National Certificate in Building, Construction, and Allied Trades Skills (BCATS)

Demonstrate knowledge of and apply safe working practices in the construction of a BCATS project

Unit Standard – 24352

Level 1, Credit 2

Name: _____

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What you need to do

Safety is everyone's responsibility– not just the responsibility of the organisation, company, teacher/tutor, employer, supervisor or trainee. Through the combined efforts of everyone, accidents can be prevented.

Experience has shown that the best safety measure is a careful worker. Form safe working habits, wear the correct safety equipment and consider the safety and wellbeing of other workers.

By the end of this module, you should be able to:

- show you know about safe working practices for a BCATS project; and
- select, use and maintain personal protective equipment.

How you will be assessed

You will be assessed by a combination of practical and written work.

To achieve this unit standard, you need to complete BCATS projects where you can demonstrate safe working practices, and select, use and maintain5 items of personal protective equipment. Your teacher/tutor will tell you which projects to complete.

You need to show your teacher/tutor that you can:

- read and/or listen to the instructions for a job and check anything you are not sure about;
- work out what dangers there are and explain what you will do to stop them happening;
- carry out the job safely and correctly;
- work out what personal protective equipment (PPE) you need to use;
- use 5 items of PPE correctly. Some typical examples of PPE are:
    - clothing to cover the body – such as overalls and aprons
    - items to protect hands and feet – safety gloves and safety boots
    - breathing protection devices – dust masks or respirators
    - hearing protection devices – earmuffs and earplugs
    - eye safety protection – safety glasses, safety goggles, welding helmets
    - head protection – hard hats
    - skin protection – sunscreen, hats, long-sleeved clothes; and
- check, clean and store the PPE, and tell your teacher/tutor if anything is wrong with it.

Your teacher will give you an Assessment Record Sheet for Safe Working Practices so you can record the PPE used on your projects, why you used them, and what hazards they were controlling.

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Glossary of Terms

Term	Meaning
Accident	An event that causes a person harm
Decibel	The unit for measuring noise
Ear protection	Ear plugs or ear muffs worn to protect the wearer's hearing from exposure to excessive noise levels
Eliminate	To remove completely
Emergency	A sudden unforeseen situation requiring immediate attention
Eye protection	Safety goggles or face masks worn to protect the eyes from injury
Hard hat	A helmet designed to protect the head from injury
Harm	Illness, injury, or both; includes physical or mental harm caused by work-related stress
Hazard	Anything that can cause harm, including a person's behaviour
Hazard identification	Recognising that a hazard exists and identifying a method for controlling the risk
Isolate	To prevent people from being exposed to a hazard. This is a method of minimisation control.
Minimise	To reduce the risk of harm to a person
Sun protection factor (SPF)	Is a measure of sun-burn producing rays that reach the skin

Job Specifications

The first stage in any BCATS project should be the job specifications, which are instructions about:

- what the project is; and
- how the project is to be done.

This could involve:

- materials:
  - material type – e.g. plaster board;
  - material brand – e.g. Winstone Gibraltar Board; and
  - material size – e.g. 16mm.
- finishes:
  - finish type – e.g. paint, etc.

The job specifications are designed to ensure that the project meets the customer's requirements and is produced in accordance with workplace practice.

Using the job specifications

To ensure that the project matches exactly the specifications it is important to:

1. read through the written specifications with the person providing the information and clarify what is required;
2. check that the working drawings and written specifications provide all the required information; and
3. listen to the oral instructions and check that:
   - they match the written specifications; and
   - they are easily understood and clearly state what is required.

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Hazards

Hazards continually change because of what people do or do not do, and because the nature of the work may change. The Health and Safety at Work (HSW) Act sets out the minimum legal obligations for identifying and controlling hazards in workplaces (including schools),

Identifying hazards

Anyone in charge of a workplace must have an effective method in place for identifying hazards. Anyone who is going to be working in the workplace needs to be consulted, trained and involved in the process of identifying and controlling them.

Everyone should be provided with information about the hazard identification procedures, which may include:

- information about hazards that are known to be present in the workshop or on the project site (which could be in the form of a checklist); and
- the process you must follow to identify hazards.

There are several methods which can be used to identify potential hazards.

Physical inspection

This is the most practical of all hazard identification methods. It involves common sense and observation:

- Every time before starting work, take the time to check and evaluate the environment you will be in.
- Check equipment before using it to make sure all required safety guards are in place and the equipment is in good working order.
- Following a break, such as lunch, take a few steps back from the task and check to see whether everything is still where it should be. This is sometimes called the '5 by 5 method' – take 5 steps back and take 5 minutes to look around the working area.

Task analysis

Identify the tasks or project to be carried out and the hazards involved at each step. The best time is before you start work. Think about what needs to be done and likelihood of each of the hazards occurring while carrying out that particular job.

Area analysis

Using plans of the site and planned workflows, divide the site into identifiable areas, such as workshops, stores, plant and equipment, or the BCATS project area. Then identify the hazards area by area, paying particular consideration to the design of the workplace, the work programme and environmental and ergonomic factors.

Process analysis

Identify hazards associated at each stage of a particular process. This is best done at the planning stage, when work flow and work programmes can be considered along with all other available information about design, work methods and products (from the manufacturers' data sheets).

Occupation (trade) analysis

Identify the hazards associated with specific trades or occupations who may also be working on the job; for example, carpenter, electrician, blocklayer, painter etc.

Hazard types

A hazard is any activity, situation or substance that can cause harm. Hazards can be identified as:

Physical:

- objects that could fall;
- tripping over objects;
- electrical hazards;
- room temperature, too hot or cold, or draughty; and
- noise.

Chemical:

- paints, varnishes;
- glues; and
- solvents and cleaning materials.

Biological:

- unhygienic toilets;
- unhygienic food preparation facilities; and
- infectious diseases.

Ergonomic:

- poor lifting technique;
- computer use for OOS;
- workstation set up; and
- height of benches/desks, chair height/design.

Psycho-social:

- risky and hazardous behaviour;
- stress/fatigue;
- violence/bullying/intimidation; and
- workload.

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Controlling hazards

Hazards are controlled in two main ways:

1. Eliminate the hazard (remove the hazard) – for example, prevent falls by working on the ground.

2. Minimise the hazard (lessen the hazard) – for example, use safety nets, safety harnesses. Minimise includes isolating the hazard (separating the hazard from the worker), such as through installing guardrails. The actual means of controlling the hazard will depend on the hazard and the situation.

Personal Protective Equipment

Eye protection

An eye injury only needs to happen once to blind a person for life!

In accidents where the eye is penetrated, approximately:

- 1/3 result in blindness;
- 1/3 result in a loss of vision; and
- 1/3 make a full recovery.

Chemicals can destroy your vision in seconds and dust can cause infection and discomfort.

You need to be able to identify potential eye hazards and select and use the correct type of protection to minimise the possibility of eye injury. In most cases, this will involve wearing safety glasses or goggles.

The major causes of eye injuries are due to:

- being struck in the eye by flying particles and objects, e.g. a nail ricocheting off a hammer face;
- being hit in the eye by moving or stationary objects, e.g. walking into a piece of timber protruding from a rack;
- toxic splashes, fumes and dust coming into contact with the eye, e.g. eye contact with molten metals, hot liquids or corrosive chemicals; and
- exposure to welding flash, laser beams, infrared radiation, laser reflection.

You will also need to wear eye protection when working close to any person who is creating a hazard, e.g. someone grinding steel.

Consider how the loss or damaging of your sight would affect your lifestyle. What would it do to your career opportunities, sport and social relationships, your ability to drive a car or travel? Is not wearing the correct eye protection worth the risk?

Case study

Rob Aisablie (31) was using a new portable sawmill in Rotorua. At 10.20am a six metre 150 x 100 log shot out of the sawmill and straight into Rob's face at 160 kms per hour.

Rob completely lost his vision and spent nearly six months in hospital recovering from reconstructive surgery to his face.

"I see a steady wall of nothing," says Rob. "No shadows, no light or dark."

"It was really scary when I first lost my sight. I'd get dressed in the morning and then not know what I could do all day."

"Take a second for safety to save your eyes. Once they're gone, they're gone for life."

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Eyes – protective equipment

1. Injuries from dust particles can vary in severity from mild irritation and watering to complete loss of the eye itself, often from secondary infection.

   Properly fitting safety glasses or goggles can help to prevent these injuries.

2. If you are grinding, using a circular saw or router, wear safety glasses/ goggles. The main hazard to your eyes will be particles being flung into your eyes.

3. Shaded safety glasses to protect your eyes from glare must be worn when brazing, using an oxy-acetylene set.

4. For arc welding, a welding helmet with the correct lenses must be worn.

5. Fixed and mobile screens should also be set up to protect other people from injuries. This would include any situation where there is a chance of bystanders being injured by objects flying off the job or radiation from welding operations.

6. Some glue contains corrosive substances, such as alkalis or acids that can cause chemical burns and permanently damage your eyesight. The eye becomes bloodshot with itching, burning pain and loss of vision. When using these glues you need to wear goggles or a full-face shield to protect your eyes.

Eyes – emergency action

A well-equipped first aid kit is also required in all work places. The standard first aid items for treating eye injuries include:

- eye wash – flush any foreign objects out of the eye; and
- eye patch – sterile bandages.
- If sand, dirt or small debris gets into your eyes **do not rub them**. This can scratch the outer surface of the eye and cause further damage. Rinse the eye thoroughly with water. If you still cannot dislodge the particle, lightly bandage the eye and see an eye specialist.
- For blows to the eye, gently apply a cold compress to reduce pain and swelling. Avoid putting pressure on the eye.
- If a foreign object penetrates the eye, you should ***never*** attempt to ***remove it***. Call for ***medical assistance*** immediately.
- Should a chemical splash your face, the first course of action is to ***immediately flush the face under running water*** and call for medical assistance.

Activity 1

Match the appropriate eye protection PPE to the hazard by writing the identifying hazard number beneath the appropriate eye protection (in the space provided)

Hazard 1	Hazard 2	Hazard 3	Hazard 4	Hazard 5	Hazard 6
Low velocity hazard flying particles and objects	Medium velocity hazard small flying particles	High velocity hazards particles	Gas vapours	Non-ionizing radiation only	Infrared and UV radiation

Polycarbonate face shields

Best for hazard:_____

Hood and helmet (completely sealing the face)

Best for hazard:_____

Wide vision goggles

Best for hazard: _____

Safety glasses

Best for hazard:_____

Safety glasses/goggles with filter lens

Best for hazard:_____

Welding helmet

Best for hazard: _____

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Head protection – hard hats

A hard hat is a helmet designed to protect the head from injury. It must be worn at all times where there is a risk of head injuries from objects falling or in some situations collision with fixed objects, tool or plant.

Respiratory protection

Maintaining clean air in a BCATS environment can be difficult. Toxic dust and chemical fumes that are produced there have the potential to injure people.

Setting up and using an efficient extraction system is essential to providing healthier and more comfortable working conditions. Adequate ventilation, to produce airflow around the job, is also important.

Where it is not possible to remove all impurities, it is important to use appropriate and efficient respiratory equipment to protect your lungs.

Breathing wood dust can be hazardous

- Breathing dust from timbers, such as ***rimu,*** is particularly irritating to your nasal passages, causing sneezing or nosebleeds. Some imported timbers are quite toxic.
- Fine dust, which is produced when ***medium density fibreboard (MDF)*** is cut or sanded, is fine enough to get through your nose and become lodged in the passages of your lungs.

  Protection – In a dusty environment wear a dust mask over the nose and mouth to stop you inhaling the dust.

Demolition and renovation

Be particularly wary of fibrolite and other similar asbestos-based products used in older buildings. These contain very fine fibres that may be inhaled and become lodged in your lungs. These fibres can cause cancer and other respiratory problems, so special protective equipment must be used when handling or cutting them.

Arc welding/welding

- Arc welding produces fumes and vapours that the operator needs to be protected from. The toxicity depends on the type of welding, the material being welded and the airflow around the operator.

  Protection – Wear an appropriate respirator. Check that the model is suitable for the type of welding e.g. welding galvanised, mild steel will require a different level of protection that when TIG welding stainless steel.

Chemicals, fibre-glass and spray painting

- Working with these produces fumes, vapours and fine particles that the operator needs to be protected from.

  Protection - Because of the chemicals involved you need to wear a respirator fitted with filters appropriate to the job. Simple paper masks are not suitable
- Check the filters regularly to ensure that they are not clogging up and changed as necessary.
- Always spray in a properly constructed spray booth.
- Two-part systems (for example 'two-pot' varnishes and paints) contain highly toxic chemicals that are particularly dangerous. They require specialist equipment to be worn, especially when spraying.

  Protection – You must wear a special breathing apparatus that has its own pure air supply and wear fully-protective clothing to prevent any of the paint from coming into contact with your skin.

Note: *If you do not wear the correct safety protection when working with these products, you run the risk of developing lung diseases, cancer and other serious health-related problems.*

Consider how respiratory damage would affect your ability to play sport, as well as to live a healthy lifestyle. Always wear the appropriate protection equipment, even on the smallest of jobs.

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Activity 2

From the photos below, select the appropriate equipment for:

1. sanding timber
2. arc welding
3. spraying glue
4. spraying 'two-pot' paint

Write the identifying number beneath the appropriate respiratory protection.

Hearing protection

Work sites can be noisy. Some machines are fitted with noise-suppressing covers but you will still need to wear hearing protection to reduce the risk of damaging your hearing.

Your ears can be protected by wearing:

- **Ear plugs** fit inside your ears. They are often more practical than earmuffs when used in conjunction with safety goggles and/or a hardhat. However, they can be unhygienic when inserted with dirty hands.
- **Ear muffs** fit over your ears. They are easy to fit and generally offer better protection than earplugs.

Measuring noise levels

Noise levels are measured in decibels (dB). The effects of noise will vary with distance from source but exposure to noise above 80dB has the potential to damage hearing.

Source	dB level	Notes
-	15dB	Average hearing threshold
Soft whisper	30dB	Acceptable
Normal speech	60dB	Acceptable
Heavy city traffic	85dB	Possible damage threshold – below this level an 8-hour day can be worked without using hearing protection devices
Belt sander	90dB	Damage after prolonged exposure
Router / Grinder	100dB	Damage after 15 minutes
Circular saw	105dB	Damage after 10 minutes
Chain saw / Rock Band	110dB	Damage after 2 minutes
Sand blasting	115dB	Damage after 30 seconds
Jet engine	130dB	Above 130dB (A) will cause damage if unprotected
Other	155dB	Instant pain and damage above this level

When to use ear protection

- Select and use the class of hearing protection that is most suitable for the noise you are likely to be exposed to.
- Hearing will be damaged by exposure to high noise levels for a short time.
- Hearing can be damaged by long exposure to moderate noise levels.
- Legally, people are required to wear ear protection when working in a noise level above 85dB.
- Ear muffs are rated according to the level of protection that they provide. A class 5 ear muff will offer the best protection.

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Approved hearing protection grades

Hearing protection class	Equivalent continuous sound level (8 hours)
1	Less than 90dB(A)
2	90-95dB(A)
3	95-100dB(A)
4	100-105dB(A)
5	105-110dB(A)

Checking ear protection

- Ensure that the hearing protection is properly fitted:
  - Ear muffs should cover the ear.
  - Ear plugs should sit properly in the outer ear. A poor fit will not provide sufficient protection.
- Check that the hearing protection is clean and in good condition.

Class 5 ear muffs

Class 4 ear muffs

Ear plugs

Signs of hearing loss

The early signs of hearing loss may include a ringing sound in your ears or a slight muffling of sound. If this occurs, it is likely your hearing has been permanently damaged.

Even if you already have some hearing loss, wearing ear muffs will reduce any further loss.

Consider how the loss or partial loss of your hearing would affect your ability to use the telephone, be involved in a conversation, listen to music, watch television, meet people and play sport.

Skin protection

Many construction jobs will involve prolonged exposure to the sun. Sunburn is uncomfortable and has dangerous long-term side effects. However, you can protect yourself by wearing suitable clothing, a hat and sunscreen when working outside.

Sunscreen and sun block provide effective protection from the effect of the sun's harmful ultraviolet (UV) rays. They have a sun protection factor (SPF) rating. Follow the information on the product label.

Barrier creams can provide limited protection against the effects of solvents and chemicals that cause dermatitis or other allergic reactions.

An allergic reaction like dermatitis can be triggered by contact with a skin irritant, e.g. MDF dust and solvents. It usually shows up as swelling, redness and itching that may develop into blistering and cracking if left untreated.

The best treatment for allergies of this kind is to avoid contact:

- Ask your supervisor to move you to another job.
- Wear gloves and apply barrier creams regularly.
- Wash affected areas regularly to get rid of any dirt and contamination.
- Use hand lotion to replace lost skin oils.

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Protective clothing

Protective clothing is designed for specific purposes to ensure that the wearer is both comfortable and protected. It is important to protect your health by wearing the protective clothing appropriate to the conditions and the type of work.

Appropriate protective clothing is needed:

- around machinery, such as circular saws and lathes;
- outside, for protection from the sun and the weather;
- in the vicinity of heat or sparks;
- when spraying paint or fibre-glass; and
- when carrying tools.

Protective clothing for the situation

When **working outdoors** you will need to prepare for varying conditions with:

- wet weather gear;
- sun block, a hat and shirt; and
- durable clothing and a leather apron on building sites.

When **welding** you need to be protected from heat and sparks with:

- overalls – for complete body protection;
- appropriate face protection – to protect eyes, nose and mouth; and
- a welding jacket – for extra protection.

When working in **dirty and dusty** environments:

- bib overalls for less dusty jobs;
- complete overalls - for dustier or dirty operations;
- appropriate face protection – to protect eyes, nose and mouth; and
- dustcoats – for protection from shoulder to knee.

Machine operators should wear:

- close-fitting clothing. Do not wear ties or baggy sleeves as they can easily become caught up in moving machinery.

Spray painting or fibre-glassing requires:

- overalls for complete body protection from paint, over-spray and chemicals; and
- appropriate breathing protection.

Protection from **falling objects**:

- a hard hat.

Note: High visibility vests *are bright yellow or orange and usually have reflective strips to ensure that the wearer can easily be seen by plant operators. This can reduce the possibility of injury from moving vehicles and equipment.*

Hand protection

There is a wide range of hand protection available, depending on the job that you are doing.

- ***Leather gloves*** protect against cuts and burns.
- ***PVC gloves*** protect you against chemicals.
- ***Cotton gloves*** protect finished surfaces from marks, caused by the oils in your skin.
- ***Leather or reinforced poly-cotton*** gloves provide protection from sharp edges and coarse surfaces when stacking timber and materials.

PVC Gloves

Reinforced poly-cotton gloves

Leather welding gloves

Leather gloves

Always check that all ***safety guards are fitted correctly.***

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Protective footwear

The most appropriate footwear for a construction area is sturdy but comfortable industrial footwear:

- Safety shoes and boots with steel caps, strong leather uppers and non-skid soles. The steel caps protect your feet from falling objects and from accidentally kicking or tripping over hard objects.
- You should never wear sandals or jandals in work areas because they offer minimal protection to your feet.

Boots are designed for use in a range of situations including:

- wet areas;
- construction site/assembly shop;
- welding; and
- on-site fitting.

Gumboot

General purpose light weight boot

High laced steel-capped boot

Safety shoes

Non-skid, anti-fatigue mats are designed for use in situations where people are standing for long periods of time, e.g. in front of machines. They help to minimise foot and leg fatigue, varicose veins and back pain.

Care and Maintenance of Personal Protective Equipment

It is extremely important to care for and maintain your personal protective equipment (PPE).

Poorly fitting and unmaintained PPE is uncomfortable to wear and often exposes the wearer to additional hazards.

Ensure that all PPE is clean and well maintained. This will include:

- cleaning the lenses of your safety glasses daily;
- sterilising your respiratory protection equipment and changing filters regularly;
- cleaning your ear muffs and checking the pads for damage;
- replacing your ear plugs;
- checking your gloves for tears or damage;
- washing your overalls and keeping clothing clean and tidy;
- cleaning and inspecting the soles of your safety boots/shoes;
- checking that hard hats are in good condition and free of cracks or splits; and
- reporting any defects or damage to your teacher/tutor/supervisor/employer.

Important:

- *Do not share your personal protective equipment with anyone else.*
- *Store all personal protective equipment in a clean, safe and easily accessible location.*
- *Select a sterile location for respiratory equipment.*
- *Maintain personal hygiene – no-one enjoys working next to a dirty, smelly person.*

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Safety precautions

Students should observe the following precautions to avoid accidents in a BCATS environment:

- Always wear appropriate PPE. Make it a habit.
- Do not wear neckwear, such as ties, scarves, or jewellery that can get caught in machinery.
- Tie back long hair before operating machines, or wear a hat. If hair gets caught in a machine, it will either be ripped out or peeled from your scalp.
- Do not wear loose or dangling clothing. Loose clothing can get caught in machinery.

Activity 3

1. Compile a list of rules/codes of conduct that would ensure safe working practices in a BCATS environment.

a. *E.g. wear the appropriate eye protection at all times.*

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

For each of the above points, describe the potential consequences that may occur if the Safety rules/codes of conduct are not followed.

a. *E.g. Eye injury or blindness may occur if eye protection is not worn.*

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

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2. Why should jandals never be worn on a work site?

3. Identify the hazard – What type of clothing would be a hazard to wear in the following situations?

Around heat or sparks

Around machinery such as lathes

When spraying paint

4. Identify the potential hazards of wearing long hair around machinery.

5. Identify the purpose of the following signage.

6. When nailing timber you should always wear eye protection. Describe an eye hazard associated with this activity.

7. Describe the risks of not maintaining 5 items of PPE.

8. Identify the hazards and select the most appropriate type of PPE that should be worn for each of the following situations.

You are using an electric router to shape the edges of a rimu tabletop. Identify (at least) 4 hazards you need to be protected from.

Eye protection

Respiratory protection

Hearing protection

Body protection

Foot protection

Hand protection

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You are breaking up a concrete path using a sledge hammer. Identify at least 3 hazards you need to be protected from.

Eye protection

Respiratory protection

Hearing protection

Body protection

Foot protection

Hand protection

You are turning a bowl on a Wood Lathe. Identify at least 3 hazards you need to be protected from.

Eye protection

Respiratory protection

Hearing protection

Body protection

Foot protection

Hand protection

You are unloading sheets of plywood off a truck and stacking them in a storage shed. Identify at least 3 hazards you need to be protected from.

Eye protection

Respiratory protection

Hearing protection

Body protection

Foot protection

Hand protection

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