ventilation.

If you have to use a fuel-powered forklift:

- Develop a policy on the use of forklifts and associated hazards. Inform, train and supervise staff on CO hazards and monitor their health.
- Restrict use in poorly ventilated or confined areas. Turn them off if you’re not working.
- Tune them regularly, and test them for CO emissions. An out of tune forklift will overload the catalytic converter.
- Install carbon monoxide alarms on forklifts or in buildings, tell your supervisor or manager immediately if these alarms sound.

If you work on or near a forklift you should report any ventilation problems or exhaust fumes (as this will indicate a build up of carbon monoxide) to your supervisor or manager.

What to do in an emergency
If someone at work seems to be affected by carbon monoxide poisoning, it’s important to ACT QUICKLY:
- make the situation safe by turning off the source
- if that’s impractical, ensure breathing apparatus is worn by rescuers
- get the affected person outside – if the person is unconscious, call 111
- if there’s no heartbeat, begin CPR.

Anyone who has been affected by carbon monoxide poisoning, even if they only have a headache, must see a doctor or go to the nearest hospital as soon as possible.
Appendix C

HIRERS/SELLERS OF FORKLIFTS: YOUR CARBON MONOXIDE HEALTH AND SAFETY OBLIGATIONS

Introduction
Fuel-powered forklifts using LPG, petrol or diesel produce carbon monoxide. This gas can rapidly build up in indoor areas. People can be overcome without realising they are being exposed. Confusion, headache, dizziness, and weakness may set in too quickly for victims to save themselves.
Carbon monoxide poisoning can cause permanent brain damage. Even low levels of carbon monoxide can set off chest pains and heart attacks in people with heart problems.
Carbon monoxide can kill.
If you hire or sell fuel-powered forklifts for use in a workplace, you have a duty to ensure that your customer has the information they need to choose the right forklift for their environment.

Your legal obligations
Section 18A of the Health and Safety in Employment Act 1992 requires hirers and sellers of forklifts to find out:

- what the forklift is going to be used for
- where it will be used
- take all practicable steps to make sure that the forklift is safe for its intended purpose or other reasonable use – either by design, manufacture or maintenance.
This means that you must advise your customers about the hazards of carbon monoxide if the customer’s intended use of the forklift indicates that this might be a problem.

When does carbon monoxide become a hazard?
Carbon monoxide becomes hazardous when forklifts are used indoors, or in restricted or poorly ventilated areas – places where emissions from forklifts can accumulate. If there’s not enough ventilation to carry the carbon monoxide away from workers – whether they are drivers or others working nearby – it can quickly build up and overcome them.
Examples of environments where carbon monoxide can be dangerous are:
- garages and small buildings, particularly when doors are shut
- buildings with no mechanical ventilation to extract harmful gases to the outside
- shipping containers and trailer units
- areas where work on fuel-powered engines is carried out.

What you can do to manage carbon monoxide hazards?
Making your customer’s environment safe is their legal responsibility.
You could consider:

- **Electric forklifts**: if your client needs to use a forklift to work in restricted areas with poor ventilation, advise them to hire or purchase an electric forklift instead. These forklifts can go into any environment, and don’t emit harmful gases
- **Forklift Tuning**: poorly tuned forklifts emit more carbon monoxide. The target emission rate for well-tuned forklifts should be 1% or less.
- **Catalytic Converters**: these can reduce carbon monoxide by 70 to 90 percent, but they do not eliminate the danger. They’re not effective until the forklift’s engine has been running for about 10 minutes so short term running can impact poorly on its effectiveness.

What should forklift hirers or sellers do to advise customers?
A short notice, either given directly to the customer or placed inside the forklift, can help you achieve your legal obligations to inform customers about carbon monoxide hazards.
Here’s an example notice:

**WARNING: CARBON MONOXIDE HAZARD**
This forklift is fuelled by LPG/diesel/petrol (select one) and emits carbon monoxide when operating.
Carbon monoxide is a dangerous gas that can cause headaches, dizziness, unconsciousness and even death. It can quickly build up in areas with limited ventilation.
The risk of carbon monoxide exposure increases when forklifts are left to idle when not in active use or in near enclosed areas such as:
- shipping containers
- truck and trailer units
- coolstores

**OPERATE FORKLIFTS IN WELL-VENTILATED AREAS**

---

1. These legal obligations do not apply if selling second-hand forklifts “as is” (without representations or warranties about its quality, durability or fitness).
You can also consider using the following checklist for discussion with your customers.

**Hirers/seller: Staff checklist for discussion with customers**

1. What will you use the forklift for?
2. Where will it be used?
3. Could the forklift ever be used indoors or in poorly ventilated areas including:
   - a warehouse, coolstore or factory
   - any other type of building, including a garage
   - a semi-enclosed area, like a delivery bay
   - a shipping contained or truck trailer.

If they answer yes to any of the above:

- Recommend the use of an electric-powered forklift.
- Tell the customer that if they intend to use a fuel-powered forklift indoors or in a poorly ventilated area they must have a safety plan to prevent carbon monoxide poisoning.
- Tell the customer about the importance of keeping the forklift well-maintained to reduce the amount of dangerous gases in the exhaust.
Introduction

This programme has been put together for assessment of competency for the driver license endorsement F (forklifts (Mandated by the revised Land Transport Licensing Rule 1999 regarding forklift operations on public roads)) in addition to Department Of Labour certification to assist readers the significance of these new regulatory measures is highlighted in the information below.

Licensing and certification on-road and off-road

The revised Land Transport Licensing rule was amended in 1999 to help road users comply with the new legislation we shall summarise here the statutory requirements applicable to forklift operation.

First, however, we should stress that the long-standing legal distinction between on-road and off-road operations has not changed. As before, these are two quite separate jurisdictions. Operators are “certified” under the department of Labour code of Practice to operate forklifts on the road.

**OFF-ROAD OPERATIONS:** If a forklift is used solely within the confines of company premises and not driven on a public road, the company and staff member must comply with the provisions of the Health and Safety Employment Act 1992, specifically section 13 (Training and Supervision) which required the employees be adequately trained in the safe use of the machinery they operate. In addition the companies must also comply with the Department of labour’s Code of Practice for training Operators of Powered Industrial Lift Trucks (Forklifts). In brief this code of practice prescribes that operators be certified as professionally trained and properly tested in the safe operation of forklifts to the standards laid down by the Department of Labour.

**ON-ROAD OPERATIONS:** If a forklift is at anytime driven on a road it has to be registered as a vehicle like other road vehicles, and the driver must satisfy two legal requirements:

1. Be a licensed driver; and
2. Have a forklift endorsement known as “endorsement F” on his/her driver licence.

The holder of a **FULL class 1** drivers license with a F endorsement may drive a forklift not exceeding 18,000 kg gross laden weight on a road, while holders of a **Full class 2** license with F endorsement, may drive on a road any forklift more than 18,000Kg regardless of it’s weight **(no upper limit)**.

It will be noted here that a fully loaded 2.5 tonne forklift with attachments fitted weighs about 6,000 kg while a fully loaded 3 tonne forklift weighs about 8,000 kg. Hence a class 1 license with endorsement F would suffice for most forklifts in use. A driver operating a forklift on a public road is also required to have a current Department of Labour certificate.
DEFINITION OF A ROAD
Road includes:
   a) A street; and
   b) A motorway; and
   c) A beach; and
   d) A place to which the public have access, whether as of right or not; and
   e) All bridges, culverts, ferries, and fords forming part of a road or street or motorway, or a place referred to in paragraph (d); and
   f) All sites at which vehicles may be weighted for the purpose of the Act or any other enactment.

WORKING GUIDE
While the definition of a road appears to be very wide and open-ended the courts have imposed restrictions to make it workable. The following comments are a guide only in relation to (d) a place to which: the public have access, whether as of right or not. This working guide will not cover every possible situation.
A road is essentially any area principally used for vehicle or pedestrian traffic, which the general public uses as thoroughfare to gain access to another place, in the same way they would use a road or a street. In practice this will generally be areas and thoroughfares that the general public use and expect to be able to use such as a road, street, or supermarket car parks.
Areas where there is clearly restricted access are generally not considered to be a road. This may include: physical barriers to restrict access to an area e.g. locked gates, security checks e.g. security guard or controlled gates. Signposted areas that are marked as restricted access: e.g. signs show no public access, forklift or other machinery in use.

Relevant industry codes and legislation
The F endorsement is to be used in accordance to the following:
✓ The Land Transport (Road User) Rule 2004: contains the regulations for driving on a road.
✓ The Road Code: Being a “Plain English” interpretation for driving on the road.
✓ Land Transport (Driver Licensing) Rule 1999: contains the requirements for drivers to be licensed and to hold an endorsement F.
✓ The approved Code of Practice for Training Code: contains the requirements for training operators of forklifts.
✓ The Safety Code for forklift truck operators: contains the requirements for the safe operation of forklifts.
✓ The Truck Loading Code: contains the requirements for the safety of loads on vehicles.

FORKLIFT DIMENSIONS
To be able to drive a forklift on the road without any over dimensional or over weight permits the following must be observed:

Maximum width – 2.5 metres or 1.25 metres from the longitudinal centre line of the vehicle.
Maximum height – 4.25 metres from the ground, or such a height to clear any overhead obstructions that are lawfully there.
Maximum front overhang – 3 metres forward of the front edge of the drivers seat.

Distance a load may extend past the side of the forklift before an over dimensional flag is required – 200 mm.

Maximum weight allowed on an axle with single tyres – 6,000kg

Maximum weight allowed on an axle with twin tyres – 8,200 kg

Special speed limits for vehicles with rigid suspensions and solid rubber tyres – 10 km/h.

**DOCUMENTATION**
For a forklift to be operated on the road, it must display the following:

- License Label
- Warrant of Fitness
- Registration Plate
- Manufactures Load Plate
## Classes of Licence

<table>
<thead>
<tr>
<th>Licence type</th>
<th>Class</th>
<th>Weight limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car licence</td>
<td>1</td>
<td>Any motor vehicle (including any tractor), or combination vehicle, that is not a motorcycle that has a gross laden weight or gross combination weight of 6,000 kg or less, or, for a special-type vehicle that is a forklift, has a gross laden weight of 18,000 kg or less.</td>
</tr>
<tr>
<td>Heavy rigid vehicle</td>
<td>2</td>
<td>Any rigid vehicle (including any tractor), with a gross laden weight of more than 6,000 kg but less than 18,001 kg, or any combination vehicle that has a gross combination weight of 12,000 kg or less, or any combination vehicle consisting of a rigid vehicle of 18,001 kg or less towing a light trailer, or any rigid vehicle with a gross laden weight of more than 18,000 kg with no more than 2 axles.</td>
</tr>
<tr>
<td>Heavy combination vehicle</td>
<td>3</td>
<td>Any combination vehicle with a gross combined weight of more than 12,000 kg but less than 25,001 kg.</td>
</tr>
<tr>
<td>Heavy rigid vehicle</td>
<td>4</td>
<td>Any rigid vehicle (including any tractor), with a gross laden weight of more than 18,000 kg, or combination vehicle consisting of a rigid vehicle of more than 18,000 kg towing a light trailer.</td>
</tr>
<tr>
<td>Heavy combination vehicle</td>
<td>5</td>
<td>Any combination vehicle with a gross combined weight of more than 25,000 kg.</td>
</tr>
</tbody>
</table>

To be able to drive a forklift on the road with a gross laden weight less than 18,000 kg a Full Class 1 licence with a F endorsement is required. For forklifts with a gross laden weight of more than 18,000 kg and having no more than 2 axles, a full class 2 licence with an F endorsement is required.

Forklifts differ from other vehicles in that:
- When driving on a road visibility may be reduced by weather conditions or load, if you can’t see over your load you may drive in reverse.
- The load may affect steering control.
- Forklift braking may be affected by the load.
- Forklift speed will be much lower than other traffic
- Forklift stability may be affected by road conditions, road camber and/or road slope/gradients.
When travelling or working on a road the following precautions may be taken to avoid an accident.

- Temporary signs warning of forklifts operating may be displayed
- Hazard lights
- Have another person to help guide traffic
- Place cones to keep traffic clear of operating area
- Travel in reverse if you are unable to see over your load
- Sound horn
- Travel at reduced speed
- Defer travel if road is busy
- Additional lighting may be required in low light conditions.

**PARKING**

When parking a forklift:

- Forklift should be parked on level ground and sway from doorways and emergency exits.
- Forks should be lowered to ground level and horizontal so the forklift is not supporting the load.
- Apply the parking brake.
- Steering wheels should be in the straight ahead position
- Engine switched off.
- Alternative fuel valves turned off (if fitted)
- Battery master switch turned off (if fitted).
- With no load, forks lowered to the ground with the mast tilted forward so that the tips touch the ground and the heels are clear of the ground.
- The key removed and forklift secured to prevent unauthorised use.

**ENVIRONMENTAL FACTORS**

Environmental factors which could contribute to an accident:

- Reduced visibility due to light conditions
- Reduced friction of wet surface, affecting steering and braking, resulting in loss of control.
- Uneven or rough road surfaces may reduce forklift stability.
- Forklift stability may be affected by road conditions, road camber and/or road slope/gradient.
- Other road users including cars, trucks, bikes and pedestrians.

**DRIVING HOURS**

- A driver must not spend more than 13 hours working in any one day.
- You must have at least 10 hours continuous rest.
- In addition to this, after working 5 ½ hours, you must have at least ½ an hours rest break.
- After working a total of 70 hours, you must have a rest period of at least 24 consecutive hours.
We at PassRite specialise in all commercial and private driver training and driver license endorsements. Our courses are Land Transport New Zealand approved and we are NZQA approved Assessors.

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- Class 2  Truck Theory and Practical
- Class 3  Trailer
- Class 4  Truck Practical
- Class 5  Trailer Theory and Practical
- Class 6  Motorcycle (Basic Handling Skills, Intermediate, Advanced and ‘One on One’ Training)
- P Endorsements (Passenger Service/Taxi Licenses)
- F Endorsements (Fork Lift License and Operator Training)
- D Endorsement (Dangerous Goods Courses)
- T, W & R Endorsements. (Tracks, Wheels & Rollers)
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### BRANCHES

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<td>Wellington</td>
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