

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

**Demonstrate knowledge of the
gasfitting industry within a
BCATS environment**

Unit Standard – 25327

Level 2, Credit 2

Name: _____





What you need to do

By the end of this module, you should be able to demonstrate knowledge of the gasfitting industry covering:

- major industry sectors
- industry work processes
- industry clients, supply and inter-trade relationships
- the impact of regulatory and trade bodies on the industry and
- industry jobs and their training requirements.

How you will be assessed

Your teacher/tutor will give you a worksheet that you need to complete, which your teacher/tutor will mark.

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 **Glossary of Terms**

Term	Meaning
Accredited network supplier	A company legally allowed to sell gas.
Billing meter	A meter that belongs to the gas supplier and is used to bill the customer for gas used.
Gas supply point	The outlet of either a billing meter or a LPG cylinder's regulator.
Gas supply	Relates to the gas supply system before and up to a property's gas supply point.
Gasfitting	Relates to that work carried out from a property's the gas supply point.
Apprentice gasfitter	A trainee who is learning the trade of gasfitting.
Licensed gasfitter	A gasfitter that is employed by a Certifying gasfitter, and who is qualified to supervise apprentices.
Certifying gasfitter	An employer or employee who is legally allowed to certify gasfitting work and installations.
Gas installation	The gas supply system that extends from the gas supply point to gas appliances, flues and ventilation.
Trouble shooting	The task of finding faults in gas appliances or installations.
Repairing	The task of fixing faults in gas appliances or installations.
Servicing	Scheduled preventative-maintenance that is performed on gas appliances and installations.
Certificate	The document signed by a Certifying gasfitter certifying that the installation does not leak, and that appliances have been installed and commissioned to the standards and specifications required by law.
PGDB	Plumbers Gasfitters and Drainlayers Board.
ITO	Industry Training Organisation. A tertiary education organisation which develops qualifications and arranges training for a specific industry.

Introduction

Major industry sectors

The gas industry can be divided into the following three groups:

- Gas supply industry
- Gas appliance and equipment suppliers and merchants
- Gasfitting.

Gas supply industry:

The organisations and businesses that supply natural gas as far as the gas meter; or in the case of LPG cylinders, as far as tanks.

Gas appliance and equipment suppliers and merchants:

The companies that sell and supply gas-burning appliances and equipment.

Gasfitting:

The installation of gas-burning appliances, equipment, and their supply pipes, and connecting these to gas supply meters and cylinders. Gasfitting begins from the billing meter outlet or the cylinder's regulator.

Gasfitting work may also be divided into the following three categories:

- domestic – on residential premises
- commercial – on commercial premises selling goods or services
- industrial – where gas is used for manufacturing or processing.

The Gas Industry – A history of gas in New Zealand

One of the first gases used in New Zealand was **coal gas**, also known as town gas. The Dunedin Gas Light and Coke Company was founded in 1862. A gas works and pipeline were constructed for the reticulation of coal gas that was produced by heating coal inside retorts. Initially this coal gas was only used for street lighting; it became available for domestic consumption in the 1870s. This network has been upgraded and now supplies reticulated LPG to consumers.

The discovery of **natural gas** at the Kapuni gas field in Taranaki in 1959 was the first commercially viable find in New Zealand. Then, in 1969, the major Maui offshore field was discovered. By 1969 a pipeline had been constructed from Kapuni to both Auckland and Wellington. Natural gas also quickly became an important fuel for the large petrochemical industry and for electricity generation. Natural gas is sent via transmission pipelines at very high pressure, 8600 kPa, to distribution networks. The distribution networks send the gas at lower pressure, 400 kPa, to the consumer's point of supply, ending at the gas meter.

Liquid Petroleum Gas (LPG)

is a mix of the two gases propane and butane. It has all the advantages of natural gas and is portable. Because it is heavier than air, LPG will fall and accumulate at the lowest level available e.g. in the bottom of a boat, or a drain hole or basement. To warn people of the accumulation of un-burnt LPG an odour is added to make it smell.

LPG is obtained during the refining of crude oil and natural gases from wells, and is available in pressurized containers from both local and international sources. As the gas is delivered to an appliance, the liquid in the bottle will boil to keep producing gas.



Gasfitting

Gasfitters are responsible for the installation of domestic cookers or hobs; space heaters or water heaters; flue pipes used to safely remove by products from combustion processes; all commercial and industrial gas-burning equipment such as boilers, ovens, forges, driers and air heaters; gas trains, and flue systems. Gasfitters also install the gas pipes which connect appliances to natural gas meters or LPG regulators.

Domestic gasfitting involves installing low-pressure gas appliances and pipes, flues, and the ventilation systems which support gas combustion; as well repairing and servicing gas appliances.

Work Processes

Gasfitting involves various work processes, including:

- connecting appliances
- installing gas pipework
- welding
- soldering
- threading
- brazing
- flaring
- trouble shooting
- repairing
- servicing.

Appliance connections

This is a connection usually using a union fitting. This could be made from either steel, brass from a soft copper flare fitting brazed onto half-hard copper tube, or from a proprietary system.

Installing gas pipework

Gas piping that is installed above ground may be made from black steel, galvanised steel, half-hard copper, soft copper, or a proprietary system.

Welding

In gasfitting, high-temperature fusion welding is used to join uncoated (black) mild steel in pipe, sheet or plate form. In fusion welding, the pipe and fitting surfaces, as well as a steel filler rod, are melted and fused together. The joint solidifies as it cools. Low-temperature fusion welding is used for high-density polyethylene (HDPE) gas pipe, which is for underground use only. HDPE fittings include an electric heating element (no filler rod is used).

Threading

Threading is the process of cutting external threads into steel pipes to allow them to be screwed together.



Pipe vice and hand operated die for threading steel pipes

Brazing

This is "hard soldering" (*not* welding), whereby copper pipe and fittings are heated until they glow red, but do not melt. When the copper, zinc or nickel-alloy brazing rod is applied to the hot joint, it melts and is drawn in by capillary attraction. The joint solidifies and hardens as it cools.



Flaring

Soft copper may be brazed. However it may also be flared to form an end shaped like a funnel. A nut is slipped over the end of the pipe which is then flared using a forming tool. The flare fits over a cone shaped nipple, which has a pipe thread at the other end.



Flaring tool and wheel cutter to cut copper tube

Soldering

This is “soft soldering”, which is similar to brazing but at a lower temperature. A filler rod of soft solder (lead and tin alloy) melts in contact with a heated steel, lead or copper surface. The molten solder is drawn into narrow gaps by capillary attraction and adheres (sticks) to the surfaces. The joint solidifies as it cools. Soldering is not commonly used for gas installation work, and is more likely to be used for soldering electrical joints in gas appliance control systems.

Trouble shooting

The process of diagnosing faults associated with a gas installation or appliance by recognising symptoms.

Repairing

The task of fixing a fault once it has been found, for example: repairing a leaking gas pipe or appliance. If the fault is not repairable then the customer must be advised that the gas installation or appliance should be either replaced or removed.

Servicing

The task of carrying out scheduled preventative maintenance of gas appliances and testing of pipework. This is not trouble shooting.



Client Base

Gasfitting work for clients is arranged either:

- directly, or
- by sub-contracting.

Direct clients

The home or business owner engages the gasfitter directly and pays them for their work.

Sub-contracting

A main contractor engages the gasfitter and pays them for their work. Examples of main contractors include:

- architects
- builders
- property management companies
- appliance retailers
- gas suppliers.

Supply Relationships

Gasfitters require a range of trade supplies, including:

- appliances and equipment
- pipe and fittings
- gas supply.

Appliance and equipment suppliers

These companies supply gas appliances, flue kits, controls and equipment. Gasfitters may be able to deal directly with these suppliers, or the supplier may prefer to deal through a merchant.

Manufacturer guarantee systems

Normally any company that manufactures or supplies appliances, equipment, pipe or fittings guarantees their product against failure under normal conditions for a set period of time.

The guarantee may or may not include labour to fix the problem. Certain circumstances will cancel the manufacturers guarantee, such as where:

- the product has been installed incorrectly
- the product is misused or subjected to unduly harsh conditions
- the guarantee has not been properly registered through the completion and return of documents to the manufacturer.

Pipe and fittings

Suppliers such as Bunnings and Mitre 10 supply and sell pipe and fittings. They may also source and provide appliances, tools and equipment. Plumbing merchants such as Plumbing World and Mico may also supply and sell these as gasfitters are often also plumbers..

Product training

Product training is provided to trades people involved in installation work by the supplier of appliances, equipment, pipe or fittings. Installers are trained in:

- how the product works
- correct installation
- how to find and fix faults.

Often a gasfitter will not be allowed access to the product without having first received product training from the supplier.

Accredited supply networks

An accredited supply network is a company legally allowed to sell gas.

Natural gas network utilities provide gas reticulation systems, as well as the isolating valve, pressure regulator and billing meter. They own and maintain this equipment - *not* the user of the gas.

LPG suppliers often sell gas in bottles but it can also be stored in larger tanks or piped to billing meters.

LPG suppliers will also often lease cylinders to customers. These can either be replaced upon request or on prescheduled days.

Natural gas suppliers charge the customer for gas, equipment and cylinder changes. However they may also employ gasfitters to carry out work at stages of the supply system *before* the gas supply point.

Although this work may require gasfitting skills, as the work is outside the legal definition of “gasfitting” it does not require a gasfitting practicing license.

Gas suppliers may also:

- offer gasfitters incentives for connecting customers to their supply system
- pay gasfitters to install the gas pipes and appliances.

Trade accounts

Trade accounts are charge accounts that gasfitters often arrange with merchants and suppliers of fixtures, appliances and equipment. This allows gasfitters to purchase goods without the upfront payment of cash; instead the merchant sends the gasfitter a bill for “payment due” at the end of the month.

Trade discount

In return for shopping at a particular merchant gasfitters often receive a reduced price on some items. This is usually a set percentage less than the retail price of the goods. For example, with a 10% trade discount goods worth \$100 would be reduced to \$90.

Relationships with other Trades

Gasfitting is legally defined in the Plumbers Gasfitters and Drainlayers Registration Act 1976.

Gasfitting includes fixing or unfixing any pipe, appliance or flue at stages after the gas supply point, as well as pipes that provide ventilation for gas combustion and efficient flue operation.

Gasfitting requires a current practicing license. No unlicensed person is legally allowed to carry out gasfitting work.

Like all construction-related trades, gasfitters cooperate with various other trades in the course of their work, including:

- builders
- plumbers
- electricians
- roofers.

Builders or carpenters

Builders and carpenters build the structures within which the gas pipes and appliances must be installed, such as mountings, access points and penetrations, ventilation openings, and cover grilles - all under direction from the gasfitter.

Plumbers

Plumbers are responsible for installing the cold water supply to, and hot water supply from, water heaters (including gas-fired water heaters).

Although plumbers require practicing licenses, a plumbing extension issued by the PGDB enables gasfitters to carry out related plumbing work. However, gasfitters may not install or replace taps, faucets, mixers, sanitary fixtures or discharge pipes.

Roofers

In situations where gas flues need to penetrate specialised roofing material, roofing contractors will often be required to supply the flashing.

Electricians

Electricians install and maintain permanent wiring to power points, and sometimes electrical control systems for gas fired equipment. Electricians must be licenced and no one may carry out work on electrical systems above 50 volts DC without the requisite level of electrical registration.



Requirements of Industry Bodies

Various industry bodies, including, control the gas industry. These include:

- Ministry of Business, Innovation and Employment (MBIE)
- Plumbers, Gasfitters and Drainlayers Board
- Building Consent Authorities
- Standards New Zealand
- Trade and professional associations
- Industry Training Organisations

When working in the plumbing, gasfitting or drainlaying trades in New Zealand, there are a number of industry bodies that have an impact on the way trades people work and provide their services. For the plumbing, gasfitting or drainlaying trades these include:

Ministry of Business, Innovation and Employment (MBIE)

The Ministry of Business, Innovation and Employment (MBIE) administers the Building Act and Building Code and also oversees a range of other building and housing related acts and regulations (including occupational licensing in the building trades).

It is also the government body responsible for the Plumbers, Gasfitters and Drainlayers Board.

Plumbers, Gasfitters and Drainlayers Board (PGDB)

The PGDB is a ministerially-appointed board which is tasked with promoting high quality-standards, professional conduct, and public health and safety in the plumbing, gasfitting and drainlaying trades. The PGDB administers a registration and licensing scheme for the certification of competent plumbers, gasfitters and drainlayers.

The PGDB's responsibilities include:

- setting and marking registration exams
- registering gasfitters
- issuing practicing licenses
- prosecuting unlawful gasfitting work.

WorkSafe New Zealand (WorkSafe)

WorkSafe is the work health and safety regulator and is responsible for implementing the Health and Safety at Work Act 2015.

WorkSafe's functions include:

- Monitoring and enforcing compliance with work health and safety legislation
- Providing guidance, advice and information on work health and safety

- Fostering a co-operative and consultative relationship between the people who have health and safety duties and the persons to whom they owe those duties and their representatives.
- Collecting, analysing and publishing statistics and other information relating to work health and safety.

Standards New Zealand

Standards NZ is an agency of the Standards Council, a Crown entity operating under the Standards Act 1988. The majority of quality standards in New Zealand are developed in partnership with Standards Australia, and set agreed minimal specifications for products, processes, services or performance in both countries. New Zealand standards are used by a wide range of organisations to enhance their products and services, improve safety and quality, and meet industry best practices. Quality standards help to keep our homes, buildings, playgrounds and health services safe.

Note: Gasfitting in New Zealand must currently comply with NZS 5261:2003

Building Consent Authorities

Building consent authorities are usually situated within city councils, although are also sometimes independent businesses. They are the organisations responsible for issuing building consents, inspecting building work, issuing code compliance certificates and compliance schedules in order to ensure that all building work complies with the Building Act 2004.

Note: In New Zealand, gasfitting is self-certified by a Certifying gasfitter, meaning that gas installations do not require a building consent. Building consents may however be required for building penetrations, flashings, and for methods of disposing of expansion water or condensation.

Trade and professional associations

Trade and professional associations provide industry information and trade upskill sessions to members. A major trade association in New Zealand is Master Plumbers, Gasfitters and Drainlayers New Zealand Incorporated, which was established in 1901 and has 16 regional associations. For more information visit www.masterplumbers.org.nz

Industry Training Organisations (ITOs)

Industry Training Organisations (ITOs) set the skill standards and arrange training for people employed in the industries the ITO is responsible for. Almost all apprentices in New Zealand are enrolled with an ITO.

The ITO for the plumbing, gasfitting and drainlaying trades is the Skills Organisation. For more information on this ITO, visit skills.org.nz.

Job Roles and Training

Traditional roles within the gasfitting industry include:

- Trainee gasfitter
- Licensed gasfitter
- Certifying gasfitter.

Trainee (Apprentice) gasfitters

As they are only learning the trade, apprentice gasfitters must work under the direct supervision of a Certifying gasfitter for the first two years. They must also apply annually to the PGDB for a limited certificate trainee gasfitter license.

Licensed gasfitters

To become a licensed gasfitter, you need to:

- obtain an apprenticeship with an employing certifying gasfitter
- obtain a Limited certificate trainee gasfitter license
- sign a training agreement between yourself, your employer and the Skills Organisation
- successfully complete a gasfitting apprenticeship and gain the National Certificate in Plumbing & Gasfitting
- pass the PGDB's gasfitting Registration examination
- apply to the PGDB for registration and pay the required registration fee
- upon becoming registered, receive your first annual practicing license.

A Licensed gasfitter must be supervised by a certifying person as they are ultimately responsible for ensuring the work is done competently..

Certifying gasfitters

Licensed gasfitters may continue their studies, and upon passing advanced level examinations set by the PGDB, may apply for registration as certifying gasfitters.

Certifying gasfitters can:

- install and repair gas services and appliances
- direct the work of licensed gasfitters
- supervise trainee gasfitters
- certify their own gasfitting work and that of registered and apprentice gasfitters under their direction.

A certifying gasfitter may choose to either:

- work for an employer
- become an employer of licensed and/or trainee gasfitters.

Less traditional roles within the gasfitting industry include:

- gasfitting trainer and/or assessor.

Gasfitting trainer and/or assessor

Either of these roles requires experience and certification as a certifying gasfitter.

Other roles

There are other related roles where training and certification as a gasfitter may be an advantage, but is not necessarily a requirement, for example working as a supplier or merchant's sales representative, or for an ITO.

Training Requirements

For information on the licensing, registration and training of gasfitters see the Plumbers, Gasfitters and Drainlayers Board website (www.pgdb.co.nz) and the website for the Skills Organisation (skills.org.nz) as they are the ITO who serves the gasfitting industry.