CONTINUING PROFESSIONAL DEVELOPMENT 2018
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Continuing Professional Development (CPD) 2018

Topic 1: Working at height, confined spaces and fire protection considerations
**Topic 1: Working at height, confined spaces, and fire protection considerations**

This topic for Continuing Professional Development (CPD) 2018 for plumbers, gasfitters and drainlayers focuses on working at height, confined spaces, and fire protection considerations.

This topic covers the following:

**Working at height**

- Falls while working at height statistics.
- Factors that contribute to injuries.
- Legal obligations.
- Duty holders.
- The meaning of ‘reasonably practicable’.
- Risk management.
- Task analysis.
- Short duration work.
- Apprenticeship training.
- Unit standard 23229 ‘Use safety harness system when working at height’.
- Unit standard 15757 ‘Use, install and disestablish temporary proprietary height safety systems when working at height’.
- Unit standard 17600 ‘Explain safe work practices for working at heights’.
- Formal working at height training.
- Best practice guidelines.
- Group controls vs personal controls.
- Roof pitch.
- Barriers to restrict access (also known as bump rails).
• Using ladders.
• Controls for height hazards.
• WorkSafe’s approach.
• Particular hazardous work (notifiable work).
• Notifying Worksafe about particular hazardous work.

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• What is a confined space?
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• Australian standard: AS 2865 Confined spaces.
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Working at height

Much of the information included in this section is sourced from WorkSafe best practice guidelines.

Falls while working at height statistics

Investigations by the Ministry of Business, Innovation and Employment into falls while working at height show the following:

- More than 50 percent of falls are from less than three metres.
- Approximately 70 percent of falls are from ladders and roofs.

The cost of these falls is estimated to be $24 million a year—to say nothing of the human cost as a result of these falls.

Factors that contribute to injuries

Factors that contribute to injuries sustained from working at height include the following:

- A lack of, or inadequate, planning and hazard assessment.
- Inadequate supervision.
- Insufficient training for the task being carried out.
- Incorrect protection or equipment choices.
- Incorrect use or set-up of equipment including personal protective equipment.
- Unwillingness to change the way a task is carried out when a safer alternative is identified.
- Suitable equipment being unavailable.

More injuries happen on residential building sites than any other workplace in the construction sector.

Legal obligation

When thinking about the basics of safety at height and edge protection, the question most tradesmen will begin with is: “What is my legal obligation?”. Usually worded along the lines of: “So what do I have to do?”

The Health and Safety at Work Act 2015 clearly defines the responsibilities of all PCBUs (Person Conducting a Business or Undertaking) in that each have a responsibility to ‘take all reasonably practicable steps’.
People often ask: “Why can’t WorkSafe make black and white rules for working at heights?”

The fact is, a group of workers from a firm can use the same vans, the same tools and perform similar work every day, but what changes is the workplace.

One day they can be working on a single-storey house, the next on a commercial construction site, and a tall warehouse the day after that.

**Duty holders**

Where the potential of a fall exists, the following simple hierarchy of controls need to be considered by duty holders:

1. Can the job can be done without exposing persons to the hazard. In other words, is it possible to **eliminate** the hazard? This can often be achieved at the design, construction planning and tendering stages.

2. If elimination is not practicable, then steps should be taken to **isolate** people from the hazard. This can be achieved using safe working platforms, guardrail systems, edge protection, scaffolding, elevated work platforms, mobile scaffolds and barriers to restrict access.

3. If neither elimination nor isolation are practicable, then steps should be taken to **minimise** the likelihood of any harm resulting. This means considering the use of work positioning systems or travel restraint systems, safety harnesses, industrial rope access systems and soft landing systems.

It is mistakenly believed that no controls are needed where a person faces a fall of less than three metres. That belief is wrong and ignores the overarching duties in the Act.

The Act requires that if there is a potential for a person at work to fall from any height, steps must be taken to prevent harm from resulting.

**The meaning of ‘reasonably practicable’**

‘Reasonably practicable’, in relation to a duty of a PCBU, means ‘that which is, or was, at a particular time, reasonably able to be done in relation to ensuring health and safety, taking into account and weighing up all relevant matters, including—

- the likelihood of the hazard or the risk concerned occurring

- the degree of harm that might result from the hazard or risk

- what the person concerned knows, or ought reasonably to know, about the hazard or risk, ways of eliminating or minimising the risk and the availability and suitability of ways to eliminate or minimise the risk.’
After assessing the extent of the risk, and the available ways of eliminating or minimising the risk, the cost associated with the available ways of eliminating or minimising the risk will need to be assessed. This cost assessment including consideration of whether the cost is grossly disproportionate to the risk.

- On a re-roof job for example, it is known that multiple parties will be on the roof for a long period of time, so edge protection or scaffolding will be deemed the appropriate control.

- However, if the plumber turns up to the apartments and the scaffolding has been removed, is it ‘reasonably practicable’ to expect to have scaffolding re-erected to install the dekites?

- Instead, is it appropriate that a ladder and harness is used in a state of total restraint to complete each flashing?

- Of course, the latter is correct but the individual needs to document their ‘safe approach to working at height’ through task analysis etc.

**Risk management**

The steps in performing a risk assessment are as follows:

- Identify the risks to your health and safety.

- Assess the risks, the consequences vs. the likelihood.

- Think about:
  - What is a reasonably practicable way to manage the risk?
  - Is there a common control? Scaffolding, for example?

- Put controls in place.

- Record what you have done and tell people about it.

**When should you do a risk assessment?**

A risk assessment is mandatory for certain high-risk activities such as working at heights.

Risk assessment is always needed when new or different risks are associated with a change in work systems or work location.

More complex risks may require more detailed risk management. The greater the possible harm to health or safety, the more you may need to do to manage the risk that could lead to the harm.
One effective way to manage a risk when a solution is clear, may be to act quickly by using acceptable industry standards and guidance. You can usually use common controls for common risks.

In managing a risk, you must assess what might go wrong when the work is being done. This includes any risks or combination of risks.

You must understand the seen and unseen causes of risk that lead to uncontrolled risks to health and safety not being addressed or going unnoticed. For example, business systems or attitudes.

You also need to think about whether or not the types of controls used (such as administrative controls or Personal Protective Equipment – PPE) are enough to manage risks effectively.

Managing risks at work doesn’t need to be a burden, or complex or costly to implement or document. You must take positive action to make a situation safer, and apply the most appropriate and reasonable solution.

Task analysis

A task analysis worksheet should be completed, to help identify hazards that may be present, under the following circumstances:

• When planning to perform a hazardous job.

• Just prior to the task being performed so that the hazards at the time can be considered while completing the worksheet.

• When completing a job which is not often undertaken by a worker.

• When a worker is completing a more familiar task in a new situation.

A task analysis should be used to help identify hazards that may be present. Because every roof and site can be different, it is recommended that you complete a task analysis every time you intend to perform work at heights.

Different hazards are present on different jobs. If you were working at a school, for example, you would have different things to consider than if you were working on a construction site. This is why task analysis is so important.

Consider this example:

• You are working on a single-storey home which is against a steep bank with a six meter drop adjacent to the house.

• You need to take note of the additional risk and put the appropriate controls in place to manage the risks.

• While we all automatically assess the risks in our heads when we approach a job, if time is taken to write a task analysis you could catch things that you may have overlooked. In this situation, powerlines for example.
Things to consider when completing a task analysis:

- How skilled are the workers performing the task?
- Break the job down into steps to help understand the risks better.
- What obvious or potential hazards are present?
- What else could possibly go wrong?
- What steps could be taken to eliminate or minimise the potential hazards?
- What PPE will be required?

Remember that if an incident were to occur, a completed task analysis worksheet can be good evidence that the hazards were being considered before the task was undertaken.

**Short duration work**

‘Short duration work’ is work that lasts minutes rather than hours.

It may not be reasonably practicable to provide full edge protection for short duration work but it still needs to be considered during the assessment of hazards, and should not be discounted. Appropriate controls must be put in place.

In most circumstances, the minimum requirements are as follows:

- For short duration work on a sloping roof, a properly constructed and supported roof ladder.
- For short duration work on a flat roof without edge protection, a harness with a short lanyard attached to secured anchorage.

Short duration work at height shall be treated the same way as any other activity at height. Appropriate fall prevention controls shall be put in place, regardless of the time duration of the task.

**Doing nothing is not an option!**

Aluminium mobile scaffolds are a great solution for many situations and can often be assembled in less than 10 minutes. An aluminium mobile scaffold provides a platform with guard rails where you can step on and off the roof to work. Mobile scaffolds can sometimes take less time than setting up a harness system.
Apprenticeship training

Since 2009, heights training has been included into apprenticeship training.

If you completed your apprenticeship before this date, and especially if you have been working for a smaller company, the chances are that you may have no formal heights training at all.

Heights training begins with unit standard 23229.

Unit standard 23229 ‘Use safety harness system when working at height’

This training covers the following.

Knowledge of the hazards associated with wearing a safety harness and the following associated equipment:

- Fall restraint.
- Fall arrest.
- Free fall.
- Suspension intolerance.
- Working at height.
- Unprotected edge work.

Knowledge of safety harnesses and associated systems and equipment:

- Fall restraint systems.
- Fall arrest systems.
- Static line and anchorage systems.
- Work-positioning systems.

How to check and fit a safety harness system:

- Attachment points.
- Shoulder straps.
- Front buckles.
- Leg straps.
- Lanyards.
- Shock absorbers.
- Inspection tags.
- Fall arrest attachment points
Using safety harness systems where a fall hazard exists:

- Attachment points.
- Shoulder straps.
- Front buckles.

Choose and confirm the safety of possible hook on points:

- Attaching lanyards in a safe manner to anchor points at height.

Knowledge of the rescue plan to be activated in the event of a fall:

- This includes things like describing the roles of individuals involved in the rescue plan.

Heights training then continues on to unit standard 15757.

**Unit standard 15757 ‘Use, install and disestablish temporary proprietary height safety systems when working at height’**

This training covers the following.

Identifying anchor points:

- Identify and confirm safe anchor points.
- Establish ratings, direction of loading and anchor point limitations.
- Accessing and checking anchor points for condition.
- Checking of equipment in accordance with manufacturer’s instructions.

Installing of proprietary height safety systems:

- Select and rig slings and compatible hardware.
- Install the proprietary fall arrest system, in accordance with manufacturer’s instructions and best practice.

Use temporary proprietary height safety systems:

- Actions required of a user in retrieval of a worker trapped within the system.
- Hook and detach the temporary proprietary fall arrest system.
- Disestablish temporary proprietary height safety systems.
• Check for flaws, log and store equipment in accordance with manufacturer’s instructions and workplace procedures.

• Reporting of flaws in equipment and anchors.

Often, unit standard 17600 is also included in apprenticeship training.

**Unit standard 17600 ‘Explain safe work practices for working at heights’**

This training covers:

Knowledge of legislative requirements associated with working at heights, and the systems suitable for working at heights:

• Employers’, employees’, and principals’ duties.

• Hazard identification and control.

• Regulations involved when working above three metres.

• Safety equipment manufacturers’ and suppliers’ duties.

• Training and supervision obligations.

Knowledge of the systems suitable for working at heights:

• Permanent fixed and non-fixed access and platforms.

• Scaffolding.

• Mechanical plant for the support of personnel.

• Safety belts.

• Sit-harnesses.

• Line person belts.

• Full body harnesses.
Formal working at height training

What formal training must you have to work at height?

• You must take all reasonably practicable steps to ensure your safety.

• You need to know what measures need to be taken to ensure your safety.

• You need to be adequately trained with any equipment that you are using.

• You may have been trained by a work associate rather than a training company, but you will need a record of what you are trained in, how you were trained and evidence that you have had recent refresher training.

For simplicity, and cost effectiveness, it makes sense to attend a proper training course for heights and get the unit standards to show that you know what you are doing to ensure your safety.

It is much easier to not have to worry about the chance of an accident due to your lack of knowledge, or even a WorkSafe inspector turning up and asking for proof that you know what you are doing.

Some tradesmen have no training with harnesses but may even own them.

Not knowing how to use a harness system can sometimes even lead to an accident.

A harness can easily be put on by anyone, even when they don’t know how to use them. They trip over them, set them up wrong and don’t know the proper procedures or understand the limitations of the equipment.

Best practice guidelines

WorkSafe have many best practice guides and fact sheets available for download from the WorkSafe website.

Two important best practice guidelines you should have are:

• Best practice guidelines for working at height in New Zealand.

• Best practice guidelines for working on roofs.
The best practice guidelines are generic guides that are not industry-specific. These guidelines outline how people working at height, and those involved in the process, can meet their obligations under the Health and Safety at Work Act 2015.

These guidelines and adherence to them may be relevant as evidence in a court if an incident that leads to court proceedings occurred.

*Study Notes*

*Much of the following information can be found in the best practice guidelines. For more detailed guidance when working at heights always refer to the available guidelines provided by WorkSafe.*
Group controls vs personal controls

Controls that protect multiple people from falling are known as group controls.

The best work methods are those that don’t require any active judgement by the workers to keep themselves safe, such as edge protection, scaffold, and elevating work platforms.

Examples of group controls are as follows:

- Scaffolding.
- Edge protection.
- Mechanical access plant.
- Safety mesh.

Personal controls only look after individuals and rely on active judgement by the user for them to work safely (for example, fall restraint harness and fall arrest). Training, inspection and equipment maintenance are critical for these personal control measures to be effective.

Roof pitch

The steepest pitch that will provide a secure footing on a textured surface roof is 35 degrees. On a smooth surface roof it is 25 degrees. These pitch factors only apply to clean and dry roofs.

If the slope of the roof exceeds 25 degrees, a roof ladder should be used in addition to perimeter guardrails (or a fall arrest system) to reduce the likelihood of a worker slipping.

Barriers to restrict access (also known as bump rails)

When barriers are used to restrict access to edges or areas where falls could occur, they should be placed at least two metres in from any unprotected edge or opening.

Barriers should be highly visible and capable of remaining in place during adverse weather conditions. The height should be between 900 mm and 1100 mm and should act as a boundary around a work area to prevent access to a height hazard such as a skylight.

Workers should not cross, or work on the wrong side of a barrier to restrict access without additional protection (for example, total restraint).

Barriers to restrict access should not to be used for roofs with a pitch over 10 degrees.
Using ladders

Ladders or stepladders should only be used for low-risk and short-duration tasks.

You should maintain three points of contact with a ladder or stepladder to reduce the likelihood of slipping and falling.

Around 70% of falls from height are from roofs and ladders. We all need to take extra care when using ladders to keep ourselves safe.

Ladders and stepladders should be of trade or industrial standard and be rated at not less than 120 kg. In New Zealand, industrial-use ladders should be compliant with AS/NZS 1892.

Use rubber mats designed to increase the footprint of the ladder and keep it from slipping out.

Use ladder approved stability devices to ensure good footing on uneven surfaces.

Make sure ladders are only used according to the manufacturer’s recommendations. People often view the warning stickers as being over the top when it comes to safe use, but those stickers show how the ladders should be used to keep you safe.

Make sure you tie the ladder off securely do not tie to the spouting as it may come off. Screw two screws to barge board and use cable ties to secure the ladder or drill two holes in the roof line and use a bungee to secure it. Climbing a ladder to secure it at the top can be hazardous. It is advisable to have another person to secure the ladder at the bottom while this is achieved.

Overreaching is still a problem that is occurring. Three points of contact are always needed. This could mean both feet and bracing your body/torso against the ladder, it doesn’t have to be your hand – you often need two hands for your work. Always work front on, not sideways to the ladder to ensure your stability.

Ladders should always be checked before use and after any incident (for example, ladder being dropped).

Three-step ladders are allowed to be used, although some building companies have decided to ban them from their work sites. Take care if you use these ladders as it is easy to misstep as you are getting off them as you feel closer to the ground. You can sometimes mistakenly assume you are closer to the ground than you actually are.
Once again you must always use ladders as per the manufacturer's recommendations which are shown on the stickers on the ladders. You can use ladders so long as you do so properly.
Controls for height hazards

Scaffolding

Scaffolds are a common way to provide a safe work platform. There are a wide variety of scaffolding systems available.

All scaffolds should be erected, altered and dismantled by persons who have been trained and have suitable experience with the type of scaffolding being used.

All scaffolds from which a person or object could fall more than five metres, should only be erected, altered and dismantled by a person with an appropriate Certificate of Competency.

If a scaffold has been altered, modified, tampered with and/or appears to be unsafe, the scaffold shall not be used until it has been checked and certified as safe by a competent person.

Where work is performed using mobile scaffolds the scaffold should:

• be erected by a competent person and used in accordance to the manufacturer’s specifications
• remain level and plumb at all times
• never be accessed until all the castors are locked to prevent movement
• never be moved while anyone is on it
• be clear from overhead powerlines.

Edge protection

Edge protection may involve:

• a proprietary (engineered) system
• erected scaffolding that supports a temporary edge-protection system.

Erecting edge protection

Persons erecting edge protection could potentially be exposed to the hazard of working at height until the installation is completed. Pre-planning, such as a task analysis, will identify the hazards involved and controls can be implemented to prevent harm during the erection process.
**Mobile elevating work platforms (MEWPs)**

Common forms of MEWPs include cherry pickers, scissor lifts, hoists and travel towers. There are some key safety issues that should be considered before using a MEWP.

These are specialised pieces of equipment often designed for particular types of operation. It is essential that the correct type of machine is selected for the intended work. The operator should be competent to operate the type of mechanical access plant.

It is essential that these types of plant are operated within the manufacturer’s guidelines.

Some MEWPs are designed for hard flat surfaces only (for example, concrete slab), while others are designed for operating on rough and uneven terrain.

Scissor lifts and other elevating work platforms such as cherry pickers can be used as a means of access to a work area.

On a scissor lift, a harness should be worn unless a hazard assessment has clearly demonstrated that the work can be undertaken without a harness and there is no risk of falling.

**Harness systems**

A harness system enables a person to be positioned and safely supported at a work location for the duration of the task being undertaken at height. Harness systems are used for gaining access to, and working at, a workface where there is a risk of a fall.

The most common harness systems include:

- total restraint systems
- fall arrest systems
- work positioning systems.

**Total restraint system**

The preferred harness system for working at height is the total restraint system.

This system protects a user from approaching an unprotected edge, thereby preventing a free fall from occurring.
Fall arrest system

A fall arrest system is designed to support and hold a person in the event of a fall.

It is not a work positioning system, as they are not designed to support a person while working.

Only when total restraint is impractical, should a fall arrest system be considered.

When fall arrest systems are used an appropriate safety helmet shall be worn to protect the worker from head injury during an uncontrolled fall.

Work positioning systems

Work positioning systems enable a person to work supported in a harness under tension in a way that a fall is prevented. Generally, the arrangement allows for the worker to maintain a stable position and to work hands-free while completing a task.

Anchorage

Permanent anchors

A permanent anchor point should be designed by a chartered professional engineer.

The manufacturer and designer should ensure that each permanent anchor is uniquely identified so that its installation, testing and maintenance can be tracked during its lifetime.

Anchors should have a rated load of 15 kN. All fall arrest and abseil anchors should be tagged and recertified annually to remain compliant with AS/NZS 1891.4.

Temporary anchorage

A temporary anchor can include proprietary fittings or an appropriate arrangement of strops and ropes. All temporary anchors shall be set up by a competent person.

Where a proprietary temporary system is used, it shall be installed in accordance with the manufacturers or designer’s instructions and specifications.

The roof or other building component to which an anchor is to be attached shall be checked by a competent person to verify that it is suitable for supporting the anchor.
Training in relation to harness installation and use

All harness work requires training and competence and only trained and competent personnel can install and use harness systems on site.

Persons not trained should be inducted by the system installer, or other qualified persons, before they are permitted to use the system. They should also be supervised at all times by another person who is also trained and competent.

Rescue planning in relation to harness use

A rescue plan should be developed before installing the harness system. It is critical that a suspended worker can be promptly rescued.

A worker suspended in a harness can develop suspension intolerance. This is a condition in which blood pooling in the legs can lead to loss of consciousness, renal failure and, in extreme cases, death.

“Workers using fall arrest systems must never work alone.”

Temporary work platforms (TWPs)

Temporary work platforms should be constructed by a competent person and should be suitable for carrying out specific work that is, most often, carried out at under five metres in height.

TWPs are usually a proprietary (engineered) work platform constructed and used in accordance with the manufacturer’s instructions.

Scaffold temporary work platforms

The most common example of a TWP is scaffolding—proprietary and tube and clip.

Guardrails, including mid rails and toe boards, should be provided on the exposed sides and end of all working platforms regardless of height.

All scaffolds or TWPs, from which a person may fall five metres or more, are required to be notified to the Ministry of Business, Innovation and Employment, and shall be erected by a person holding a relevant certificate of competency.

Fixed roof ladders and crawl boards

Fixed crawl boards and roof ladders may be used to provide permanent access to a work positioning system, or on pitched or brittle roofs to gain access to service plant. Roof ladders should be used on roof pitches over 25 degrees.
Study Notes
**WorkSafe’s approach**

WorkSafe expect a PCBU to understand risk management in their business.

When visiting a workplace or carrying out an investigation WorkSafe will:

- check whether the PCBU is thinking about eliminating a risk before looking at minimising it (if reasonably practicable to do so)

- check whether the PCBU is applying appropriate control measures

- check whether the measures the PCBU has in place are working as planned

- assess your understanding and management of risks (including an understanding of health and safety systems management).

In deciding whether a PCBU has controlled a risk, so far as is reasonably practicable in the circumstances, WorkSafe will compare the controls in place against good practice in the relevant industry.

What is WorkSafe likely to do if they see you using a harness system on a roof?

WorkSafe is likely to do the following:

- Check whether you have a planned system of work because every job is unique.

- Confirm that you have a full understanding of how the equipment works.

- Check you have an emergency rescue plan in place, you may have all the gear but if you have no emergency plan in place it all falls over.

- Check to see if you have a backup person.

- Find out what training you have. How often do you do this sort of work?

- Look at harnesses dates and if they are non-compliant, they will then ask why you did not pick this up in your pre-start check. WorkSafe will mainly look for indications that your systems are in place. If you don’t have a system in place to make sure that your gear is in good working order, what else are you missing?

- If your harness is date compliant, they could just ask what you check about the harness before you use it and what do you do with the harness when you are finished with it, once again checking for systems to obviously be in place.

- Look at what you are anchored to. Do you know the rating of your anchor point? Will it meet the required 15 kilo-newtons?
WorkSafe vary rarely prosecutes first off. WorkSafe will first look for improvement, so you would probably be issued an improvement notice if your systems are found to be inadequate.

WorkSafe recognises that there is a lack of skill in the workforce and wants you to learn from the experience.

An improvement notice would most likely require you to supply evidence that you have had suitable training, purchased suitable equipment or changed work protocols (for example, proof that you no longer work alone if that was one of the issues).

WorkSafe doesn’t necessarily want to prosecute you. WorkSafe wants you to get better.

If, however, you had an accident and it was evident that you did not have suitable protocols and procedures in place, that is when a prosecution is likely to occur.

WorkSafe usually prosecutes when an accident occurs.

It does not matter that you never meant to hurt anyone. We all need to follow the rules, and if an accident happens it shows that you had a breakdown in your system.

We all know that working at heights is dangerous, people do get hurt, and there are plenty of solutions out there.

To ensure that you are taking all reasonably practicable steps, follow the best practice guidelines.
Particular hazardous work (notifiable work)

Some types of work have been identified having a higher level of risk and an increased chance of resulting in an accident causing harm.

What types of work need to be notified to Worksafe?

- Logging or tree felling undertaken for commercial purposes.
- Construction work with a risk of falling 5 metres or more (more information follows).
- Erecting or dismantling scaffolding with a risk of falling 5 metres or more (more information follows).
- Use of a lifting appliance where the appliance has to lift a mass of 500 kilograms or more a vertical distance of 5 metres or more.
- Work in any pit, shaft, trench, or other excavation in which any person is required to work in a space more than 1.5 metres deep and having a depth greater than the horizontal width at the top.
- Work in any drive, excavation, or heading in which any person is required to work with a ground cover overhead.
- Work involving the use of explosives, or storage of explosives for use.
- Work in which a person breathes compressed air, or respiratory medium other than air (not diving).
- Work in which a person breathes compressed air, or respiratory medium other than air (diving).

Construction work with a risk of falling 5 metres or more

The following work is excluded:

- Work in connection with a residential building up to and including 2 full storeys.
- Work on overhead telecommunications lines and overhead electric power lines.
- Work carried out from a ladder only.
- Maintenance and repair work of a minor or routine nature.
Erecting or dismantling scaffolding with a risk falling 5 metres or more

You must have a certificate of competence to erect, or dismantle, scaffolding.

You also need a certificate of competence when carrying out the following type of work:

- Working with explosives.
- When you work in, or are breathing, compressed air or air substitute (diving).
- Performing restricted work involving asbestos.
Notifying WorkSafe about particular hazardous work

WorkSafe requires you to tell them that you are undertaking particular hazardous work. This is done by completing the notification form. WorkSafe will then decide whether or not to send an inspector to assess that the work is being done in an appropriate and safe manner.

A notification form is available for download from the WorkSafe website. These forms should be printed, and copies kept with your health and safety manual.

Completing Notification Forms

When completed the form should be sent to the WorkSafe office nearest to the location at which the work is being carried out.

The form should be completed online, posted or faxed to the WorkSafe office to arrive at least 24 hours before the work is due to start.

A list of addresses and fax numbers is supplied with the notification form.

Someone at WorkSafe may contact you if they have any queries regarding the work or the form. However, if you are not contacted you are free to start work on the date you intended.

If you have completed the work by the date you estimated on the notification form you do not need to take any further action. If the work has taken longer than expected, it is recommended that a further notification form be completed and sent to the WorkSafe office.

Is someone going to show up to check on you?

WorkSafe will choose whether or not to send an inspector to your job site. This will depend on the type of work being carried out, the location and the relative risk of the work compared to other sites that it has been notified about where work will be carried out at the same time.
Questions

Answer the following questions.

1. Do you need a recognised qualification to assemble scaffolding?

2. Is it acceptable to use ropes and harnesses while on a roof if you do not have a recognised qualification?

3. What is the difference between group controls and personal controls used for working at heights?
4. What is the steepest pitch that will provide a secure footing on a roof?
Confined space work

Much of the information included in this section is sourced from WorkSafe Confined spaces: planning entry and working safely in a confined space quick guide.

What is a confined space?

Not every small space or enclosed space is a confined space. A confined space is defined as an enclosed or partially enclosed space that:

- may have restricted means for entry and exit
- is not intended or primarily designed for human occupancy
- may present a risk from one or more of the following at any time:
  - unsafe concentration of harmful airborne contaminants
  - unsafe concentration of flammable substances
  - unsafe levels of oxygen
  - substances that can cause engulfment.

Examples include: storage tanks, tank cars, process vessels, boilers, silos, pits, pipes, sewers, shafts, ducts and shipboard spaces.

The risk of death when entering confined spaces to carry out work is a real one! There have been many incidents of loss of life.

In some cases, multiple fatalities have occurred, when would-be rescuers entered the space and become victims themselves.
Australian standard: AS 2865 Confined spaces
Anyone who carries out confined space work needs to be familiar with the standard AS 2865 Confined spaces, and should have specialist training as well.

The Health and Safety at Work Act 2015 requires persons conducting a business or undertaking (PCBU) to identify the hazards associated with working in the confined space and conduct a risk assessment and control the risks posed by the hazards.

Underfloor and ceiling crawl spaces
Is working in the crawl space under a house or in the ceiling crawl space of a domestic home confined space work?

The answer is that it may be! You will need to assess the hazards associated with the space before you enter.

Usually (but not always) these areas are well ventilated and are built with the intention of allowing people to access services which have been run through these areas.

You must always carry out a risk assessment to assess the risk to you and your workers before you enter these spaces.

You need to keep in mind the hazards which may be posed by these areas, such as the following:

- The chances of getting trapped while entering or working.
- The temperature, especially of ceiling cavities during the summer months.
- Hazards that may be created by the work you are performing.

Although you may not consider working under a house to be defined as a confined space, you still need to keep in mind what would happen if you hurt yourself while under the floor. Could you get out?

For any tradespeople who work alone and find themselves in these situations, it is good practice to text or phone another person to tell them that you are going to be working under the floor of a house and to text them again once you get out.
Hazards in confined spaces

Hazards in confined spaces include the following:

- Oxygen-deficient atmospheres.
- Toxic atmospheres.
- Flammable or explosive atmospheres.
- Engulfment.
- Operation of moving parts.
- Uncontrolled introduction of a substance.
- Other hazards.

Oxygen-deficient atmospheres

Oxygen-deficient atmospheres can cause unconsciousness, brain damage and death. Oxygen deficiency can be caused by rust, fire, absorption by grain or soils, consumption by bacteria, or displacement by another gas.

Toxic atmospheres

Toxic atmospheres are where gases, vapours, dusts or fumes that have poisonous effects on the body are present. Cleaning, painting or welding may produce dangerous vapours and fumes.

Flammable or explosive atmospheres

Flammable gases, vapours or dusts which could be ignited by a spark or open flame. The risk of explosion or spontaneous combustion is increased if an oxygen-enriched atmosphere exists.

Engulfment

Workers can be trapped or buried by bulk materials such as grain, sand, flour, fertiliser and sawdust.

Operation of moving parts

Being trapped or crushed by augers, mixers, agitators or conveyor belts.
Uncontrolled introduction of a substance
Steam, water, or other gas or liquid.

Other hazards
Noise, extremes of temperature, radiation, manual handling and falls.
Controlling the risks

The control measures should be applied in the order given in the ‘Duty holders’ section of this material (beginning with elimination, followed by minimisation).

Consider the following issues.

**Can work be done without entry to the confined space?**

Always, as a first step, check to see if the work can be done with equipment from outside the confined space.

The golden rule is: **Don’t go in if you don’t have to.**

**Isolate contaminants and moving parts**

Prevent accidental introduction of materials (for example, steam, water or bulk materials, through piping, ducts, vents, etc). De-energise, lockout or tag machinery.

**Clean and purge the confined space if necessary**

Use a suitable cleaning method to remove harmful solids or sludges. Purge with fresh air to remove harmful gases or vapours.

**Warning:** Never use oxygen to purge a confined space. This can create a fire and explosion hazard.

**Test the atmosphere for oxygen**

Use a suitable detector to determine whether the confined space contains a safe oxygen level for breathing.

Where possible, carry out atmospheric testing without entering the confined space.

Test the atmosphere for toxic and flammable contaminants.

**Test for toxic contaminants**

Hydrogen sulphide, methane, carbon monoxide and flammable contaminants (for example, petroleum vapours).

You need to use appropriate detection equipment, which should be correctly calibrated at regular intervals.
**Ventilate the confined space safely**

Ventilate the confined space by using a blower designed for the purpose.

When blowing air into the confined space, make sure high volume of air is blown in at a low speed – this can be provided by trunking and a blower made especially for this purpose.

Then test again for levels of oxygen and other gases to ensure that contaminants are reduced to below the Workplace Exposure Standard, or a safe level.

**Select appropriate breathing apparatus if necessary**

If the space can’t be ventilated, or if the work will contaminate the atmosphere (for example, hot work, painting, sludge removal), use a suitable self-contained breathing apparatus or supplied-air respirator.

**Select the right protective and safety equipment**

Personal protective equipment (PPE) is essential when working in confined spaces.

PPE should be combined with other control measures to control the risk.

As well as respiratory protective equipment (RPE), this could include items such as safety helmet, gloves, hearing protectors, safety harness and lifeline.

Care should be taken when selecting the right PPE for an emergency response.

**Work with a stand-by person**

You must have a trained stand-by person to monitor the safety of the person working inside the confined space and to take action if an emergency arises.

Ensure there is a reliable system of communication – by voice, radio, hand signals, hard-wired communication etc.

**Monitor and maintain control measures**

Test the air in a confined space regularly (or constantly if appropriate) as oxygen and gas levels in a confined space can change quickly. Be alert for any change in conditions.

If conditions change, evacuate the confined space.

There should be a system for getting a worker out of the space quickly, if necessary, in case anything goes wrong. This could include using a safety harness and lifeline attached to a tripod.
Training

Provide training for all workers who may be involved in confined space work, including stand-by persons, to ensure they have the skills to safely do this work.

Regularly reassess their competency for working in confined spaces.

Workers who use detectors to test whether the atmosphere is safe must be trained to use them correctly.

Confined space emergency procedures

Have a site-specific emergency procedure and emergency equipment available for every confined space job.

This will include the following:

- First aid.
- Firefighting equipment.
- A rescue procedure for workers who may be injured or incapacitated.
- PPE and RPE for rescuers.
- Emergency contact details register.

Rescue procedures should be tested to make sure they are safe and effective – it is not easy to extract a person from a confined space.

When testing rescue procedures, make the situation as realistic as possible. The victim and the rescuer are likely to be wearing PPE and RPE. That may make it more difficult to extract them.

Issue a written authority for entry to work

The PCBU or person responsible for the work should issue a written authority – or confined space entry permit – as described in the Standard. Essentially, this permit is a safety checklist to make sure nothing is overlooked.
Entry permits

Working in a confined space is never a one-person job.

A supervisor, stand-by personnel and rescue personnel are needed to ensure the safety of anyone entering the confined space.

The supervisor must be a suitably trained person who provides the confined space entry permit when all of the hazard control measures, protective equipment are issued, and rescue procedures are in place.

A confined space entry permit does the following:

- Lists the people permitted to enter the confined space.
- States the location of the confined space work to be done.
- Gives a description of the work taking place.
- Shows all test results of the atmosphere and possible contaminants.
- States what control measures have and are to be put in place.
- Details any chemical agents that are to be used in the confined space.
- Lists the stand-by personnel.
- Includes rescue plans in case of an emergency.
- Confirms the dates that the permit is valid for.

Particular hazardous work (notifiable work)

Working in a confined space is not classed as ‘particular hazardous work’ in itself. However, occasionally entry into a confined space will require notification to WorkSafe.

This notification needs to be provided at least 24 hours before the work begins. Refer back to the information about the notification process given in the ‘Notifying Worksafe about particular hazardous work’ section.

Construction-related ‘particular hazardous work’ that may take place in a confined space includes the following circumstances:

- Where a person may fall more than 5 metres.
- Erecting and dismantling scaffolding over 5 metres in height.
- Work in some excavations.
- Work where compressed air breathing apparatus is required.
- Working with asbestos.

**Questions**

Answer the following questions.

5. If you are working alone, under the floor or in the ceiling of a building, what should you do before you begin to help ensure you are safe?

6. If you are carrying out confined space work, you need to be familiar with which standard?
Study Notes
**Fire protection for pipe penetrations**

We can think about fire protection in the following categories:

- Active fire protection.
- Passive fire protection.

**Active fire protection**

Active fire protection usually requires some form of activation, whether manual, mechanical or electronic.

Examples of active fire protection measures:

- Fire alarms.
- Fire sprinklers.
- Smoke alarms.

**Passive fire protection**

Passive fire protection is intended to contain a fire where it started or to delay spread of fire and smoke to other areas for a period of time.

Examples of passive fire protection measures:

- Firestops.
- Fire walls.
- Fire doors.

These types of passive fire protection are tested to determine the fire resistance rating (FRR) of the item. The rating of these measures is expressed in terms of hours of fire resistance.

**Fire cells**

For the purpose of safety, buildings are divided into separate compartments called fire cells. These fire cells within a building may be a single room or a group of rooms.
The purpose of having separate compartments is to slow the spread of fire and smoke throughout the building in the event of a fire.

The New Zealand Building Code requires that buildings be constructed to maintain structural stability during fire so that the following occur:

- People are safeguarded from any unacceptable risk of injury or illness caused by fire.
- Surrounding properties are protected from damage during a fire.
- Structural systems in buildings provide firefighters with safe access for the purpose of firefighting and rescue operations.

Buildings are required to be constructed so that they remain stable during and after fire.

**Fire walls**

A fire wall, or fire separation wall, is passive fire protection and can be described as a wall which separates fire cells, or fire cells from safe paths, and provides a specific fire resistance rating.

Fire walls may be required in a building to protect an adjacent property or the safety of the building occupants. A fire wall can be used to divide a large, single building on the same property into two or more fire cells, or to serve as a shared wall between two buildings on different properties.

To maintain the required structural stability, fire walls between properties are often independent of a building’s structural system. This will allow for a situation where a building collapses from the effects of a fire but not bring the fire wall down with it.

Buildings that are on boundaries are usually required to have fire walls. Details around these requirements can be found in the New Zealand Building Code.

**Fire resistance rating (FRR)**

The fire resistance rating (FRR) of an element such as a wall is presented as three numbers identifying the structural stability, integrity and insulation characteristics of the component.

As an example, a wall with a FRR of 30/60/30 would have a 30-minute rating for stability, 60-minute rating for integrity, and 30-minute rating for insulation.

*Stability*

The stability fire rating is based on the length of time, in minutes, a product can resist structural collapse during a standard fire test (usually conducted in a furnace) without losing its loadbearing capacity while under load.
Integrity
The integrity fire rating is the time during which a product’s fire separation capability is maintained, determined by the tightness of joints to limit smoke and gas penetration and resist the passage of flame.

Insulation
The insulation fire rating is a product’s ability to resist the transfer of heat and indicates the time before a specified level of rise in temperature on the non-exposed side is reached.
Responsibilities

Building owners are responsible for making sure that people entering and using their buildings are safe.

Under the Building Act, all buildings, other than single residential buildings, require a compliance schedule and annual building warrant of fitness if they contain specified systems that form part of a building’s means of escape from fire. Fire separations and smoke separations are specified systems that fall into this category.

Building owners must ensure the effective operation of all the specified systems.

The building compliance schedule includes details on the inspection, maintenance and reporting procedures that must be carried out on these systems.

These procedures will generally require specialist inspections by independent qualified persons (IQP) to ensure the specified systems are operating effectively.

Inspection of a fire separation would usually include checking that any penetrations are appropriately sealed, there are no holes or gaps, and checking that smoke seals are not damaged.

An IQP is a person approved by the territorial authority as qualified to inspect certain specified systems and ensure that necessary maintenance occurs. ‘Independent’ means they have no financial interest in the building.

Most specified systems require at least an annual inspection by an IQP in order to provide a Building Warrant of Fitness.

It is an offence, carrying a fine of up to $100,000, to use or permit the use of a building if it has inadequate means of escape from fire.
Pipe penetrations through firewalls

Often when we are working in our trades we must run pipes through walls and floors of buildings.

When any opening is going to be made in a fire separation whether it is in a wall, or a floor, of a multi-storied building, consideration needs to be taken in regard to maintaining the fire resistance rating of the fire separation.

The spread of a fire is contained by the fire resisting compartments and you must ensure that any openings and gaps are fire-stopped to restrict possible spread of fire.

Fire stops are used to return gaps and holes made in any fire wall or floor to the same degree of fire resistance as the rest of the wall or floor.

All care taken with construction of fire separations can be let down by lack of attention paid when services such as ducting, plumbing, electrical and even sprinkler pipework services are installed and pass through the fire separations.

Only methods tested by a competent authority can be guaranteed to provide the appropriate fire resistance rating.

Any fire stops used where penetrations are installed must be fitted in accordance with the manufacturer's specifications. Manufactures specifications have been tested to establish the FRR of the fire-stopping system, but this will only work if they are installed as intended by the manufacturer.
Passive fire protection for pipe penetrations

Protecting against fire from spreading from one fire cell to another through plumbing penetrations is required each time you install any plastic or metal pipe through a fire rated wall in a building.

When a plastic pipe is being fire-stopped it will require a specific type of sealant which will seal the hole even if the pipe melts and burns away.

The most common products which are used in these situations are as follows:

- Pipe collars (fire collars).
- Pipe wraps (fire wraps).
- Pipe bands (fire bands).
- Fire rated sealant and foams.

Intumescent pipe collars, or pipe wraps, are essential for meeting fire safety regulations and for limiting the potential of a fire becoming extremely dangerous.

These fire protection products provide fire stopping for plastic pipework at the point where they lead through a fire compartment wall or floor.

The intumescent material expands in the event of a fire, crushing the pipe inwards to seal the hole and prevent the fire from passing through.
Intumescent material

An intumescent product is a substance which swells as a result of heat exposure, increasing volume and decreasing density. A char is produced, which is a poor conductor of heat, therefore heat transfer is retarded.

- Intumescent material has a temperature activation at 288°C.
- Once activated, intumescent material will expand to 80 times its original volume.
- The pressure which it applies to whatever is surrounding it is 131 PSI.

This is why it is important to make sure that fire collars and wraps are located correctly to ensure that the intumescent product expands in the intended direction to seal the penetration.

Intumescent products are suitable for:
- backfilling around service penetrations.
- fixing window or door frames.
- filling irregular or awkward gaps where the foam will expand to completely fill the cavity/void.

Intumescent products features:
- Excellent adhesion to many common building substrates.
- Once cured the foam can be cut, sawn, painted or plastered over.
- Expands up to 40 times its original volume.
- Coloured pink to identify it as a fire rated product.

Installation instructions

1) Surfaces must be firm, clean and free of dust and loose particles. The cavity or voided area to be filled must be moistened well with water, this will aid installation adhesion to the substrate.

2) Shake the can thoroughly, until the foam inside becomes liquid. Then attach the straw to the canister and commence to fill the cavity from the base of the aperture slowly and build up the layers of the foam, ensuring that the void is filled. Care to be taken not to over-fill the cavity.
3) As a rule, only fill the cavity approximately half full as post expansion will fill the hole.

4) Allow the foam to cure – full cure will be reached in approximately 24 hours. Cured foam can be cut using a sharp bladed instrument.

5) Protect the foam from exposure to direct sunlight as polyurethane foam is not UV stable. Protect exposed foam from UV with plaster or paint.

Study Notes
Pipe collars (fire collars)

The low-profile pipe collars are designed to be installed in concrete, brick or masonry fire rated walls and floors, and fire rated plasterboard walls.

When used on solid construction walls the hole should be sized correctly and just big enough to fit the pipe. Over sizing of the hole will affect the operation of the pipe collar in the event of a fire.

Pipe collars consist of intumescent material encased in a stainless steel or galvanized steel surround with fixing tabs.

When fire occurs, the intumescent material expands against the steel surround as the flammable plastic pipe running through the collar melts and burns away.

The steel casing acts as an excellent heat sync ensuring fast activation of the intumescent, forming a stable fire-resistant plug, maintaining both fire integrity and insulation.

Pipe collars are designed to be exposed in a wall or floor application (i.e. face fixed). The collars should always be fixed to the underneath of the concrete floor.

In wall situations one collar should be used on each exposed side of the fire rated wall.
Installation instructions

1) Ensure substrate around pipe is flat and free from obstructions.

2) Open pipe collar and position around pipe.

3) Slide tab through slot in pipe collar and fold back 180° to secure.

4) Secure pipe collar into concrete by using M6 masonry anchors or expanding metallic bolts. Install pipe collars into plasterboard using expanding hollow core wall anchors. Do not use fixings which rely on plastic or nylon components for grip.

5) Install only from underside on floor penetrations. Install pipe collar on both sides for wall penetrations.
Pipe wraps (fire wraps)

Pipe wraps, or fire wraps, are designed to be installed in solid construction walls and floors.

They consist of layers of intumescent material sealed in a polyethylene sleeve. The sleeve features a strip of double sided tape to enable easy installation.

When a fire occurs, the intumescent seal is activated and expands into the penetration cavity as the burning plastic pipe melts. When the intumescent seal expands it forms a fire-resistant plug in the penetration, preventing the spread of fire.

The pipe wrap is designed to have the ends of intumescent material meet around the circumference of the pipe.

No overlap will exist, allowing the pipe to be centrally located within a core hole. For pipe sizes up to 100mm, only one layer of intumescent material is required, ensuring core holes can be kept to a minimum size.

They are suitable for fitting with:

- concrete, masonry and porous concrete wall constructions.
- concrete floor construction.
- plasterboard penetrations (with a fire band).
Installation instructions

1) Position fire wrap around circumference of pipe and remove backing from the self-adhesive strip and join ends together.

2) Slide wrap into position ensuring wrap is located entirely within depth of the wall or floor. For floor applications, the wrap should be flush with the underside of the floor. For wall applications, two wraps are required – one from each side; each wrap should be flush with the outside wall.

3) If there is a space between the concrete and the outer side of the wrap and above the wrap, backfill the space with mortar.

4) The polyethylene sleeve can be removed and intumescent strip taped in place if the core hole is very tight.

5) For plasterboard wall applications, a fire band must be used.
Pipe bands (fire bands)

Designed for the fire protection of plasterboard walls penetrated by plastic pipes, fire bands are rolled galvanized steel sleeves with two slide tabs fixed through a corresponding slot and fold back tabs for fixing to the plasterboard.

A pipe wrap is installed on each face of the plasterboard within the fire band.

When a fire occurs, the intumescent pipe wraps contained within the steel fire band activate, filling the band with a fire-resistant seal.

They are suitable for:

- plasterboard wall penetrations.

Installation instructions

1) Open fire band around pipe, slide tabs through slot and fold back 180° to secure. Slide into plasterboard wall penetration.

2) Install a pipe wrap on each face of the plasterboard wall (two per fire band).

3) Seal gap between the fire band and the plasterboard of both wall faces with intumescent sealant.
Cast-in collars

Cast-in collars, also known as cast-in fire collars, are designed to reduce the labour content of passive fire rating plumbing pipe penetrations on concrete floors that are poured on site.

Simply fix the base to the formwork on site and the plumbing pipe penetration is located complete with passive fire protection.

This eliminates the need for core drilling of penetrations after the floor is poured and retro fitting a fire collar or wrap. Once the floor is poured and formwork stripped, simply cut off the top of the cast-in collar and install pipe.

They are suitable for fitting with:

- solid masonry floors.

Installation instructions

1) Nail to formwork in correct location.
2) Pour concrete floor.
3) Remove formwork ensuring galvanised steel ring is exposed.
4) Cut plastic collar to desired height.
5) Install pipework.
6) Seal gap between pipe and collar on top side of floor with intumescent sealant.

![Installation Details]

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Drop-in collars

Drop in fire collars provide a simple and effective passive fire rating option for thin concrete floors or trapezoidal steel tray concrete floors.

These floors feature profile changes on the underside of the slab and make it difficult to fire rate with a conventional fire collar fixed to the underside of a floor slab.

They are suitable for fitting with:

- thin concrete floors (minimum 70mm)
- trapezoidal steel tray concrete floors.

Features:

- They can be installed and fixed from top side of slab.
- They can be retrofitted around pipe.

Installation instructions

1) Core drill hole to specified diameter to suit pipe size.
2) Install drop in fire collar fixing with two M5x22mm metal pin anchors.
3) Insert pipework through collar.
4) Seal gaps between concrete/ collar and collar/pipe with intumescent sealant.

![Installation Details](image)
Intumescent sealant (Fire mastic)

Intumescent sealant is used to clean up around the core hole and the plumbing pipe for any through-floor installation, cast-in collar, drop-in fire collar and plaster board wall installation before a fire collar is installed.

The correct penetration seal must be selected for the pipe and type of fire rated wall or floor and installed according to the manufacturer's instructions.

Common installation faults to avoid

- Oversize holes cut for pipes.
- Gaps filled with inappropriate materials.
- Incorrect product used in hollow wall construction.
- Mastics used for thickness greater than they are intended for.
- Fixings used on collars are the incorrect type and number specified by the manufacturer.

Never modify any passive fire protection product.

Before installing any fire stops in a building you need to do the following:

1) Make sure that you understand all of the products you intend to use.

2) Know what the Fire Resistance Rating (FRR) is for the building.

3) Submit products you intend to be used to the architect prior to construction start date.

4) Only use products that are part of a tested system.

5) Get all core hole sizes right from day one. It will save time in the long run.

6) If you are unsure call the supplier.

Use with steel and copper pipework

It is not always necessary to use fire collars, fire bands or other products which are intended for plastic pipes when sealing penetrations through fire rated walls using steel or copper pipework.
Intumescent sealants (fire mastics) are used to achieve the integrity rating of the floor or wall when steel or copper pipes are installed.

Intumescent sealants (fire mastics) are used for sealing of gaps around pipes, cables, ducts and services which penetrate fire rated walls penetrations in plasterboard, concrete floors and masonry wall constructions. Keeping the penetrations well sealed to help prevent the spread of fire and smoke through walls and floors.

**Questions**

Answer the following questions.

7. Give an example of an active fire protection product.

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8. What does an intumescent product do?

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9. What are the three values of Fire Resistance Rating (FRR)?
10. Why do you need to use fire collars rather than mastic for sealing plastic pipe penetrations?
Continuing Professional Development (CPD) 2018

Topic 2: Insurance considerations
**Topic 2: Insurance considerations**

This topic for Continuing Professional Development (CPD) 2018 for plumbers, gasfitters and drainlayers focuses on Insurance.

This topic covers the following:

- The importance of having insurance cover.
- Premiums.
- Risk.
- What might need to be insured?
- Protecting yourself.
  - Medical/health insurance.
  - Accident Compensation Corporation (ACC) cover.
  - Personal income, income replacement and trauma insurance.
- Protecting your assets.
  - Motor vehicle insurance.
  - Tools and equipment.
  - Goods in transit.
  - Stock.
- Protecting your business.
  - General or public liability insurance.
  - Statutory liability insurance.
  - Professional indemnity insurance.
  - Employers’ liability insurance.
  - Business interruption insurance.
  - Insurance implications and responsibilities after you stop actively working in the industry.
  - Insurance implications and responsibilities if you are an employee and you are moving on to another company, going out on your own, or changing careers.
- Important checks to make when deciding on an insurance company and policy.
The importance of having insurance cover

Insurance is all about swapping an unknown cost for a known cost.

You can’t know how long you will be off work if you get sick, how much it will cost to repair any damage caused by your actions, or how expensive it will be to replace lost or stolen equipment when you don’t know how much equipment will be gone.

Insurance is a regular payment (premiums) paid on a fortnightly, monthly, quarterly or annual basis that means those unknown expenses will be paid for by the insurance company.

You can insure yourself and your business for nearly any sudden or unforeseen event, unless it has already happened. So, if you want any type of insurance you must organise it before the loss has occurred.

Insurance only covers you for unintentional injury or damage. If you intentionally damage or lose property, insurance will not pay for any repairs or replacements. Similarly, if you are driving under the influence of drugs or alcohol any accident will not be covered.

Premiums

The premiums or cost of insurance can vary for numerous reasons.

Variations may occur in relation to the following:

• The insurance company you use.

• How much insurance cover you need – do you have a van full of hand tools or a workshop full of specialist equipment?

• How much excess you are willing to pay – you will be required to pay the first portion of costs when making an insurance claim. This could be anywhere from $400 to $2000 dollars. The higher the excess the lower the premium.

• What type of business you are in and the activities involved. Insurance companies have calculated the average risk and costs for different situations and use those when deciding their premiums. If your business has less risks than the average business in your industry, tell your insurer why, and negotiate a discount.
**Risk**

When deciding on insurance, you need to weigh up the risk (or chances) of a situation happening and consider how expensive that may be.

You will then decide whether or not the premiums the insurance company charges amount to a reasonable and affordable cost for your business.

If you decide not to have insurance, consider if the costs involved in fixing, or replacing, something if things go wrong are going to be affordable.

**What might need to be insured?**

- Yourself.
- Your assets.
- Your business.

Protection options in the form of insurance are discussed in the following sections.
Protecting yourself
This section provides information on the following:

- Medical/health insurance.
- Accident Compensation Corporation (ACC) cover.
- Personal income, income replacement and trauma insurance.

Medical/health insurance
There are many different levels of medical/health insurance.

There is insurance to pay for every visit to the GP, dentist, or optometrist and to cover prescription medications.

Surgical insurance. If you need to have surgery and don’t want to go on the public waiting list.

Insurance that covers any specialist appointments for diagnosis, the surgery or treatment you may need and follow up appointments following treatment.

The option that is right for you will depend on how much you spend on health care now, your personal medical history, and your budget.

Accident Compensation Corporation (ACC) cover
- ACC provides some cover should you be unable to work.
- Be aware: that this is only if you can’t work due to having some type of accident.
- ACC has three types of income replacement cover.
- Cover for PAYE earners: The premiums for this are paid to ACC by your employer and based on your earnings. ACC can see from IRD records how much you are earning on a regular basis and will make payment based on that amount. **Note:** ACC won’t replace untaxed income.
- ACC Cover Plus: For people paying provisional tax, such as the self-employed. In this case ACC will take an average of your last 3 years’ earnings and make payments based on that.
- ACC Cover Plus Extra: This is an agreed value policy where you and ACC agree on how much you are earning and how much they will pay, so if you have a year of low earnings for any reason, it is not factored into a 3-year average like the previous ACC Cover Plus.
Personal income, income replacement and trauma insurance

What if an issue arises that is not caused by an accident?

There is a risk that, in the future, you may become unwell (from disease, stroke, heart attack, etc.) Such illnesses may mean you are unable to work for a period of time or perhaps permanently.

Have you considered how long you would be able to continue to cover your expenses and maintain your current standard of living?

You may be able to cover the costs indefinitely from savings or a partner’s income, you may be mortgage free and have no dependants, so your expenses could be quite low, or you may not be able to pay next week’s rent if you became unwell today.

You can be protected in this situation with personal income, income replacement, and/or trauma insurance.

• Personal income insurance will replace your income for up to two years. This allows you time to re-train or make other arrangements to replace your lost income.

• Income replacement insurance will pay you a ‘wage’ whilst you are unable to work due to injury or for a medical reason. Depending on the type of policy you choose, some will continue to pay you fortnightly or monthly (and often adjusted for inflation) until you reach retirement age, currently 65. The premiums for income replacement insurance can be adjusted by changing the amount of time you would be off work before the insurance starts to pay you. The longer you can wait, the lower the premiums will be.

• Trauma insurance policies usually offer a lump sum for certain medical events; for example, heart attack, stroke, cancer etc. as well as serious injuries and is often offered alongside income replacement insurance.
Protecting your assets

This section provides information on the following:

- Motor vehicle insurance.
- Tools and equipment.
- Goods in transit.
- Stock.

Motor vehicle insurance

Vehicles used for business purposes have different premiums than vehicles used privately. You need to let your insurance company know if your vehicle is for work and/or private use.

There are things that you can do to reduce the costs of vehicle insurance such as having an alarm or installing a GPS in the vehicle.

**Be aware:** In the case of an accident, vehicle insurance only pays if the driver at fault was within the restrictions of the licence they hold (passengers, time of day, alcohol level). The excess will vary from $350 to $2000+ depending on the age of the driver.

Tools and equipment

Tool insurance is expensive and the excess to pay for each claim is high.

As tradespeople we have brought this upon ourselves. Think back to the last time you were working on site, when you got the signal for lunch, where did you leave the tools you were using?

There are choices you can make as to how much insurance cover you want.

- Maybe you only want to cover your larger, less portable items.
- Do you want your policy to cover mobile phones and laptops?
- Under which circumstances do you want your items covered?
- Perhaps you only want your tools and equipment to be covered whilst they are in your workshop and you will take responsibility for them when you are out and about. This will reduce the premiums the insurance company will charge.
- How much excess you are willing to pay?
The cover for theft has separate costs and excess terms than insurance cover for burglary or damaging/breaking a tool.

For example

Dropping and damaging/breaking a tool = Standard excess $500.

Burglary (must be signs of breaking and entering) = Excess $1000.

Theft (someone taking the tool from site or van while you are working) = Excess $2500.

**Goods in transit**

If you are often transporting appliances and fixtures from the merchant to site in your vehicle, ‘goods in transit’ insurance will cover the item if you break it whilst loading or unloading it into your vehicle, or if you were involved in a vehicle accident that damaged the item.

**Be aware:** This type of damage is unlikely to be covered under your standard vehicle insurance and should be insured separately. Some vehicle policies will offer a small amount of cover for ‘stock’ in their liability wordings.

The cover for goods in transit changes based on who owns the goods at the time they are being transported. Make sure you understand your policy and how it works.

**Stock**

Depending on how large your company is, the amount of stock (fittings, pipe, fixtures, appliances, spare parts etc) you will be carrying (holding at your workplace) will vary.

- How much would that cost to replace if it was damaged (perhaps a fire in the workshop) or stolen?

- Do you need to get insurance to cover you if that was to happen?
Protecting your business

This section provides information on the following insurance protection for businesses:

- General or public insurance.
- Statutory liability insurance.
- Professional indemnity insurance.
- Employers’ liability insurance.
- Business interruption insurance.
- Insurance implications and responsibilities after you stop actively working in the industry.
- Insurance implications and responsibilities if you are an employee and you are moving on to another company, going out on your own or changing careers.

General or public liability insurance

This insurance really is a must have. Most construction companies won’t allow a sub-contractor on to site without it. It will cover you for numerous situations that are all very common in our industry.

In a domestic or commercial situation there is a risk of you damaging somebody’s property or business. Burning down or flooding a house, leaving the gate open when installing the effluent field and a herd of cows escaping, forgetting to lock the door when you leave and a burglar emptying the property.

In a commercial or industrial situation there are also risks. Maybe in the course of completing an installation you drop one of your tools into your customer’s expensive piece of machinery, which damages it and puts it out of action for a few days.

This liability insurance will pay for the repairs to the machine and any loss of earnings suffered by your customer.

There are many other scenarios that make this type of liability insurance a good idea. One substantial liability claim could be the end of your business.

The amount of public liability cover you need to have will vary depending on the type of work you do. Domestic work may only require 1 to 5 million dollars’ worth of cover, commercial properties or construction companies will often state how much cover you must have before working on their sites. Fonterra, for example, requires contractors to carry a minimum of 10 million dollars of public liability cover.
Be aware: This insurance does not cover damaging the item you are working on.

If you dropped a bath lifting it into place, for example, the bath is not covered. If it knocked over an expensive vase and/or put a hole in the wall while lifting the bath, the vase and wall would usually be covered.

Also, public liability insurance does not cover faulty workmanship. Many insurance policies will not cover faulty workmanship or faulty equipment, though in some cases damage arising from that may be covered.

**Statutory liability insurance**

What could happen if you accidentally break the law, or somebody thinks you have?

Statutory liability insurance will cover the costs for defending any charges in court and for any compensation you are ordered to pay if found guilty.

Depending on the legislation (Act) that has been broken this insurance will also cover any fines you are required to pay.

Be aware: Not all Acts can be insured against. For example, it is illegal to insure against fines issued under the Health and Safety at Work Act (however, you can be covered for defence and compensation costs).

**Professional indemnity insurance**

This type of insurance protects people who give advice, recommendations or other professional services as part of their business. This type of insurance could be particularly useful if you complete design work.

Professional indemnity insurance is for situations where you have made an error when designing an installation or you have given somebody professional advice and upon acting on your advice they have suffered a loss (either of money or time). This type of insurance can cover any legal costs in defending court proceedings and any compensation you may be required to pay.

**Employers’ liability insurance**

There are some things that you could be responsible for, as an employer, in relation to employees, that are not covered by ACC.

This can include, for example, mental injury, nervous shock, or stress of your employees.

This insurance covers you for defending a claim and paying costs that you are found legally liable for.

Be aware: It does not cover employment disputes.
Business interruption insurance

Business interruption insurance will cover your business if for some reason your customers can't get to you anymore, perhaps an earthquake has damaged the roads or the council is repairing the footpath and your business income has dropped as a result.

However, given that most of our work is completed on other sites and in people's homes this type of insurance may not be necessary for you.

To be offered business interruption insurance you are likely to need a building, stock or contents insurance policy with the company first.
Insurance implications and responsibilities after you stop actively working in the industry

What to do when you’ve finished working

Your options here will be different depending on how your business is structured.

Some insurances you can stop paying from the day you stop working or very soon after.

Other insurances you will need to keep for up to 7 years after you stopped actively working in the industry. Not all losses and damages come to light immediately. You may have a leak somewhere unseen that causes expensive damage over a period of time. You can still be liable for this damage even though you are no longer working.

Insurance companies will be able to provide ‘run off’ cover. This cover should be at a reduced premium as there is no new work being added, therefore the risk of any claims is gradually decreasing.

Be aware: You are only covered if you are paying your premiums when the incident is notified to the insurance company. If you were paying premiums when the job was completed, but you are not paying premiums when the incident is notified to the insurance company, you would not be covered.

Example scenarios

Scenario 1

You are a one-man band or partnership and you’ve retired or wound up the business

You won’t need to pay for income protection insurance as you are no longer earning an income.

However, all of the work that you completed still needs to be covered in case damage occurs and a claim is made after you have ceased trading.

It is customary to continue to insure against public liability claims for 7 years from when you ceased working. However, with each passing year the amount of work being insured will decrease, so you may decide the risk is low after a period of time, or negotiate a cheaper premium than before as there is no new work being added as time goes on (this is often called run-off insurance).
Scenario 2

As a company director, you are winding up or selling a limited liability company

If you are winding up a limited liability company, it is the company that is liable for any damages and your personal finances may not be affected by any claim.

If the company no longer exists it cannot pay the premiums.

If you are selling the company, you would likely need run off cover.

The new owners of the business will not be liable for any work done by the previous owner.
Insurance implications and responsibilities if you are an employee and you are moving on to another company, going out on your own or changing careers

Your professional responsibilities and your insurance responsibilities are different.

Professional responsibilities

As a certifying tradesman the PGDB holds you responsible for work that you have completed or for work that has been completed under your supervision.

In the event of a complaint, the PGDB will contact the certifying tradesman. Depending on the outcome, the certifier may be liable for disciplinary action. This will be the case regardless of whether you are still working for the same company or not.

Tradesmen or journeymen working outside of any restrictions on their licence, without a licence, or under an expired licence could also find themselves subject to disciplinary action.

Insurance responsibilities

Your insurance responsibilities are different to your professional responsibilities.

What if an insurance claim is made and you are no longer with that company?

The company that completed the work (generated the invoice or received payment) is responsible for compensating for any damage caused, either by repairing the damage themselves or making a claim on their insurance policy.

Tradesmen or journeymen working outside of any restrictions on their licence, without a licence, or under an expired licence

In regard to professional responsibilities, tradesmen or journeymen working outside the restrictions on their licences would likely end up with a disciplinary issue with the PGDB, similar to what would happen with persons working without a licence or whose licence has expired.

When considering insurance responsibilities, work that has been done privately (after hours ‘cash jobs’) would not be covered by the supervisor's or employer's insurance. This would be the case whether or not you were completing the work ‘under supervision’. The tradesman would need to have their own insurance as they are effectively running their own business.

The homeowner would be able to make a claim on their house/contents insurance; however, their insurance company will forward that cost to the person responsible for the damage. If the person responsible does not have insurance, they will have to pay the costs themselves.
The following circumstances may result in a claim being denied:

- When a person was completing the work for a company or privately if they were working outside of the restrictions of their licence.
- When a person was completing the work for a company or privately and their licence had expired.
- When a person was completing the work for a company or privately and had no licence.

**Important checks to make when deciding on an insurance company and policy**

- Check policy differences between companies. The insurance policies may have the same name but the cover you actually get can vary widely. Find out if there is a reason for the difference in premium costs between companies.
- Do some research into the reputation the insurance company has when it comes to settling claims.
  - How easy is it to lodge a claim?
  - How many claims does the company actually pay out on?
  - How quickly do they make the payment?
Questions

Answer the questions below.

1. What are the three options ACC have for cover in the event of an accident?

2. What factors can result in an insurance company rejecting a claim on vehicle insurance?

3. List three types of liability insurance cover available.

4. Is business interruption insurance likely to be required by all businesses? Why/why not?

5. Describe the important checks it is advisable to make when deciding on an insurance company and policy.
Continuing Professional Development (CPD) 2018

Topic 3: Customer complaints
**Topic 3: Customer complaints**

This topic for Continuing Professional Development (CPD) 2018 for plumbers, gasfitters and drainlayers focuses on **customer complaints**.

This topic covers the following:

- Customer complaints received by the Board.
  - When does the Board get involved in customer complaints?
  - When does the Board not get involved in customer complaints?
  - When might the Board get involved in customer complaints?

- Definition of a complaint.

- What motivates people to complain?

- Why complaints can be positive for your business.

- Guidelines for complaint handling.

- An effective complaints process.

- Your response to a complaint affects customer satisfaction.
  - Effectiveness of service recovery.
  - Interactional justice.
  - Empathy.
  - Dealing with emotional responses.
  - Defensive responses.

- Generating options for a resolution to a complaint situation.
  - Interests not positions – uncovering interests through questioning.
  - Generating resolution options.
  - Customers do not respond to logic while running on emotion.
  - Clear and open communication.

- The Board complaints process.
  - How should you react if the Board investigates a complaint raised against you?
  - Gasfitters to supply gas certificates on completion of work.
Customer complaints received by the Board

The Plumbers, Gasfitters and Drainlayers Act gives a statutory meaning to the word ‘complaint’ and sets processes for the Board to deal with complaints that fall under the Board’s jurisdiction. These are not the types complaints this topic will focus on.

Over recent years, the Board has seen an increase in the calls received from the public with complaints about matters that the Board has no jurisdiction on.

These calls are often made by members of the public as an escalation option, once they feel they’ve exhausted their options with the tradespeople or the companies doing work for them.

The main focus of this topic is to consider how you can manage these general complaints and deal with dissatisfied customers in situations that fall outside the Board’s jurisdiction.

When does the Board get involved in customer complaints?

The Board will usually get involved if the work is found to be illegal, or there are workmanship issues.

If the complaint relates to a competency issue or illegal work, the Board must follow it up as that is its role.

Sometimes, the Board may suggest that the parties mediate the situation and resolve it amongst themselves. However, the Board still has the power to prosecute or discipline the tradesperson even if the dispute with the customer has been resolved.

It’s important to remember, the Board’s complaints process is not about getting a good outcome for the person complaining.

The Board’s complaints process is about dealing with:

• Situations where the law has been broken.

• Situations when someone that was supposed to complete a safe, compliant, competent job has failed to do so.

• Situations where the work carried out could potentially become unsafe or non-compliant.
When does the Board not get involved in customer complaints?

The Board does not get involved with contractual issues such as:

- Timeliness.
- Damage to a customer's property, like a damaged wall or broken household item.
- Complaints relating to invoicing.

If the Board is contacted in relation to these situations, it will advise the person complaining to pursue their complaint through other means.

For example, through the following channels:

- Consumer affairs
- Disputes tribunal
**Definition of a complaint**

There is an international standard for complaints management, *AS/NZS 10002:2014 Quality management – Customer satisfaction: Guidelines for complaints handling in organisations*.

The Standard defines a complaint as follows:

‘An expression of dissatisfaction about a product, service, staff member, or the way a complaint is handled where an outcome is implicitly or explicitly required’.

A customer doesn’t have to say, “I want to make a complaint” for it to require treatment as a complaint.

You will need to be able to recognise ‘a complaint’ about a service provided by you, and differentiate between complaints and queries or requests for service so that you can take appropriate action.

**Questions**

Answer the following question.

1. Write down some examples of the differences between a complaint, a query and a request for service.
What motivates people to complain?

Six factors affect feelings toward the act of complaining:

- The customer’s previous experience of complaining.
- The extent of cost or trouble involved.
- Organisation responsiveness.
- Expectation of societal benefits (i.e. will the act of complaining help others).
- Personal norms concerning complaining.
- Situational factors – perceived blame for failure, cost and importance of issue, frequency of patronage.

Surprisingly, very few dissatisfied customers complain after a service failure. Research indicates that only 5-10% of dissatisfied customers complain in the event of a service failure.

This is concerning because while they may not complain to you or the Board, they are very likely to complain to others, and tell friends, family and colleagues about their ‘bad experience’.

The main things that research identifies as deterring people from a complaint are things you have control over.

To facilitate a good complaints process, you should aim to make it as easy and pleasant an experience as possible for people to make a complaint to you.

Why complaints can be positive for your business

- Complaints provide opportunities to learn and improve.
- Insights from complaints identify root cause problems.
- A good complaints management process improves the customers’ experience and organisation’s efficiency.

Organisations gain great benefits from managing complaints efficiently—whether managing them on behalf of others, or responding to complaints about the organisation’s services and/or products.

The way an organisation is structured and delivers services helps it meet its overall objectives and goals.
No organisation is perfect, and sometimes things go wrong. Continuous improvement should be a feature of all organisations.

When service failures occur, complaints provide valuable information. Complaints can reveal trends and patterns that can be used to improve performance. Think of complaints received as a vital source of (free) intelligence that helps you improve services and fix problems.

Questions

Answer the following questions.

2. What factors do you think would make people decide it is worth complaining about something?

3. What deters people from complaining?
4. If you were a customer who received bad service, would you complain? If so, how would you make your complaint?

5. Are there any trends and patterns to the types of complaints you receive?

6. How can complaints be a good thing for the business receiving them?
Guidelines for complaint handling


The Standard sets out what an organisation needs to do to achieve good practice in complaints management.

There are seven aspects of complaint management covered by the standard that set out what an organisation is expected to do.
An effective complaints process

Good practice in complaints management for an organisation is linked to objectives in customer service, productivity, and performance efficiency.

An effective complaints process should facilitate the following:

**For your customers**
- Quick response and assistance times.
- Acknowledgment of the customer’s concerns and feelings of distress.
- Customer feeling that they are being listened to and taken seriously.
- Customer feeling they are being treated with respect.
- Understanding the customer’s situation and the impact on them.
- Fairness.

**For you**
- Learning where problems exist.
- Using learning to make improvements.
- Preventing complaint escalation.
- Showing customers you care.
- Creating loyalty.
- Encouraging customers to complain in future if they have a problem.
- Improving the skill sets of your people.
- Developing a customer service culture.

*People forgive problems, but not responses*

- Customers do understand that things can sometimes go wrong.
- A study of 700 incidents found that it was not necessarily the failure itself that led to dissatisfaction.
- It is more likely to be the organisation’s response (or lack of) to a failure that causes dissatisfaction.
- Good practice in complaints management for a customer involves considering their feelings and emotions as well as the practical outcomes.
Questions

Answer the following questions.

7. When ‘good practice’ in managing complaints is followed, what does this mean for your customers?

8. When you think of ‘good practice’ in managing complaints, what does this mean for your business?
Your response to a complaint affects customer satisfaction

When a customer does choose to complain, how do you think your reaction affects the way they are feeling?

Research indicates that complainants understand when a failure occurs in many cases, and that the way the complaint is handled can be just as significant in causing satisfaction or dissatisfaction.

Research also shows that the way you respond to a complaint is at least as significant as the incident that occurred to cause the complaint.

If you fail to handle a complaint well, your complaint handling becomes the issue and can overtake the problem itself as a cause of dissatisfaction.

It’s ‘yours to lose’ if you cause a customer to escalate a complaint by the way you respond. It is easy to make things worse with an ill-judged response.

Effectiveness of service recovery

Effectiveness of service recovery (how you can remedy an unsatisfactory situation) depends on the customer’s view of ‘perceived justice’.

‘Perceived justice’ or ‘social justice’ is a research term which describes whether a complainant feels the result they’ve obtained is ‘fair’.

A customer’s perception of fairness is typically based on the following:

- Procedural speed.
- Flexibility of resolution.
- Interactional manner in which people are treated.
- Distributive fairness of the service outcome.

Interactional justice

Interactional justice (how you treat people) has the greatest impact on negative word of mouth and customer intention to use the services of a company again. The way you handle the complaint has the greatest impact on what people say afterwards about their experience.

A negative experience leads to a dissatisfied customer becoming angry. The way you handle a complaint is the critical point that can create a positive customer experience if you handle it well – or increase the chance of a customer moving from ‘dissatisfaction’ into ‘anger’ if you handle it badly.
Customer’s emotions have a big impact on how they perceive your organisation. It is important to remember that this is within your control. Appropriate actions and responses can influence a positive perception.
**Empathy**

Empathy is an awareness of another person’s feelings and how they impact their perception.

Empathy and sympathy are both useful emotions, but in a (potential) conflict situation, empathy is most helpful, because it allows you to better understand the perspective of the other person.

Understanding other perspectives allows for greater opportunity for resolution.

**Dealing with emotional responses**

It is often ourselves that get in the way of resolving complaints. It can be difficult to manage stress levels, frustrations or anger.

Emotion can be positive as well as negative. Ignoring or shutting down emotion can cause harm. Emotion should be managed (both theirs and yours). We can see, hear and feel emotion. But what we see, hear and feel is only the tip of the iceberg. The explicit, not the implicit.

To go to the heart of what drives emotion, we must explore and satisfy the actual concerns that the emotion is actually expressing. Behind every emotion lays a concern.

Know yourself; know others.

**Defensive responses**

- We all want to feel significant, competent and liked. When we don’t feel that way, we become defensive, because we feel ignored, humiliated or rejected.

- When we don’t feel significant (and feel ignored), we behave in ways that force people to pay attention to us.

- When we don’t feel competent (and feel humiliated), we behave in ways that force people to recognise our control or we refuse to take any responsibility.

- When we don’t feel liked (and feel rejected), we behave in ways that either force people to be part of our lives or create barriers to others.

Our defensive responses are a way to protect ourselves. When we act defensively, our physical behaviour will change, as will our emotional responses to the situation and the way we communicate with others.
Questions

Answer the following questions.

9. What are your own responses when your significance, competency or likeability are challenged?

10. What defensive responses can you recognise in other people?

11. How can we combat defensive responses?

Check your ideas against the descriptions in the table on the next page.
### Examples of defensive responses

#### Physical responses

<table>
<thead>
<tr>
<th>Physical responses</th>
<th>Communication responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tight stomach.</td>
<td>• Inappropriate laughter or giggling.</td>
</tr>
<tr>
<td>• Fast breathing/heartbeat.</td>
<td>• Becoming physically immobile or shaking.</td>
</tr>
<tr>
<td>• Suddenly tired or sleepy.</td>
<td>• Addictive behaviour (alcohol, drugs, shopping, gambling, food, etc.).</td>
</tr>
<tr>
<td>• Skin temperature change (cold/clammy; hot/sweaty).</td>
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#### Communication responses

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<th>Communication responses</th>
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<tbody>
<tr>
<td>• Taking offence/denial/attacking.</td>
</tr>
<tr>
<td>• Wanting to be right (“No question about it”).</td>
</tr>
<tr>
<td>• Wanting the last word/flooding with information to prove point.</td>
</tr>
<tr>
<td>• Endless explaining/rationalising.</td>
</tr>
<tr>
<td>• Withdrawal into silence.</td>
</tr>
<tr>
<td>• Being highly critical (making fun of others, belittling ideas).</td>
</tr>
<tr>
<td>• Use of sarcasm.</td>
</tr>
<tr>
<td>• Blaming and/or cynicism.</td>
</tr>
<tr>
<td>• Selective deafness.</td>
</tr>
<tr>
<td>• “I’m aware of that, leave me alone!” (defence of awareness).</td>
</tr>
<tr>
<td>• Speaking too fast or too loudly.</td>
</tr>
<tr>
<td>• Dominating the conversation.</td>
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<tr>
<td>• Teaching or preaching.</td>
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#### Emotional responses

<table>
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<tr>
<th>Emotional responses</th>
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<tbody>
<tr>
<td>• Obsessive thinking.</td>
</tr>
<tr>
<td>• Jumping to conclusions.</td>
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<tr>
<td>• Mind reading.</td>
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<tr>
<td>• Magnifying or minimising everything.</td>
</tr>
<tr>
<td>• Playing “Poor me.”</td>
</tr>
<tr>
<td>• Emotional rigidity (If I feel it, it must be true).</td>
</tr>
<tr>
<td>• All or nothing thinking (inability to compromise).</td>
</tr>
<tr>
<td>• Personalising everything.</td>
</tr>
<tr>
<td>• Being too nice.</td>
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</table>
Generating options for a resolution to a complaint situation

Interests not positions – uncovering interests through questioning

It is important to be able to separate ‘positions’ (what the people involved want) from their interests/needs (why they want what they want).

Using the ‘sandwich principle’, a position is that a person wants a sandwich.

However, through some facilitative questioning, we can quickly uncover that the actual interest (need) is hunger and that there is a way of meeting that need with a meal involving bread.

A useful list of facilitative questions for all situations, includes:

- Help me understand why this is important to you.
- How has this affected you?
- What is most important to you?
- What are the consequences for you?
- Why is this a problem for you?
- How do you think this can be resolved?
- What would you like to see happen next?

Understanding interests instead of focusing on positions opens greater opportunity for generating options for resolution. If we only focus on the position, rather than the interest (need), we will never be able to ‘expand the pie’. Are there any other ways of meeting that need?

Uncovering interests is critical to being able to generate options for a resolution that everyone agrees with.

Generating resolution options

- Ask the client (what would you like to see happen? How can this be solved?); and using identified interests as goals for resolution.

- BATNA: best alternative to a negotiated agreement. If you don’t agree, what’s the best outcome for you? This is your back-up plan.

- WATNA: worst alternative to a negotiated agreement. What is the threat to you if you are not able to agree? What are the consequences?
The goal in generating options is to come up with as many as possible. It doesn’t matter if they are realistic—not yet.

Once you apply the objective criteria lens, you will weed out all unrealistic options. The more avenues you have to go down, the more options you can generate and the greater the chance for an agreement.

Generating options should be unlimited. Get as much down as you can. The process is also empowering to those involved in the complaint, as they are part of the decision-making process.

**Customers do not respond to logic while running on emotion**

- Stay calm yourself – don’t antagonise the customer
- Let the customer vent – don’t interrupt their anger
- Show empathy – acknowledge and recognise emotions
- Do some restating – it shows them you’re listening
- Find agreement – accept their point of view
- Gently confront them – use helpful, positive language
- Smile – it transfers to your voice on the phone

**Clear and open communication**

- Clear and open communication go a long way to prevent situations that may end up in a customer wanting to complain about something.
- The most common situations customers would feel the need to complain in, involve money, property damage and behaviour.
- Clarity around costs and pricing is essential.
  - Quoting and invoicing processes should follow a ‘no surprises’ approach.
  - Be clear about what you are quoting or charging for.
  - Itemise what is and what is not included in your quote.
- Communicate with your customers on how variations will be dealt with.
- Remember that people don’t understand your job, explain these things as part of your quoting process.
- For example, disclose that sometimes for health and safety reasons you need a second person onsite. Don’t leave it up to the customer to think “there was another person there and they just watched you on the roof, and I got charged for it”. Be clear about these situations. State that due to health and safety requirements this might be needed.
• Be clear about your approach to travel time; when are you charging from, what about if you need to go and get extra gear.

• Clarify if there are minimums as part of your charging structure. Maybe have your charging structure on your website with as much detail as possible and reference your site on your quote.
Questions

Answer the following questions.

12. What are three common examples of what people complain about?

13. State four steps you could take when quoting to help reduce the risk of a complaint occurring?
The Board complaints process

The complaints process information is available on the Board’s website.

The Plumbers, Gasfitters, and Drainlayer’s Board runs a process for dealing with complaints about the conduct of plumbers, gasfitters, and drainlayers. This process mostly applies to:

- registered plumbers, gasfitters, or drainlayers, although there are some exceptions

NOTE: the law on complaints and discipline in relation to plumbers, gasfitters, and drainlayers is set out in Part 3, Subpart 1 of the Plumbers, Gasfitters, and Drainlayers Act 2006.

The Board only considers complaints about conduct that might be a disciplinary offence as set out in section 89 of the Plumbers, Gasfitters, and Drainlayers Act 2006. That conduct mainly relates to poor, unsafe, and improper or incompetent plumbing, gasfitting, or drainlaying.

People commonly contact the Board about issues it cannot consider. Some examples of matters the Board doesn’t usually consider are:

- Providing a producer statement: this is a requirement under the Building Act 2004 and is under the jurisdiction of territorial authorities.
- Billing/invoicing disputes: these are primarily contractual in nature, and may be best dealt with through civil avenues, such as the Disputes Tribunal.

Where a complaint goes right through the complaints and discipline process, and the Board finds a plumber, gasfitter, or drainlayer guilty of a disciplinary offence, the Board can make orders such as:

- censuring the person
- requiring the person to do some further training
- fining the person (the fine is not paid to the complainant)
- cancelling, suspending, or restricting the person’s registration and/or practising licence, or provisional licence
- disqualifying the person from doing plumbing, gasfitting, or drainlaying work.

The Board has no powers to order a plumber, gasfitter, or drainlayer to fix work or pay a consumer money.
**How should you react if the Board investigates a complaint raised against you?**

Be factual, don’t be emotive, and don’t get defensive. Most importantly, engage; even if it is to say that you have nothing to say.

When sending your response, remember to keep your information simple and complete as it helps speed up the process and keep costs down.

Information you should supply includes:

- What happened.
- When it happened.
- Who did what.
- How it happened

Information you supply should only relate to the complaint. There is no point providing your personal opinions about the person, as the complaint is investigated on facts only.
Gasfitters to supply gas certificates on completion of work

You cannot refuse to supply the customer with a gas certificate on completion of work as a means of ensuring that you get paid.

All certificates must be supplied within the required timeframes set out in legislation.

It has come to the Board’s attention that some gasfitters are not supplying certificates to homeowners at all.

Legally you must supply the documents to the consumer when the work is completed.

No excuses! Payment is not a condition of supplying these documents.

If the Board hears of non-compliance with these requirements, it may forward that information to Energy Safety.

Failing to supply the documentation can result in action being taken by Energy Safety against the gasfitter.
Continuing Professional Development (CPD) 2018

Topic 4: Common mistakes and concerns relating to: backflow, vaporization and pipe sizing
**Topic 4: Common mistakes and concerns relating to: backflow, vaporization and pipe sizing**

This topic for Continuing Professional Development (CPD) 2018 for plumbers, gasfitters and drainlayers focuses on common mistakes and concerns relating to: backflow, pipe sizing and vaporization.

This topic covers the following:

**Backflow**
- What is backflow?
- Backflow can happen when there is a cross-connection.
- Common mistakes.
- Back-pressure and back-siphonage.
- Preventing backflow.
- Degree of hazard.
- Methods of backflow prevention.
- Bypassing a backflow prevention system.
- Checking the situation before installing a backflow prevention device.
- Responsibilities relating to backflow prevention devices.

**Vaporization**
- Twin pack LPG cylinder stations.
- Common mistakes.
- Compliance with AS/NZS 5601.
• Liquefied Petroleum Gas (LPG).
  » LPG storage cylinders.
  » Characteristics of LPG.
  » Propane versus butane.
  » Latent heat.
  » Absorption.
  » Vaporization rates.
  » LPGA Code of Practice vaporization rates.
• Domestic installation examples.
• Commercial installations.
• Duty and reserve cylinders
• Change-over valves.
  » Manual change-over valves.
  » Auto change-over valves.
• Using 9kg LPG cylinders on a domestic installation.
• Excess flow valves/devices.
• The LPGA Code of Practice (COP).

**Pipe sizing**
• Water supply pipework.
• Gas pipework.
• Waste water pipework.
• Surface water pipework.
Backflow
This section is focussed on backflow.

What is backflow?
Backflow is a term used to describe the following events:

• Where drawn water is allowed to return to its source.

• A non-potable water supply can, or has the potential to, mix with a potable water supply.

Backflow can happen when there is a cross-connection
The term cross-connection is any connection, or possible connection, between a potable water system and any other system which could allow the contents of the two systems to mix.

These connections could be between the potable water supply and:

• drawn/used or non-potable water

• a secondary or supplementary water supply

• industrial fluids or other chemicals and substances.

As cross connections cannot always be avoided, it is required that the potable water supply is protected from any potential contamination.

Common mistakes

• Not understanding how the hazard rating of an installation is determined.

• Incorrect valve type for the installation.

• Incorrect installation of the valve including filters and disconnection unions, clearances, and accessibility.

• No bypass (or inadequately protected bypass) installed when an uninterrupted water supply is required.

• Backflow prevention device is not located within the system correctly.

• Not understanding who is responsible for the device, who can test the device and when it should be tested.
Back-pressure and back-siphonage

There are two factors that can cause contaminants to enter the potable water supply. These are as follows:

- Back-pressure.
- Back-siphonage.

What is back-pressure?

Back-pressure is the undesirable return of drawn water, or mixture of drawn water and other contaminants to the potable supply pipework.

What causes back-pressure?

Back-pressure can be caused by many different factors. For example: a downstream pump increasing the pressure of the system above the pressure of the supply pipework. Or an increase in temperature in the system, which would also increase the pressure.

This can allow the increased pressure in the downstream system to return to the supply pipework.
What is back-siphonage?

Back-siphonage can occur when there is a negative or sub-atmospheric pressure in the supply piping.

This can be caused by the supply main being damaged or disconnected for service, or high draw off rates from neighbouring factories or the fire service.

The reduced pressure in the supply pipework allows drawn water and any contaminants to be siphoned into the potable water supply.

Preventing backflow

Avoiding cross connections altogether is the safest way to prevent any contamination of the water supply; however, this is not always possible.

Where the water supply feeds equipment or locations, where any possible cross connection could exist, a backflow prevention method must be installed.

There are a few different ways backflow can be managed and a selection of devices available which can be installed throughout the supply line to prevent backflow.

Each valve has been designed for different situations and will provide different levels of protection depending on:

- the type of backflow likely to occur (back-pressure or back-siphonage)
- the severity of any potential harm to people from contact with a contaminated water supply.
**Degree of hazard**

To choose the correct backflow preventer for your situation you must first identify the ‘degree of hazard’.

Hazards fit into one of three different categories: high, medium or low.

These categories indicate how dangerous any contamination may be.

<table>
<thead>
<tr>
<th>Degree of hazard</th>
<th>Category meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Any condition, device or practice which, in connection with the potable water supply system, has the potential to cause death.</td>
</tr>
<tr>
<td>Medium</td>
<td>Any condition, device or practice which, in connection with the potable water supply system, has the potential to injure or endanger health.</td>
</tr>
<tr>
<td>Low</td>
<td>Any condition, device or practice which, in connection with the potable water supply system, would constitute a nuisance, by colour, odour or taste, but not injure or endanger health.</td>
</tr>
</tbody>
</table>

New Zealand Building Code, Clause G12/AS1 (NZBC G12) gives examples of the hazard ratings for different types of industries, equipment or fixtures.

If the situation you are working on is not listed in this document, you will need to compare your situation to the examples listed and the hazard definitions.

Your local water supplier will also have an opinion regarding what level of hazard the installation has.

The acceptable method of protection required is decided by the hazard rating, and the correct method must be used in all instances.
The table below from NZBC G12 shows which methods/valves can be used to protect against back-pressure and/or back-siphonage for the three hazard ratings.

<table>
<thead>
<tr>
<th>Type of backflow protection</th>
<th>CROSS CONNECTION HAZARD</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HIGH back-pressure</td>
<td>MEDIUM back-pressure</td>
</tr>
<tr>
<td>Air gap (see Note 1)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reduced pressure zone device</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Double check valve assembly (see Note 2)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pressure type vacuum breaker (see Note 3)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Atmospheric vacuum breaker (see Note 4)</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Note:
1. *Air gaps must not be installed in a toxic environment.*
2. *Double check valves can be installed in a medium and low hazard toxic environment.*
3. *Pressure type vacuum breakers are designed to vent at 7 kPa or less. However, they require a significantly higher pressure to reset and must be installed only in systems which provide pressures sufficient to ensure full closing of the valve.*
4. *Hose outlet vacuum breakers are a specific type of atmospheric vacuum breaker.*

There is information regarding backflow, and a similar table in AS/NZS 3500.1; however, section 4 of AS/NZS 3500.1 is not cited as a pre-approved acceptable solution or verification method to comply with the New Zealand Building Code.

**Questions**

Answer the following questions.

1. What are the two factors that can cause backflow to occur?
2. What are the three different cross-connection hazard levels and how are they different from each other?
Methods of backflow prevention

Whichever method of backflow prevention is selected, it should be installed as close as possible to the potential source of contamination. This will protect the maximum amount of potable water supply pipework.

Backflow prevention devices fall into two categories, Testable and Non-Testable. Testable devices are required in high hazard situations, and they need to be regularly checked to ensure they are providing adequate protection.

Air gap

An air gap for backflow prevention is so common it may at times go unnoticed.

Many years ago, it was possible to purchase a basin and taps where the outlet of the tap was below the overflow level of the basin.

If you have a look around now, you will notice that the outlets of tapware and spouts are now well above the overflow level of the fixtures they serve, and toilet cisterns and water tanks are designed to discharge at a level lower than the supply valve to maintain an air gap.

An air gap can be used in high, medium, and low hazard situations and will protect against both back-pressure and back-siphonage.

Technically an air gap is testable, by measuring the height difference between the outlet and the overflow point. It is also a passive form of backflow prevention as it does not rely on any working or moving parts to operate.

The height of the gap must be high enough to comply with NZBC G12 section 3.5.1

Note: An air gap cannot be used in a toxic environment where polluted air could enter the pipework through the air gap.
Non-testable devices to protect against backflow

Check valves

Check valves perform well under perfect conditions and are useful when installed, for example, on hot water cylinder supplies and as part of the internal workings of a single lever mixer.

Check valves are often used to prevent a reverse flow in potable water systems; however, they are not acceptable for the purposes of backflow prevention as their efficiency can be easily compromised by grit and other debris that may be present in the water supply.

Hose connection vacuum breaker (HCVB)

A garden hose may be discharging into a bucket, swimming pool, or connected to a chemical spray system, creating a cross-connection through the hose tap to the potable water supply. If a back-siphonage situation was to occur is could be potentially very harmful.

Another common cause of backflow in relation to garden hoses is the use of spray nozzles such as those shown below, where the flow can be stopped at the end of the hose without turning the hose tap off.

In this situation, the pressure in the hose will become the same as the water supply pressure. This will cause the hose to expand.
Water draw off upstream can cause the supply pressure to drop. This will cause the hose to contract, forcing water from the hose back into the supply pipework.

Pressure can also build up in a hose if it is heated by the sun. This pressure increase can force water from the hose back into the water supply pipelines.

A hose connection vacuum breaker will not protect against this back-pressure; however, they do provide protection from back-siphonage. This device incorporates a check valve that will close, and allow any backflow to be discharged to the atmosphere. They are designed to be fitted to the outlet of a hose tap, and have a locking screw located on the side. Once fitted to the hose tap this screw should be tightened until the head of the screw breaks off, this prevents the vacuum breaker being removed from the hose tap.

**Carbonated beverage backflow preventer**

Carbonated water can dissolve copper pipe. Since copper is harmful for humans to ingest, care must be taken when installing carbonated drink dispensers.

The copper will dissolve and mix into the carbonated water. This mixture could then be drawn into the next drink dispensed, causing the consumer to become ill. The severity of this illness would depend on the amount of copper ingested.

For this reason, no copper tube or brass fittings should be used between the outlet of the backflow preventer and the beverage machine.

Carbonated beverage backflow preventers are designed for installation on the water supply to the beverage machine. They should be made from stainless steel and prevent backflow of carbon dioxide and carbonated water into the potable supply.

Under some conditions, this backflow preventer will discharge fluid which needs to be conveyed to a suitable drainage point. If the device does discharge, it would indicate that there is a fault in the system and that the check valve within the device is compromised. The installation should be checked, the valve replaced and the filter cleaned.
**Testable devices to protect against backflow**

**Atmospheric vacuum breaker (AVB)**

An atmospheric vacuum breaker (AVB) can be used to provide protection in low, medium and high hazard situations against back-siphonage only.

An AVB has very specific mounting heights and location requirements and must have an unobstructed outlet, which means there are to be no valves installed downstream from the AVB.

The most common location for an AVB is on the supply line to an irrigation or lawn sprinkler system, as the sprinkler heads are installed at, or below, ground level and could potentially be sitting in a puddle contaminated by fertiliser or similar.

An AVB has a weighted disc inside, which is raised by the incoming water pressure to close off the ventilation ports. The water then travels to the outlets. When the supply is turned off, the water downstream of the AVB is discharged and the disc will drop down. This re-opens the ventilation ports and allows air into the system so that a siphon cannot be created.

An AVB should be inspected regularly to make sure it is operating correctly and the disc has not become jammed or seized.
**Pressure vacuum breaker (PVB)**

A pressure vacuum breaker (PVB) can be used to provide protection against back-siphonage in low, medium and high hazard situations.

This assembly can be used in both continuous and non-continuous pressure applications which means that other valves or controls are permitted to be installed downstream of a PVB.

A PVB, like the AVB, also has specific height and location requirements for the installation.

Where the two vacuum breakers differ is that the PVB incorporates springs in the design to assist in the correct closure of the valves, also the PVB has test points included in the construction so that pressure gauges can be connected to determine if the valve is working correctly.
Double check valve assembly (DCV)

A double check valve (DCV) is more than just two check valves screwed together. A DCV must be a factory made single body device with test ports.

A DCV has test points fitted to the body of the assembly so that it can be tested to ensure the non-return valves inside are closing correctly.

A DCV can be used to provide protection only in low or medium hazard situations, particularly where a potential health hazard does not exist.

This assembly is intended for use in both continuous and non-continuous pressure applications, in both back-siphonage and back-pressure situations.

Double check detector assembly (DCDA)

A double check detector assembly (DCDA) is essentially the same as the double check valve, except that it also incorporates a water meter to measure how much water has passed through the valve.

This feature is particularly useful on firefighting water supplies to ensure that no theft of water through the firefighting supply is occurring.
**Reduced pressure zone device (RPZ)**

An RPZ will protect against back-pressure and back-siphonage for all hazard ratings.

Although it should be avoided, an RPZ may be installed in a toxic environment, which is an advantage over an air gap.

Because an RPZ type backflow preventer has a built-in relief system, it will discharge water to the atmosphere to protect the incoming supply, even if the RPZ has become faulty.

For this reason, it must not be installed anywhere that the relief valve may become obstructed or submerged, any drain attached to the relief valve must be sized according to manufacturer's instructions.

RPZ valves are also available as detector assemblies with a water meter built in to the design.
Questions

Answer the following questions.

3. Name four different types of backflow prevention devices?
Bypassing a backflow prevention system

The water feeding through a backflow prevention device needs to be turned off for the device to be tested.

Some installations, however, require an uninterrupted water supply (such as at hospitals, and in some industrial or commercial situations). In those circumstances, an additional water supply, bypassing the device to be tested, will need to be installed.

The bypass MUST include the same level of backflow prevention as the main supply.

Depending on the flow requirements of the installation, the bypass may be of a smaller diameter, providing enough water for essential outlets while minimising the expense of the device and associated pipework.

Both the main feed and the bypass will need their own filters and isolation valves to be able to switch between, and test the two devices without interrupting the water supply.

Questions

Answer the following questions.

4. What are the requirements when installing a bypass on a backflow prevention installation?
Checking the situation before installing a backflow prevention device

Make sure you consider the following before installing a backflow prevention device.

• Is the preventer going to be installed inside or outside? Backflow devices must be protected from corrosion, heat, frost, physical damage and toxic environments. A lockable cage or cabinet may be required to prevent damage or vandalism.

• If the device is being installed inside, can any discharge from the device be conveyed to a location where it will be noticed but not damage the surrounding property? Always refer to the manufacturers recommendations to make sure the drain size is adequate.

• Where in the system should the backflow device be installed? As close as possible to the hazard so that as much of the pipework is protected as possible. Avoiding toxic and corrosive environments wherever possible. Most water suppliers will require a backflow prevention device to be installed at the boundary to ensure the reticulated water supply is protected from all connections on the property.

• The backflow prevention device needs to be accessible for testing, servicing and replacement. The valve should be installed at a height that is easily reached without the need to work from a ladder. There must be enough space around the valve to allow for the easy connection of test equipment.

• Also, you will need to consider the weight of the backflow preventer especially if mounting on a wall. Is the fixing available strong enough to support the valve?

• Isolating valves must be installed on the inlet and outlet of a backflow device, with exception of an AVB which must have no valve on the outlet or anywhere downstream.

• Unions to allow for the removal and replacement of the backflow device must be installed. They must be installed between the isolating valves so that the water can be turned off and the unions disconnected.

• A filter must be installed on the inlet of a backflow prevention device to prevent particles in the water supply compromising the effectiveness of the valve. Filters should be installed in the correct flow direction and able to have the water isolated so that they can be cleaned out. In some cases, water supplies solely for the use of firefighting do not require the installation of a filter.

• If a by-pass around the device is installed, the bypass must contain another backflow prevention device equivalent to the same hazard rating as the main feed.
• Backflow devices must be installed to ensure flooding and pooling cannot submerge the device.

• Are you intending to install the device vertically?

If so, the device should have an upward flow.

Many backflow preventers cannot be installed with a downward flow as the head of water could potentially prevent the valves within the backflow preventer from closing effectively.
Responsibilities relating to backflow prevention devices

Information in relation to the following is included in this section:

• Responsibilities in relation to testing.

• The responsibilities of property owners.

• The responsibilities of water suppliers (e.g. territorial authorities (TAs) and network utility operators (NUO) and/or building consent authorities (BCAs).

• The responsibilities of installers.

Testing

A backflow prevention device must be tested at the following times:

• Immediately after installation.

• Annually.

• On completion of any maintenance work.

• After a backflow or suspected backflow incident.

• At the request of the Area Health Officer, Building Control Officer, Dangerous Goods Inspector or Water Services Manager.

On many sites, especially commercial sites where a backflow preventer is installed, its existence needs to be recorded on a compliance schedule for a building warrant of fitness and a (successful) test certificate must be produced for the warrant of fitness to be renewed.

The test must be performed by an Independent Qualified Person (IQP) this is a person who has completed an approved course for backflow prevention testing and is registered with the appropriate authority for the area in which they wish to perform tests. Your local authority should be able to advise which courses have been approved for training in this area.

The IQP must be independent from the business or building on which they are performing the test, this means that the IQP must have no financial or other interest in the business or building or the outcome of the test.

The IQP testing the device is not required to be a registered plumber; however, any servicing or replacement of the device must be completed by a person authorised by the Plumbers, Gasfitters and Drainlayers Board.
Property owners

The property owner needs to ensure a suitable backflow prevention device, as instructed by the water supplier, is installed and maintained. The property owner must keep the device in proper working order at all times.

The owner is required to uplift a building consent for the installation, alteration and removal of all backflow prevention devices. Should the relevant regulations or standards change at any time, the property owner is responsible for fully complying with any new requirements.

The property owner is responsible for the payment of all fees and costs associated with consents, installation, maintenance, and testing, and to meet the requirements of the water supply authority.

The property owner needs to notify the water supply authority of any alterations to plumbing that may compromise the quality of the potable water supply and of any additional risks on site.

Some water supply authorities will require a backflow survey of a site to be completed every 5 years to check if the backflow requirements for the property are continuing to be met.

The owner must also ensure the testing of the devices by an IQP is completed annually.

The owner needs to keep copies of current and previous test forms on the site for the device and ensure copies of all test forms as required are forwarded to the water supply authority.

The property owner needs to allow access for a water supply authority’s contractor, as required, and ensure that any device is accessible at all times and is not bypassed unless the bypass is fitted with the same protection.

Failure to meet the above responsibilities may result in legal action.

It is the property owner’s responsibility (under the Health Act 1956, and the Building Act 2004) to take all necessary measures on their side of the point of supply to prevent water backflowing into the water supply.
**Water suppliers (TAs, NUOs BCAs)**

The water supplier usually has the final determination in establishing the level of backflow risk or potential health hazard.

The supplier may fit a backflow prevention device on their side of the property boundary where the customer cannot demonstrate that the risk of backflow is adequately managed.

The supplier may recoup all installation, testing and ongoing maintenance costs from the customer.

**Installers**

A person who installs a backflow prevention device must be authorised (i.e. registered and/or licensed) by the Plumbers Gasfitters and Drainlayers Board to complete the work.

The installer must take all reasonable steps to ensure the device can operate in a way that does not compromise the operation of any automatic sprinkler system, or other outlets, connected to the water supply (e.g. will not reduce the flow rate too much).

Before the water supply is connected, the backflow prevention device must be tested and commissioned by a registered IQP (Independent Qualified Person).

Though the installer may choose the appropriate devices or assemblies to suit the application, the water supply authority shall have the final determination in establishing the level of backflow risk, or potential health hazard of an installation, and which devices are to be.
Questions

Answer the following questions.

5. Who is allowed to test a backflow prevention device?

6. How do you become an independent qualified person (IQP)?

7. What makes an IQP independent?

8. Who is responsible for organising the testing of a backflow prevention device?
**Vaporization**

**Twin pack LPG cylinder stations**

Many gasfitters are installing gas appliances at domestic houses and connecting to twin packs which have been supplied by the gas supplier.

Twin packs are usually two 45kg cylinders.

Twin packs are the standard issue for domestic homes with it being assumed that there should be sufficient gas supply from the two 45kg cylinders to cope with the normal demand required from the household.

**Common mistakes**

- Not understanding how the environment affects vaporization.
- Not understanding how to work out peak loading.
- Only installing the cylinders, the customer wants.
- Using 9kg cylinders on an installation.
- Not understanding the expected vaporization capacity of 45kg cylinders.
- Not understanding the purpose of a duty cylinder.
- Not understanding how auto changeover valves work.
- Not understanding how excess flow devices work.
- Lack of maintenance of domestic LPG gas supply systems.

Most domestic gasfitting that we do will be completed to meet the requirements of AS/NZS 5601 Part 1.

Gasfitters are generally ensuring that the pipework, appliances and commissioning are done correctly so that the job will be compliant and safe for the customer.

There are, however, many instances of appliances not working correctly due to the lack of gas supply.
Compliance with AS/NZS 5601

To make sure that your work complies with AS/NZS 5601 you need to know what the gas demand required for the installation is before you start work and make sure that the gas supply can keep up with the expected demand.

Excerpt from AS/NZS 5601 Part 1

SECTION 3

MEANS OF COMPLIANCE – GENERAL REQUIREMENTS AND SAFE WORK PRACTICES

3.1 GAS SUPPLY

Before commencing an installation, all the following must be established:

a) The type of gas available.

b) That the gas supply is adequate to satisfy likely simultaneous demands or peak loading.

c) That the capacity of the GMS meter or cylinder supply is sufficient to meet the anticipated maximum demand.

d) The pressure of the gas available at the inlet to the consumer piping.

e) The maximum pressure supplied from the outlet of the GMS meter or cylinder in the event of failure of the supply regulator or control.

f) Location of the GMS or meter.

3.2 GAS DEMAND

The pressure and flow requirements for all gas appliances, including any existing gas appliances shall be established from the gas appliance data plates or by reference to the gas appliance manufacturer’s instructions.
Liquefied Petroleum Gas (LPG)

LPG comprises mainly of propane and butane.

The mix of these gases can vary throughout the year and is dependent on the availability of propane. The mix of the gas can vary from 80% – 20% to 50% – 50% and can sometimes affect the operation of some equipment and vaporization of gas in some areas.

LPG is 1.5 times heavier than air. Being heavier than air makes it harder for any build-up of the gas to dissipate into the atmosphere should a leak occur. This often means that leaking LPG will pool around low areas which can be of concern with drains in the area and especially on boats where any leakage may gather in the bottom of the boat.

LPG storage cylinders

LPG is mostly known to be stored in cylinders. The size of storage can vary from as small as a butane lighter up to large bulk tanks serving reticulated suburbs or industrial sites.

The most common sized cylinders that spring to mind for most are 9kg or 45kg cylinders.

Characteristics of LPG

- LPG is not visible in itself, though when viewing large volumes of gas escaping a haze can be seen.
- LPG has no natural odour. Odorant is added to give the gas an unpleasant smell.
- The flammability limits of LPG are 2% – 10% which is a narrow range but it is not as safe as natural gas due to it being heavier than air so less likely to disperse.

Propane versus butane

- Propane and butane are stored in liquid form. When the gas is required the liquid boils allowing gas vapour to be produced.
- Propane vaporizes (boils) at -42°C and butane vaporizes (boils) at 0°C.
- This can be a problem if the LPG cylinder is located in a cold area. If the cylinder is below 0°C the butane would remain liquid unless the temperature was to increase.
• If all of the propane were to be used from the cylinder, it can appear to be empty while still containing a fair amount of liquid butane.

• The build-up of butane is referred to as ‘butane enrichment’. Currently the butane content of a cylinder is not permitted to exceed 50%.

• In commercial or industrial installations, when large quantities of gas are required, gas vaporizers are sometimes used to ensure all of the gas is used.

• For domestic application areas, where extreme cold is a common occurrence, 100% propane is sometimes used to help ensure all of the fuel is vaporized.

**Latent heat**

Because the boiling point of propane is -42°C the cylinder is normally warm enough to provide heat to be conducted into the liquid propane to allow it to vaporize.

The heat taken from the cylinder is called ‘latent heat’. The latent heat is the energy used by the liquid during boiling. The heat lost is replaced from the air surrounding the propane cylinder, absorbed via the metal cylinder’s surface.

Everything around us contains latent heat. Latent heat is stored in everything that is above absolute zero.

An example would be if you accidently spilled liquid propane onto your skin.

Propane boils at -42°C; your skin is 34°C the liquid boils drawing the latent heat from your skin. As your skin surrenders the heat it gets colder and colder causing damage and pain to your skin.

This process can be observed when an LPG cylinder is constantly supplying gas to an appliance and drawing heat from the cylinder surface.

• As the heat is removed from the cylinder it becomes colder.

• Moisture in the air condensates on the outside of the cold cylinder.

• As the cylinder continues to surrender heat for gas vaporization and gets colder.

• The condensate gathering on the surface of the cylinder becomes ice.

• The cylinder now has less latent heat available to be used by the liquid LPG.

• Vaporization slows down so less gas vapour is available.
Absorption

Heat from the air surrounding the LPG cylinder is absorbed via the metal cylinder’s surface.

This occurs on the surface area of the cylinder where the liquid LPG touches, this surface absorption area is referred to as the ‘wetted surface’.

The size of the wetted surface directly affects the vaporization rate of the cylinder.

The larger the ‘wetted surface’ area the more propane vapour will be available to draw off.

1 litre of LPG liquid once vaporized becomes about 250 litres of LPG gas. The area containing the gas vapour has little impact on the volume of available vapour, the rate (speed) of vaporization is more important.

When insufficient wetted area is available the cylinder may freeze up and fail to produce the required amount of vapour. This becomes more evident if the LPG had a high concentration of butane, as the cylinder can quickly cool below the boiling/vaporization point of the butane (0°C).

Vaporization rates

How much gas can you expect a cylinder to be able to deliver per hour? The volumes of vaporization can vary dependant on factors such as the following:

- Ambient temperature  *The colder the area the less latent heat.*
- Size of the wetted surface  *The less surface area the less latent heat available.*
- Frequency of draw off  *If the cylinder can recover heat between uses.*

Appendix J of AS/NZS 5601 Part 1 is an informative appendix and includes expected vaporization rates for LPG cylinders for you to use as a guide.

The standard tells us that a number of assumptions have been made in order to calculate the expected vaporization rates.
These are:

(a) That the gas is propane (which vaporizes easier than butane).
(b) The cylinder is 30% full.
(c) The relative humidity is 70%.
(d) The cylinder is under continuous load (gas is being used).

Table J2
Vaporization capacity of gas cylinders

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>-1°C</th>
<th>4°C</th>
<th>10°C</th>
<th>16°C</th>
<th>22°C</th>
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</thead>
<tbody>
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<td>45kg cylinder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vaporization capacity</td>
<td>118MJ/h</td>
<td>141MJ/h</td>
<td>164MJ/h</td>
<td>188MJ/h</td>
<td>211MJ/h</td>
</tr>
</tbody>
</table>

Which temperature do you choose?
Temperatures vary quite a bit around the country from the bottom of the South Island up to Northland, and between summer and winter.

Average temperatures for Queenstown
January average temperature 16°C
June average temperature 4°C
Winter low temperature -2°C

Average temperatures for Auckland
January average temperature 20°C
June average temperature 11°C
Winter low temperature 4°C
**LPGA Code of Practice vaporization rates**

Take note that the vaporization capacity chart from table J2 assumes that the gas being used is propane. As we know New Zealand LPG is a mix of propane and butane.

The LPGA code of practice states:

“As a guide on NZ LPG mix, a 45kg cylinder is capable of supplying a duty cycle of 1kg/50MJ over the period of 1 hour. The instantaneous demand can exceed this rate for short periods.”

**Peak load (simultaneous demand)**

You can add up the MJ/h of all of the appliances to give you the peak load of an installation.

*Average gas consumption of appliances*

- Continuous flow water heater: 190MJ/h
- Ducted central heating furnace: 120MJ/h
- Cooker: 30MJ/h
- Decorative fire: 30MJ/h

You will also need to consider how the gas appliances are used.

**Morning** – Central heating operating and shower running as people get ready for work.

**Evening** – Central heating operating, cooker being used, decorative fire running and possible showers.

Even though more appliances are being used in the evening, the most common incidences of lack of gas supply occur in the early mornings. This is due to colder outside temperatures impacting on the ability for the gas cylinders to gather sufficient latent heat for vaporization from the cold air.
Domestic installation examples

You may only have one standard domestic continuous flow water heater installed. The water heater may have a maximum gas consumption of 190MJ/h.

Does this installation need more than one cylinder? You will need to consider the expected operation of the water heater.

People usually shower for about 10 minutes and then the water stops as they get dressed before another person enters the shower. These quick bursts and rest periods will give the cylinder a chance to regain latent heat and help with vaporization.

It should be noted that the vaporization capacity chart from AS/NZS 5601 Part 1 assumes that the cylinder is under constant load which is not the case in this situation. In this situation it may be suitable to use one 45kg cylinder plus a reserve cylinder.

A space heater and a continuous flow water heater may require an additional cylinder (totaling four) depending on the consumption of the space heater to ensure all appliances are able operate to their expected performance maximums.

A central heating system requires one 45kg cylinder (plus a reserve). If a continuous flow hot water heater was added to the installation an extra 45kg cylinder (plus another reserve) will be needed.

Though it is tempting to hide gas cylinders away try not to locate cylinders in shaded or sheltered areas. Warmth from the sun aids vaporization.

Remember:
When specifying the LPG installation, you need to ensure the number of cylinders supplying the appliances is sufficient to maintain working pressure on all appliances at peak load times and in extreme conditions. Remember that you must ensure that the gas supply is sufficient to meet the anticipated maximum demand.
Commercial installations

This is where you would want to consider the worst-case scenario for each location to make sure that the gas supply will be sufficient at these times.

Winter, when the ability for the cylinder to vaporize, is the time of year when the most demand would be expected from the gas appliances, as people warm their businesses and use a lot of hot water.

It is a good idea to develop your own rule of thumb for the area where you work to stay aware of gas supply needs. This will ensure that you do not get unexpected callouts when customers find their appliances are not working as expected.
Duty and reserve cylinders
A duty cylinder is the cylinder that is being used to feed the installation. The reserve cylinder will come on line if the duty cylinder can no longer supply sufficient gas pressure.

Change-over valves
Change-over valves are designed to assist consumers manage an uninterrupted supply of gas to their home or business.

Manual change-over valves
A manual change-over valve operates on the following principle:

• Gas installation consumes gas from the duty cylinder.
• Once the duty cylinder is empty the appliance stops operating.
• Consumer is required to turn the valve to face the reserve cylinder and relight the appliance.
• A replacement cylinder is ordered.

Auto change-over valves
An auto change-over valve operates on the following principle:

• Gas installation consumes gas from the duty cylinder.
• Once the duty cylinder cannot deliver the required gas supply to the installation the reserve cylinder will automatically come on line. An indicator shows the consumer that the duty cylinder is low on pressure.
• Consumer is required to turn the valve to face the reserve cylinder this now becomes the duty cylinder (gas supply has not been interrupted as with the manual system).
• A replacement cylinder is ordered.
In a perfect world all installations would perform like that, but many systems are undersized and perform as this example shows:

- Gas installation consumes 200MJ/h of gas from the 45kg duty cylinder.
- Once the duty cylinder cannot deliver the required gas supply to the installation the reserve cylinder will automatically come on line.
  - The duty cylinder may not be empty but can no longer vaporize enough gas to supply the installation. This could occur in as little as 10-15 minutes.
  - If a 20-minute shower is run then a possible 10 minutes of supply could have been from the reserve cylinder.
- An indicator shows the consumer that the duty cylinder is low on pressure.
  - If the indicator is observed while the installation is in use, it may appear that the duty cylinder is empty. In reality, it may be near full but cannot supply gas until the cylinder regains sufficient heat to vaporize the fuel.
- Consumer is required to turn the valve to face the reserve cylinder this now becomes the duty cylinder (gas supply has not been interrupted as with the manual system).
- A replacement cylinder is ordered.
- The reserve cylinder runs out shortly after the duty. The customer complains that the changeover valve is not working and is drawing from both cylinders at once.

Questions

Answer the following questions.

9. The changeover valve is working correctly. The gas supply is the issue. How do you fix it?
Using 9kg LPG cylinders on a domestic installation

9kg cylinders are mainly used for portable barbeques, patio heaters and portable cabinet heaters. You may even decide to use one to supply a gas hob installation.

Once again, you need to consider the gas consumption when using these cylinders as the vaporization capacity of a 9kg cylinder is significantly less than that of a 45kg. It is not uncommon for the maximum vaporization of a 9kg to be around 25MJ/h.

You may have noticed patio heaters used outdoors at restaurants. Many of these heaters have a gas consumption of 30MJ/h or more. Quite often you will see that, if they are used for a while, there is ice covering the wetted surface of the cylinder and the burner flames may be small and yellow. This is because the appliance is lacking in gas supply. People often give the cylinder a shake to try and improve the vaporization, but it is obvious that the cylinder is too small to supply the required volume for that length of time.

In some instances, you may find an installation where a customer wishes to use a 9kg cylinder to supply the gas to supply a continuous flow water heater. As mentioned above these water heaters often have a gas consumption around 190MJ/h which exceeds the vaporization capabilities of a 9kg cylinder and has no chance of operating correctly. These situations are to be avoided and the customer must be informed that the installation will not operate as it is intended.

Excess flow valves/devices

Excess flow devices are located in pigtails, regulators and some cylinder valves. Though they can vary in construction they all work under the same principle.

If the gas flow is to exceed a predetermined volume, then the excess flow device will restrict the gas flow.

Hose and regulator assemblies attached to BBQ’s often contain excess flow devices.
The situation described below shows a scenario common with excess flow devices.

- A BBQ is turned off at the cylinder and the burner controls are left on.
- The consumer goes to use the BBQ next time and turns on the cylinder valve.
- The excess flow valve detects too much sudden gas flow because the burner valves are open and shuts off gas supply.
- The consumer disconnects the hose assembly and finds that even with the cylinder valve open hardly any gas flows from the hose assembly. The assumption is that the regulator is faulty.

If there is an open end, the excess flow device will restrict flow.

Solution

- Turn off the cylinder valve.
- Disconnect and reconnect regulator from cylinder (to remove any pressure)/
- Turn off/ seal all downstream open ends, taps or valves.
- Turn cylinder valve on.
- Operate appliance.

Excess flow valves are there for a purpose. Do not remove them.
The LPGA Code of Practice (COP)

It is good practice to follow the guidelines shown in the LPGA Code of Practice on twin pack installations as well as the Code of Practice for multi cylinder installations.

The LPGA COP gives instruction on sizing of drip legs which are to be installed on twin LPG cylinder installations and provides recommended maintenance advice for domestic LPG cylinder installations.

Including the following:

• Precautions when draining of condensate traps at least every 2 years.

• Checking the condition of pigtails and replacing them at least every 6 years.

• Checking the operation of first stage regulators and replacing them at least every 10 years.

• Checking the operation of changeover valves and replacing them at least every 10 years.

• Inspection of second stage regulators and replacing them at least every 10 years.

The LPGA codes of practice are free for download from:

Questions

Answer the following questions.

10. How often should pigtails be replaced on LPG cylinder installations?

11. What document gives instruction on sizing of drip legs which are to be installed on twin LPG cylinder installations?

12. What is the rule of thumb vaporization capacity of a 9kg cylinder?
13. Using the information shown below calculate how many 45kg LPG cylinders will be required according to AS/NZS 5601 for the following installation.

A home in Auckland with the following gas appliances:

1 × 188MJ/h continuous flow water heater
1 × 160MJ/h continuous flow water heater
1 × 45MJ/h space heater

*Average temperatures for Auckland*

January average temperature          20°C
June average temperature            11°C
Winter low temperature             4°C

*Table from AS/NZS 5601. Part 1*

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>-1°C</th>
<th>4°C</th>
<th>10°C</th>
<th>16°C</th>
<th>22°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>45kg cylinder</td>
<td>118MJ/h</td>
<td>141MJ/h</td>
<td>164MJ/h</td>
<td>188MJ/h</td>
<td>211MJ/h</td>
</tr>
<tr>
<td>vaporization capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pipe sizing

The following situations, and related concerns, will be covered in this section:

- Water supply network.
- Gas pipework.
- Waste water pipework.
- Surface water pipework.

Water supply pipework

In general, sizing of plumbing pipework is being done adequately across the industry. An area of growing concern, however, relates to the length of hot pipework used for supplying kitchen sinks.

Other outlets such as showers and laundries are usually not as critical. People are usually busy doing other things in the area and are more forgiving of having to wait for the hot water to arrive. In kitchens, however, people will often be standing at the outlet holding dishes or pots while waiting for the water to heat up.

AS/NZS 3500 Part 1 contains information and guidance on sizing of pipework within dwellings, as well as maximum lengths of branch take offs.

Larger houses with island kitchens usually mean longer pipe runs and long wait times. Whenever you are running pipework to these remote kitchens, take time to consider the wait time the customer may face and design the system to suit.

This could involve reducing the pipe size to the kitchen to lessen the cold water wasted or even installing additional water heaters where required.

Gas pipework

Correct sizing of gas pipework is critical to the performance of the appliances within the installation.

Undersized gas pipework can lead to appliances producing carbon monoxide due to incomplete combustion and can potentially cause damage to appliances.

It is a requirement of AS/NZS 5601 that gas supply is adequate to satisfy the likely simultaneous demands or peak loading of the installation.
Gas installation pipework should be sized using either the graphs or the charts included in Appendix F of AS/NZS 5601 Part 1, or Appendix D of AS/NZS 5601 Part 2, whichever suits the installation being designed.

Proprietary pipework systems are now being used by most gasfitters. You will be aware that these pipe systems usually include pipe sizing design procedures into their instruction manuals.

Don’t take shortcuts when adding additional appliances to existing installations. If the demand is too great for the pipe size, make sure that it is increased accordingly.

**Waste water pipework**

There is a multitude of reasons why designers may specify larger diameter pipework for specific installations; however, it is not uncommon for installers to unnecessarily oversize waste water pipework.

This usually occurs because it may be cheaper to use 100mm pipework, or because there is a belief that the larger diameter would help reduce the possibility of blockages.

In fact, oversizing pipework does not help reduce the possibility of blockages. On the contrary, a larger than necessary diameter enables the energy of the moving water to spread out along the bottom portion of the pipe slowing the velocity of both the liquids and solids. This can allow the solids to fall out of suspension and remain sitting on the bottom or sides of the pipe increasing the potential for blockages to occur.

An adequately sized system, on the other hand, will ensure the liquids lift the solid waste and carry it farther along and at a greater speed. Correctly sized pipework will tend to concentrate the momentum and more efficiently carry the waste products through the system.

Keep in mind that, in a perfect world, foul water pipework is to be designed for pipes to run ½ full.

**Surface water pipework**

Many drainlayers do not appreciate the minimum falls required on surface water drains.

Surface water drains often carry fine silt and debris from roof and yard areas so it is important to always allow correct fall on all surface water drains.
Study Notes
Continuing Professional Development (CPD) 2018

Topic 5: Innovation in the plumbing, gasfitting and drainlaying industries
Topic 5: Innovation in the plumbing, gasfitting and drainlaying industries

This topic for Continuing Professional Development (CPD) 2018 for plumbers, gasfitters and drainlayers focuses on innovation in the plumbing, gasfitting and drainlaying industries.

This topic covers the following:

• Introduction.

• Edge protection.
  » The EBR re-roof bracket.
  » The Rail Racer.
  » Other systems available.

• Felton digital mixers.
  » The Smartflow.
  » The Smartview.

• Rinnai Smart Cylinder.

• Promax water storage tanks.
  » The Promax Slimline.

• Flexitec.

• Dux Endura grease trap (interceptor).
Introduction

In every industry things change as new technology is developed, or better ways of completing tasks are discovered.

Electric vehicles, mobile phones, computers, and Paywave, for example, just to name a few things that would have been science fiction a few decades ago and are now part of our everyday lives.

The plumbing, gasfitting and drainlaying industry is no different.

There are plumbers around that still remember lead wiping and many more that have no idea what that term means. Not that many years ago, you had a choice between galvanised iron or copper to run pipework. Now, you can choose between copper and at least four different types of plastic, each with their own jointing methods.

Gasfitters have also seen big changes in the number of different products available for pipework, as well as the introduction of high efficiency appliances allowing for flues to be constructed from uPVC.

Constructing flashings from lead is now also a rare occurrence for both plumbers and gasfitters.

Drainlayers have had massive advances in the area of onsite sewage disposal with aerated systems improving effluent quality. This has allowed the introduction of drip lines for effluent disposal. The excavation and installation of a trench effluent field is no longer your only option.

Manufacturers and suppliers are constantly developing and sourcing more products that may be the industry changers of the future. These products may be radical in their approach to solving an issue within the industry, or the changes may be subtle allowing for quicker installation times or reducing the cost of the product whilst maintaining performance.

This allows you to service more customers and keep those customers happier with reduced installation times and costs, which in turn will improve your business turnover and profit.

With that in mind, the products which have been included in this topic have been identified as innovative. They are products that are new and different in some way to what has been traditionally used.

Some of these products may be adopted by our industries and become our new ‘trade practice’ way of doing things, others may not stand the test of time.

Keeping informed of new products will ensure that you are aware of what is happening should the industry make a shift towards a new way of doing things.
The EBR re-roof bracket

The EBR re-roof bracket is designed to fit to existing buildings where cladding and soffit disruption is not an option. It’s also suitable for new housing and alterations, re-roofing, solar installation etc.

This bracket provides for excellent clearance with both timber and metal fascia systems, as well as all gutter profiles, given its adjustability by utilising either one of the two different foot mounts for flat soffits, gable ends, exposed rafters, sloped soffits and face mounting.

Features and benefits of the EBR re-roof system include the following:

• Suitable for roof pitches from flat up to 35 degrees.

• Compatible with both timber rails (90x45) at up to 2.7m bracket centres as well as aluminium tube at up to 5.4m bracket centres.

• No interference with the wall framing meaning cladding can be completed right up to just below soffit height whilst the system is in place.

• No damage to existing cladding or soffits.

• Stackable design feature ensures simple storage and transport to site.

• No more waiting for scaffold companies.

• Fast to install and faster to dismantle.

• Fully compliant to Standard AS/NZS4994.1:2009.

• Suitable for new and existing houses.

The method of attachment entails an adjustable base jack on the ground placing tension under the soffit via a vertical pole attached to the bracket.

The non-slip neoprene pads hold the bracket in place without any fixings and the design allows for ‘locking in’ of the fascia board without any damage for extra peace of mind.

This system comes standard with a fully adjustable foot mount suitable for pitched gable ends and flat soffits, whilst the optional extra ‘multi bracket’ caters for sloped soffits, exposed rafters, and fascia mounting where there is no roof overhang.
The Rail Racer

The Rail Racer is the solution for safe guardrail installation making progressive Guardrail Installation (PGI) a breeze.

- Allows full guardrail placement from the ground.
- Spring loaded mechanism for quick release.
- Install gable end rails from the ground!
- Fits all 48mm OD tube.
- 5.5 metre reach.
- No more nuisance harnesses on the roof.

Other systems available

Other systems available are also stackable and compatible with timber and tube rails:

**EBC Commercial Bracket**
- DHS purlins.
- Wall mounted to steel, concrete or timber.
- Parapet walls.
- Light gauge steel buildings/sheds.
- Timber and concrete floor perimeters.

**EBW Wall Mount Bracket**
- Commercial buildings.
- Concrete tilt panels.
- Pole framed sheds.
- Timber purlins.
- Mounted over existing cladding.

**EBA Soffit Mount Bracket**
- New housing.
- Gable ends.
- Timber framed garages.

**EBG Garage Bracket**
- Mono pitch roofs.
- Pole framed sheds.
- Steel framed sheds.
All supporting componentry and documentation also available.

EPNZ website has more information, videos and pictures.

www.edge-protection.co.nz
info@edge-protection.co.nz
0800EDGPRO (0800334776)
Felton digital mixers

There are two models of the new shower mixing valves: the Smartflow and the Smartview.

The SMARTFLOW™

The SMARTVIEW™

Both the Smartflow and the Smartview Felton digital shower mixers separate the user interface from the hot and cold water mixing chamber/control box.

This means that the mixing valve does not need to sit behind the shower lining and can be located somewhere accessible, either in the ceiling space, a cupboard or sub-floor.

This also means that there are fewer potential points for leaks to occur in inaccessible places.

The interface allows you to do the following:

- Turn the shower on or off simply by pressing the control.
- Adjust the temperature by turning the control.
- Adjust the flow by pushing and turning the control.
- Save up to three preferred settings into an easy to access memory.
- Have access to maintenance and troubleshooting information.
Rinnai Smart Cylinder

The way that a traditional electric hot water cylinder works means that users are paying to heat all of the water in the cylinder 24 hours a day, 7 days a week, 52 weeks a year.

The new Rinnai Smart Cylinder™ has a smart thermostat which actually learns the pattern of hot water use of a household, and then only heats the water when it knows it's going to be needed, typically saving 10% on water heating costs.

The Rinnai Smart Cylinder is controlled with an LCD control pad that is attached to the front of the tank.

When in IQ mode, the Rinnai Smart Cylinder will learn one week of the household’s hot water usage behaviour.

After the first week, the Rinnai Smart Cylinder will apply the savings algorithm and only heat water in the cylinder when it knows it will be needed.

The Rinnai Smart Cylinder will constantly monitor the household water usage and update the saving algorithm continuously, ensuring that it is only ever heating water to meet demand.

A minimum hot water availability is guaranteed on the level of comfort selected. There are five levels of comfort.
**VACATION MODE**

Vacation mode allows the household to save money, when household members are all away.

In vacation mode, Rinnai Smart Cylinder will keep the water at a minimum temperature (6°C) to save power.

This will also prevent the water from freezing in colder areas. The user needs to simply select the number of days they will be away, and the Rinnai Smart Cylinder will handle the rest.

After the specified time, it will automatically revert to the last mode it was set on, meaning the user can have a hot shower as soon as they get in the door!

**MANUAL MODE**

When in manual mode, the Rinnai Smart Cylinder maintains the total volume of water at the selected temperature level (it operates as a traditional electric storage cylinder).

**Models and sizes available**

Three models are available in three different sizes (135, 180, 250 L)
### Study Notes
Promax water storage tanks

The way we manage stormwater (surface water) has changed a lot over the last 20 years and the consent authorities' requirements are continually being updated throughout the country as urban sprawl puts pressure on the rainwater disposal system.

These changes include no longer allowing the discharge of stormwater to the kerb and channel and the increasingly overwhelmed Network Utility Operator (NUO) stormwater sewer.

This leaves the home owner to deal with stormwater on-site and we have seen a return to the traditional soak pits to dispose of the water. A movement towards collecting the water and using it to supply garden taps, laundries and for toilet flushing has been gaining popularity. In some areas, such as Auckland, Pukekohe, Tauranga and Hamilton, it is now compulsory when new buildings are being constructed.

Rural properties have been collecting rainwater in tanks for decades and large round tanks can be seen easily when heading out of city limits; however, these large tanks are not suitable for the small urban sections that are being made available. Also, with a ready supply of potable water from NUO, storing that much water is unnecessary.

To accommodate this new style of installation, new styles of tanks have entered the marketplace to store water in urban areas without a large footprint impacting on the available outdoor living space. One of these tanks is the Promax Slimline.

The Promax Slimline

- The Promax Slimline has a hidden pump compartment to improve the aesthetics of the installation, no longer needing to install and shelter a pump separately from the tank.

- It also has seismic restraints built into the design. Bolting the tank through the fixing points provided to a concrete foundation pad is all that it is required.

- The tank is designed to be the primary water supply for outlets that do not need a treated water supply (toilets, garden taps, laundry etc). However, provisions must also be made for times of low rainfall so that water is continuously supplied to the outlets. To achieve this a connection point to the tank from the NUO potable water supply is also included. This allows the potable water supply to top up the tank when water use exceeds the amount of rainwater harvested.

- Special care should be taken to ensure that the tank is plumbed as specified in the manufacturer's instructions so that the NUO treated water is not discharged to overflow, and to prevent the possibility of stormwater backflowing into the NUO supply.
**Flexitec**

Acting like a shock absorber, Flexitec takes the stress out of fixed and rigid PVC plumbing installations.

When regular moulded PVC fittings are installed in unstable soils, they can, over time, inherit weak spots due to the stress of soil heave and movement.

These weak spots can lead to fittings cracking, shearing and even eventually failing. Unstable soil sites pose a huge problem in construction.

Plastec’s unique Flexitec joint is made from an ABS skeletal frame and an elastomeric (rubber like) sheath which have been injection molded together creating a fitting of superior strength and flexibility. Making Flexible the complimentary solution to drainage design across all soil types.

**Flexitec fittings**

- Injection moulded for superior strength.
  Superior resistance to UV aging and general weathering.

- The ability to be used in temperatures ranging from -50 degrees to 120 °C.

- Massive twist and torque capabilities with superior fatigue resistance.

- Excellent resistance to acids, chemical detergents and cleaners.

- The ability to return back to shape after use in a wide range of temperatures.

- Ideal for sewer and stormwater installations.

- Suitable for above and below ground applications with either vertical or horizontal installation.

- Superior flexibility, angular deflection, rotation, expansion and compression.

- May be used in many applications where flexible plumbing is required.
**Dux Endura grease trap (interceptor)**

Made from durable plastic, the interceptor is light enough to handle manually, and strong enough to withstand ground forces.

It is supplied with a trafficable lid rated to 4536 kg (pedestrian lids are also available).

The Dux Endura grease trap differs from other plastic grease traps in the hydromechanical design of the inlet.

The Endura grease trap includes a dynamic inlet baffle and flow controller that changes the way waste enters the trap allowing fats, oils and grease (FOGs) to be removed from the liquid waste in a shorter period of time than a standard gravity grease trap.

This new inlet system makes use of the venturi effect to introduce microscopic air bubbles into the waste water as it enters the tank. These bubbles attract the FOGs in the waste as they flow upward, separating the FOGs and raising them quickly up to the scum layer at the top of the tank.

A 3790 litre (1000 gallon) standard gravity tank must be cleaned out when the grease and solids occupy 25% of the capacity of the tank which equates to about 500kg of FOGs.

The improved performance of the Endura XL100 can remove the same amount of FOGs with its smaller 973 litre capacity. Meaning the excavation required is now only about a quarter of the size of a traditional tank and no heavy lifting equipment is needed. This reduces the installation time for the drainlayer and the costs for the end user.

The New Zealand Building Code G13/AS2 is the acceptable solution for Foul Water and gives the minimum capacities required for grease interceptors as 5 litres for every seat at a restaurant or café.

Until this document catches up with the progress made in this area, hydromechanical grease traps like the Endura would be considered an alternative solution.

Dux Industries have technical information that can be used as evidence when applying for a building consent. The Endura grease trap has already been installed in the Lower Hutt and Christchurch areas, and it has been accepted as a compliant alternative solution by the local territorial authorities in those areas. This information can also be used when gaining permission to install this product from territorial authorities in other areas around the country.
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