



Government of **Western Australia**
Department of **Commerce**
EnergySafety

Guidelines for Gasfitting Class G Training in Western Australia

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EnergySafety WA
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Gasfitting Class G Training

Purpose

The aim of any training should be to provide adequate skills and knowledge to a person (trainee) needing to carry out gasfitting in Class G for LP Gas, natural gas installations and Type A appliances. The intention of the guideline is to outline the training required to achieve this outcome.

Scope

This guideline outlines the training to obtain a Class G gasfitting permit. It provides the information a training provider needs to consider when developing training intended to achieve a licensing outcome from EnergySafety. It includes regulatory requirements, training outcomes, training prerequisites, required course content (training topics and essential requirements) and recognition process.

Class G gasfitting, in accordance with the Gas Standards (Gasfitting and Consumer Gas Installations) Regulations 1999 (regulations) is:

Gasfitting work –

Class G “All gasfitting except work classed as Class I, E or P.”

In general terms, this means domestic and commercial gasfitting work associated with installation, commissioning and servicing of “Type A” appliances and the installation and maintenance of consumer gas piping operating up to a pressure of 200 kPa. A list of Type A appliances is provided in the regulations.

Regulatory requirements

Any person carrying out gasfitting on a consumer’s gas installation is required to have current registration with EnergySafety to do such work (Permit) or to work in a prescribed capacity under a gasfitting authorisation.

An applicant applying for a permit is required to satisfy the Director of Energy Safety that they can comply with the legislation by:

- demonstrating adequate theoretical and practical knowledge and adequate skills, to carry out the gasfitting;
- demonstrating adequate knowledge of the Act (*Gas Standards Act 1972*) and the regulations [Gas Standards (Gasfitting and Consumer Gas Installations) Regulations 1999]; and
- being a fit and proper person to carry out the gasfitting.

The technical compliance requirements (skills and knowledge) are set out in Schedules 6 & 7 of the regulations. Therefore any course based on these guidelines must focus on the current regulations, and applicable codes and standards.

The regulations mandate in regulation 18 specific requirements for the gas fitter that is gasfitting work must be carried out:

- in a safe manner;
- to a trade finish;
- in compliance with the regulations and, left safe to use.

Any training course must include these fundamental requirements.

Outcomes

Trainees shall, at the end of the training, be able to demonstrate adequate skills and knowledge in:

- installing Type A appliances; and
- the installing and servicing of consumer gas piping systems operating up to a maximum operating pressure of 200 kPa; or
- servicing of Type A appliances.

Prerequisites

A trainee must be a registered gas fitter with EnergySafety or have successfully completed training or assessments, recognised by EnergySafety, in:

- Gas standards legislation (WA).
- Gas safety.
- Basic combustion, fluing and exhaust principles.

Course content

The listed Essential Requirements and Training Topics shall be included in the course or training package and shall be considered as the minimum training that a person will need to complete to obtain a Class G permit in WA. The training may focus on:

- installing of Type A gas appliances and consumers gas piping systems; or
- servicing of Type A appliances

Where applicable, the training structure will need to address:

- safe working practices;
- gas safety, emergency procedures and combustion principles;
- legal compliance with regulations, codes and standards; and
- assessment of technical ability to complete the gasfitting work in a safe manner, to a trade finish and left safe to use.

Training shall provide a suitable balance between theory and practise. Suitable resources shall be provided for training that is competency based.

EnergySafety reserves the right to reject any training package/course that it considers does not meet an acceptable licensing outcome.

For further information, contact the Principal Engineer Gas Utilisation.

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Recognition of training

It is EnergySafety policy that, where available, training be in accordance with national competencies.

To obtain recognition of the training package or course by the Director of Energy Safety for licensing purposes, a trainer needs to provide a written submission, detailing the training to be provided, to the Director of Energy Safety for consideration and endorsement.

Without the endorsement of the Director of Energy Safety, training packages or course will not be adequate for the issuing of a licence.

The submission must:

- Identify the training package/course/outline and which Class of gasfitting the training is intended to cover.
- List the competency units the training will cover. This list must be consistent with the EnergySafety licensing requirements and any agreements between EnergySafety and the Training Authority.
- Identify where the training topics and essential requirements listed in the guidelines will be covered in your training. Provide competency to equated requirement mapping.
- Identify the qualifications of the presenter and technical ability to deliver the training.
- Provide a list of training resources which will be used by trainees to obtain each of the gas competencies.
- Provide assessments - theory and practical, how will the student be assessed both theoretically and in the workplace or through workplace simulation. For written theory assessments supply papers with answers. Provide, where applicable, a copy of the quality delivery and assessment strategy (QDAS) document and assessment flow chart.
- Provide a reporting process (documentation that will be given at the end of the training package/course) which will state the competencies attained and the Class/type of licence for which a trainee can apply. EnergySafety has recommended proformas.

For a training package/course designed to obtain a licence, a co-examiner acceptable to EnergySafety may need to be nominated to review the assessment of the trainee. This would normally take place after the Director of Energy Safety has endorsed the training.

EnergySafety reserves the right to review the delivery of training at any stage and accept or reject a qualification issued by an EnergySafety recognised training provider.

Class G Gas Fitter Training - Essential Requirements

Relevant to the intended training outcome, installation gasfitting or servicing of gas appliances, all the listed essential requirements must be covered in the course or training package.

A person undertaking training based on these guidelines shall at the conclusion of training be able to demonstrate they have adequate skills and knowledge to carry out Class G gasfitting.

Training shall provide the trainee with adequate skills and knowledge in the following:

- LP Gas supply;
- gas meters;
- consumers gas piping;
- pressure control;
- Type A appliance ventilation requirements;
- Type A appliance installation and commissioning;
- Type A appliance fluing;
- Type A appliance servicing (optional).

Training must include the specific legislation associated with Class G gasfitting. In particular, the trainee must be able to:

- state which act and regulations deal with a consumer's gas installation;
- identify the authority responsible for ensuring compliance with the *Gas Standards Act 1972* and its regulations;
- state the purpose of gasfitting permit for Class G gasfitting;
- state what class of gasfitting permit the trainee will be able to apply for on successfully completing the training;
- state how to apply for a gasfitting permit;
- describe the compliance process for (or state the compliance requirements for):
 - new installations;
 - existing installations.
- state the approvals requirements for Type A appliances;
- state the codes and standards, relevant to Class G gasfitting, called up in the Gas Standards (Gasfitting and Consumer Gas Installations) Regulations 1999 and their purpose;
- state the requirements for complying with a Notice of Defects; and
- outline the roles and responsibilities of the:
 - gas fitter;
 - consumer;
 - employer;
 - gas supplier;
 - authority;
 - gas inspectors.

National Competencies

National competencies, where available, shall be used as part of a training package, and be supplemented, as necessary, by including all the listed applicable Essential Requirements and Training Topics.

Only those competences identified by EnergySafety as specific to obtain a gasfitting license will be considered.

Minimum literacy and numeracy requirements

For public safety and to ensure gas fitters can meet the technical standards required minimum literacy and numeracy standards must be met before a person can be deemed competent to carry out gasfitting work. Once the training provider issues the student with the agreed document identified in the training recognition process the student may be issued with a gasfitting permit. The applicant for a gasfitting permit or authorisation must have sufficient literacy and numeracy skills so that they are, in the workplace, able to independently:

- (a) read, interpret and apply regulations, industry codes, standards, and manufacturers' installation instructions;
- (b) duly complete the administration requirements of the Regulations. This includes, but is not limited to Notices of Completion and compliance badges; and
- (c) correctly calculate ventilation requirements, correctly size flueing, correctly size piping systems, and correctly plan a gas installation.

Reasonable adjustments may be made to the assessment process to meet the needs of individual applicants, but shall not reduce the minimum requirements set out in this guideline.

Assessment

Each trainee will be required to demonstrate to the trainer/assessor that they have achieved adequate skills and knowledge to carry out gasfitting work safely, to a trade finish and in compliance with regulations.

The topics listed in this document are suggested as being the minimum scope of training a person will need to obtain a Class G permit. It is not intended that this is an exhaustive or definitive list; a training package may include more topics.

The trainee will need to demonstrate workplace competency validation, in all essential requirements, consistent with national competency training standards.

Assessment methodology

Training assessments shall be sufficient to demonstrate that the trainee can operate within the scope of the permit the trainee is applying for:

1. Work as an independent gas fitter; or
2. Work under supervision of a registered gas fitter while completing training.

1. *Work as an independent gas fitter*

To ensure the trainee can work as an independent gas fitter the trainee should not be deemed competent unless they can demonstrate they can perform in a workplace:

- safely;
- so that all their work is compliant with regulatory requirements and industry standards; and
- they leave the installation safe for the gas consumer to use.

Assessments of the trainee's practical competence must be established in the workplace or realistically simulated workplace environments.

The assessment of theoretical skills and knowledge can be established in a number of ways verbal or written question and answers. As a minimum the trainee must demonstrate a working knowledge and understanding of regulations and appropriate industry standards. They must be able to demonstrate the ability to reference regulations by, sections, and clauses and identify that a gas installation is compliant. They must have sufficient understanding of gas combustion (natural gas and liquefied petroleum gas [LP Gas]), exhaust principals and gas safety.

The clustering of assessments is preferred and where simulated workplace assessment is used is essential. Typical real life or very closely simulated scenarios that require the trainee to apply the appropriate skill and knowledge to a given situation are required. As an example, the trainee must be able to identify:

- the location for a gas meter or LP Gas supply;
- the correct regulator and piping system;
- the correct location for gas appliances;
- the correct components for the installation;
- the correct flue and flue location;
- the ventilation requirements;
- the correct pressure testing requirements;
- the correct commissioning procedure and adjustments;
- any defective or noncompliant gas installation;
- identify the administration provisions for obtaining gas supply and carryout the installation or service work as required.

Where a work logbook or journal is utilised they must be auditable. *EnergySafety* require the logbook or journal to identify:

- the supervising gasfitter's name and number;
- the trainees restricted gasfitting number;
- Notice of Completion number (were applicable);
- work carried out by the student with supporting evidence;
- property address, or registration number of caravan or marine craft;
- owners name and contact details;
- if the work was inspected, by the assessor or authorised gas inspector;
- if a Notice of Defects was issued for the work;
- if the assessment was simulated;
- assessors name and contact details.

A copy of a Notice of Completion for each job attached to the logbook will provide most of the information required.

The training provider agrees to retain evidence that the trainee obtained the relevant competences before being issued the documentation which allows the trainee to obtain a gasfitting permit or authorisation. The training provider must retain evidence of competence for a period of five years from the issuing of the documentation.

2. Trainee working under supervision of a registered Gas Fitter while completing training

A trainee is required to have adequate skills and knowledge to carryout gasfitting in the workplace. To obtain a restricted permit to work under supervision the trainee must have adequate knowledge of:

- WA gasfitting legislation and appropriate industry standards;
- gas safety;
- combustion and exhaust principals; and
- skills to work under supervision of a registered Gas Fitter.

As a minimum the trainee must demonstrate a working knowledge and understanding of regulation and appropriate industry standards. They must be able to demonstrate the ability to reference regulation, section, and clause and identify that a gas installation is compliant.

The trainee must be able to demonstrate the ability to work safely, carryout some basic gasfitting work and use tools of the trade.

Training Topics

All the listed training topics must be covered in the course or training package.

LP Gas Supply

Training topics:

- Principles of LP Gas vapour pressure and temperature relationship.
- Safety aspects for the siting of cylinders and tanks.
- Identify the correct location for the installation of cylinders and tanks.
- Identify cylinders and tanks comply with current standards and codes.
- Cylinder housing is correct for application and correct ventilation is installed.
- Flow and control (1st stage regulator, change over regulators etc.).
- Setting pressures.
- System design, sizing for load.
- Safety relief devices operation and location.
- Cylinder and tank piping connection.
- Materials.
- Testing.
- Purging.
- Commissioning.

Gas Meters

Training topics:

- Safety aspects for the siting of gas meters.
- Safety aspects of working with meters (disconnection, capping etc).
- Metering principles, design and sizing.
- Prohibited locations.
- Location of master meters.
- Location of subsidiary meters.
- Ventilation of meter housing.
- Pre-payment metering, safeguards (low pressure cut off).
- Connection.
- Testing.
- Commissioning.

Consumer Gas Piping

(Installation, sizing, testing and commissioning)

Training topics:

- Safety aspects for the siting and location of consumer gas piping.
- System design (calculation of loads and sizing of piping).
- Installing consumer gas piping.
- Methods of joining pipe:
 - brazing;
 - fusion welding of polyethylene (PE) pipes;
 - perform oxy-acetylene welding;
 - weld using manual metal arc welding process;
 - threaded;
 - mechanical.
- Materials acceptable for use.
- Materials not acceptable for use.
- Supporting.
- Flexible piping (hose assemblies).
- Termination of piping:
 - Bayonet points (quick connection devices).
 - Temporary termination.
 - Appliance connection points.
 - Isolation valves.
- Consumer piping:
 - Domestic.
 - Commercial.
 - Industrial.
 - Special requirements for caravan and marine craft.
- Corrosion protection.
- Maintenance and repair.
- Testing.
- Purging.
- Commissioning.

Pressure Control

(Installation, sizing, testing and commissioning - prescribed pressure up to 7 kPa, 7-200 kPa)

Training topics:

- Safety aspects for the siting and location.
- Understanding pressure.
- Measurement of pressure.
- Pressure reducing devices.
- Principles of operation.
- Safeguards for pressure raising devices (non return valves and low pressure cut off).
- Safety devices:
 - Safety shut off valve (SSOV).
 - Under pressure shut off device (UPSO).
 - Over pressure shut off device (OPSO).
 - Pressure switches.
- Design, calculation of load and sizing.
- Venting.
- Maintenance, repair and servicing.
- Testing.
- Commissioning.

Type A Appliances Ventilation Requirements

Training topics:

- Understanding basic combustion principles.
- Safety aspects for the siting and location.
- Air for combustion (sources).
- Ventilation (natural).
- Ventilation mechanical:
 - Interlocks;
 - air pressure switches.
- Testing and checking.

Type A Appliance Installation and Commissioning

Training topics:

- Understanding basic combustion principles.
- Identify "Type A" appliances.
- Safety aspects for the siting and location.
- Appliance is fit for purpose.
- Appliance is approved for connection.
- Appliance operation (including an understanding of):
 - Component parts.
 - Thermostats.
 - Safety devices.
- Installed with regard to manufacturer's instructions, current codes and standards.
- Testing.
- Commissioning:
 - Check for correct operation.
 - Adjustment.
 - Demonstrate operation of appliance.
- Conversions.
- Modifications.
- Used appliances.

Type A Appliance Fluing

(Installation, sizing, testing and commissioning)

Training topics:

- Safety aspects for the siting and location.
- Principles of fluing, factors which effect:
 - Safety.
 - Operation.
 - Performance.
 - Efficiency.
- Single and multiple flue systems.
- Natural draught.
- Forced draught.
- Interlocks for safe operation.
- Installations:
 - Natural draught flues.
 - Forced, power assisted flues.
 - Interlocks.
 - Wall and roof penetrations.
- Servicing.
- Testing.
- Commissioning.

Type A Appliance Servicing (optional)

Training topics:

- Understand basic combustion principles.
- Assessing flame/combustion quality.
- Safety aspects including hazards associated with:
 - Electricity.
 - Location.
 - Operation.
 - Ventilation.
 - Fluing.
- Decommission appliance.
- Identify and test component parts for correct operation.
- Appliance is fit for purpose.
- Service appliance:
 - In accordance with manufacturer requirements current codes and standards.
 - Identify faults.
 - Rectify faults.
- Test.
- Commission.
- Check for safe operation.
- Apply service sticker.
- Demonstrate correct operation.
- Conversions.
- Modifications.
- Used appliances.

List of Essential Performance Capability Requirements for Licensed Gas Fitters

Explanatory Note

Gasfitting is a licensed occupation throughout Australia. This document lists the essential capabilities that a gas fitter must have before they are issued with a Western Australian licence.

Enquiries: Please contact the Gas Licensing Authority

List of Essential Performance Capabilities for Prospective Gas Fitters

Preface and Context:

The following tables list the various essential or minimum capabilities expected of a licensed gas fitter in Western Australia. To put this statement into a workplace competency context where relevant, a person seeking a gas fitter license needs to be capable of competently and safely performing the tasks set out in the tables, in a wide variety of typical industry environments, working independently and without supervision.

Furthermore, the person needs to know what action, if taken, will void the integrity, compliance and/or certification of gas equipment or a gas installation.

“Typical industry environments” is to be taken to include routine types of commercial premises and office buildings, industrial sites of modest complexity (not including “Type B” gas appliances or pressures exceeding 200 kPa), institutional premises of modest complexity (eg. high schools, hospitals) and residential premises (single dwellings, multi-unit buildings including high rise units), caravans and marine craft.

The applicant will be able to competently:

	ESSENTIAL CAPABILITY	COMMENTS	Critical Item
1.	Demonstrate a knowledge of legal compliance requirements.	State or Territory legislation which applies, overview of mutual recognition laws.	Critical
2.	Explain the hazards of escaping unburnt gas.	Fundamental principles of emergency procedures.	Critical
3.	Explain how to handle a gas-affected building.	Fundamental principles of emergency procedures.	Critical
4.	Explain how to handle gas emergencies.	Managing a gas affected room, LP Gas tanks and cylinders and fundamental principles of emergency fire procedures.	Critical
5.	Explain the symptoms and effects of carbon monoxide poisoning.	Fundamental principles of emergency procedures and first aid.	Critical
6.	Explain the symptoms and effects of gas asphyxiation.	Fundamental principles of emergency procedures and first aid.	Critical
7.	Demonstrate understanding of the requirements for personal safety in the workplace.	Adoption of safe working practices, incident reporting process and responsibility to co-workers. Reference to safe gas working guidelines issued by regulators, including supervision requirements applying to apprentices and trainees.	Critical
8.	Describe basic statutory occupational safety and health responsibilities for employers and employees, including supervisory requirements and employees' own "duty of care".	Occupational safety and health regulations and gas safety regulations - legal requirements, safety committees and duty of care.	Critical
9.	Describe a workplace safety check, identify potential workplace hazards and suggest measures for accident prevention.	Workplace safety inspections. Reference to guidelines issued by both gas safety regulators and general workplace safety regulators including the supervision requirements applying to apprentices/trainees.	Critical
10.	Demonstrate a knowledge of the types of gases marketed in Australia.	Basic properties of natural gas, town gas, LP Gas, TLP and SNG.	
11.	Demonstrate a knowledge of properties and characteristics of gases.	Heating value, relative density, flame propagation, flammability limits (LEL, UEL), ignition temperatures, air requirements and odorants. Include temperature/pressure relationship, vaporisation and expansion rate of LP Gas, tank and cylinder capacity.	Critical

	ESSENTIAL CAPABILITY	COMMENTS	Critical Item
12.	Demonstrate a knowledge of gas pressure.	Conversion factors, pressure classification.	Critical
13.	Demonstrate a knowledge of pressure measurement.	Using a manometer, pressure gauge and pressure recorder.	Critical
14.	Demonstrate a knowledge of testing for soundness.	Pressure testing procedure (leakage testing) for gas installations including testing medium. Refer to AS/NZS 5601.	Critical
15.	Demonstrate a knowledge of purging.	Commissioning and decommissioning gas lines.	
16.	Demonstrate a knowledge of the principles and products of combustion.	Combustion chemistry (fuel, oxygen, ignition), products of combustion and combustion formulae.	Critical
17.	Demonstrate a knowledge of causes and effects of incomplete combustion.	How incomplete combustion occurs and how the products of combustion can change. Safety implications.	Critical
18.	Explain the operation of LP Gas vaporisers.	Include direct and indirect fired and atmospheric vaporisers.	
19.	Explain the operation of pressure relief valves and fill, vapour and liquid valves on tanks and cylinders.	Include pressure levels and valve orientation.	Critical
20.	Explain the operation of aerated and post-aerated burners.	Include combustion zones, advantages and disadvantages of each burner and types of burners.	
21.	Explain flame retention.	Include ports, rings and product recirculation.	
22.	Demonstrate a knowledge of burner adjustment.	Show the difference between over and under-aerated flames and a knowledge of how to adjust them and orifice sizing.	Critical
23.	Explain the functions of gas pressure regulators over pressure protection systems and control devices.	Include appliance regulators, compensating regulators, service regulators and volumetric regulators. Include OPSO and UPSO regulators and LP Gas automatic change over regulators.	Critical
24.	Demonstrate the knowledge of correct regulator selection and adjustment.	Explain how to select a regulator for a specific task and correctly set a regulator to provide the required pressure.	Critical
25.	Explain the function of a thermostat. (Servicing)	Include safety functions and thermal efficiency.	
26.	Explain the operation of gas appliance thermostats. (Servicing)	Principles of operation and what the applications are. Include the rod and tube, snap action, liquid expansion, vapour pressure and bimetal thermostats.	Critical

	ESSENTIAL CAPABILITY	COMMENTS	Critical Item
27.	Demonstrate the knowledge of types of flame failure devices and how they operate.	Include bimetal strips, thermoelectric, mercury and photoelectric devices.	Critical
28.	Demonstrate the knowledge of over temperature cut off devices and how they operate.	How they work and what they are used for.	Critical
29.	Demonstrate a knowledge of oxygen depletion devices and how they operate.	How they work and what they are used for.	Critical
30.	Demonstrate a knowledge of the operation of ignition devices.	Include electrical filaments, flash tubes, piezo and electronic igniters. Also flame establishment and proving concepts.	Critical
31.	Demonstrate an ability to fault find in ignition systems. (Servicing)	Include the reasons why ignition systems fail and how to locate the fault.	Critical
32.	Demonstrate a knowledge of the operation of re-igniters. (Servicing)	How they operate and what they are used for.	
33.	Demonstrate an ability to fault find in re-igniters. (Servicing)	Include the reasons that re-igniters fail.	
34.	Explain the operation of solenoid, relay and combination control valves.	How they operate and what they are used for.	
35.	Explain the operation of flue systems, including power flues.	Include the necessity for a flue and how to determine fluing requirements. Explain the operation of a flue and include the parts of a flue and their function.	Critical
36.	Demonstrate a knowledge of flue design.	Include flue materials, single, multiple and combined appliance flue systems. Include flue sizing to AS/NZS 5601.	Critical
37.	Demonstrate an ability to install gas appliance flues.	Locating a flue and installing a flue system. Refer to AS/NZS 5601.	Critical
38.	Demonstrate a knowledge of appliance ventilation requirements.	Include high and low level room ventilation and external flue terminal positioning for both atmospheric and mechanical flues. Refer to AS/NZS 5601.	Critical
39.	Explain the principles of gas appliance conversion.	Include manufacturer's conversion kits, regulatory procedures and labelling.	
40.	Demonstrate an ability to install gas pipe.	Practical skill in brazing, welding (oxygen/acetylene, arch), PE pipe fusion and UPVC jointing methods, pipe fitting including flare connections, pipe bending and appliance connection.	Critical

	ESSENTIAL CAPABILITY	COMMENTS	Critical Item
41.	Demonstrate a knowledge of sizing consumer piping.	Refer to AS/NZS 5601 for procedure required.	Critical
42.	Explain the principles of operation of gas appliances.	Include cooking, space heating and water heating domestic and commercial type A appliances. Include pool heaters, fryers, laundry dryers, bbq grillers and commercial hot water systems.	Critical
43.	Demonstrate an ability to install gas appliances.	Locating the appliance correctly and include safety precautions for each appliance. Refer to AS/NZS 5601.	Critical
44.	Demonstrate an ability to commission gas appliances.	Include installation check and appliance operation. Include instructions to the customer.	Critical
45.	Explain the operation of gas meters.	Include wet and dry positive displacement meters and rotary meters.	
46.	Demonstrate the ability to install a gas meter.	Include connecting to a high and medium pressure inlet service, use of bonding straps.	Critical
47.	Demonstrate the ability to read a gas meter.	Check gas rates and reading both imperial and metric meters.	
48.	Demonstrate the ability to correctly locate a gas meter.	Refer to AS/NZS 5601.	Critical
49.	Demonstrate a knowledge of LP Gas decanting procedures.	Demonstrate the use of the bleeder valve and safety precautions used.	
50.	Demonstrate the ability to correctly locate LP Gas storage to an aggregate capacity of up to 500L.	Refer to AS/NZS 5601.	Critical
51.	Demonstrate the ability to install LP Gas systems in caravans and marine craft.	Include correctly siting cylinders, gas detection, and installation procedures to AS/NZS 5601.	
52.	Demonstrate the knowledge and practices that are essential for working safely with power equipment and tools and knowledge of testing and tagging procedures.	Testing and tagging procedures, common causes and prevention of electrical incidents. Safe use of hand and power tools, including power actuated fastening devices, ladders, elevated work platforms etc.	Critical

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