CSA Unit 1- Safety

Chapter 1
On-the-job Safety Measures

Safety is the responsibility of all workers in all trades. Gas technicians/fitters routinely work in potentially dangerous locations with equipment that could cause injury to oneself and others. A gas technician/fitter must be thoroughly familiar with hazards and safety procedures that relate to work habits, work sites, and use of various tools and equipment.

MK
Created
by Mike Kapin

Safety Objectives

Describe personal safety factors

Understanding the importance of proper work habits, clothing, and protective equipment

Identify site hazards and protections

Recognizing potential dangers in the workplace and implementing appropriate safeguards

Ensure safety of tools and equipment

Properly maintaining and using all tools and equipment to prevent accidents

Develop general safe work habits

Establishing routines and practices that prioritize safety in all work situations

Key Terminology

Term	Abbreviation (Symbol)	Definition
Confined space		Work area where location, design, or construction restricts entry and exit and where equipment, operations, or atmospheres may pose hazards to health and safety.
Group safety equipment		Equipment such as fire extinguishers and first aid kits supplied by the employer and positioned around the job site.
Lockout procedures		Procedures using locks and safety tags to ensure the isolation and lock off of all sources of potential, kinetic, and stored energy during work on a system.
Musculoskeletal disorder hazards	MSD hazards	Aspects of the job or the process of doing the job that increase the risk of a worker developing a musculoskeletal disorder (MSD). Primary hazards are force, postures, and repetition.
Personal protective equipment	PPE	Standard safety clothing.
Ventilation equipment		Equipment found in workshops designed for the removal of harmful dust or fumes.

Personal Safety Overview

Personal safe work practices are as important as a gas technician's/fitter's trade skills. The way of handling personal safety underlies all the other safety issues and rules to live by at work. Personal safety is a combination of knowledge and awareness: a gas technician/fitter must be knowledgeable and skilful in the use and care of tools and aware of the hazards and safety procedures that apply to any job or job site.

Work Habits

Developing proper techniques and awareness of how actions affect others

MSD Hazards

Understanding and preventing musculoskeletal disorders through proper techniques

Clothing

Wearing appropriate attire for specific work conditions

Protective Equipment

Using proper PPE for head, respiratory, eye, hearing, hand, and foot protection

Work Habits for Safety

Courtesy

Means taking into account the safety of those you are working with. Put yourself in the other person's place and keep the other person in mind.

Attention

To the safety of your environment and those working nearby helps avoid accidents.

Safe Conduct

Includes wearing appropriate clothing and protective equipment, observing good housekeeping and safety procedures, and displaying common sense. Safe conduct also involves following correct procedures after an accident has occurred.

A competent worker learns skills to the point where they become automatic. Skilled workers have learned to do the job both safely and correctly without losing sight of how actions may affect the safety of other workers.

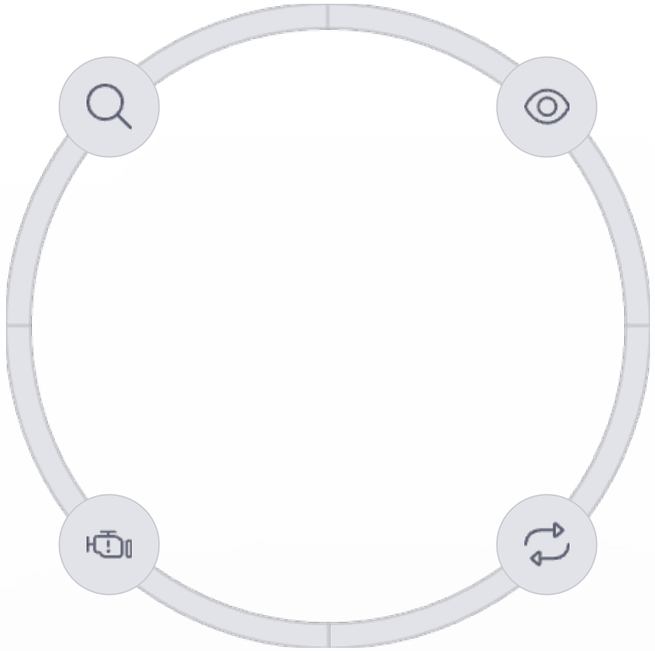
Musculoskeletal Disorder Hazards

Force

The amount of effort exerted by the muscles and the amount of pressure on body parts that result from different job demands.

Other MSD Hazards

Contact stress, vibration, cold temperatures, hot work environments, and repeated impacts.

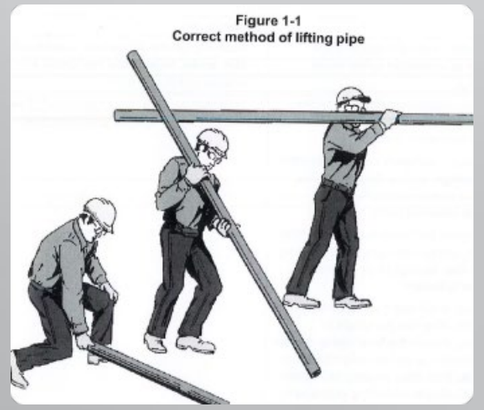


Posture

Another name for the position of various parts of the body during any activity. Good or "neutral" posture means joints are used near the middle of their full range of motion.

Repetition

The risk of developing an MSD increases when the same parts of the body are used repeatedly, with few breaks or chances to rest.



Proper Lifting Technique

For most joints, a good or "neutral" posture means that the joints are being used near the middle of their full range of motion. The image above demonstrates good posture when lifting pipe.

The farther a joint moves towards either end of its range of motion or the farther away from the neutral posture, the more awkward or poor the posture becomes and the more the muscles, tendons, and ligaments around the joint experience strain.

For more information, go to Canada's National Workplace Health and Safety website with links to federal, provincial and territorial governments and their agencies: http://www.canoshweb.org/

Appropriate Work Clothing

Do

- Always wear clothing supplied by the employer or as directed by the safety supervisor
- Wear non-synthetic breathable workwear that covers all exposed body parts that the work environment can affect
- Wear specific workwear for tasks requiring special ratings, such as flame-retardant clothing
- Wear clothing that protects your body from dirt, heat, sparks, and flying chips
- Wear caps or hairnets if you have long hair or a beard
- Remove rings, metal watchbands, bracelets, loose ties, and neck chains when working around electrical equipment

Do Not

- Wear oily, greasy, or synthetic clothes since they are fire hazards and may cause skin irritation
- Tuck your pant legs inside your boots if you are working with or near a torch or grinder

For gas technicians/fitter, wearing street clothing is not usually recommended on the job. Each work task will dictate which work clothing is necessary for the job conditions.

Personal Protective Equipment (PPE)

Specific work conditions will dictate the necessary personal protective equipment (PPE) you will use as a gas technician/fitter. You should note, however, that safety equipment including PPE is considered the "last line of defence". You should employ first and foremost an awareness of your environment and safe work practice.

Head Protection

Hard hats and accessories to protect from falling objects

Respiratory Protection

Masks and respirators to prevent inhalation of harmful substances

Eye Protection

Safety glasses, goggles, and face shields for various tasks

Hearing Protection

Ear plugs and ear muffs to prevent hearing damage

Hand Protection

Various types of gloves for different hazards

Foot Protection

Safety footwear with toe protection and other features

Head Protection

Regulatory authorities and employer requirements may demand that workers wear hard hats and accessories in specific areas and to suit specific job conditions. They can require a variety of protective gear. Most head protection is adjustable, and some have chin straps, liners, or ear muffs.

Requirements

Reference CSA Standard Class E I or II for additional information on head protection requirements.

Restrictions

You must not wear metallic hard hats when working on electrical equipment. Regulations prohibit you from altering your hard hat in any way, as it will reduce the level of protection provided by the hat.

Prohibited Modifications

Painting, placing stickers on, or drilling holes in the head protection is not allowed.

Respiratory Protection

You may be exposed to airborne particles, chemicals, toxic gases, or fumes that can cause lung damage if inhaled. In situations involving such exposure, use an approved mask or respirator.

Proper Filter Selection

When using a filter respirator, ensure that you are using the correct cartridge for the gas or hazard you are exposed to. Refer to the manufacturer's specifications for the equipment you are using.

Certification Requirements

A gas technician/fitter may need to have special certification for a respiratory system. Refer to the Occupational Health and Safety Act (OHSA) and employer Occupational Health and Safety (OH&S) requirements and policies.

Immediate Action

You should immediately consult your supervisor if you suspect a designated substance that may be a respiratory hazard.

Reference CAN/CSA Z94.4 and CSA Z180.1 for additional information on respiratory protection standards.

Types of Respirators

Different types of respirators and masks are designed for specific hazards and environments. The image shows various respirators and masks, including Self-Contained Breathing Apparatus (SCBA) systems.

When selecting respiratory protection, consider:

Type of Hazard

Identify the specific airborne contaminants you need protection from

Level of Protection

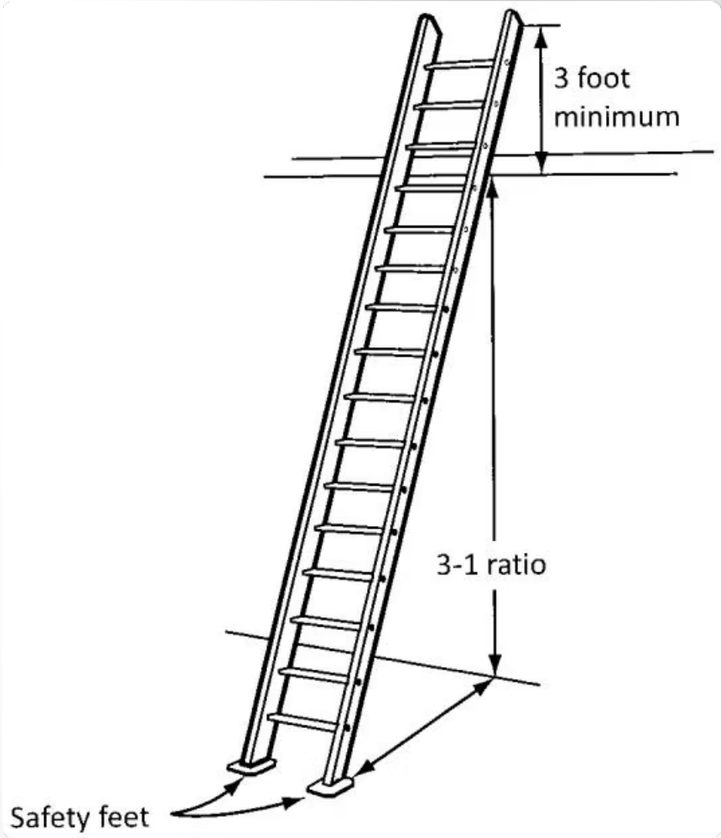
Determine the concentration of contaminants and required protection factor

Duration of Use

Consider how long you'll need to wear the respirator

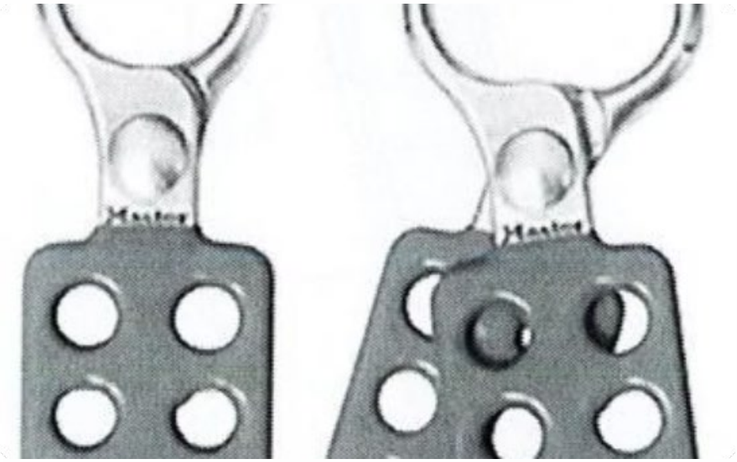
Fit Testing

Ensure proper fit for maximum protection



Eye and Face Protection

Eye protection is one of the most important safety concerns of workers and people on a job site. Workers must wear the appropriate eye and face protection for the task performed or the work conditions. OH&S regulations require certified eye and face wear, which also come as part of the employer's requirements.



Safety Glasses

Basic protection for low-impact hazards

Safety Goggles

Sealed protection from dust, chemicals, and splashes

Face Shields

Full-face protection for high-risk activities

Reference CSA Z94.3.1, CSA Z462 for additional information on eye and face protection standards.

Eye Protection Guidelines

1

Assess the Task

Select the eye and face protection required for the specific job you're performing

2

Wear Protection Consistently

It is a good habit to wear general eye protection at all times while you are in the work zone

3

Regular Maintenance

Clean and check regularly all eye and face protection, replacing it as required

4

Report Faulty Equipment

Inform your supervisor of any faulty equipment immediately

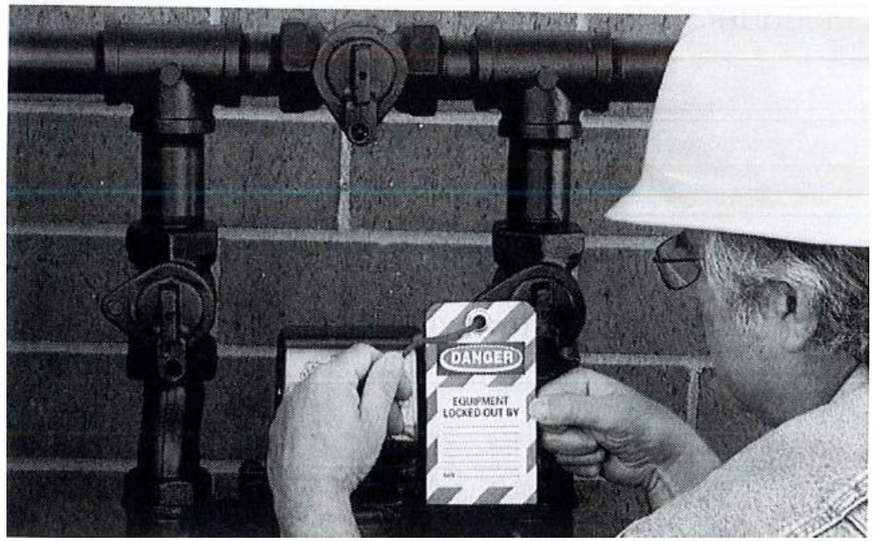
5

Use Task-Specific Protection

Wear goggles when chipping concrete or handling caustic liquids and proper flash goggles when working around welding

Caution! Never assume that your regular prescription glasses, sunglasses, or contact lenses will give you adequate eye protection. Without proper eye protection, dust particles, wood chips, sparks, or "flash" may still cause eye injury.

Hearing Protection



Many job situations also require hearing protection. Noise can affect you in various ways, from diminishing your ability to hear certain sounds to causing permanent hearing loss.

Effects of Noise

- Moderate noise levels over a long period can diminish your ability to hear certain types of sounds
- High noise levels impair your hearing and can cause permanent damage
- High noise levels also affect your mental state, making you irritable and mentally fatigued

Choosing Ear Protection

1. Choose a type of protection suitable to the job you are doing
2. Ear plugs should be pliable, fit each ear tightly, clean, and free of damage
3. Ear muffs make it easier to hear certain signals in noisy environments
4. Headphones designed for listening to music do not provide adequate protection

Reference CSA Z94.2 for additional information on hearing protection standards.

Hand Protection

Accident statistics indicate that approximately 30% of work-related injuries happen to fingers, hands, and arms. Exposed hands and skin are susceptible to physical, chemical, and radiation hazards. Workers must protect hands and skin from injury by keeping hands shielded from the present hazard.

Thermally Insulated Gloves

For handling hot metal or cold substances, or working in cold weather

Chemical-Resistant Gloves

Rubber or approved plastic-treated gloves when handling chemicals, such as acids and cleaning chemicals

Welding Gloves

Gauntlet-type welder's gloves when welding or flame cutting

Electrical Work Gloves

Rubber gloves certified for electrical apparatus over 50 volts as required by CSA Z462

General Work Gloves

Leather or vinyl-coated gloves when handling lumber or steel

Reference CSA Z462 for additional information on electrically rated hand protection.

Foot Protection

A gas technician's/fitter's working environment calls for Grade 1 footwear, which should comply with CSA Z195. This type of footwear has a green equilateral triangle with sides measuring approximately 25 mm (1 in) sewn or otherwise permanently attached to the right shoe upper as a means of indicating that sole protection and Grade 1 toe protection are provided.

Electrical Protection

Footwear with electric shock resistance soles has a rectangular white patch with an orange-colored Greek letter omega (Ω)

Important Note

Electric shock resistance does not mean footwear is shockproof. Wear and wet conditions may significantly lower the effectiveness

Regular Maintenance

Regularly inspect the sole and heel, remove metal pieces, and replace footwear when the tread pattern is eroded

Water Resistance

Remove road salt and other contaminants and apply water repellent compounds to enhance resistance to water

Preventing Ankle Injuries

Use Proper Mounting Techniques

Using three points of contact (two hands and one foot, or two feet and one hand) when climbing on and off ladders, ramps, heavy equipment, and machinery

Maintain Good Housekeeping

Proper housekeeping procedures to reduce tripping and slipping hazards

Wear Appropriate Footwear

Use of high-cut (260 mm or 8 in) or medium cut (150 mm or 6 in) CSA-certified Grade 1 work boots

Properly Lace Boots

Lacing of boots to the top of the eyelets supplied will add greatly to the ankle support provided

Replace Worn Footwear

Badly worn boots do not offer the same support to the ankles as the firmness of the leather in newer footwear

Site Hazards Overview

A gas technician/fitter will work in a variety of different work environments in many capacities and will encounter hazards specific to the work site. Technicians/fitters must learn to identify these hazards and take precautionary measures to protect themselves from harm.

Site hazards change with each specific work site or area. Therefore, you need to determine and understand many hazards found on work sites. Your first action is to identify the hazards and ask questions if you are unsure of the situation. Always consult your supervisor for information about the hazard and the protections that you need to work safely.

Physical Hazards

Restricted Spaces

Working in cramped work areas with limited movement

Access Difficulties

Challenges in gaining entry to work areas

Moving Equipment

Non-fixed equipment or appliances that can shift

Corrosive Residues

Chemical substances that can damage skin and equipment

Electrical Hazards

Exposed wiring or energized equipment

Fluid Movement

Movement of liquids or solids in pipes, tubes, or other vessels

Temperature Extremes

Very hot or cold environments that can cause injury

Identifying Physical Hazards

External Inspection

Inspect a confined space from outside without entering

Equipment Assessment

Identify equipment that can suffer adverse effects from stored pressure, accidental contact, or gravity

Site Plan Review

Check site plans and proposed work with the site manager and other tradespersons

Electrical Hazard Check

Check for exposed electrical conductors or energized equipment

Generally, you can identify physical hazards quite easily. Before starting work on a job site, you must complete all these steps to ensure a safe working environment.

Atmospheric Hazards

Atmospheric hazards or environmental hazards are generally chemicals or materials in the air around the work site. They could also be in confined spaces and are often more difficult to assess. The particulate or gases usually require the use of special testing devices like a gas analyzer.

Combustible Gases

Explosive gases and vapors that can ignite

Oxygen Levels

Too much or too little oxygen in the atmosphere

Toxic Fumes

Harmful gases like carbon monoxide (CO)

You must check the atmosphere every time you plan to enter a confined space and regularly while you work there. Various types of gas detection equipment are available, and you must use the proper equipment to test specific conditions.

Confined Space Safety

A confined space is a work area where location, design, or construction restricts entry and exit and where equipment, operations, or atmospheres may pose hazards to health and safety.

1 Special Training Required

Before engaging in confined space activities, you usually have to undergo site- and situation-specific training and certification

2 Consult Local Requirements

Consult the safety authority in your area for local requirements, and seek clarification regarding the employer's policies and procedures

3 Regular Atmospheric Testing

Test the atmosphere before entry and at regular intervals while working

4 Use Proper Equipment

Ensure you have all necessary safety equipment for confined space entry

Visit www.ccohs.ca for more information on confined space safety requirements.

Site Protection Measures

Be aware that companies and employers are responsible for posting cautions and warnings to ensure the safety of everyone working on site. Before you start on a job, ensure that you know how the safety installations work and where they are located in your workplace.

Group Safety Equipment

Fire extinguishers, fire blankets, and first aid kits positioned around the job site

Ventilation Equipment

Systems designed to remove harmful dust, fumes, or exhaust gases

Clear Access Ways

Unobstructed pathways for movement and emergency evacuation

Good Housekeeping

Clean and organized work areas to prevent accidents and fire hazards

First Aid Equipment

Readily available medical supplies and trained personnel

Emergency Plans

Established procedures for evacuation, rescue, and emergency shutdown

Group Safety Equipment

Fire Extinguishers

Fire extinguishers are designed to fight small fires, but a standard extinguisher is of little value after a fire is well under way. Different types of extinguishers are designed for different classes of fires.

Fire safety is described in more detail in Chapter 4, Fire Safety Practices.

Fire Blankets

Gas technicians/fitters occasionally find themselves required to weld or use a cutting torch above flammable substances. In this situation, you should always use an approved fire blanket (ultra-heavy fibreglass Pyroblanket) to catch sparks and slag.

The types and amount of equipment supplied depend on the size and type of the job involved.

Ventilation Equipment

Vacuum Systems

Remove sawdust and chips from machines in millwork and joinery shops

Exhaust Systems

Remove exhaust gases from mechanical shops; you must use this whenever you run a gasoline or diesel engine

Special Ventilating Equipment

Removes harmful dust and toxic paint fumes used in body shops and spray-painting booths. You also use special equipment in confined or enclosed areas, especially during oxyacetylene cutting or welding

Most types of ventilation equipment found in workshops are designed for the removal of harmful dust or fumes. Proper ventilation is essential for maintaining a safe working environment, especially when working with materials that produce hazardous airborne particles or gases.

Clear Access Ways

Do not allow material to block or restrict access ways since blocked access ways can slow or prevent escape in the event of fire or evacuation. Partially blocked, littered, or otherwise restricted access ways can cause someone to fall. This is a serious hazard around machinery or when the worker is carrying something heavy, sharp, or breakable.

Emergency Evacuation

Clear pathways ensure quick exit during emergencies

Safe Movement

Unobstructed walkways prevent trips and falls

Material Transport

Clear paths allow for safe movement of equipment and materials

Access to Safety Equipment

Ensure clear access to fire extinguishers, first aid kits, and emergency exits

Good Housekeeping on Site

Keep Work Areas Clean

Waste build-up is a major fire risk. Except in cases of spontaneous combustion, the waste does not actually cause the fire, but furnishes fuel that will spread the fire if it is ignited by sparks.

Maintain Storage Areas

Do not use lockers and storage areas for storing waste, particularly paint-smeared or oily cloths.

Dispose of Oily Waste

You must avoid the build-up of oily waste on rags or clothing to prevent the very real risk of spontaneous combustion. Collect oily waste and rags in designated covered containers.

Clean Up Spills Immediately

A spill of a relatively small amount of volatile or flammable liquid can pose a serious fire hazard. Some spills require reporting to the local environmental authority.

First Aid Equipment and Training

Most modern industrial settings include a first aid station with a trained attendant or a staff person trained in workplace first aid procedures. The person who staffs the station is able to perform a wide variety of services, from bandaging minor cuts to stopping major bleeding and splinting broken bones.

Locate First Aid Resources

Take some time to find out where the first aid station is, who staffs it, and what services are available

Report All Injuries

If you have an injury, no matter how minor, ensure that the incident is reported in the first aid station log

Working Alone

If you are working alone or in an isolated area, be sure to have easy access to first aid supplies and have a way of notifying someone nearby

Maintain Certification

It is a good policy to keep first aid certification current

Emergency Plans and Shutdown Systems

Every work site should have an Emergency Response Plan. Workers need to familiarize themselves with this plan and consult their supervisor for training requirements.

Emergency Shutdown Systems

Many shop areas have emergency shutdown systems or "panic buttons." When you enter a shop or industrial setting for the first time, locate and learn how to use the emergency shutdown.

Power Cutoff

These systems are installed so that only one switch has to be thrown to kill the power to a large amount of equipment. Such systems are to be used when a person is being electrocuted or is caught in a piece of machinery.

Observe Emergency Stations

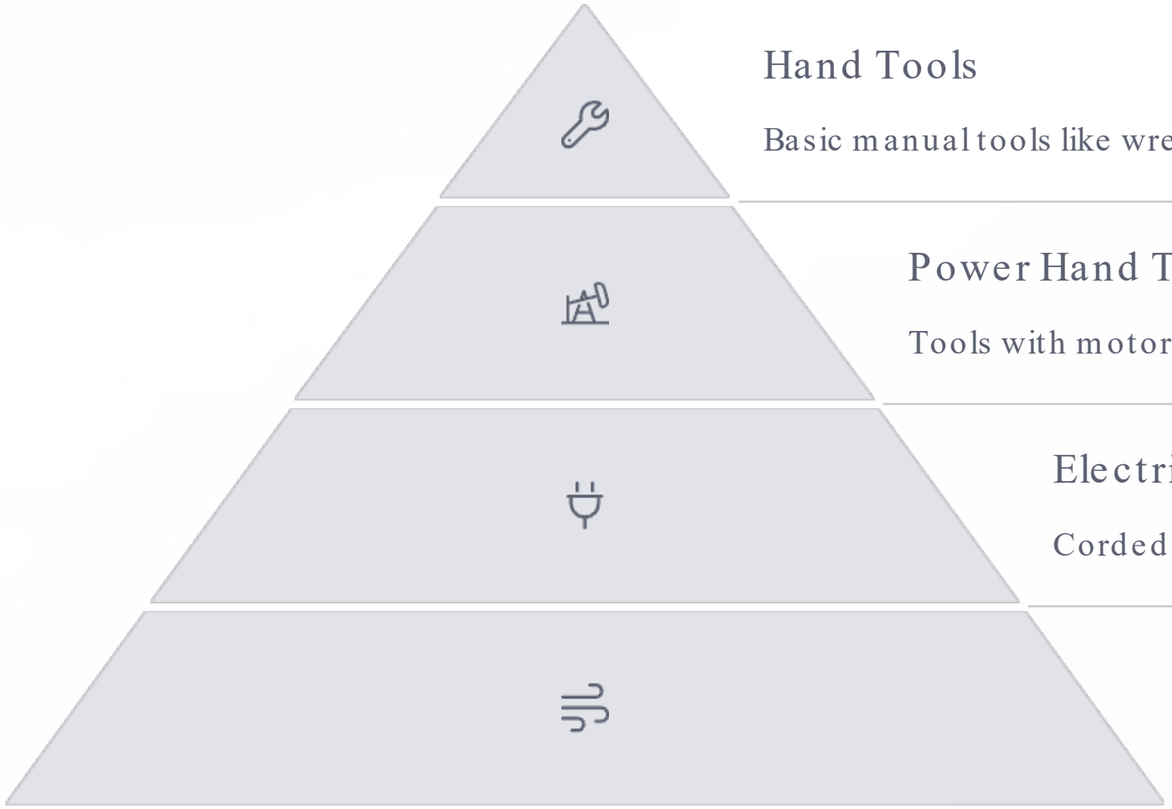
Make a habit of observing these emergency stations when familiarizing yourself with a facility.

Evacuation Routes

Be aware of the locations of smoke and heat detectors and automatic sprinkler systems, as well as doors, passageways, and emergency exits.

Safety of Tools and Equipment

A gas technician/fitter is required to use hand, power, electric, and pneumatic tools. The use and care of tools is very important to any tradesperson. All these tools have specific safety rules geared to the specific type of tool to protect you and others from harm.



Hand Tools

Basic manual tools like wrenches, hammers, and screwdrivers

Power Hand Tools

Tools with motors like drills, saws, and grinders

Electrical Tools

Corded, cordless, and fixed powered equipment

Pneumatic Tools

Air-powered tools with unique safety considerations

As a general rule for tools, if you are not familiar with a piece of equipment, do not use it until you have read the instructions and are ready to proceed.

Hand Tools Safety

Do

- Always select the proper tool for the job
- Keep hand tools clean, serviced, and in good condition
- Check that handles of hammers and axes fit tight into the head of the tool
- Only use pipe wrenches to turn or hold a pipe
- Replace worn jaws on pipe tools
- Select wrenches with sufficient capacity and leverage
- Pulling on wrenches is preferred to remain in control of the force
- Return tools to their proper place when not in use
- When using sharp-edged tools, always cut away from the body

- Always wear or use PPE that is appropriate for the hazards presented

Do Not

- Use a tool for a purpose other than what it is meant for
- Use damaged or unsafe tools
- Leave tools where they protrude or can fall and strike someone
- Use a file or rasp without a handle
- Use pipe extenders with wrenches
- Use wrenches to bend or twist, creating excessive torque
- Use pliers instead of a wrench or a wrench as a hammer

Power Hand Tools Safety

Authorization

Only authorized persons are allowed to use power tools or equipment. Consult your supervisor.

Training

Before using any power tool, review the operation and safety manual for the specific tool. Workers must be trained for each different tool.

Inspection

Before using any tool, check the condition of all guards, tool retainers, power supply cords, extension cords, and other accessories. Report any damage or defects, and remove the tool from service.

Shutdown

Shut off machinery when you leave the immediate area. Make sure revolving machinery has stopped before leaving.

Adjustments

Before adjusting or cleaning, be sure all machinery is stopped, disconnected, and locked off.

Power Tool Operation Safety

General Power Tool Safety

- Always use protective equipment to protect your eyes and/or face from flying particles
- Always use a dust mask when sanding or buffing with power tools
- Beware of moving parts: the drill, blade, disk, grinding wheel, or other device
- Do not use power tools without all guards and covers in place
- Be careful when using tools with spinning chucks or shafts

Tools with Axles (Arbors)

- Always check to see that the wheel, blade, or other rotating tool is securely mounted on the arbor
- When replacing a grinding wheel, be sure that the wheel is rated to match the RPM of the machine

Drill Press Safety

- Use a vice or clamps to hold material
- Use a face shield
- Set the drill speed and feed to match your particular drilling Chapter
- Check whether the equipment is free from obstruction
- Check that people are well clear before the machinery is turned on

Electrical Tools Safety

There are three types of electric tools: cordless (battery-powered), corded (plug-in), and fixed powered non-portable (mostly large tools).

Cordless Tools

Treat cordless tools and equipment the same as electric power tools and equipment while operating, servicing, or maintaining them. Cordless equipment is preferred for wet or outdoor usage.

Disconnecting Tools

Always disconnect, unplug (remove battery), or lockout electrical tools before making adjustments. Adjustments include changing saw blades, grinding wheels, or doing preventative maintenance.

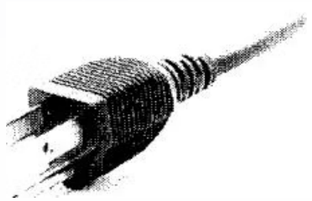
Grounding

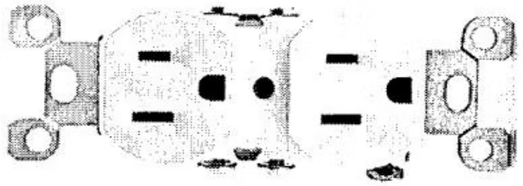
When using plug load-powered electric power tools, make sure the terminal (in the electrical outlet) and the ground pin (on the power cord) are in place and in good repair.

Double Insulation

Some hand-held electric power tools have an insulated handle or housing and are called "double insulated". These tools have no ground in the plug. Be sure you correctly identify these tools before using them.

Polarized Plugs and Electrical Safety





Polarized sockets are outlets that will only accept their own style of plugs, inserted in one way. The image shows a three-prong polarized plug with grounded, polarized receptacle.

Cord Condition

Make sure the insulation on the power cord is not cut or frayed. Damaged cords can cause an electric shock.

Cord Positioning

Position the cord to prevent it from being damaged while you use the tool.

Tool Handling

Hold electric tools firmly and with adequate control, and assume a comfortable, balanced position.

Proper Lifting

The proper and safe way to lift tools is by their handles. Do not lift an electric tool by its power cord.

Unplugging

Always remove plugs by grasping and pulling them straight out of the socket.

Outdoor Use

When using any corded power tool wet or outdoors, ensure that the circuit it is connected to is provided with a ground fault circuit interrupter (GFCI).

Pneumatic Tools Safety

Portable pneumatic (air-powered) tools have similar hazards as electrically powered tools, plus some that are unique.

Air Hose Management

You can trip over air supply hoses just as you can trip over electric cords. Route air hoses overhead or out of the way, so you cannot trip on them.

Hose Damage

If the air hose is cut, broken, or disconnected while under pressure, it can flail about and injure people. Do not allow them to lie where vehicles can cut or run over them.

Flying Debris

The air blowing from a hose can cause chips, dirt, and debris to fly about, causing irritation or danger to the eyes and lungs.

Personal Safety

Do not use air hoses to clean your clothes or body. Air pressure directed at you can be forced under your skin (which is painful) or into your bloodstream (which can kill you).

Never point an air hose at another person.

Lockout Procedures

Lockout procedures are quite basic. If you work on a machine or system, use locks to ensure that all sources of hazardous energy are isolated and locked off during work.

Lockout must involve more than merely disconnecting the energy source. You must assess the system hazards thoroughly, and isolate and lock off all energy sources - potential, electrical, pneumatic, hydraulic, rotational, or gravitational, static or dynamic. This is called zero energy state.

Locks

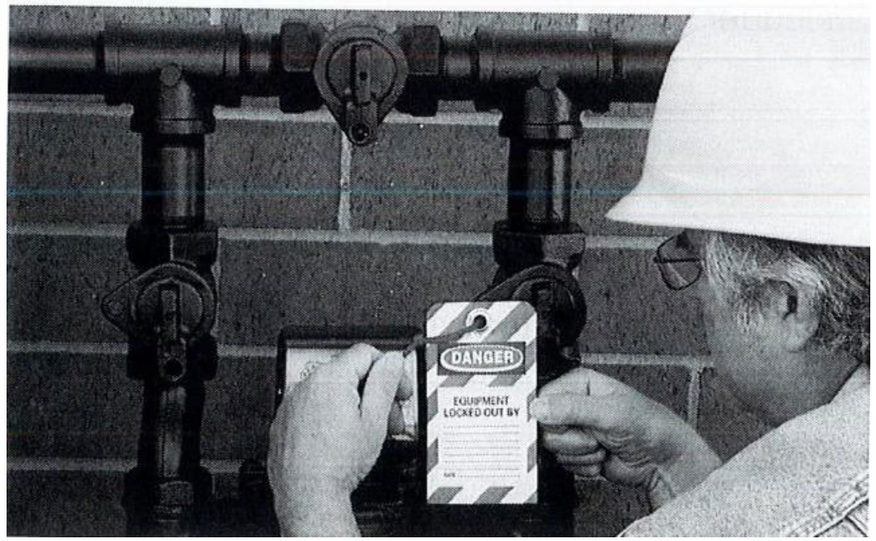
Locks are keyed to render a system inoperative

Safety Tags

Safety tags are used to identify the person who locks out a system and, sometimes, to warn other workers not to power up a system that cannot be locked out

Never work live unless you are authorized and supervised!

Safety Tag and Lockout Process



Each worker has his or her own lock and key (combination locks are not allowed), and you should use only these locks to lock out energy sources. Personnel then place safety tags on the locks, and only those who placed them can remove the tags and locks. The shift supervisor, however, keeps and takes control of a master key for use in an emergency.

Operator Information

The machine operator receives information on service or maintenance plans, but rules strictly forbid operators and other workers to remove either the tag or the lock.

Important Warning

It is against regulations and extremely dangerous to remove someone else's lock.

Universal Application

These procedures apply not only to stationary industrial equipment but also to mobile equipment, including passenger cars, truck equipment, and heavy construction equipment.

Multiple Lockout

Sometimes more than one person is working on a system or piece of machinery, and since each maintenance worker must use the lockout procedure before starting his or her Chapter, a device called a safety hasp is used to hold the locks. It is attached to the control box of the system or machinery so more than one lock may lock out the power. That way, when one worker is finished, the power remains locked out until the last worker is done.

Team Safety

Multiple lockout ensures that equipment cannot be reactivated until all workers have completed their tasks and removed their locks

Individual Responsibility

Each worker is responsible for their own lock and must remove it personally when their work is complete

Documentation

Keep records of all lockout procedures, including who placed locks and when they were removed

Ladder Safety

Accidents involving ladders and scaffolds are a major cause of injuries and fatalities in the workplace. Use the correct ladder for the job: do not improvise or use a ladder for any purpose other than its intended use.

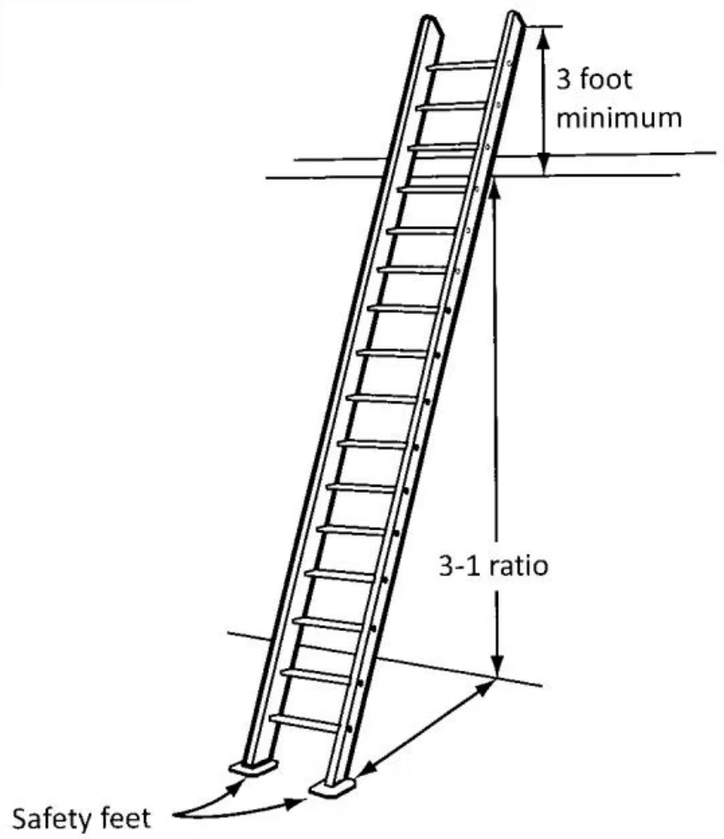
Common Hazards

- Falls or slides from ladders because of slippery rungs or steps
- Ladders not being properly secured to ground, wall, or other equipment

- High winds that cause them to fall over
- Workers leaning out at dangerous angles from ladders
- Too close proximity to electrical lines, particularly aluminum ladders
- Damaged or defective ladders
- Dents, warps, bends, and loose rungs

Reference CSA Z11 for additional information on ladder safety standards.

Proper Ladder Positioning



The image shows the proper positioning of a ladder. Ensure the ladder is set 1 ft (30 cm) out for every 3 ft (90 cm) up.

1 **Check for Defects**

Inspect the ladder thoroughly before use

2 **Check for Power Lines**

Ensure there are no power lines close by

3 **Secure the Base**

Ensure that the ladder is on a firm, level surface with no debris nearby

4 **Avoid Doorways**

5 **Proper Placement**

Ladder Usage Safety

Top Rail Height

Ensure the top rails are at least 3 ft (90 cm) above the sill or landing so you can grip the ladder securely when stepping on or off

Three-Point Contact

Face the ladder when going up or down and maintain a "3-point contact," which means placing two hands and one foot or two feet and one hand on the ladder at all times

Check Clothing

Check that your clothing and tools will not catch on the railings and that your boots are clear of slippery materials

Tool Handling

Lift tools or materials with a hoist rope (in a bucket) rather than in your hands

Safety Harness

At heights over 10 ft (3 m), wear a safety belt or harness that is tied to the building you are climbing to

Extension Ladder Safety

A minimum 3 ft (90 cm) overlap between the upper and lower sections is required when using extension ladders.

Ask for Help

Ask for help when you have to erect long or heavy ladders

Proper Usage

Don't use ladders as braces, planks, runways, or for any other purpose for which they are not designed

Storage

Always rest ladders on their side rails, not their rungs

Section Overlap

Ensure proper overlap between sections of extension ladders

Figure 1-11
Minimum 3 ft (90 cm) overlap required between upper and lower sections of extension ladders

Ladder Inspection and Maintenance

Do

Regularly inspect ladders for:

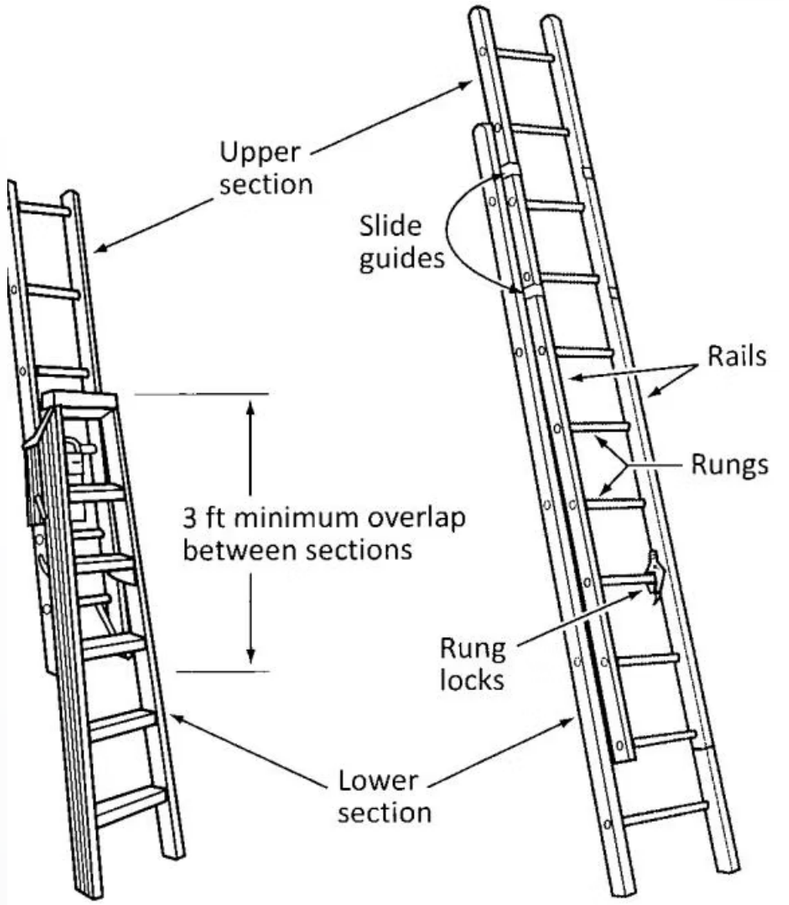
- Straightness
- Rigidity
- Frayed or worn ropes on extension types
- Dents and bends
- Rail and rung strength
- Proper swivelling and non-skidding of the feet
- Cracks, splits, or rotting on wooden ladders

Regularly check that ladders are free of:

- Grease
- Oil
- Pieces of stone, metal, or other materials

Do Not

- Use ladders that are defective
- Paint a ladder—it may cover defects and make the rungs slippery



Scaffold Safety

Different types of scaffolds are used for a variety of tasks in the workplace. Since gas technicians/fitters may be required to assemble and use scaffolds, they need to become familiar with the relevant hazards. Scaffolds are an elevated platform and require fall protection at all times. Training and certification is required for most fall protection; consult your supervisor for instruction.

1 Check for Overhead Wires

Ensure there are no overhead wires close by

2 Verify Stability

Ensure the scaffold is securely mounted and tied

3 Assess Weight Capacity

Verify it can bear the weight of workers and the tools, materials, and equipment to be carried

4 Confirm Experience

Ensure the supervisor and crew have experience working on scaffolds

5 Check Weather Conditions

Ensure the weather conditions are favorable

6 Look for Obstructions

Ensure there are no dangerous obstructions

7 Protect Pedestrians

Make provisions to divert pedestrian traffic around the scaffold

General Safety Rules

Preventing work-related injuries and diseases and creating a healthy work environment are the main safety objectives. Identifying hazards and eliminating them as much as possible requires everyone's attention.

The following safety rules apply in all training and work situations. You must follow these rules when doing any practical task. Expect your instructor to observe your work habits as they apply to these rules and to mark you on how you use them while you are in the shop.

Get into the habit of using safe work practices now. Review and use the rules and consult the employer's safety policy.

Safe Work Practices

No Horseplay

Do not tolerate running, wrestling, throwing objects around, and all other types of unsafe behaviour in the shop.

Clean Up

Good housekeeping is a must in any shop or site situation: keep your work area clean; remove or protect protruding sharp objects; post hazard signs; store gas cylinders upright.

Tool Organization

Your tools are important to your job: keep them clean and store them properly when not in use.

Prevent Falling Hazards

Do not place articles on ladders or where there are falling hazards. Tools and materials left on raised areas, such as ladders, can easily fall and injure someone.

Adequate Lighting

You must be able to see what you are doing: if you need more light, use a trouble lamp.

Proper Lifting

Improper lifting can cause injury: use the correct posture and rigging equipment.

Additional Safety Practices

Use Protective Equipment

Safety gear and clothing are required when working in the shop or job site: use the appropriate equipment for the job at hand.

Tag Defective Items

You must tag a tool or piece of equipment that is defective to indicate that it should not be used. You should remove all defective items from the work area.

Report Accidents

You should report any accident or injury, no matter how minor it may seem to you, to your supervisor, and if necessary, to the first aid attendants.

Monitor Health

Report any health problems to your supervisor. Even a minor problem, such as a mild head cold affecting your sense of balance, could cause hazards if you must operate on high scaffolding.

No Impairment

Do not work while impaired by alcohol or medication. Avoid drinking alcoholic beverages or taking medication that suppresses the activity of the central nervous system before or during work.

Address Unsafe Conditions

You must correct any safety violation or unsafe condition right away or report it immediately to your supervisor, who will take action.

Safety Resources

The safety rules may seem like common sense and rather obvious, but you must ensure that you follow them wherever you are working.

You can find additional health and safety rules at:

http://www.hrsdc.gc.ca/eng/labour/health_safety/index.shtml

At the provincial and territorial level, the name of the government department responsible for OH&S varies with each jurisdiction. Usually it is called a ministry or department of labour. In some jurisdictions, it is a workers' compensation board or commission that has the responsibility for occupational health and safety.

A list of Canadian government departments with chief responsibility for occupational health and safety is available at:

http://www.ccohs.ca/oshanswers/information/govt.html

Responsibilities of Parties Involved

Everyone involved in a construction site has specific responsibilities for safety. The following guidelines are typical of those found in provincial Acts and Regulations for construction projects.

Constructor

Ensures measures and procedures required by Acts and Regulations are carried out on the job site

Health and Safety Representative

Performs site inspections and helps mediate disputes over unsafe conditions

Employer

Provides equipment, materials, safety clothing, and protective devices required by law

Supervisor

Ensures workers follow safety procedures and use proper protective equipment

Worker

Works in compliance with all applicable Acts and Regulations

Constructor Responsibilities

The constructor is the person who undertakes a job for an owner and can include the owner when he/she undertakes all or part of a job alone or with more than one employer.

Regulatory Compliance

The constructor is responsible to ensure that the measures and procedures required by the current Acts (e.g., Occupational Health and Safety Act) and Regulations (e.g., Regulations for Construction Projects) are carried out on the job site.

Workforce Compliance

The constructor must ensure employers and workers on the job site comply with applicable Acts and Regulations.

Worker Protection

The constructor is responsible for ensuring the health and safety of workers on the job site is protected.

Employer Responsibilities

Equipment Provision

The employer must ensure the equipment, materials, safety clothing, and protective devices required by law are provided.

Equipment Maintenance

The employer must ensure the equipment, materials, and protective devices provided are maintained in good condition and used as prescribed.

Procedural Compliance

The employer must ensure the measures and procedures required by law are carried out.

Information and Training

The employer must provide information, instruction, and supervision to protect the health and safety of workers.

Competent Supervision

The employer must appoint a competent person as supervisor.

Supervisor Responsibilities

Work Oversight

The supervisor must ensure workers work in the manner and with the protective devices, measures, and procedures required by all applicable Acts and Regulations.

Equipment Usage

The supervisor must ensure workers use or wear the equipment, protective devices, or clothing that the employer requires to be used or worn.

Hazard Communication

The supervisor must advise workers of any potential or actual danger to their health and safety.

Safety Instruction

The supervisor must provide workers with instructions on the measures and procedures to follow for their protection.

Worker Responsibilities

Regulatory Compliance

The worker must work in compliance with all applicable Acts and Regulations.

Equipment Usage

The worker must use or wear the equipment, protective devices, or clothing that the employer requires to be used or worn.

Reporting Issues

The worker must report to the employer or supervisor any problem with equipment that may endanger the worker or other workers, any contravention of all applicable Acts or Regulations, and any hazard on the job site.

Safe Work Practices

The worker must never work in a manner that may endanger anyone and never engage in any prank, contest, feat of strength, unnecessary running, or rough and boisterous conduct on the job site.

Health and Safety Representative Responsibilities

The health and safety representative performs site inspections, helps to mediate disputes over unsafe conditions, may assist in investigating serious accidents, and confers with supervisors, workers, and inspectors (typically from the Ministry of Labour) when necessary.

Site Inspections

Regularly inspect the workplace to identify potential hazards

Dispute Mediation

Help resolve safety-related disagreements between workers and management

Accident Investigation

Participate in investigations of serious workplace incidents

Communication

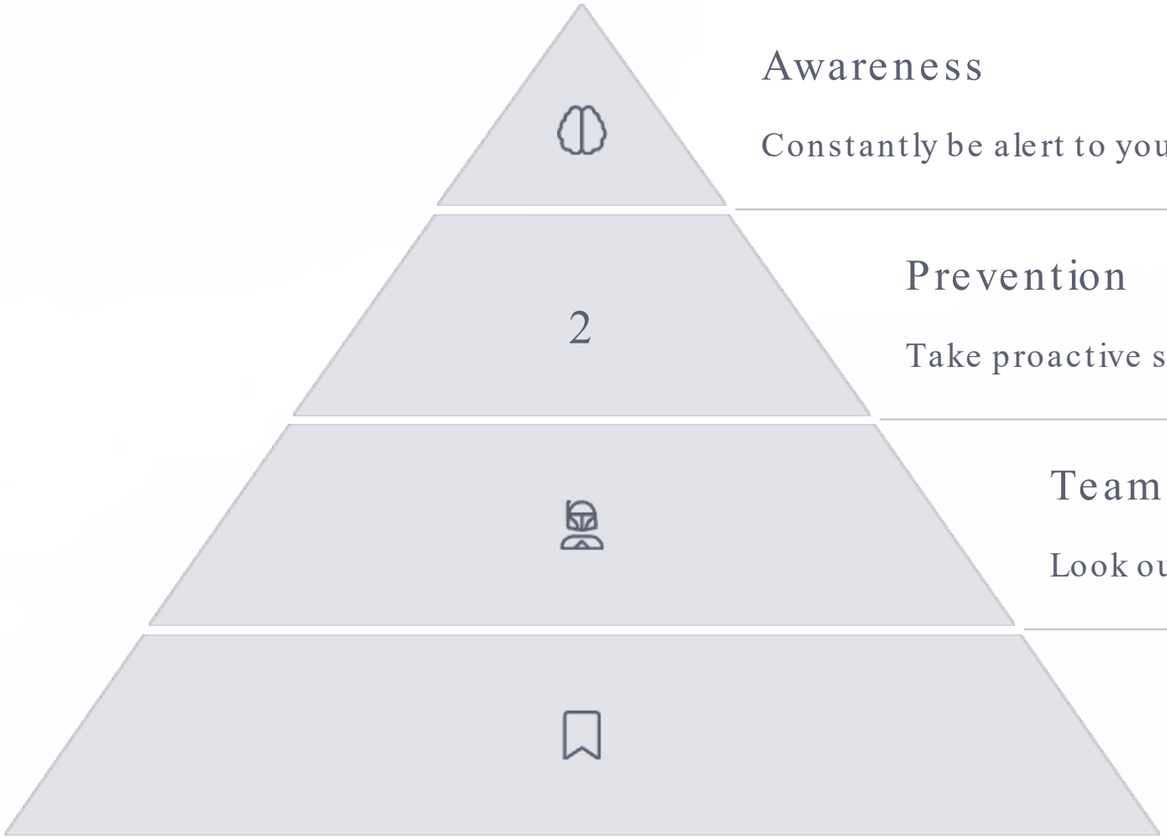
Facilitate discussions between workers, supervisors, and regulatory inspectors

Documentation

Maintain records of inspections, recommendations, and follow-up actions

Safety Mindset

Always think about safety. If you do not, you are, quite literally, an accident looking for a place to happen!



Awareness

Constantly be alert to your surroundings

Prevention

Take proactive steps to eliminate hazards

Teamwork

Look out for yourself and your coworkers

Knowledge

Continuously learn about safety practices

Safety is not just about following rules—it's about developing a mindset that prioritizes well-being in every decision and action you take on the job.

Provincial and Territorial Safety Authorities

At the provincial and territorial level, the name of the government department responsible for OH&S varies with each jurisdiction. Usually it is called a ministry or department of labour. In some jurisdictions, it is a workers' compensation board or commission that has the responsibility for occupational health and safety.

Each provincial or territorial department is responsible for the administration and enforcement of its occupational health and safety act and regulations.

Local Resources

Familiarize yourself with the specific safety authority in your province or territory

Regulatory Knowledge

Understand the specific regulations that apply to your work location

Contact Information

Keep contact details for your local safety authority readily available

Online Resources

Utilize websites and online tools provided by safety authorities

Safety Resources Directory

A list of Canadian government departments with chief responsibility for occupational health and safety is available at:

http://www.ccohs.ca/oshanswers/information/govt.html

These resources provide valuable information on safety regulations, best practices, and training opportunities to help you maintain a safe working environment.

Safety: A Shared Responsibility

Individual Commitment

Each worker must take personal responsibility for safety

2

Team Vigilance

Workers must look out for each other and communicate hazards

Organizational Culture

Companies must foster an environment where safety is valued above all

Industry Standards

The entire industry must continually improve safety practices

Safety in the gas technician/fitter trade is not the responsibility of any single individual or organization—it requires commitment at every level. By working together and maintaining a constant focus on safety, we can prevent accidents, protect lives, and ensure everyone returns home safely at the end of each workday.

CSA Unit 1- Safety

Chapter 2
Government Acts and Regulations for Gas Technicians

Government acts and regulations provide workplace requirements. Many of these requirements will directly affect the workplace of the gas technician/fitter and it is therefore important for the students to become familiar with these regulations for their benefit and safety.

Purpose of Government Acts and Regulations

Workplace Requirements

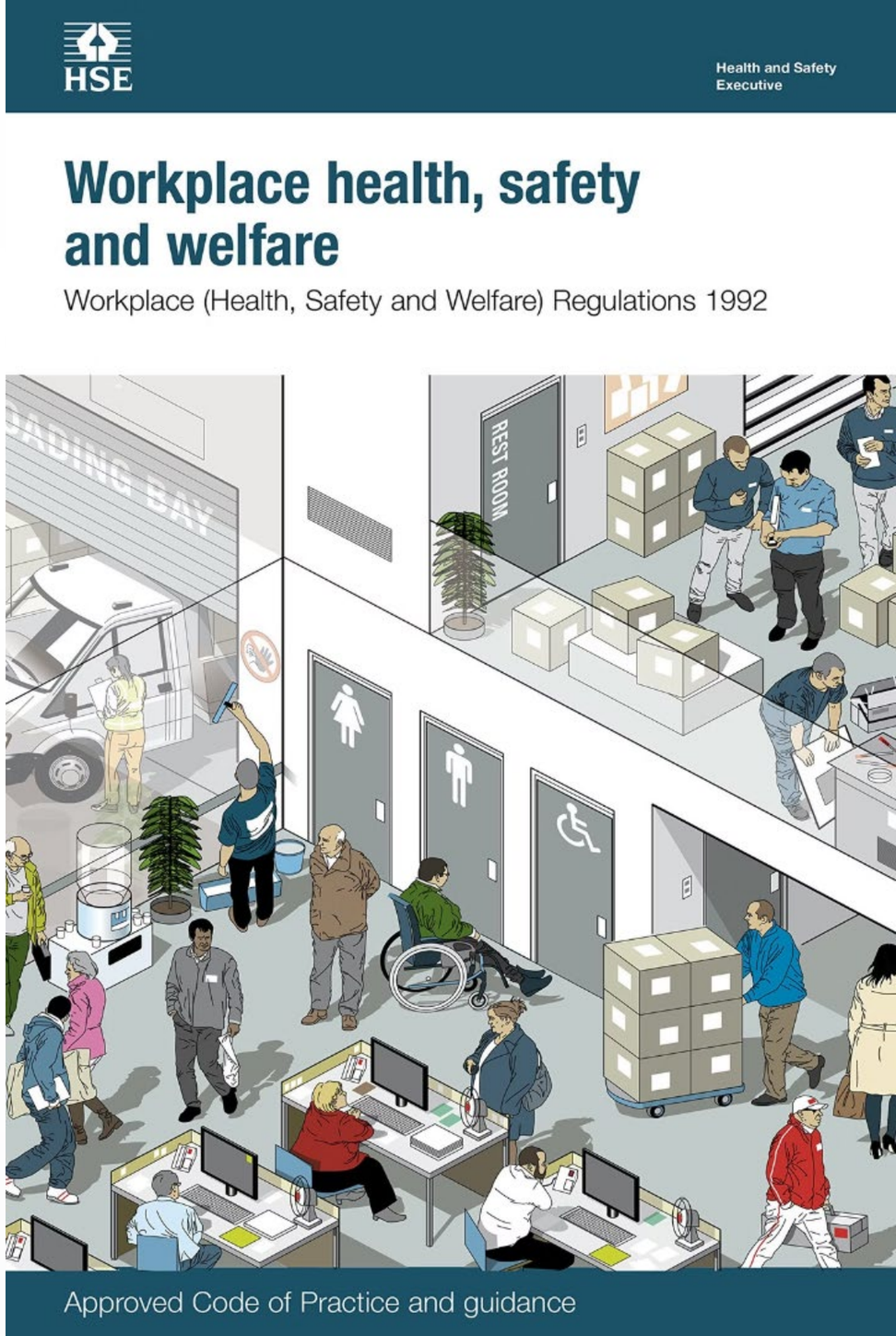
Government acts and regulations establish essential workplace requirements that directly impact gas technicians and fitters.

Safety Standards

These regulations create standardized safety protocols that protect workers in potentially hazardous environments.

Legal Framework

They provide the legal foundation that governs workplace practices, responsibilities, and enforcement mechanisms.



Learning Objectives

Describe Relevant Sections

At the end of this chapter you will be able to describe the relevant sections of the occupational health and safety acts and regulations in the provincial jurisdiction that covers the site of work.

Apply Knowledge

You will understand how to apply these regulations to your daily work as a gas technician/fitter to ensure compliance and safety.

Identify Requirements

You will be able to identify specific requirements that affect gas installation, maintenance, and repair operations.

Key Terminology

Term	Abbreviation (Symbol)	Definition
Act		Legal document that determines the powers of directors, inspectors, etc., as well as enabling the government to write regulations.
Regulation		Legal directive that focuses on specific areas made under an act.
Workers' Compensation Board	WCB	Agencies responsible for workers' compensation in the federal, provincial, and territorial jurisdictions.

Provincial Jurisdiction

Provincial Governance

Requirements for occupational health and safety are governed by provincial jurisdiction.

Legislation Forms

Most provinces have legislation in the form of regulations and acts dealing with occupational health and safety.

Technician Responsibility

The gas technician/fitter must study and become familiar with these acts and regulations for the jurisdiction in which he or she will practice.

Understanding Acts and Regulations

What to Expect

This section describes what one can expect to find in the acts and regulations and indicates some important sections that have direct relevance to the gas technician's/fitter's trade.

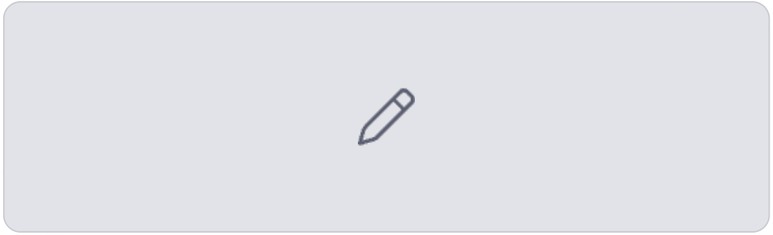
Recommendation

It is strongly suggested that you obtain the local acts and regulations and study them so that you may be informed and knowledgeable.

What is an Act?

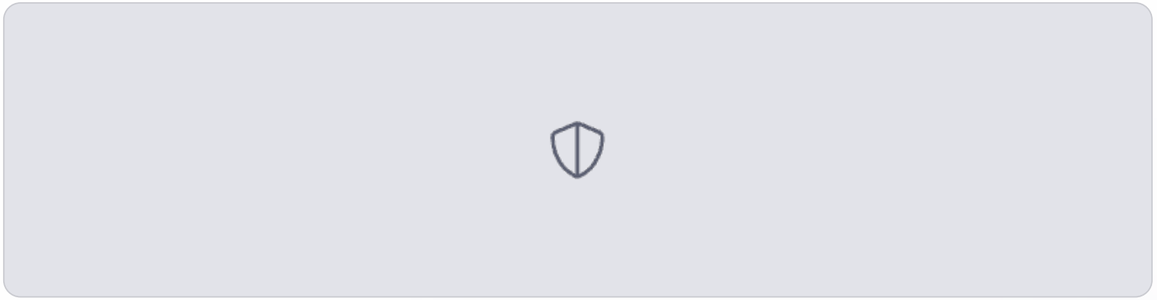
Legal Document

An act is a legal document that determines the powers of directors, etc.



Enables Regulations

Acts enable the government to write regulations.



Establishes Authority

Acts establish the legal authority and framework for enforcement.

Provincial Occupational Health and Safety Acts

Application

Defines where and to whom the act applies

Administration

Outlines how the act is administered

Duties

Specifies duties of employers and workers

Toxic Substances

Addresses handling of hazardous materials

Right to Refuse

Establishes right to refuse or stop unsafe work

Enforcement

Details how the act is enforced

Other Provincial Acts

Energy Acts

Address energy safety and standards

Storage Acts

Address safe storage of fuels

Fuel Acts

Cover fuel handling and usage

Gas Safety Acts

Focus on gas equipment installation and safety

What are Regulations?

Legal Directives

Regulations are legal directives that focus on specific areas.

Specific Focus

They address particular aspects of safety and compliance in detail.

Made Under Acts

Regulations are created under the authority granted by acts.

Enforceable Rules

They establish enforceable standards and requirements.

OH&S Regulations Content

Construction Site Requirements

- General construction safety
- Excavations
- Tunnels
- Shafts
- Caissons and cofferdams
- Work in compressed air

Useful Indexes

- OH&S indexes
- Construction regulation indexes
- Ministry office locations

Benefits of Indexes

The indexes are particularly useful when trying to find information in either OH&S or the Regulations.

Gas Technician Responsibilities: Immediate Hazards

Shut Off Gas Supply

Immediately shut off the supply of gas to the appliance or work

Notify Distributor

Immediately give oral notice of the holder's actions to the gas distributor

Provide Written Notice

Immediately give to the user a written notice describing the condition that constitutes an immediate hazard, and directing that the appliance or work not be used until the condition is corrected

Follow Up

Give written notice of the condition to the distributor, including notice of gas supply shutoff, within 14 days of finding the condition

Is the emergency control valve clearly labelled?			

Appliance Details					
	Appliance Location	Appliance Type	Appliance Model	Appliance Make	Type of Flue (OF/RS/FL)
1					
2					
3					

Gas Technician Responsibilities: Non-Immediate Hazards

Oral Notice

Immediately give oral notice of the condition to the distributor of gas to the appliance or work

User Notice

Immediately give written notice to the user of the appliance or work describing the condition and advising that the distributor receives the notice of the condition

Written Notice

Give written notice of the condition to the distributor within 14 days of finding the condition

Provincial Acts and Regulations: Alberta

Acts

- Occupational Health and Safety Act (SA 2017 cO-2.1)

Available at:
http://www.qp.alberta.ca/1266.cfm?page=002P1.cfm&legtype=Acts&isbncln=9780779800865&display=html

Regulations

- Occupational Health and Safety Code 2009
- Building Code Regulation, Alta Reg 31/2015
- Gas Code Regulation, Alta Reg 111/2010

Provincial Acts and Regulations: British Columbia

Acts

- Workers Compensation Act [RSBC 1996] Chapter 492
- Safety Standards Act R.S.B.C 2003, c.39

Regulations

- Occupational Health and Safety Regulation B.C.
- Gas Safety Regulation B.C. Reg. 103/2004

Provincial Acts and Regulations: Manitoba

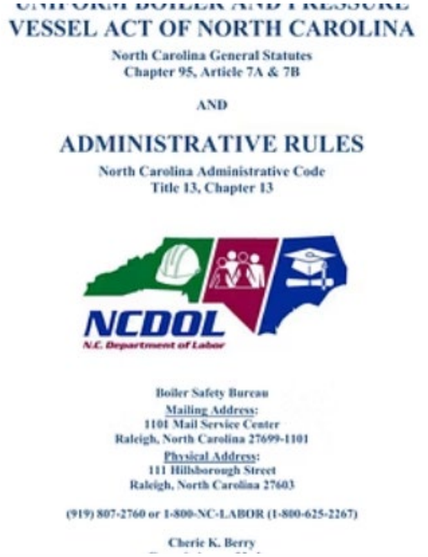
Acts

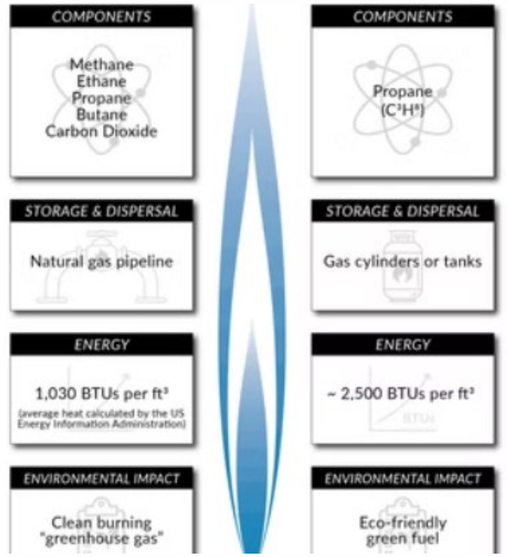
- Gas and Oil Burner Act R.S.M. 1987, c. G.30
- The Workplace Safety and Health Act CCSM, c W210

Regulations

- Gas and Oil Burner Regulation Man. Reg. 104/87 R
- Workplace Safety Regulation Man. Reg. 217/2006

Provincial Acts and Regulations: New Brunswick





New Brunswick has several key acts including Workers' Compensation Act, Occupational Health and Safety Act, and Boiler and Pressure Vessel Act, along with regulations like Forms Regulations, General Regulations, and Propane, Natural and Medical Gas Regulation.

Provincial Acts and Regulations: Newfoundland

Acts

- Workplace Health, Safety and Compensation Act R.S.N.L. 1990, c. W-11
- Occupational Health and Safety Act R.S.N.L. 1990, c. O-3
- Public Safety Act S.N.L. 1996, c. P-41.01

Regulations

- Occupational Health and Safety Regulations, 2012, N.L.R. 5/12
- Workplace Hazardous Materials Information System Regulations C. N.R. 1149/96
- Boiler, Pressure Vessel and Compressed Gas Regulations Nfld. Reg. 119/96

Provincial Acts and Regulations: Northwest Territories

Workers' Compensation Act

S.N.W.T. 2007, c.21

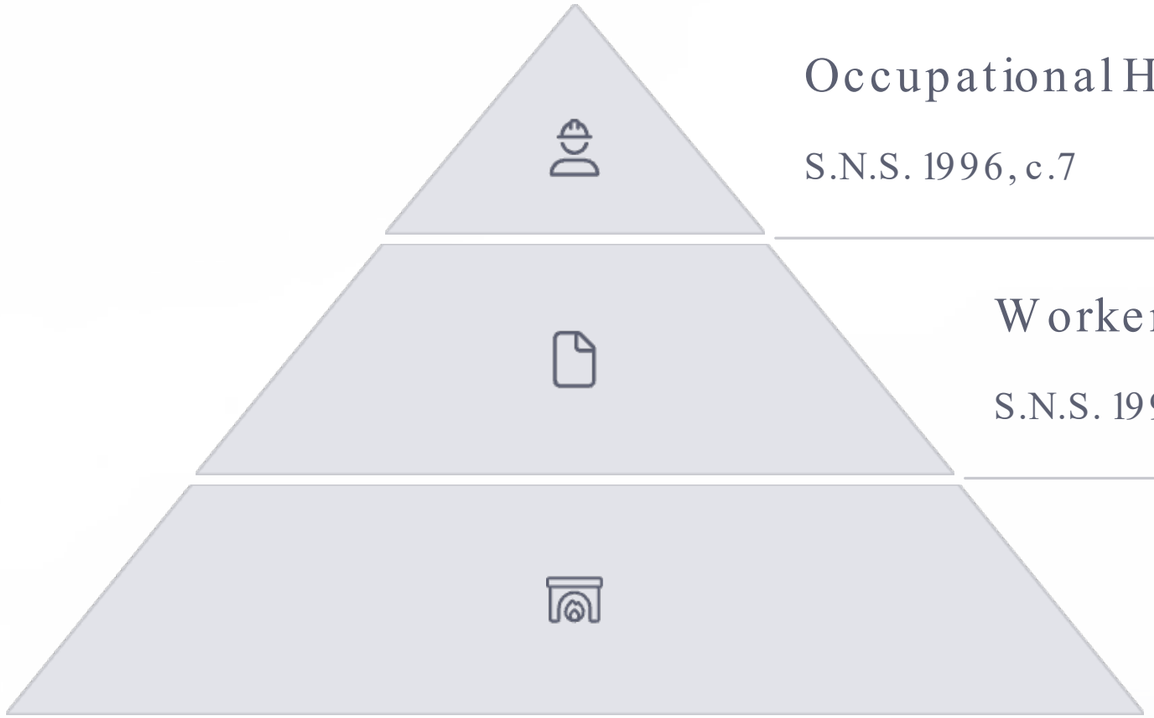
Fire Prevention Act

R.S.N.W.T. 1988, c. F-6 with Propane Cylinder Storage Regulations, R-094-91

Safety Act

R.S.N.W.T. 1988, c. S-1 with Occupational Health and Safety Regulations and Work Site Hazardous Materials Information System Regulations

Provincial Acts and Regulations: Nova Scotia



Occupational Health and Safety Act

S.N.S. 1996, c.7

Workers' Compensation Act

S.N.S. 1994-95, c.10

Fire Safety Act

S.N.S. 2002, c. 6

Nova Scotia has comprehensive regulations under these acts including Occupational Safety General Regulations, WHMIS Regulations, Workplace Health and Safety Regulations, Workers' Compensation General Regulations, and Fuel Safety Regulations.

Provincial Acts and Regulations: Ontario

Acts

- Occupational Health and Safety Act R.S.O. 1990, c.O.1
- Workplace Safety and Insurance Act 1997 S.O. 1997, c.16
- Technical Standards and Safety Act, 2000 S.O. 2000, c.16

Regulations

- Construction Projects O. Reg. 213/91
- Workplace Hazardous Materials Information System (WHMIS) Regulation R.R.O. 1990, Reg. 860
- First Aid Requirements R.R.O. 1990, Reg. 1101
- Functional Abilities Form O. Reg. 456/97
- Fuel Industry Certificates O. Reg. 215/01
- Gaseous Fuels Regulation O. Reg. 212/01
- Propane Storage, and Handling, O. Reg. 211/01

Provincial Acts and Regulations: Prince Edward Island

Occupational Health and Safety Act

2004 c.42 R.S.P.E.I. 1988, O-1.01 with General Regulations E.C. 180/87 and Workplace Hazardous Materials Information System Regulations EC455/17

Workers Compensation Act

S.P.E.I. 1994, c. 67 with General Regulation E.C. 831/94

Fire Prevention Act

R.S.P.E.I. 1988, c. F.11 with Codes and Standards Order Regulations E.C. 16/85

Provincial Acts and Regulations: Québec

Act respecting occupational health and safety

R.S.Q., c. S-2.1

Act respecting industrial accidents and occupational diseases

C.Q.L.R. c. A-3.001

Building Act

CQLR c B-1.1

Québec has numerous regulations including Safety Code for the Construction Industry, Regulation respecting the quality of the work environment, First-aid Minimum Standards Regulation, and Hazardous Products Information Regulation.

Provincial Acts and Regulations: Saskatchewan

Acts

- The Saskatchewan Employment Act, SS 2013, c S-15.1
- Gas Inspection Act, R.S.S. 1993, c. G-3.2

Regulations

- Occupational Health and Safety Regulations, 1996 R.R.S., c. O-1, r. 1
- Gas Inspection Regulations R.R.S., c. G-3.2, r.1

Provincial Acts and Regulations: Yukon

Occupational Health and Safety Act

R.S.Y. 2002, c. 159 with Occupational Health Regulations Y.O.I.C. 1986/164 and other related regulations

Worker's Compensation Act

S.Y.2008, c.12

Gas Burning Devices Act

R.S.Y 2002, c. 101with Gas Regulations Y.O.I.C. 1998/213

Provincial Acts and Regulations: Nunavut

Consolidation of Safety Act

R.S.N.W.T. 1988, c.S-1

Consolidation of Technical Standards and Safety Act

S.Nu. 2002, c.1

Consolidation of Workers' Compensation Act

S.Nu. 2007, c.15

Importance of Staying Current with Regulations

Periodic Revisions

Acts and regulations are revised periodically

Verification

Users should check with regulators for current information

Certification Requirements

Regulatory changes may affect certification needs

Regular Updates

Stay informed about changes to maintain compliance

Workers' Rights in Canada

Right to a Safe Workplace

All workers have the right to a safe workplace in Canada.

Right to Know

Workers have the right to know about hazards in their workplace and how to protect themselves.

Right to Participate

Workers have the right to participate in identifying and resolving workplace health and safety concerns.

Right to Refuse

Workers have the right to refuse unsafe work without fear of reprisal.

Hazard Reporting Requirements

Identify Hazard

Worker identifies potential workplace hazard

Report Within Timeframe

Provincial requirements specify that hazards be reported within a specific time period

Document Incident

In some cases, accident investigation and reporting are required by law

When Uncertain

If you are unsure about reporting requirements, contact your supervisor immediately or contact the provincial Workers' Compensation Board (WCB)

Employer Reporting Responsibilities

1

Form Completion

The employer must fill out a form from the provincial Workers Compensation Board (WCB), Workers Safety Insurance Board, or equivalent

14

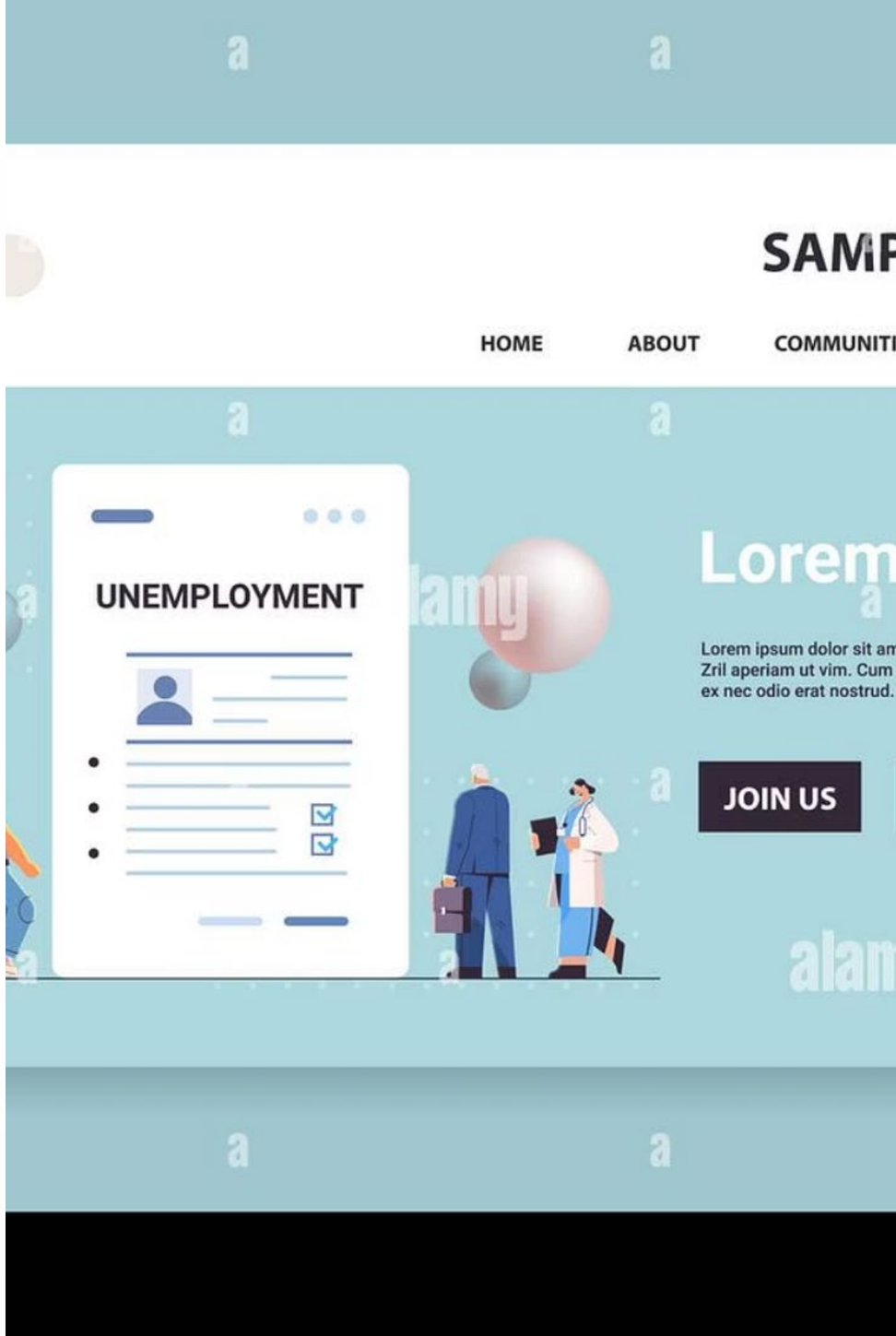
Days Maximum

Many jurisdictions require reporting within 14 days of an incident

3

Triggering Conditions

Reports are required when a worker sustains a work-related injury or occupational disease with specific consequences



When Employer Reporting is Required

1 **Work Absence or Modified Duties**

When a worker is absent from their regular work and/or assumes lighter duties due to a work-related injury or occupational disease

2 **Reduced Earnings**

When a worker earns less than regular pay due to a work-related injury or occupational disease

3 **Health Care Required**

When a worker obtains health care for a work-related injury or occupational disease

Information Sharing Requirements

1

Form Completion

Employer completes WCB form

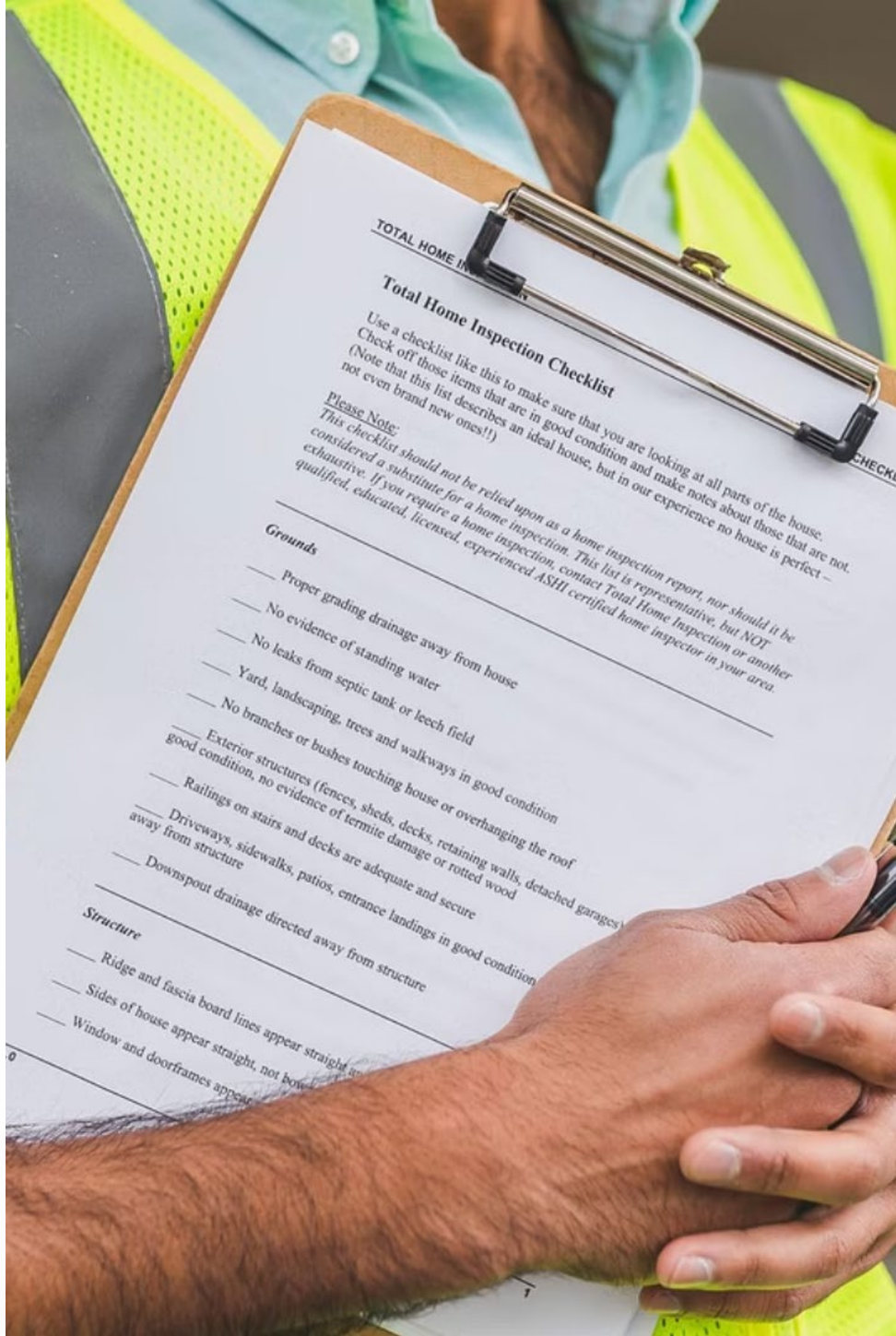
Copy Creation

Employer photocopies the form (minus personal information)

Information Sharing

Copy sent to health and safety representative

This process meets the information requirements under provincial acts and regulations (e.g., occupational health and safety acts).



Gas Technician's Role in Safety

Safety Guardian

Protecting public and property

Hazard Identifier

Recognizing dangerous conditions

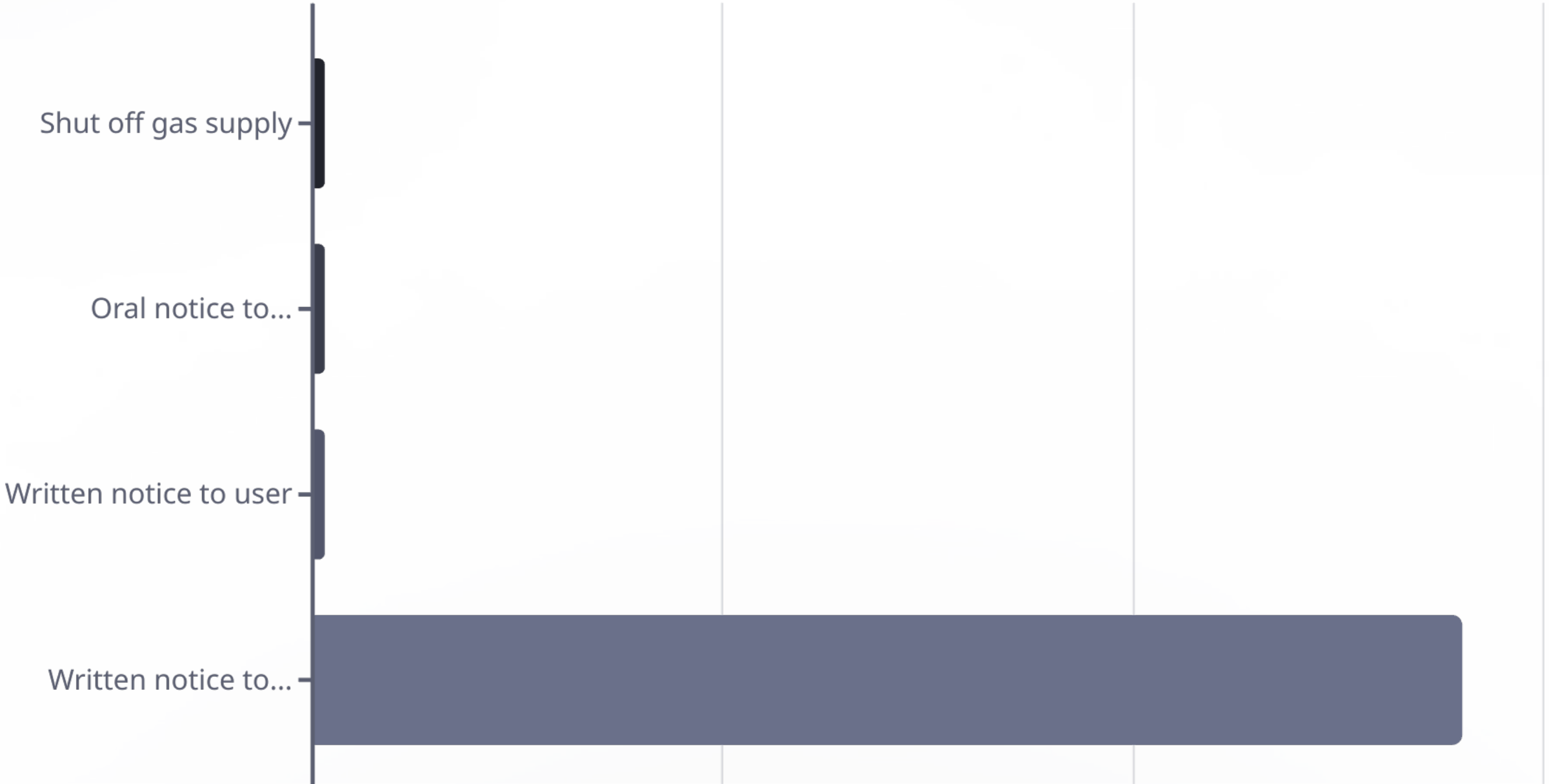
Compliance Reporter

Documenting and reporting issues

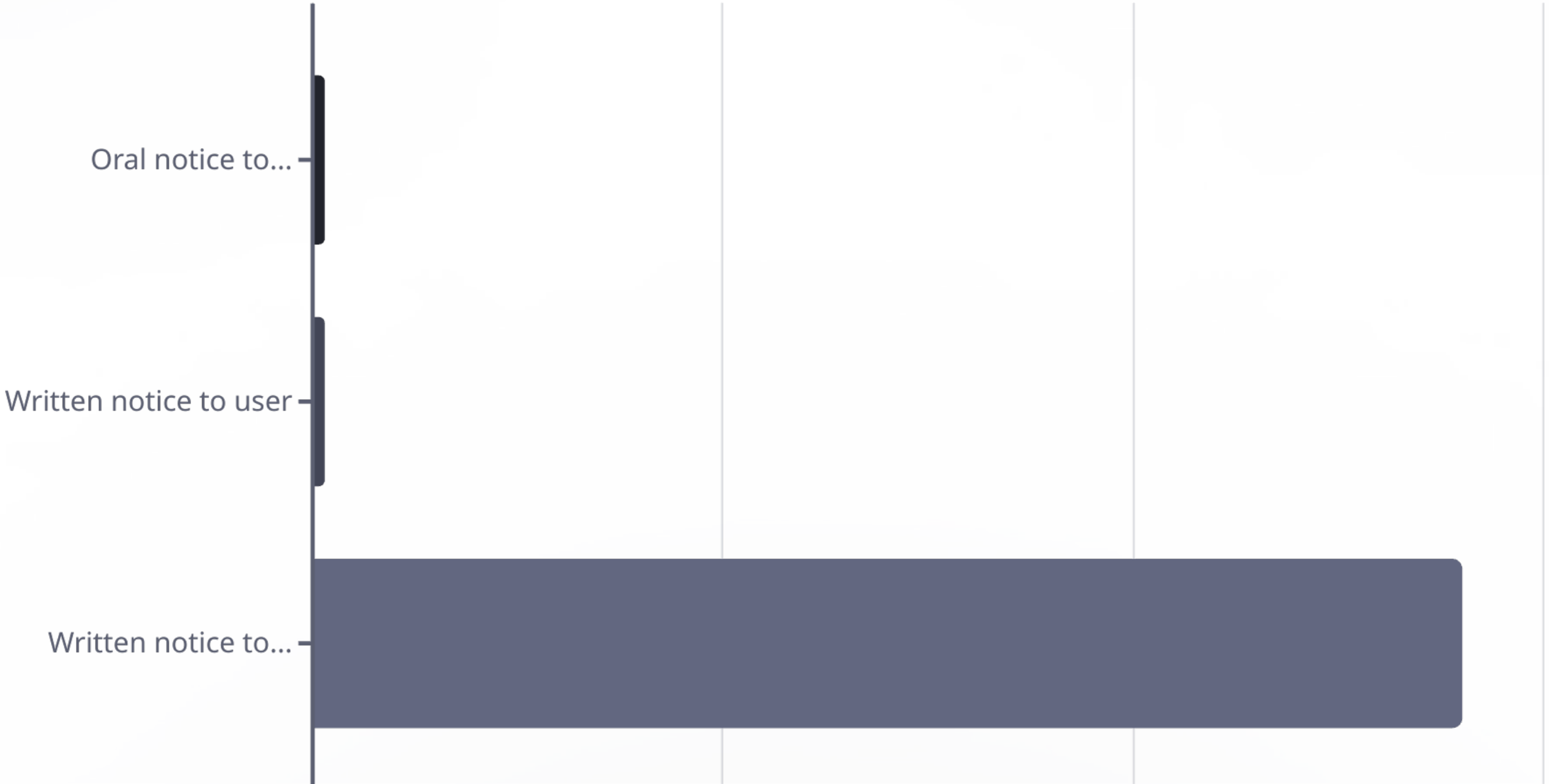
Technical Expert

Applying knowledge to ensure safe installations

Immediate Hazard Response Protocol



Non-Immediate Hazard Response Protocol



Comparing Immediate vs. Non-Immediate Hazard Protocols

Immediate Hazard Protocol

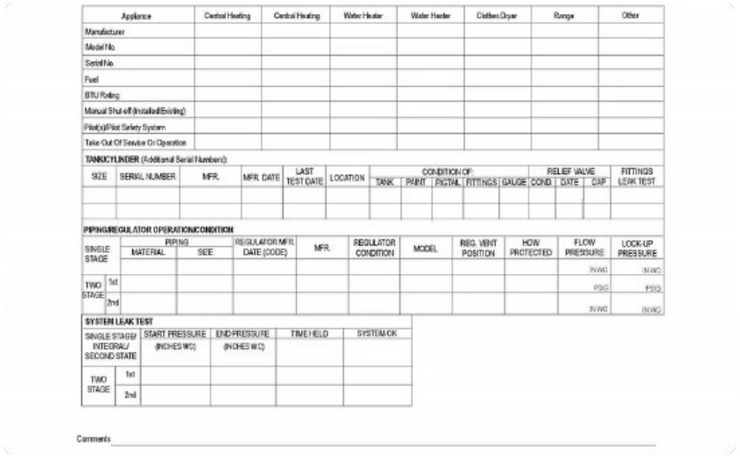
1. Immediately shut off the supply of gas to the appliance or work
2. Immediately give oral notice of the holder's actions to the gas distributor
3. Immediately give to the user a written notice describing the condition and directing that the appliance not be used
4. Give written notice to the distributor within 14 days

Non-Immediate Hazard Protocol

1. Immediately give oral notice of the condition to the distributor
2. Immediately give written notice to the user describing the condition
3. Give written notice of the condition to the distributor within 14 days

The key difference is that immediate hazards require shutting off the gas supply, while non-immediate hazards do not.

Documentation Requirements



Appliance	Central Heating	Central Heating	Water Heater	Water Heater	Clothes Dryer	Range	Other
Manufacturer							
Model No.							
Serial No.							
Fuel							
BTU Rating							
Manual Shut-off (Installed/Existing)							
Pilot(s)/Hot Surface Ignition							
Take Out Of Service Or Operation							

TANK/CYLINDER (Additional Serial Numbers):

SIZE	SERIAL NUMBER	MFR.	MFR. DATE	LAST TEST DATE	LOCATION	CONDITION OF: TANK	PAINT	PIGTAIL	FITTINGS	GAUGE	RELIEF VALVE: COND	DATE	CAP	FITTINGS: LEAK TEST

PIPING/REGULATOR OPERATION/CONDITION

		PIPING: MATERIAL	PIPING: SIZE	REGULATOR MFR. DATE (CODE)	MFR.	REGULATOR CONDITION	MODEL	REG. VENT POSITION	HOW PROTECTED	FLOW PRESSURE	LOCK-UP PRESSURE
SINGLE STAGE										IN WC	IN WC
TWO STAGE	1st									PSIG	PSIG
	2nd									IN WC	IN WC

SYSTEM LEAK TEST

SINGLE STAGE/ INTEGRAL/ SECOND STATE	START PRESSURE (INCHES WC)	END PRESSURE (INCHES WC)	TIME HELD	SYSTEM OK
TWO STAGE 1st				
TWO STAGE 2nd				

Comments:

Safety Inspection Forms

Detailed documentation of all safety inspections must be maintained, including date, time, location, and specific findings.

Hazard Notification Notice

To All Employees:

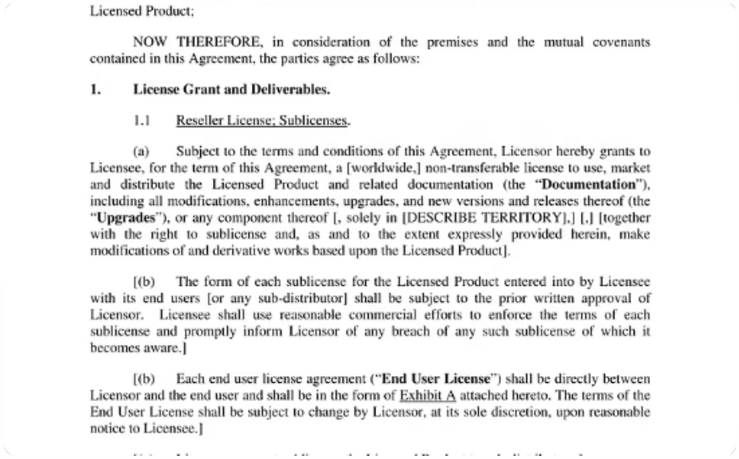
This notice is to alert you regarding a potential hazard identified within our workplace. Please read and follow the instructions carefully to ensure your safety and that of your colleagues.

Type of Hazard:
[Electrical Hazard - Damaged Wiring in Office Area]

Location of Hazard:
[Second Floor, West Wing, Near Conference Room B]

Hazard Notification Letters

Written notices to users must clearly describe the condition found, potential risks, and required actions to remedy the situation.



Licensed Product;

NOW THEREFORE, in consideration of the premises and the mutual covenants contained in this Agreement, the parties agree as follows:

1. License Grant and Deliverables.

1.1 Reseller License; Sublicenses.

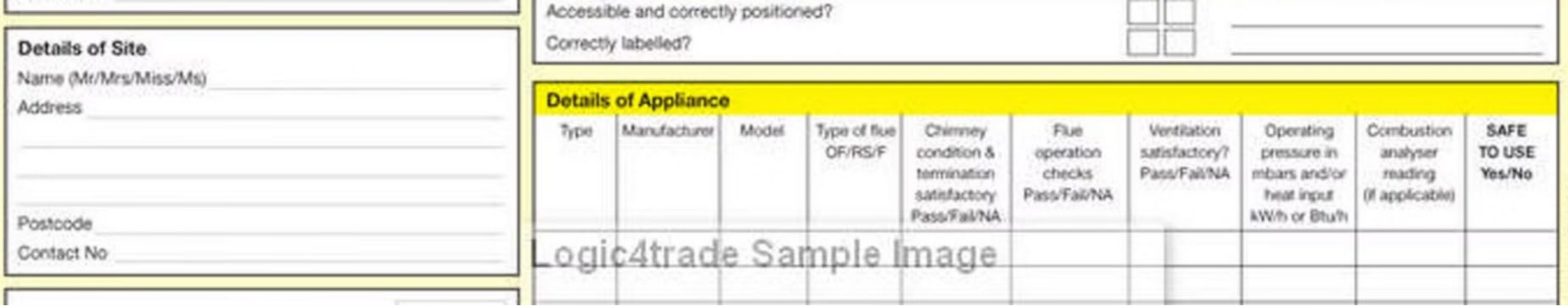
(a) Subject to the terms and conditions of this Agreement, Licensor hereby grants to Licensee, for the term of this Agreement, a [worldwide,] non-transferable license to use, market and distribute the Licensed Product and related documentation (the "**Documentation**"), including all modifications, enhancements, upgrades, and new versions and releases thereof (the "**Upgrades**"), or any component thereof [, solely in [DESCRIBE TERRITORY],] [,] [together with the right to sublicense and, as and to the extent expressly provided herein, make modifications of and derivative works based upon the Licensed Product].

[(b) The form of each sublicense for the Licensed Product entered into by Licensee with its end users [or any sub-distributor] shall be subject to the prior written approval of Licensor. Licensee shall use reasonable commercial efforts to enforce the terms of each sublicense and promptly inform Licensor of any breach of any such sublicense of which it becomes aware.]

[(b) Each end user license agreement ("**End User License**") shall be directly between Licensor and the end user and shall be in the form of Exhibit A attached hereto. The terms of the End User License shall be subject to change by Licensor, at its sole discretion, upon reasonable notice to Licensee.]

Distributor Notifications

Communications to gas distributors must include all relevant details about the condition, location, and actions taken by the technician.


Accessible and correctly positioned?
Correctly labelled?
Details of Site
Name (Mr/Mrs/Miss/Ms)
Address
Postcode
Contact No
Details of Appliance
Type | Manufacturer | Model | Type of flue OF/RS/F | Chimney condition & termination satisfactory Pass/Fail/NA | Flue operation checks Pass/Fail/NA | Ventilation satisfactory? Pass/Fail/NA | Operating pressure in mbars and/or heat input kW/h or Btu/h | Combustion analyser reading (if applicable) | SAFE TO USE Yes/No

Importance of Proper Documentation

Legal Protection

Proper documentation provides legal protection for the gas technician by demonstrating that they followed required protocols.

User Safety

Clear written notices ensure users understand the hazards and necessary precautions to take.

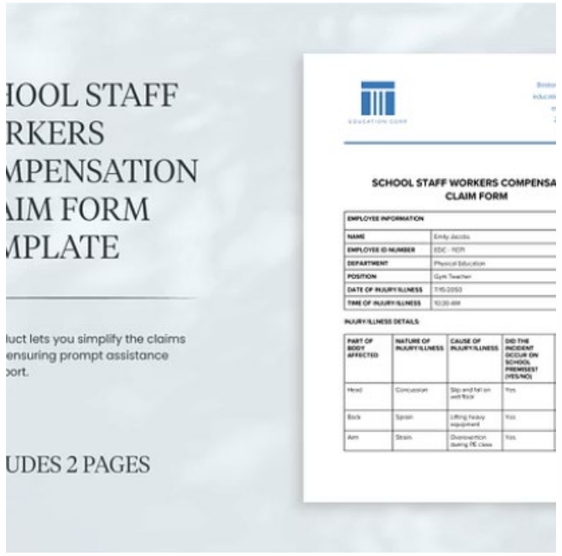
Property Protection

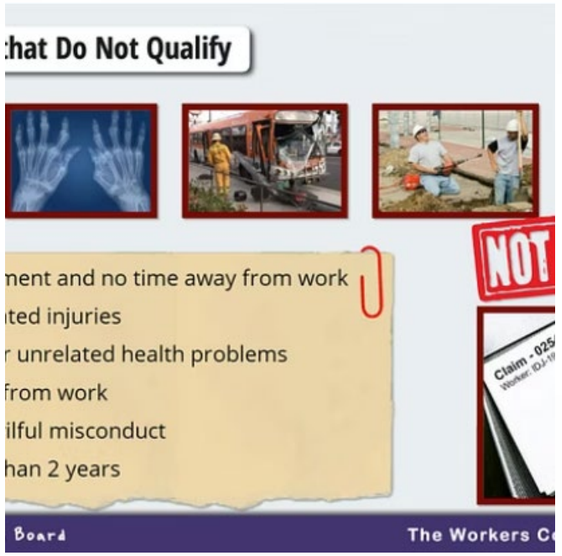
Documentation helps prevent property damage by ensuring hazards are addressed promptly.

Regulatory Compliance

Maintaining proper records demonstrates compliance with regulatory requirements.

Workers' Compensation Board Resources





The Workers' Compensation Board provides numerous resources for both workers and employers, including forms, guidance documents, and contact information. Additional information can be found at http://www.ccohs.ca/oshanswers/information/writers/

Accessing Provincial Regulations

Identify Relevant Jurisdiction

Determine which provincial or territorial regulations apply to your work location.

Visit Official Government Websites

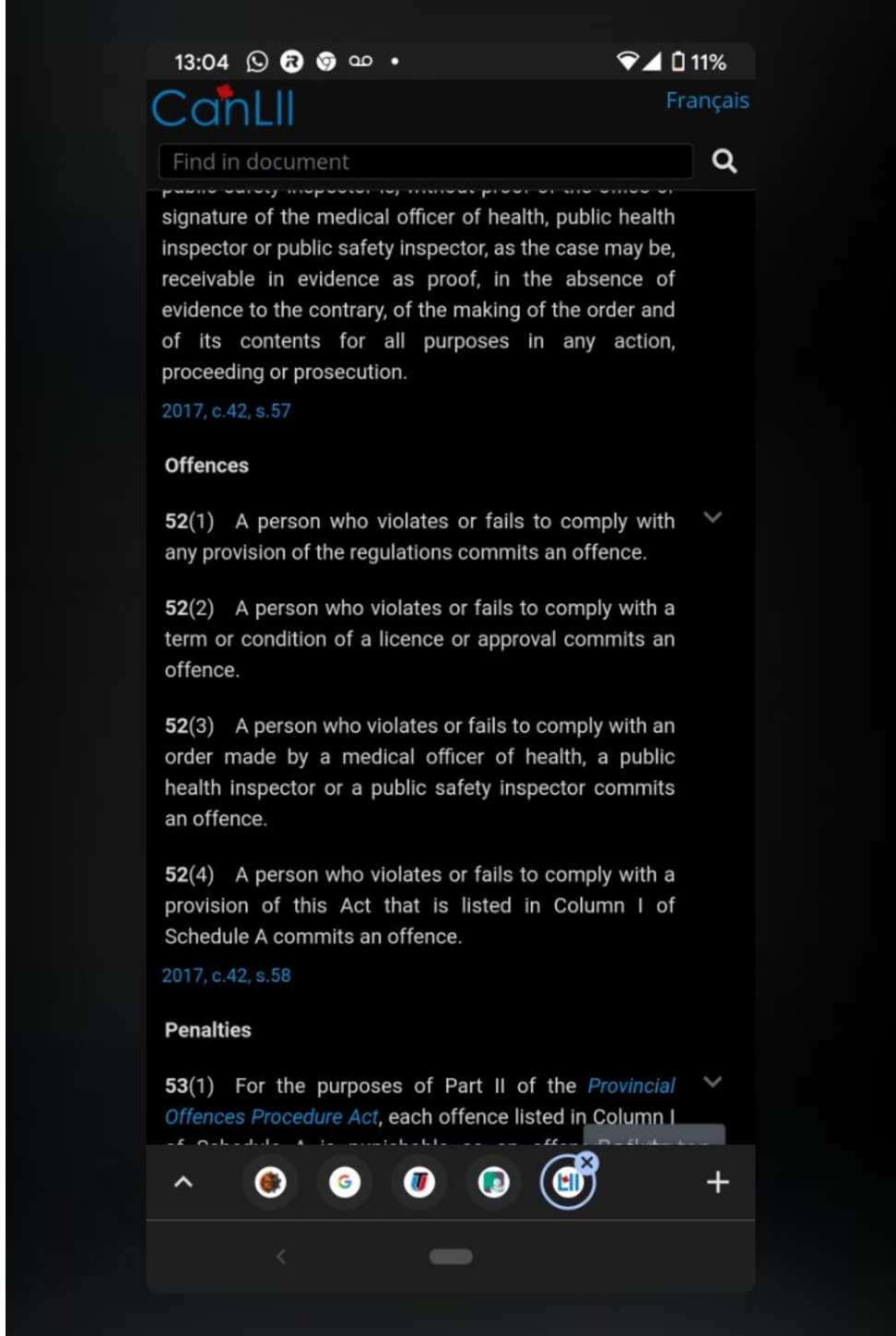
Access the official provincial government website or legislative database.

Search for Specific Acts and Regulations

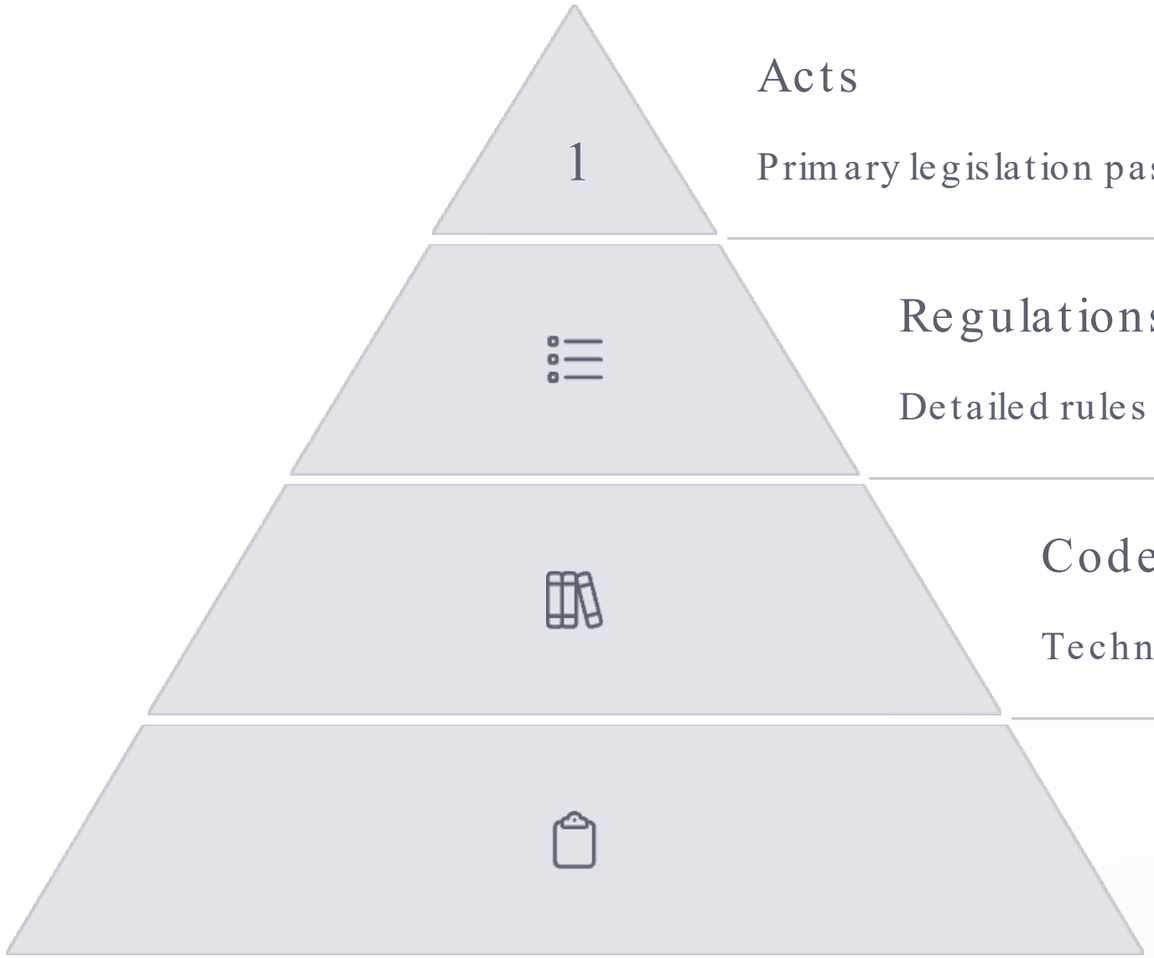
Use search functions to find relevant occupational health and safety, gas safety, or workers' compensation legislation.

Download or Bookmark Current Versions

Save or bookmark the most current versions of applicable regulations for easy reference.



Understanding Regulatory Structure



Acts

Primary legislation passed by government

Regulations

Detailed rules made under acts

Codes

Technical standards often referenced in regulations

Guidelines

Non-binding recommendations for best practices

Regulatory Compliance Benefits

Enhanced Safety

Protecting workers, customers, and the public from potential hazards.

Legal Protection

Reducing liability and legal risks through proper compliance.

Cost Savings

Preventing accidents and incidents that could result in financial losses.

Professional Reputation

Building trust with clients and employers through demonstrated compliance.

Consequences of Non-Compliance

Legal Penalties

- Fines and monetary penalties
- Potential imprisonment for serious violations
- Stop-work orders

Professional Consequences

- Loss of certification or license
- Damage to professional reputation
- Difficulty finding employment

Safety Impacts

- Increased risk of accidents and injuries
- Potential for property damage
- Possible loss of life in severe cases

Regulatory Updates and Changes

Regular Review Cycles

Most regulations undergo scheduled reviews and updates

Public Notification

Proposed changes are typically published for public comment

3

Implementation Period

Changes usually include a transition period for compliance

Enforcement

Full enforcement begins after the implementation period

Staying Informed About Regulatory Changes

Government Websites

Regularly check official government websites for updates to relevant regulations.

Professional Associations

Join industry associations that provide regulatory updates to members.

Email Subscriptions

Subscribe to regulatory authority newsletters and update notifications.

Continuing Education

Participate in continuing education courses that cover regulatory changes.

Workplace Safety Committees

Committee Formation

Establish committee with worker and management representatives

Hazard Identification

Identify and document workplace hazards

Implementation

Implement and monitor safety measures

Policy Development

Create and review safety policies and procedures

Personal Protective Equipment (PPE)

Head Protection

Hard hats protect against falling objects and head impacts, essential when working in construction areas or where overhead hazards exist.

Eye Protection

Safety glasses or goggles shield eyes from flying particles, dust, and chemical splashes that are common when working with gas systems.

Hand Protection

Appropriate gloves protect against cuts, burns, chemical exposure, and other hazards encountered during gas fitting work.

Workplace Hazardous Materials Information System (WHMIS)

Purpose of WHMIS

WHMIS is Canada's national hazard communication standard that ensures workers have the information they need to work safely with hazardous materials.

Most provincial regulations include specific WHMIS requirements that gas technicians must follow when handling potentially hazardous materials.

Key Components

- Hazard classification
- Warning labels
- Safety Data Sheets (SDS)
- Worker education and training

Gas technicians regularly work with materials that require WHMIS compliance, including solvents, adhesives, and cleaning agents.

Right to Refuse Unsafe Work

Identify Hazard

Worker identifies a condition they reasonably believe is dangerous to their health or safety.

Report to Supervisor

Worker reports the concern to their supervisor or employer and explains the reason for refusing to work.

Investigation

Employer investigates in the presence of the worker and a worker representative from the health and safety committee.

Resolution

If the issue is resolved, the worker returns to work. If not, further steps involving a health and safety officer may be required.

First Aid Requirements

1

First Aid Kit

Every workplace must have at least one properly stocked first aid kit accessible to workers

15

Minutes Maximum

First aid must be available within 15 minutes in most jurisdictions

1:50

Trained Personnel Ratio

Many jurisdictions require at least one trained first aid provider for every 50 workers

Emergency Response Planning

Plan Development

Create comprehensive emergency response plans for various scenarios

Team Training

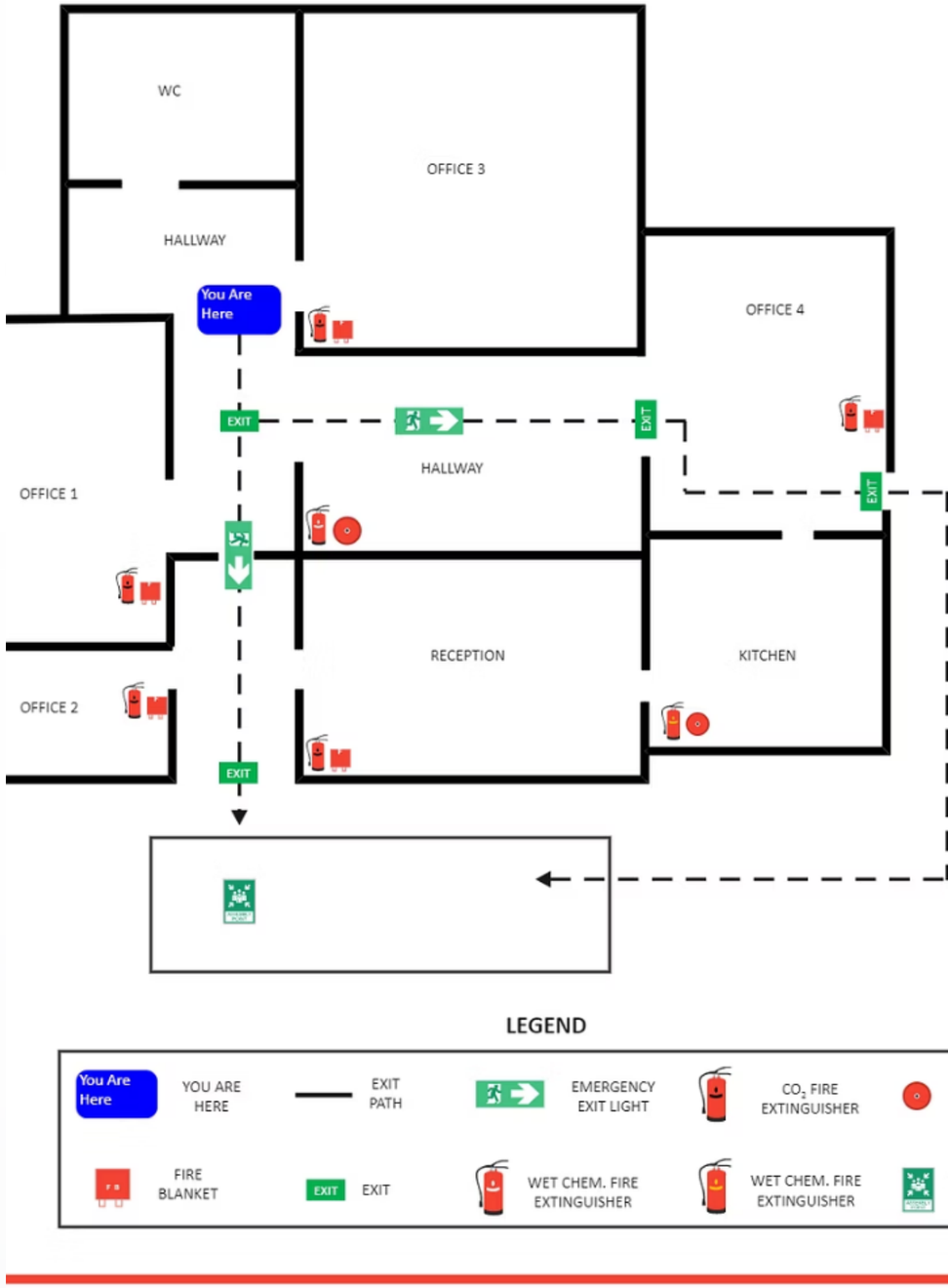
Train all workers on emergency procedures and responsibilities

Facility Preparation

Install proper signage, emergency equipment, and evacuation routes

Regular Drills

Conduct practice drills to ensure readiness and identify improvements



Gas-Specific Safety Regulations

Installation Standards

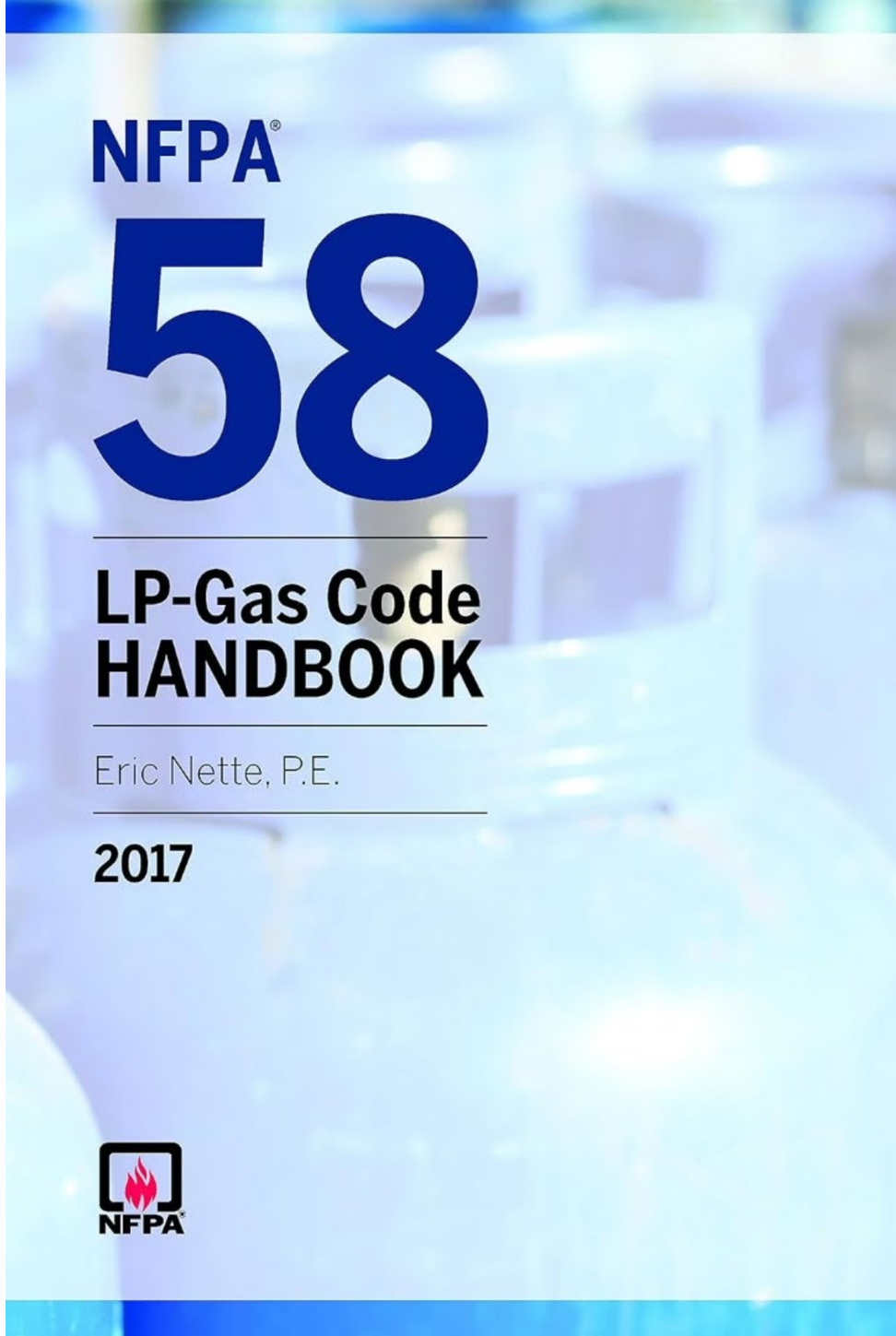
- Specific clearances and ventilation requirements
- Proper materials and fittings
- Testing procedures

Certification Requirements

- Technician licensing and certification
- Continuing education requirements
- Scope of practice limitations

Inspection Protocols

- Initial inspection requirements
- Periodic inspection schedules
- Documentation standards



Confined Space Regulations

Hazard Assessment

Identify and evaluate potential hazards before entry

Entry Permit

Complete required documentation and obtain authorization

Attendant System

Maintain communication with workers inside the space

Atmospheric Testing

Monitor air quality before and during confined space work

Excavation Safety Requirements

Before Excavation

- Locate and mark all underground utilities
- Obtain necessary permits
- Plan appropriate protective systems
- Conduct soil classification

During Excavation

- Install protective systems (shoring, sloping, benching)
- Provide safe access and egress
- Test for hazardous atmospheres
- Inspect daily and after weather events
- Keep spoil piles at least 1m from edge

Fall Protection Requirements

Height Thresholds

Most jurisdictions require fall protection when working at heights of 3 meters (10 feet) or more, though some require it at lower heights.

Protection Systems

Guardrails, travel restraint systems, fall arrest systems, and safety nets are common protection methods required by regulations.

Equipment Inspection

Regular inspection of fall protection equipment is mandated, with specific documentation requirements.

Training Requirements

Workers must receive specific training on fall protection systems before using them.

Electrical Safety Regulations

Hazard Identification

Identify electrical hazards in the work area

De-energization

Turn off and lock out power when possible

Safe Work Practices

Follow established procedures and maintain clearances

Protection

Use appropriate PPE and insulated tools

Propane Storage and Handling Regulations

Storage Requirements

Regulations specify minimum distances from buildings, property lines, and ignition sources. Proper ventilation and fire protection systems are mandated for storage facilities.

Transportation Rules

Specific requirements govern the transportation of propane cylinders, including securing methods, quantity limitations, and vehicle placarding.

Inspection Protocols

Regular inspection and recertification of propane cylinders and equipment is required, with specific documentation and testing procedures.

Workplace Violence and Harassment Policies

Policy Requirements

Most jurisdictions require employers to develop and implement workplace violence and harassment policies that protect all workers, including gas technicians working in various environments.

Risk Assessment

Employers must assess the risk of workplace violence, particularly for workers who travel to different locations or work alone, which is common for gas technicians.

Reporting Procedures

Clear procedures must be established for reporting incidents or threats of violence or harassment, with protections against reprisals for those who report.

Training Requirements

Workers must receive training on recognizing and responding to workplace violence and harassment situations.

Working Alone Regulations

Risk Assessment

Evaluate potential hazards specific to solitary work situations.

Communication System

Establish reliable check-in procedures and emergency communication methods.

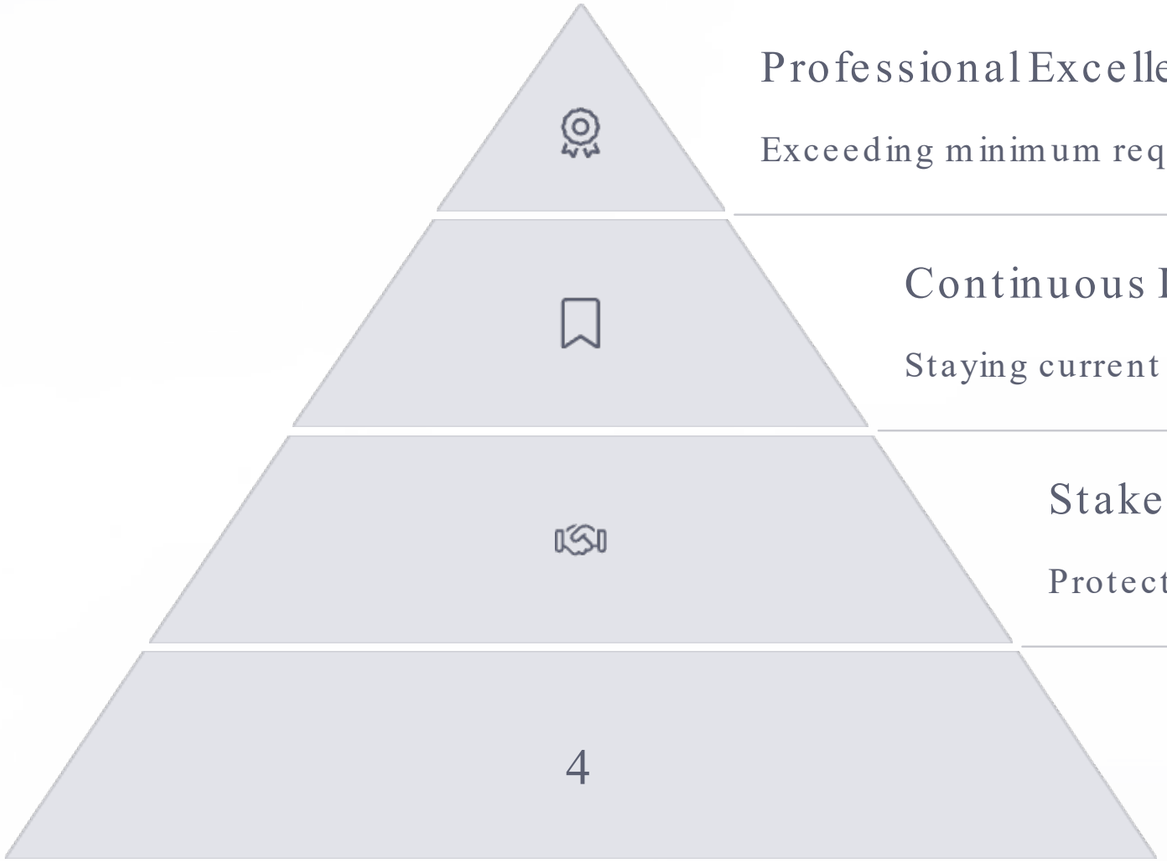
Response Plan

Develop clear protocols for emergency situations when working alone.

Regular Monitoring

Implement a system to regularly confirm the worker's wellbeing throughout their shift.

Commitment to Regulatory Compliance



Professional Excellence

Exceeding minimum requirements

Continuous Learning

Staying current with changing regulations

Stakeholder Safety

Protecting clients, colleagues, and the public

Regulatory Adherence

Following all applicable laws and standards

Gas technicians and fitters must make a personal commitment to understanding and following all applicable regulations. This commitment not only ensures legal compliance but also protects the safety of workers, clients, and the public while upholding the integrity of the profession.

CSA Unit 1- Safety

Chapter 3
Hazardous Materials in the Gas Industry

In the gas industry, technicians and fitters are exposed to a variety of potentially toxic and explosive materials. Federal and provincial legislation provides for the gas technician's/fitter's right to know, as a Canadian worker, about the major risks they can expect and the safety protection measures required to be in place wherever hazardous materials are present.

WHMIS 2015 Overview

Workplace Hazardous Materials Information System

WHMIS, established in 1988 and updated through legislation in 2015, provides workers, employers, and suppliers of materials with vital information about hazardous materials in the workplace.

Essential Understanding

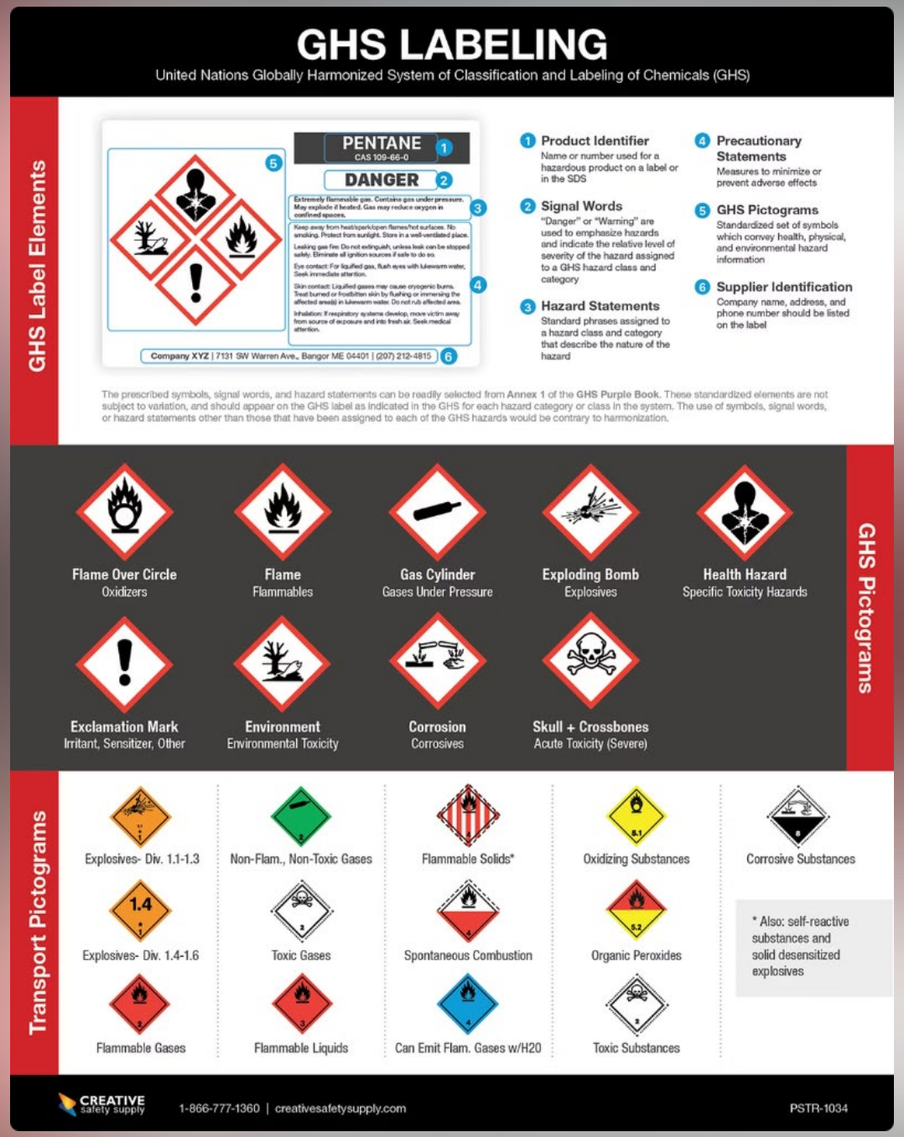
Gas technicians/fitters must understand their rights and responsibilities relating to WHMIS 2015 and maintain good housekeeping practices to ensure safety.

Global Alignment

WHMIS 2015 aligns with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), created by the United Nations.

GHS Terminology

GHS term	Description
Hazard group	Physical hazards group (based on physical or chemical property) Health hazards group (based on the health effect of the product)
Hazard class	Products that have similar hazardous properties. Examples: Flammable gases, oxidizing liquids, gases under pressure, acute toxicity, aspiration hazard, etc.
Hazard category	How hazardous the product is. Examples: Category 1, 1B, 2, 2A, etc.



GHS Label Elements

Symbols

GHS hazard pictograms.

Signal words

Only two signal words used, with only one appearing on a label:

- "Danger" for more severe hazards
- "Warning" for less severe hazards

Hazard statements

Brief, standardized statements to describe the product's hazards. Includes phrases assigned to a hazard class and hazard category.

Precautionary statements

Types focus on "general", "prevention", "response", "storage", and "disposal" information on how to minimize or prevent harmful effects from the product.

Safety Data Sheets (SDS)

Evolution from MSDS

The previous version of WHMIS enabled the additional presentation of the hazardous products information on materials safety data sheets (MSDS). With GHS adopted in WHMIS 2015, this information is now presented on safety data sheets (SDS).

Employer Responsibilities

Employers are required to establish education and training programs for workers exposed to hazardous products in the workplace. Employers must also ensure that the products are labelled, that SDS are present for each product, and that these labels and SDS are readily available to workers.

Worker Responsibilities

Workers are required to participate in the education and training programs and use this information to help them work safely with hazardous products. They may inform when labels on containers have been accidentally removed or if the label is no longer readable.

WHMIS 2015 Legislation

Federal Legislation

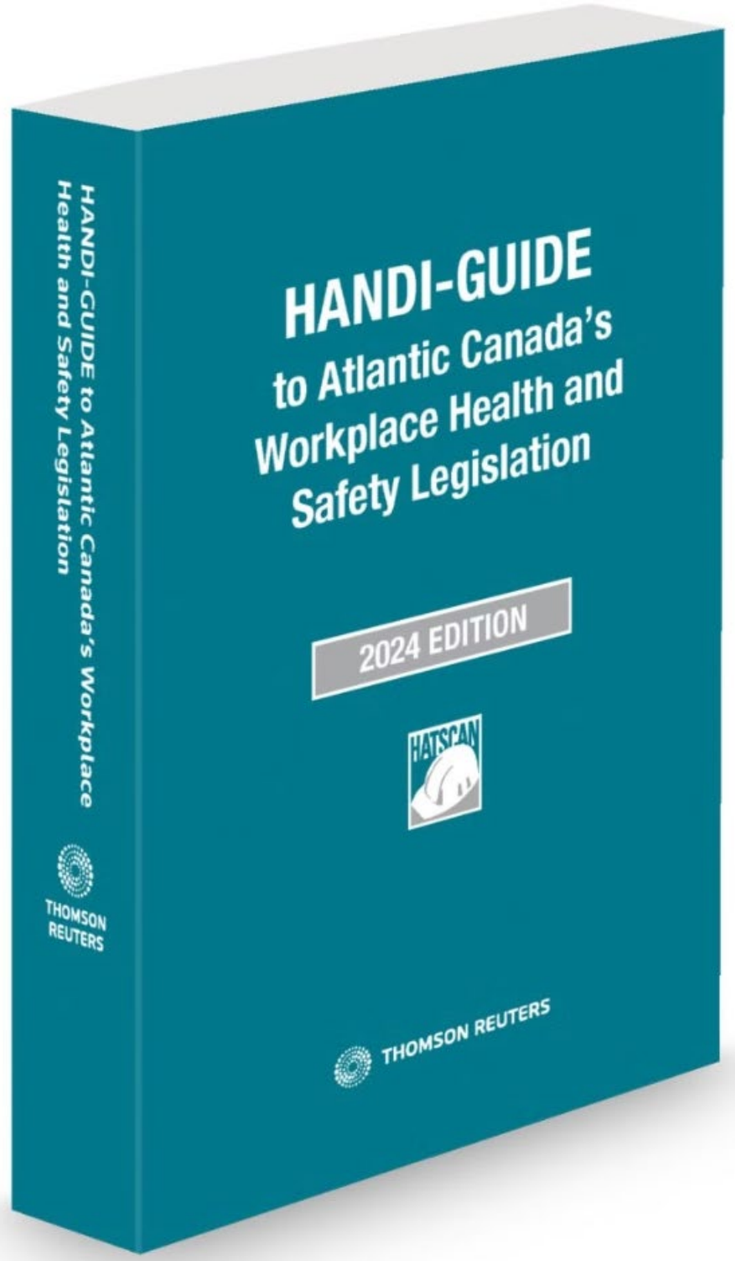
Deals with the importation and sale of controlled products. This includes establishing criteria for including hazardous products and requirements for suppliers to provide appropriate labels and SDS.

Provincial Legislation

Concerned with the storage, handling, and use of hazardous products in the workplace. Through amendments to the Occupational Safety and Health Regulations, provincial legislation ensures the employer will provide worker education and training on hazardous products.

SDS Updates

If you handle hazardous products that the employer produced and observe that additional/different procedures or precautions are necessary, you are responsible for notifying your supervisor so that the employer will add this updated information to the SDS.



GHS Label Types

Supplier Label

- Provided or affixed (attached) by the supplier
- Appears on all hazardous products received at a workplace in Canada
- For hazardous product always used in the container with the supplier label, no other label is required

Workplace Label

Required when a:

- Hazardous product is produced (made) at the workplace and used in that workplace
- Hazardous product is decanted (e.g., transferred or poured) into another container
- Supplier label becomes lost or illegible (unreadable)

SDS Information Updates

Updating Requirement

SDS are updated when the supplier is making significant changes to the SDS. Significant changes must be communicated as soon as possible to the consumer.

Format

SDS are more detailed than a hazard product supplier label or workplace label and provide detailed hazard information.

Information Sections

SDS contain 16 information sections on a hazardous product, with sections 12- 15 optional for the supplier of the product to include.

SDS Sixteen Sections Under WHMIS 2015

Identification (Section 1)

Product identifier, other means of identification, recommended use, restrictions on use, Canadian supplier identifier, emergency telephone number.

Hazard Identification (Section 2)

Hazard classification, label elements (symbol, signal word, hazard statements, precautionary statements), other hazards.

Composition/Information on Ingredients (Section 3)

Chemical name, common name and synonyms, CAS registry number, chemical name of impurities, concentration.

SDS Sections 4-8

First-aid Measures (Section 4)

First-aid measures by route of exposure (inhalation, skin contact, eye contact, ingestion), most important symptoms and effects, immediate medical attention.

Fire-fighting Measures (Section 5)

Suitable extinguishing media, unsuitable extinguishing media, specific hazards, special protective equipment and precautions.

Accidental Release Measures (Section 6)

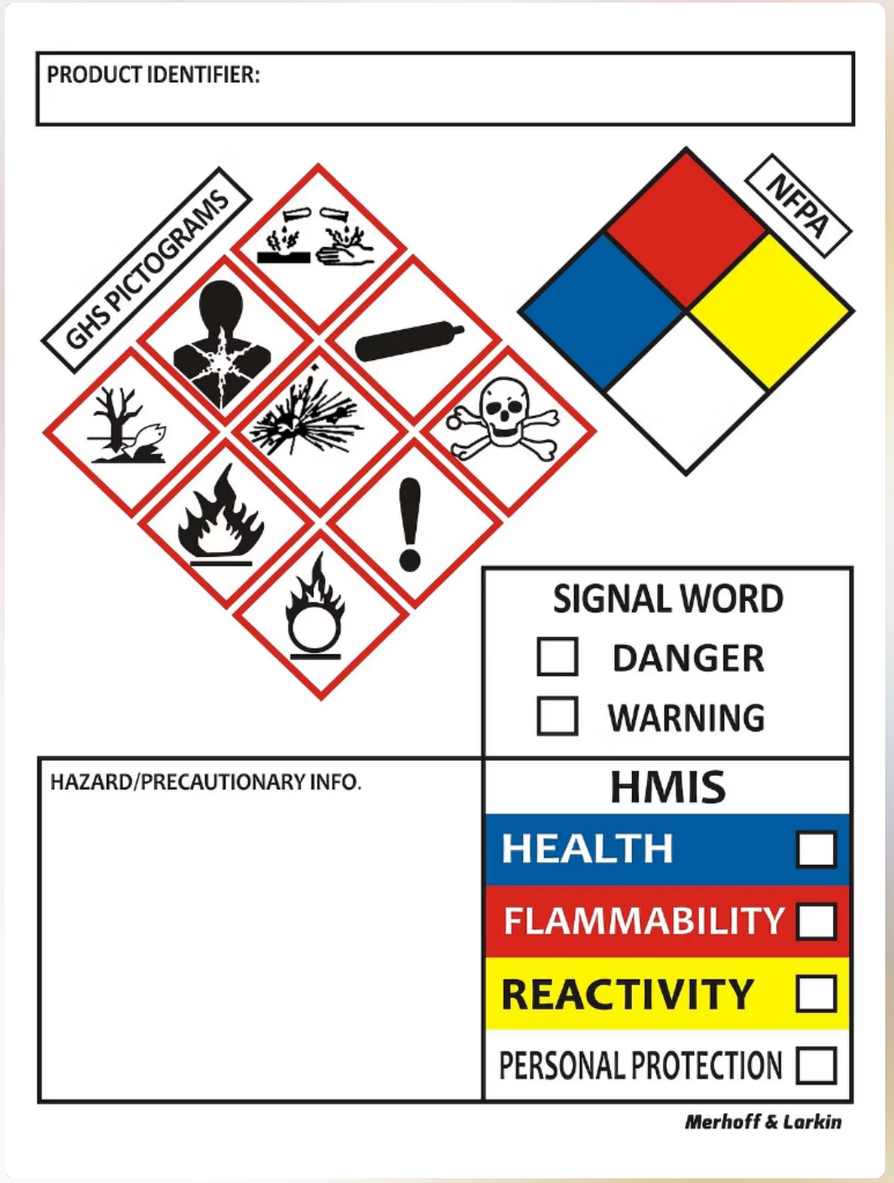
Personal precautions, protective equipment, emergency procedures, methods for containment and cleaning up.

Handling and Storage (Section 7)

Precautions for safe handling, conditions for safe storage (including incompatible materials).

Exposure Controls/Personal Protection (Section 8)

Control parameters, appropriate engineering controls, individual protection measures.



SDS Sections 9 - 12

Physical and Chemical Properties (Section 9)

Appearance, odour, pH, melting/freezing point, boiling point, flash point, flammability, solubility, and many other physical and chemical characteristics.

Stability and Reactivity (Section 10)

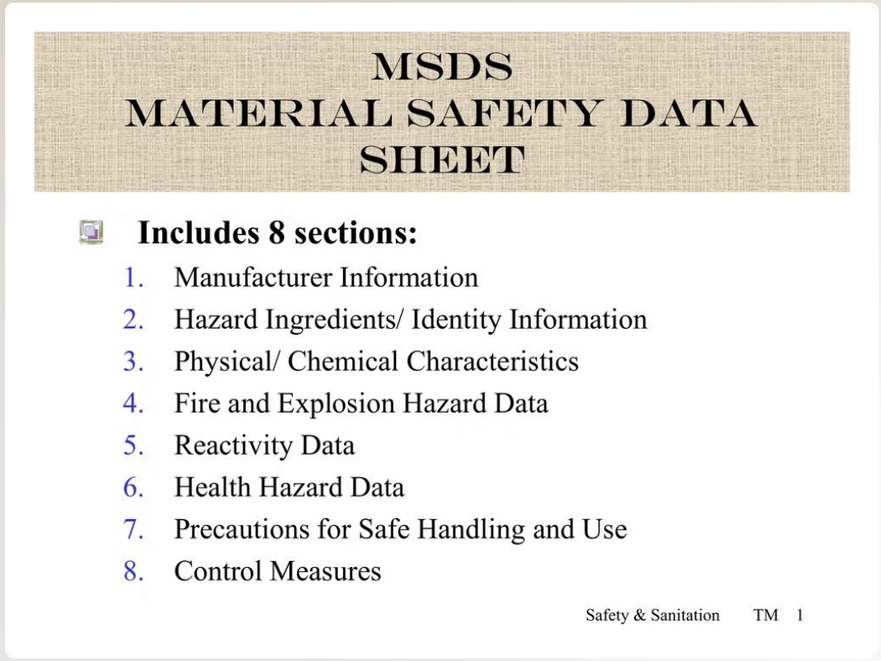
Reactivity, chemical stability, possibility of hazardous reactions, conditions to avoid, incompatible materials, hazardous decomposition products.

Toxicological Information (Section 11)

Information on likely routes of exposure, symptoms, delayed and immediate effects, numerical measures of toxicity.

Ecological Information (Section 12 - Optional)

Ecotoxicity, persistence and degradability, bioaccumulative potential, mobility in soil, other adverse effects.



SDS Sections 13 - 16

Disposal Considerations (Section 13 - Optional)

Information on safe handling for disposal and methods of disposal, including any contaminated packaging.

Transport Information (Section 14 - Optional)

UN number, UN proper shipping name, transport hazard class(es), packing group, environmental hazards, transport in bulk, special precautions.

Regulatory Information (Section 15 - Optional)

Safety, health, and environmental regulations specific to the product.

Other Information (Section 16)

Date of the latest revision of the SDS.

WHMIS 2015 Hazard Pictograms

Hazard products pictograms—symbols with red borders in a diamond shape—easily and visibly identify the product by hazard group, hazard class, and hazard category. Pictograms display on labels and SDS.

Flammable Hazard Pictogram

Physical Hazard Group

- Flammable gases, category 1
- Flammable aerosols, categories 1, 2
- Flammable liquids, categories 1, 2, 3
- Flammable solids, categories 1, 2
- Self-reactive substances and mixtures, types B, C, D, E, F
- Pyrophoric liquids, category 1
- Pyrophoric solids, category 1
- Self-heating substances and mixtures, categories 1, 2
- Substances and mixtures which, in contact with water, emit flammable gases, categories 1, 2, 3
- Organic peroxides, types B, C, D, E, F

Oxidizing and Compressed Gas Hazard Pictograms

Oxidizing Pictogram

Physical Hazard Group:

- Oxidizing gases, category 1
- Oxidizing liquids, categories 1, 2, 3
- Oxidizing solids, categories 1, 2, 3

Compressed Gas Pictogram

Physical Hazard Group:

- Compressed gases
- Liquefied gases
- Refrigerated liquefied gases
- Dissolved gases

Corrosive and Explosive Hazard Pictograms

Corrosive Pictogram

Physical Hazard Group:

- Corrosive to metals, category 1

Health Hazard Group:

- Skin irritation/corrosion, categories 1, 1A, 1B, 1C
- Serious eye damage/eye irritation, category 1

Explosive Pictogram

Physical Hazard Group:

- Self-reactive substances and mixtures, types A, B
- Organic peroxides, types A, B

Toxic and Health Hazard Pictograms

Toxic Pictogram

Health Hazard Group:

- Acute toxicity (oral, dermal, inhalation), categories 1, 2, 3

Health Hazard Pictogram

Health Hazard Group:

- Respiratory or skin sensitization, categories 1, 1A, 1B
- Germ cell mutagenicity, categories 1, 1A, 1B, 2
- Carcinogenicity, categories 1, 1A, 1B, 2
- Reproductive toxicity, categories 1, 1A, 1B, 2
- Specific target organ toxicity following single exposure, categories 1, 2
- Specific target organ toxicity following repeated exposure, categories 1, 2
- Aspiration hazard, category 1

Exclamation Mark and Biohazardous Pictograms

Exclamation Mark Pictogram

Health Hazard Group:

- Acute toxicity (oral, dermal, inhalation), category 4
- Skin corrosion/irritation, category 2
- Serious eye damage/eye irritation, category 2, 2A
- Respiratory or skin sensitization, categories 1, 1A, 1B
- Specific target organ toxicity following single exposure, category 3

Biohazardous Infectious Materials Pictogram

Health Hazard Group:

- Biohazardous Infectious Materials, category 1 (For organisms or toxins that can cause diseases in people or animals)

Good Housekeeping Practices

Follow Proper Procedures

The responsibility of a gas technician/fitter is to follow proper handling, storage, and use requirements for hazardous materials.

Consult SDS

Consult the SDS provided by the employer and ensure that you have the most recent updates to these sheets.

Read Manufacturer Instructions

Ensure that you read and follow directions on manufacturers' information sheets when handling hazardous products.

Seek Help When Needed

If information on the proper handling of a hazardous product is not available, you should phone your area's Construction Safety Association for help.

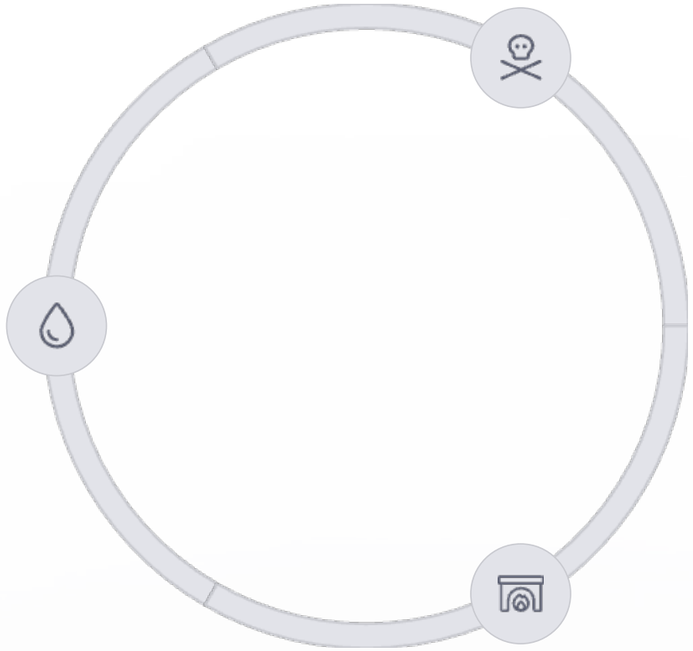
Consult Supervisor

If you cannot obtain the information you need, consult your supervisor before using any product or material to ensure that you are completely informed of the use and hazard.

Categories of Hazardous Materials

Liquid Solvents, Glues, and Resins

Used as cleaning agents and in production of various materials.



Toxic Materials

Various substances that can cause harm through exposure.

Common Fuel Gases

Flammable gases used as energy sources.

Liquid Solvents

Solvents are liquids that dissolve other substances. They are used as cleaning agents to dissolve oils, greases, and resins, and in the production of paints, lacquers, adhesives, and cements for plastic and fibreglass. Exposure to solvents may present a permanent threat to your health and reduce your awareness, thereby increasing the potential for mistakes and accidents.

Methods of Solvent Exposure

Method of contact	Description
Inhalation	Excessive breathing of solvent vapours affects the central nervous system, causing dizziness, nausea, headaches, sleepiness, the appearance of drunkenness, unconsciousness, and possibly death. Other cases of overexposure may result in serious damage to the blood, lungs, liver, and kidneys. Respirators are recommended as a means of short-term protection against inhalation hazards. They should be approved and be suitable for protection against organic fumes. Regularly check and properly maintain them.
Skin contact	All solvents can dry and irritate the skin with continuous contact, leaving the skin subject to disabling and possibly disfiguring dermatitis and opening the way to serious infection. Many solvents are easily absorbed through the skin, leading to similar effects as those described under inhalation.
Ingestion	Accidental swallowing of industrial solvents is rare because of the unpleasant odour that usually identifies them.

General Safety Precautions for Handling Liquid Solvents

Do

- Use only approved containers in good condition. Keep them tightly closed when not in use.
- Clean up liquid spills immediately. Put cleanup rags in designated containers.
- Check the grounding of large drums containing flammable liquids. This prevents static sparks from being generated when pouring solvents.
- Avoid skin contact and practice proper personal hygiene.
- Always use personal protective equipment (PPE) and special protective devices and equipment.

Do Not/Never

- Use a container for any liquid other than that for which it is intended and so marked.
- Use sawdust to absorb a spill unless you can immediately and safely dispose of the sawdust mixture.
- Smoke or produce sparks or flame in the vicinity of a flammable or combustible liquid.
- Work with a solvent if you are "not sure" of its properties or what type of protective clothing to wear. Check with your foreperson or safety supervisor if you are in doubt.

Storage of Liquid Solvents

Storage Location

Solvents may be stored either in above-ground or underground tanks. Outside storage is always preferred to inside storage, but drums should always be protected from direct rays of the sun and other sources of heat. Protection from extreme cold may be necessary in severe climates.

No Smoking or Eating

Do not smoke or eat in any area where solvents or any other volatile substances are stored or used. The danger of fire from a spark or contamination of food due to fumes is extreme.

Leaking Containers

If a drum leaks or is otherwise damaged, its contents should be immediately transferred to a sound container that is clean or that previously held the same liquid.

Clear Labeling

The contents of each drum should be clearly labelled. This prevents accidents occurring from improper use or incorrect mixtures. Where possible, the labelling should include handling precautions and emergency action.

Toxic Materials in the Gas Industry

Plastic Venting Materials

Plastic venting glues, cleaners, and cement (S636), and fibreglass solvents, glues, and resins

Chemical Substances

Chlorine

Building Materials

Asbestos

Gases

Sewer gas

Metal Fumes

Zinc or cadmium fumes

Chemical Solvents, Glues, and Resins

Gas technicians/ fitters use a variety of products to join the fittings for plastic pipe used in venting systems. The solvents and glues used with ABS and PVC and CPVC products are toxic. Take caution and use special PPE in unventilated or confined spaces. These pipe materials are highly flammable and emit highly toxic fumes when burned.

Safety Precautions for Handling ABS, PVC, CPVC, and Fibreglass

Do

Apply solvent cement with a brush and avoid skin contact.

Do Not/Never

- Smoke while using primers or solvents.
- Let solvent cement get into your eyes. If it should, flush your eyes with water and see a doctor immediately.

Storage of Solvents and Glues

Containers should be tightly sealed and kept away from extreme heat or cold.

Chlorine

Form	Description
Liquid chlorine	Is a clear, amber-coloured liquid about 1.5 times as heavy as water.
Gaseous chlorine	Is greenish-yellow and is about 2.5 times as heavy as air. Thus, if the gas escapes from a container or system, it will collect at floor level.

Chlorine is non flammable, a strong oxidant, and has a disagreeable, suffocating odour. Chlorine is a strong eye and lung irritant. Exposure to low concentrations, between 15-30 ppm (parts per million), causes a burning sensation in the eyes, nose, and throat, and sometimes headaches. There may be redness of the face, sneezing, coughing, and huskiness or loss of voice.

Chlorine Exposure Effects

Respiratory Effects

Inhalation of chlorine in higher concentrations affects both the upper and lower respiratory tract. The most prominent symptoms are eye and throat irritation, choking sensation, restlessness, nausea, vomiting, shortness of breath, chest pain, and fluid in the lungs. Delayed onset may occur 6- 12 hours after exposure.

Severe Exposure

Brief exposure to very high concentrations (800 ppm) of chlorine may cause death from suffocation. If skin or eye contacts chlorine liquid or vapour, it causes severe local irritation and burns.

Combustion Properties

While chlorine is neither explosive nor flammable, it will support combustion. Water, in certain concentrations, is explosive with chlorine gas when ignited by a spark.

Asbestos

Asbestos is one of the most dangerous substances you can encounter as a gas technician/fitter. Asbestos is a designated substance and, therefore, must be reported to your employer and supervisor. Do not engage in any activity with asbestos until you have been authorized by your supervisor.

Some asbestos fibres are so small and light that when they are breathed in, they may not be trapped by the ciliary hairs or mucous membranes of the air passages. The fibres are instead inhaled deep into the lungs and into the air sacs through which oxygen is transferred to the bloodstream. The body may not destroy the minute fibrils, and over a period of time, scar tissue forms around them. When lungs become tough and inelastic, breathing becomes difficult, insufficient oxygen reaches the blood, and the heart may become enlarged and weakened.

Precautions for Handling Asbestos

Certified Training

Personnel working with installation or removal of asbestos are required to successfully complete a certified asbestos abatement course.

Authority Contact

They must contact the authority having jurisdiction (typically the Ministry of Labour) before they remove asbestos.

Proper Protection

Always use appropriate respiratory protection and protective clothing when working with asbestos.

Decontamination

Follow proper decontamination procedures after working with asbestos materials.

Sewer Gas

Sewer gas is a mixture of vapours, odours, and gases found in a sewer. The gases may include methane (CH_4), gasoline vapour, illuminating gas, hydrogen sulfide (H_2S), carbon monoxide (CO), acetylene (C_2H_2), hydrogen (H_2), ammonia (NH_3), oxygen (O_2), and nitrogen (N).

Some of these gases are combustible and explosive in the presence of oxygen. Hydrogen sulphide and carbon monoxide are highly poisonous, even in relatively small concentrations. All may be asphyxiating when the concentration of oxygen in the atmosphere is reduced. Hydrogen sulfide, other gases, and volatile matter may be present in low concentrations, but still be sufficient to create highly offensive odours and cause corrosion.

Sewer Gas Safety Concerns

Health Controversy

The possibility that sewer gas may be dangerous to your health has created controversy. People have died from asphyxiation or gas poisoning upon entering a manhole. No scientific data can be found to prove or disprove that any specific disease results from the presence of sewer gas in a building.

Preventive Measures

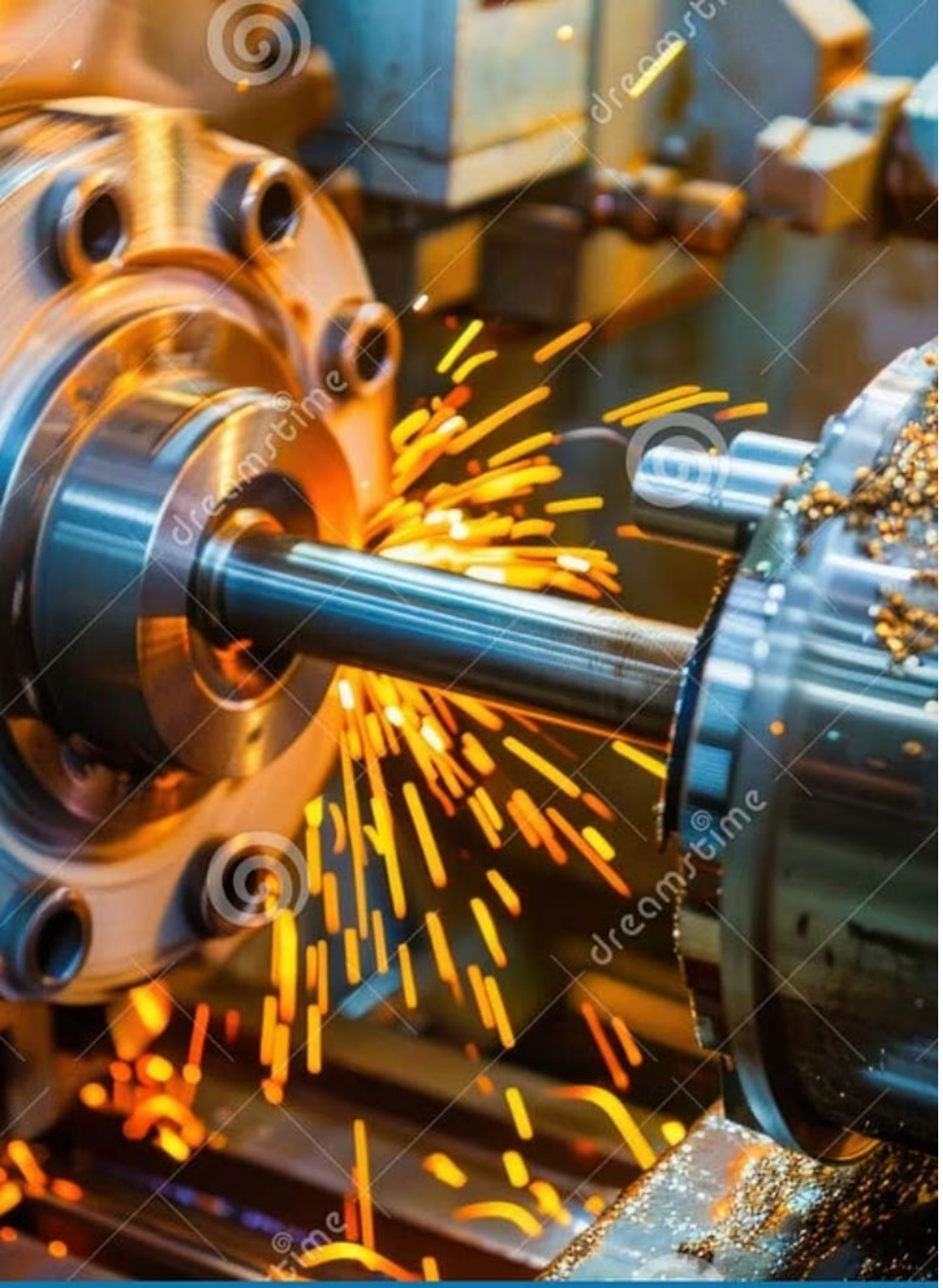
However, in view of the uncertainties, the greatest effort should be made to confine sewer gas to sewers.

Testing Requirement

Before entering a sewer, the worker must perform tests to determine the contents of the atmosphere. Where tests indicate that the atmosphere is unsafe, he/she must vent the sewer and then check it again.

Respiratory Protection

If it is impractical to vent the sewer, the worker must wear respiratory equipment. Elimination or control of all sources of ignition is required.



Zinc or Cadmium Fumes

Source of Hazard

Pipes or sheet metal galvanized with zinc or cadmium present a hazard to gas technicians/fitters. When these materials are cut with an oxyacetylene torch, the fumes given off produce a highly toxic, dense white smoke.

Ventilation Requirement

When cutting pipe galvanized with zinc or cadmium (and you are using oxyacetylene equipment) take precautions to avoid breathing the fumes. It is required to perform the cutting operation in a well-ventilated area or wear breathing equipment.

Brazing Alloys

Cadmium may also be found in some brazing alloys. Use caution and appropriate PPE to protect yourself when using cadmium-containing products. Alternatively, use a cadmium-free product if there is a choice.

Common Fuel Gases

Gasoline

Liquid fuel used primarily in vehicles and small engines.

Diesel

Liquid fuel used in diesel engines and heating systems.

Propane (LP-gas)

Liquefied petroleum gas used for heating, cooking, and vehicles.

Natural Gas

Gaseous fuel distributed through pipeline systems for heating and cooking.

Gasoline and Diesel Fuels

Gasoline and diesel fuel are liquids designed to ignite easily. This means they vaporize easily and readily form combustible mixtures, making them extremely dangerous.

General Precautions for Working with Gasoline and Diesel Fuels

No Smoking

Smoking while working with fuel gases is prohibited. The flammable limits of gasoline are 1%–16%.

Not for Cleaning

Never use gasoline and diesel as cleaning agents.

Prevent Sparks

When transferring the fuels from one container to another, avoid sparks that may cause ignition.

Clean Spills Properly

Should spillage occur, place the materials used to clean up in designated, sealed containers.

More Precautions for Gasoline and Diesel Fuels

Vehicle Transport

Never carry gasoline and other flammable liquids in the passenger compartment of a vehicle.

Approved Containers

Transport and store gasoline and other flammable liquids in approved containers bearing the CSA (CSA Group) or ULC (Underwriters' Laboratories of Canada) label.

Container Integrity

Ensure that gasoline and diesel fuel containers are not damaged, and that caps or fittings are properly secured after filling.

Secure Transport

Transport flammable liquids in an upright position, braced, or otherwise secured to prevent overturning.

Fire Extinguisher

Keep an ABC fire extinguisher in the driver's compartment while transporting gasoline or other flammable liquids in a van.

Storage of Gasoline and Diesel Fuels

Sealed Containers

Store gasoline and diesel fuels in sealed, clearly labelled containers.

Temperature Control

Keep away from extreme heat sources and direct sunlight.

Dedicated Storage

Use only approved storage cabinets and areas designed for flammable liquids.

Ventilation

Ensure storage areas have proper ventilation to prevent vapor accumulation.

LP-gas and Natural Gas

Liquid propane gas (LP-gas) and natural gas are in the gaseous state while burning at atmospheric pressure and normal temperatures. Both are non-toxic and should not harm anyone breathing low concentrations near minor leaks.

In their pure states, both fuels are tasteless, colourless, and odourless. As a safety measure, each fuel comes with an unpleasant odour so it can be detected when its atmospheric concentration reaches 1%. This concentration is well below the level at which combustion can occur.

LP-gas Properties

Visible Leaks

LP-gas leaking or released into the air looks like a steam cloud that disappears as soon as the liquid absorbs enough heat to vaporize.

Cold Burns

Heat is absorbed from everything the liquid touches, which can result in cold burns to the skin.

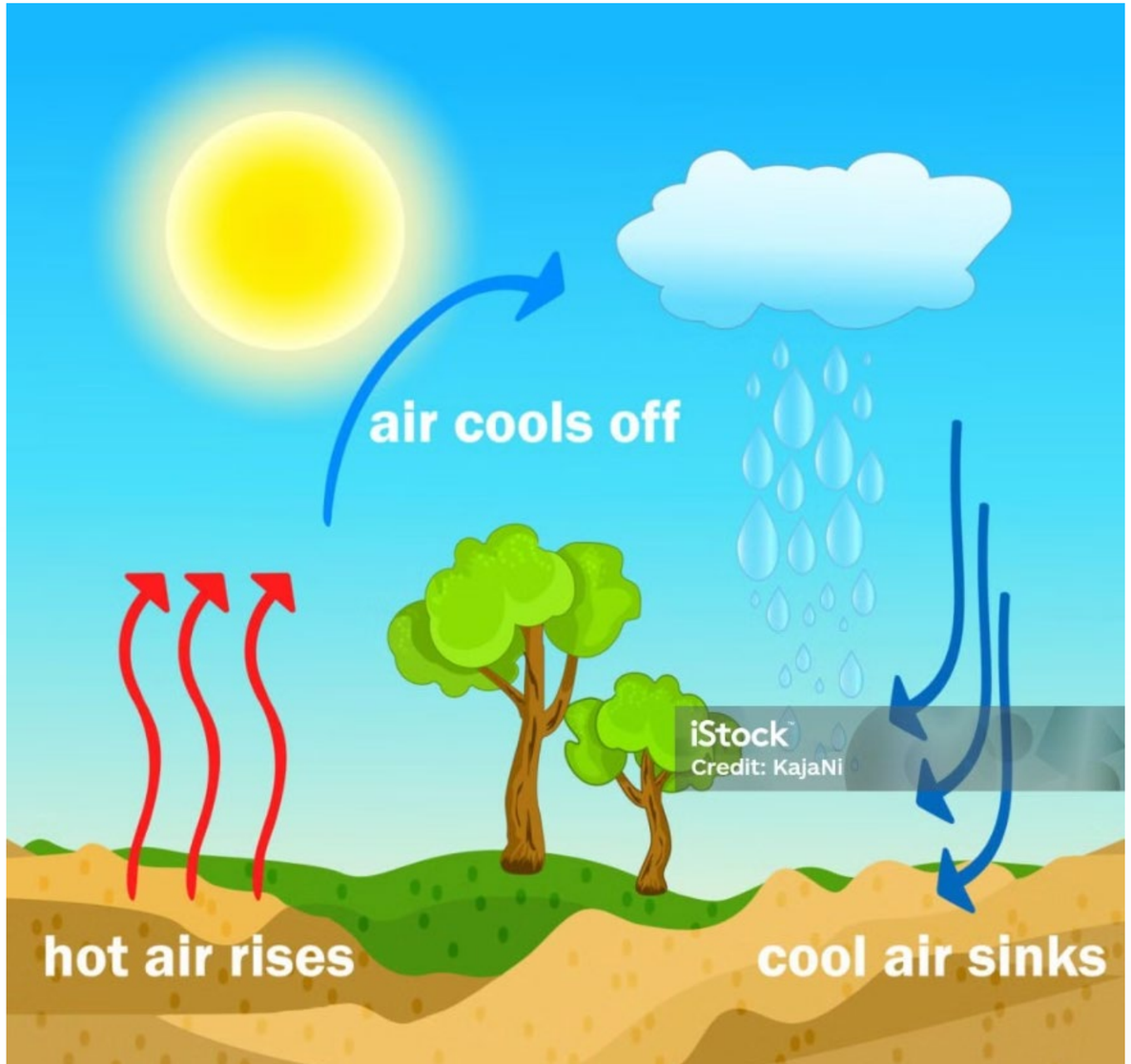
Dangerous Mixture

The combination of LP-gas or natural gas and oxygen produces an extremely dangerous mixture. If a leak is suspected, immediately shut of the supply at its source and check for the leak with an approved testing agent.

Gas Density Characteristics

Natural Gas

Natural gas is lighter than air (relative density 0.6), causing it to rise and be dissipated by currents of air.



Propane

Propane is heavier than air (relative density 1.5), which causes it to descend and collect in low points. Such pockets of gas can remain invisible; they are ready to ignite with as little as a spark from an electrical switch.

Storage of LP-gas and Natural Gas

Oxygen Separation

Store LP-gas and natural gas in the same storage area as oxygen.

Approved Containers

Store only both LP-gas and natural gas fuels, which are under pressure, in approved containers, with approved regulators and relief valves.

Careful Handling

Avoid mishandling the containers.

Temperature Control

Keep containers away from heat sources and direct sunlight.

Transportation of LP-gas and Natural Gas

Propane

Propane is shipped and stored in a container as a liquid under pressure.

Natural Gas

Natural gas remains a gas but is compressed for shipping into smaller containers or transmitted through smaller pipes.

Transportation of Dangerous Goods

CSA B149.2

Clauses from CSA B149.2, Propane storage and handling code, cover the requirements for transportation of propane in cylinders and tanks (refer to the sections "Transportation of cylinders" and "Movement of tanks not designed for transportation or delivery of propane").

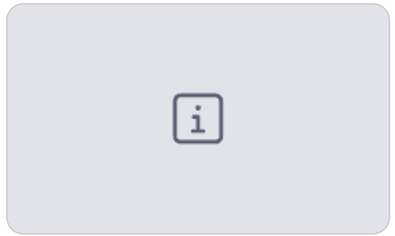
Transport Canada Regulations

CSA B149.2 references the Transportation of Dangerous Goods Regulations of Transport Canada.

Additional Standards

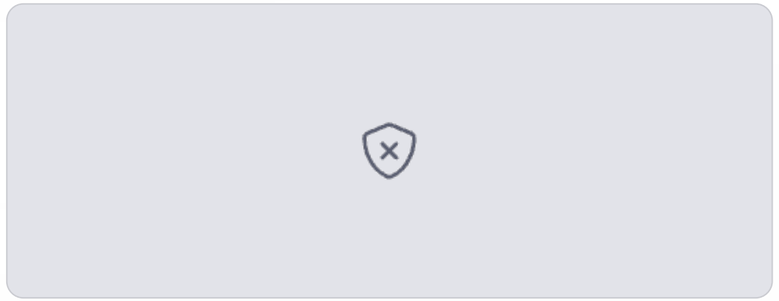
Other relevant standards include CSA B340, Selection and use of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2, and CSA-B622, Selection and use of highway tanks, TC portable tanks, and ton containers for the transportation of dangerous goods, Class 2.

WHMIS 2015 Objectives Review



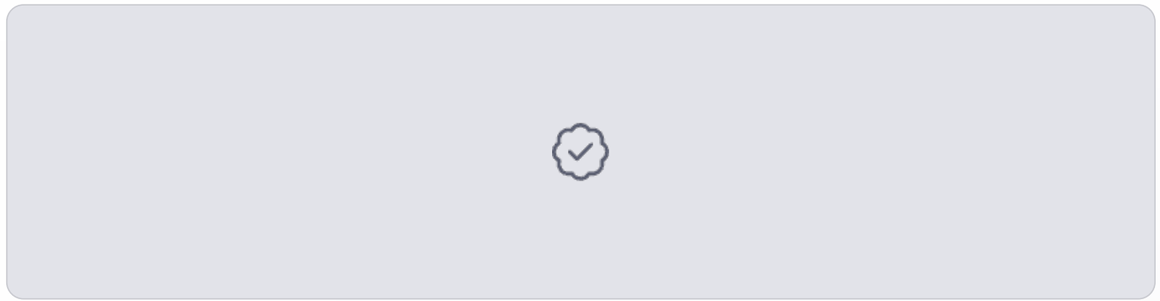
Understand WHMIS

Describe the Workplace Hazardous Materials Information System (WHMIS)



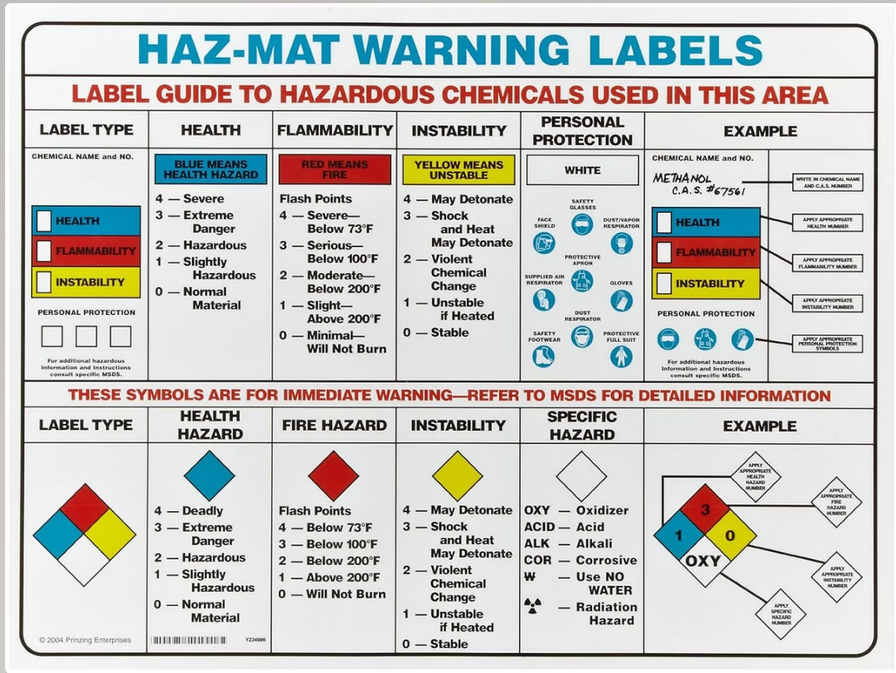
Know Safety Procedures

Describe safe handling, storage, disposal, and transportation of hazardous materials



Apply Knowledge

Use this information to work safely with hazardous materials in the gas industry

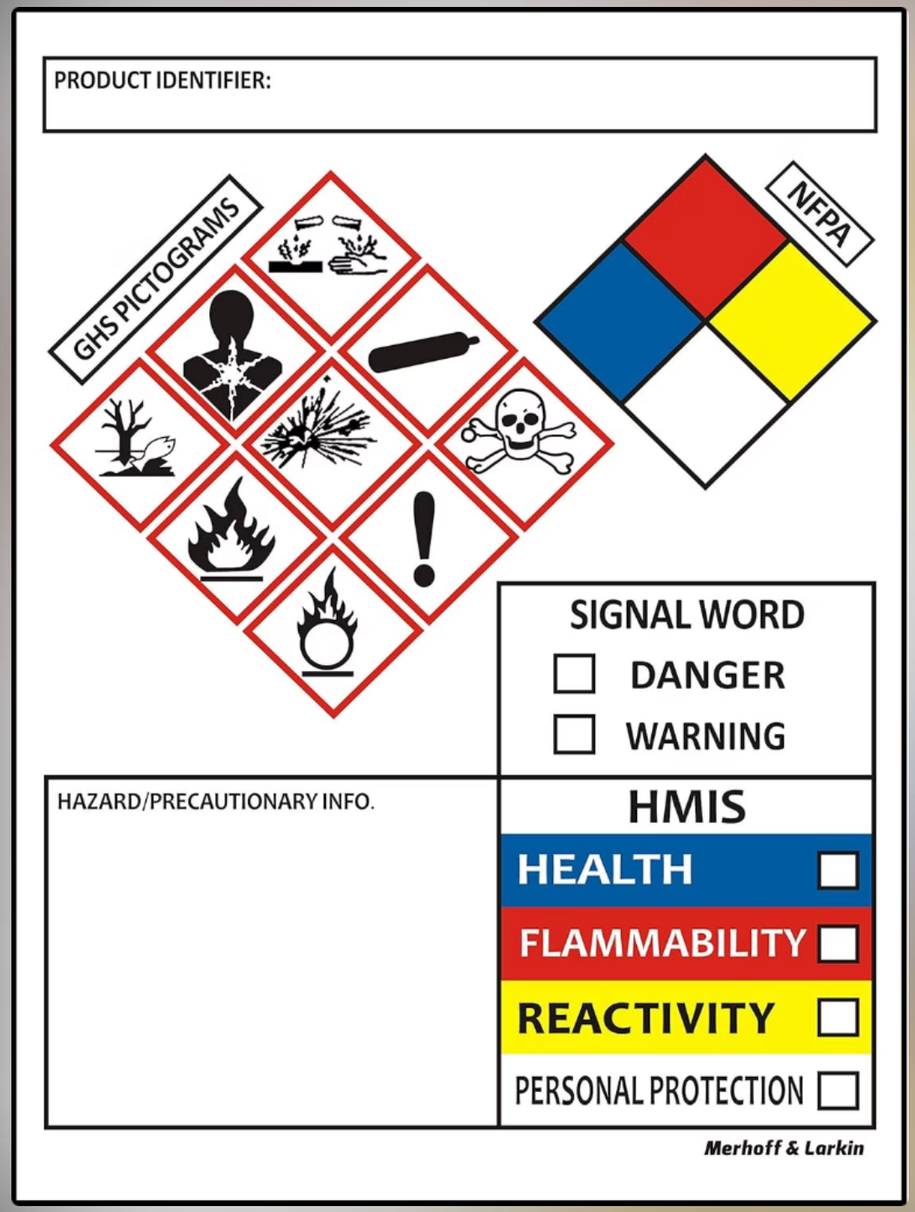


Hazardous Materials Terminology

Term	Abbreviation (symbol)	Definition
Globally Harmonized System of Classification and Labeling of Chemicals	GHS	Internationally agreed-upon system to classify and label chemicals including easy-to-understand symbols.
Liquid propane gas	LP-gas	One type of common fuel.
Material safety data sheet	MSDS	Document that provides workers and emergency personnel with procedures for handling or working with that substance in a safe manner.
Parts per million	ppm	Value that represents the part of a whole number in Units of 1/1,000,000.

More Hazardous Materials Terminology

Term	Abbreviation (symbol)	Definition
Safety data sheet	SDS	Document, adopted under WHMIS 2015 that provides workers and emergency personnel with procedures for handling or working with hazardous products in a safe manner.
Sewer gas		Mixture of vapours, odours, and gases found in a sewer.
Solvents		Liquids that dissolve other substances.
Workplace Hazardous Materials Information System	WHMIS	Provides workers, employers, and suppliers of materials with vital information about hazardous materials in the workplace. WHMIS 2015 was updated in 2015.



SAFETY MEMO

April 12, 2021 – Use of Safety Data Sheets (SDSs)

Did you know

Interpretation of SDS

The Safety Data Sheet (SDS) for a chemical identifies the dangers to human health and the environment. It provides useful information on how to use the chemical safely. The SDS also contains essential information for emergency services (firefighters, medical staff) in the event of an exposure. It is therefore essential to know how to interpret the document.

The Globally Harmonized System (GHS) of classification and labeling of chemicals has been put in place by the United Nations. This harmonized approach made it possible to establish an international reference system for the labeling of hazardous materials to classify the dangers and ensure their communication, through pictograms.

Due to the globalization of the transport and use of chemicals, this unification is essential to ensure the safe use of chemicals.

How to Use an SDS?

Here are the 7 key points of using an SDS:

1. **Locate general information**: product name, supplier, label, composition and physical-chemical properties.
2. **Know the dangers associated with the product**: flammability, stability, health and environment.
3. **Use the product correctly**: review uses identified or advised against, handling, storage, protective equipment and exposure limit values.
4. **Proper product disposal**: management of waste and contaminated packaging.
5. **Reference transport information**: special precautions and road/rail/sea classification.
6. **Know what to do in an emergency**: first aid, fire-fighting measures, and measures to be taken in the event of an accidental spill.
7. **Consult exposure scenarios**: if an e-SDS has been developed, reference the annex for information on exposure scenarios.

Development and Distribution of SDS

SDSs are written by the manufacturer, the importer or the seller. They must be written in an official language of the region where the product is offered for sale.

SDSs must be dated and sent by the supplier of the product upon delivery in paper and/or electronic form. Requirements for this information are:

- Compulsory for hazardous substances and mixtures
- Available upon request for certain mixtures not classified as hazardous containing hazardous substances at individual concentrations above the thresholds defined by law.

Annual SDS updates should be requested to ensure the information provided is current. Hazardous products that are not labeled and/or not accompanied by an SDS should not be used until these requirements are in place.

Information Sources

For more information, review the following documents listed below:

- Occupational Safety and Health Administration document: https://www.osha.gov/sites/default/files/publications/OSHA3514.pdf#:~:text=The%20SDS%20includes%20information%20such,storing%2C%20and%20transporting%20the%20chemical.&text=The%20SDS%20preparers%20may%20also,in%20various%20section(s).
- Canadian Center for Occupational Health and Safety website: https://www.cchst.ca/oshanswers/chemicals/whmis_ghs/sds.html
- QuickFDS.com (website giving access to many supplier SDSs): https://www.quickfds.com

IPSB Ingénierie de Procédés Sucres et Biotechnologies

LAPORTE

Hazardous Materials Information Resources

Canadian Centre for Occupational Health and Safety

Visit www.ccohs.ca for more information on chlorine and other hazardous materials.

Transport Canada

For more information on Transportation of Dangerous Goods (TDG) go to: http://www.tc.gc.ca/eng/tdg/safety-menu.htm

CSA Standards

Reference CSA B149.2, CSA B340, and CSA-B622 for transportation requirements.

Provincial Resources

WHMIS 2015 leaflets obtainable through the provincial Workers Compensation Board, Workers Safety Insurance Board, or equivalent.

Worker Rights and Responsibilities

Worker Rights

- Right to know about hazards in the workplace
- Right to access up-to-date SDS information
- Right to proper training on hazardous materials
- Right to appropriate personal protective equipment

Worker Responsibilities

- Participate in education and training programs
- Use information to work safely with hazardous products
- Report missing or illegible labels
- Notify supervisors of additional/different procedures or precautions needed
- Follow proper handling, storage, and disposal procedures

Employer Responsibilities for Hazardous Materials

Education & Training

Establish education and training programs for workers exposed to hazardous products

Labeling

Ensure all hazardous products are properly labeled

Accessibility

Make labels and SDS readily available to workers

SDS Availability

Maintain current SDS for each hazardous product

Personal Protective Equipment for Hazardous Materials

Always use appropriate personal protective equipment when handling hazardous materials. The specific PPE required will depend on the material being handled and should be specified in the Safety Data Sheet.

Emergency Response for Hazardous Materials

Identify the Hazard

Consult labels and SDS to understand the specific hazards of the material involved.

Protect Yourself and Others

Use appropriate PPE and evacuate unnecessary personnel from the area.

Contain the Hazard

For spills, use appropriate containment methods as specified in the SDS.

Report the Incident

Notify supervisors and appropriate emergency response personnel.

Document the Incident

Record all details of the incident and response actions taken.

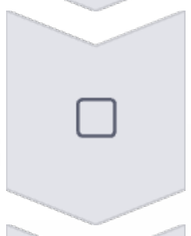
Spill Cleanup Procedures

Alert

Notify others in the area about the spill

Protect

Put on appropriate PPE before approaching the spill



Contain

Use appropriate materials to prevent spreading

Clean

Use proper absorbents and disposal containers

Report

Document the incident according to workplace procedures

Hazardous Materials Storage Compatibility

Hazardous Waste Disposal

Liquid Solvents and Glues

Must be disposed of in approved containers through licensed hazardous waste disposal companies. Never pour down drains or sewers.

Contaminated Materials

Rags, absorbents, and other materials contaminated with hazardous substances must be placed in designated containers and disposed of as hazardous waste.

Empty Containers

Even empty containers that held hazardous materials must be handled according to regulations. Some may be recycled after proper cleaning, while others must be disposed of as hazardous waste.

Asbestos Materials

Must be wetted, double-bagged in specially marked bags, and disposed of only at facilities licensed to accept asbestos waste.

Transportation of Hazardous Materials

9

TDG Classes

Different hazard classes under Transportation of Dangerous Goods Regulations

4

Placard Types

Required for bulk shipments based on hazard class

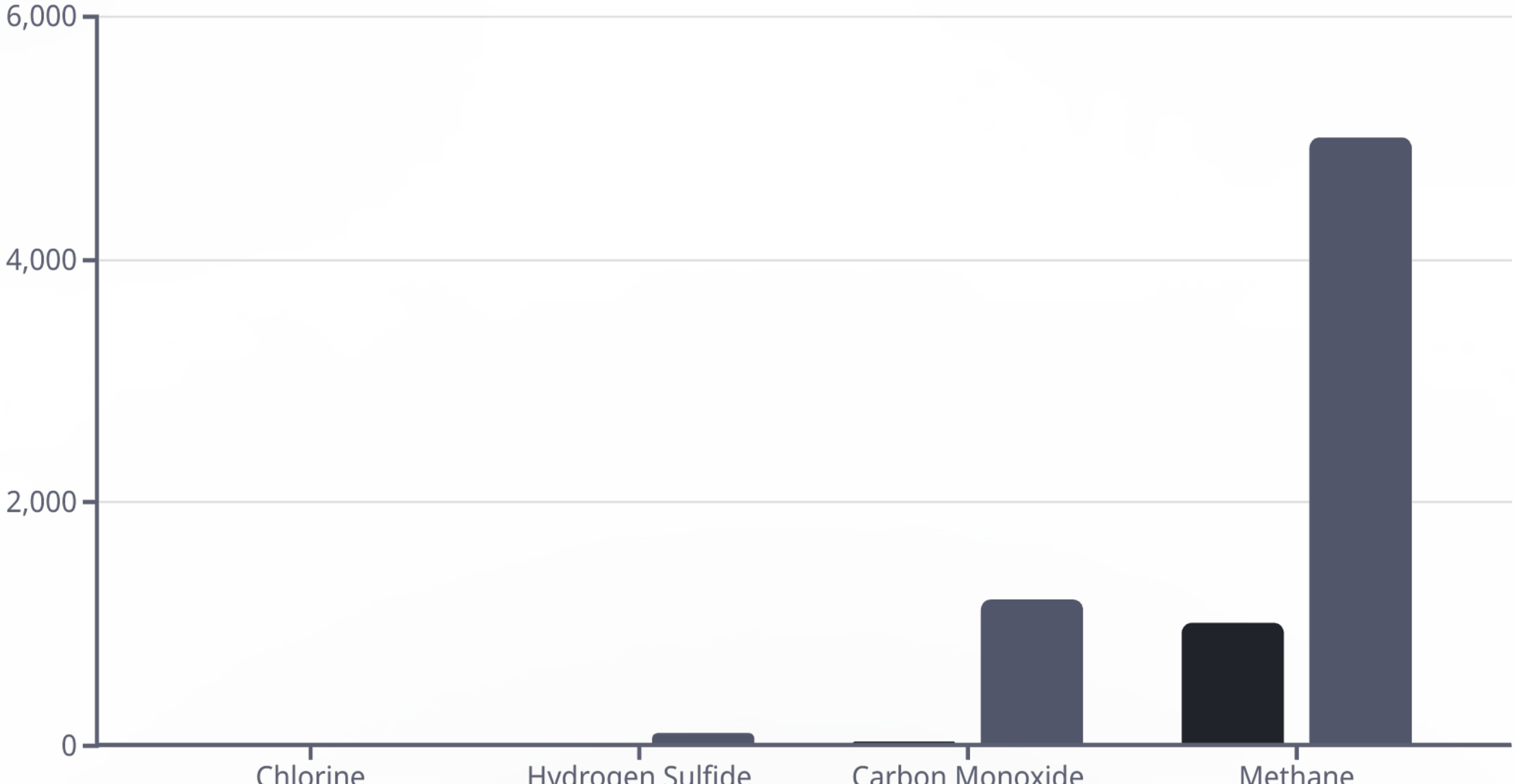
150

UN Numbers

Commonly used in gas industry for specific hazardous materials

The Transportation of Dangerous Goods Regulations require proper classification, documentation, labeling, and placarding of hazardous materials during transport. Gas technicians must understand these requirements when transporting materials to and from job sites.

Exposure Monitoring for Hazardous Materials



First Aid for Hazardous Materials Exposure

Inhalation

Move victim to fresh air. If breathing is difficult, administer oxygen if available and trained to do so. Seek medical attention immediately.

Skin Contact

Remove contaminated clothing. Flush affected area with water for at least 15 minutes. For chemical burns or persistent irritation, seek medical attention.

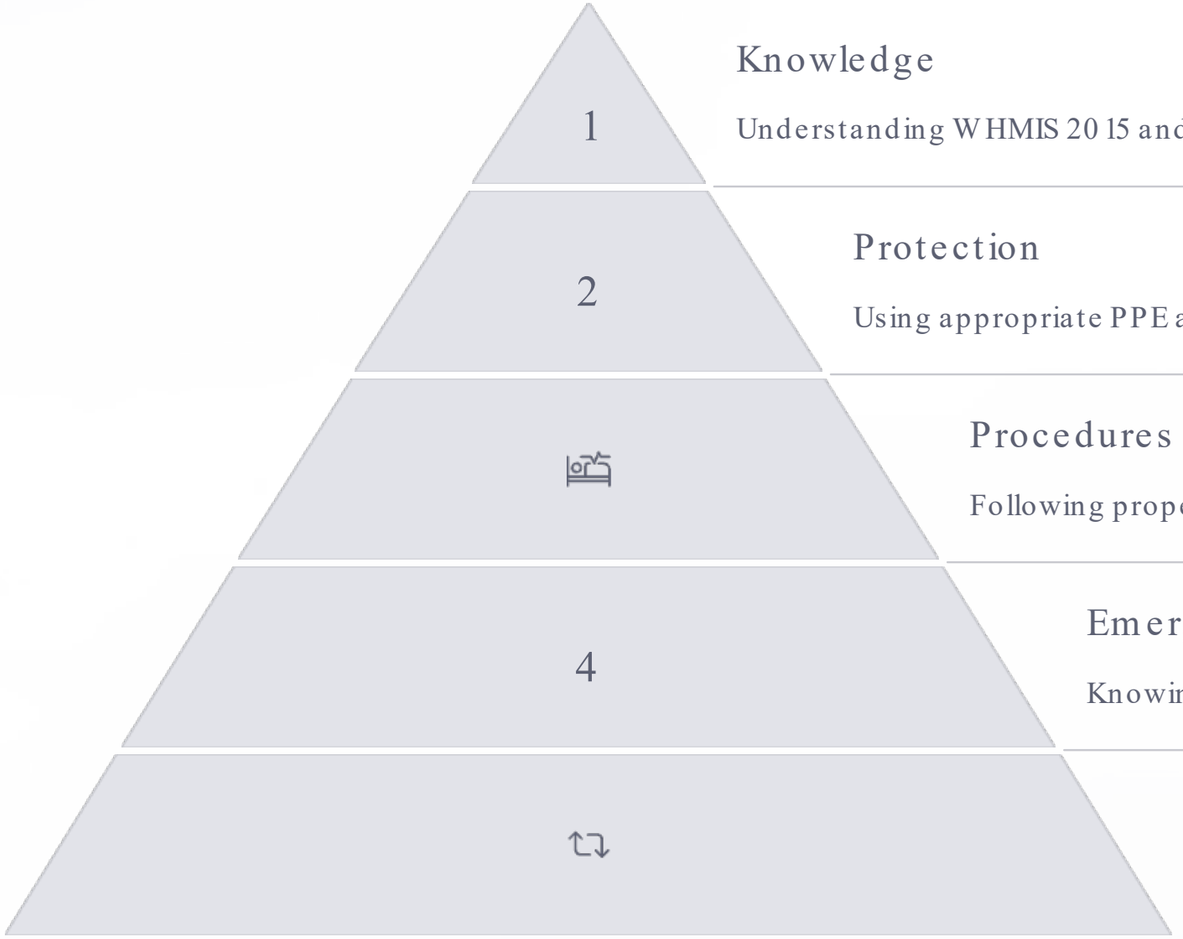
Eye Contact

Flush eyes with water for at least 15 minutes, holding eyelids open. Remove contact lenses if present. Seek medical attention immediately.

Ingestion

Do not induce vomiting unless directed by medical personnel. If conscious, rinse mouth with water. Seek immediate medical attention.

Summary of Hazardous Materials Safety



Knowledge

Understanding WHMIS 2015 and hazardous materials properties

Protection

Using appropriate PPE and safety measures

Procedures

Following proper handling, storage, and disposal methods

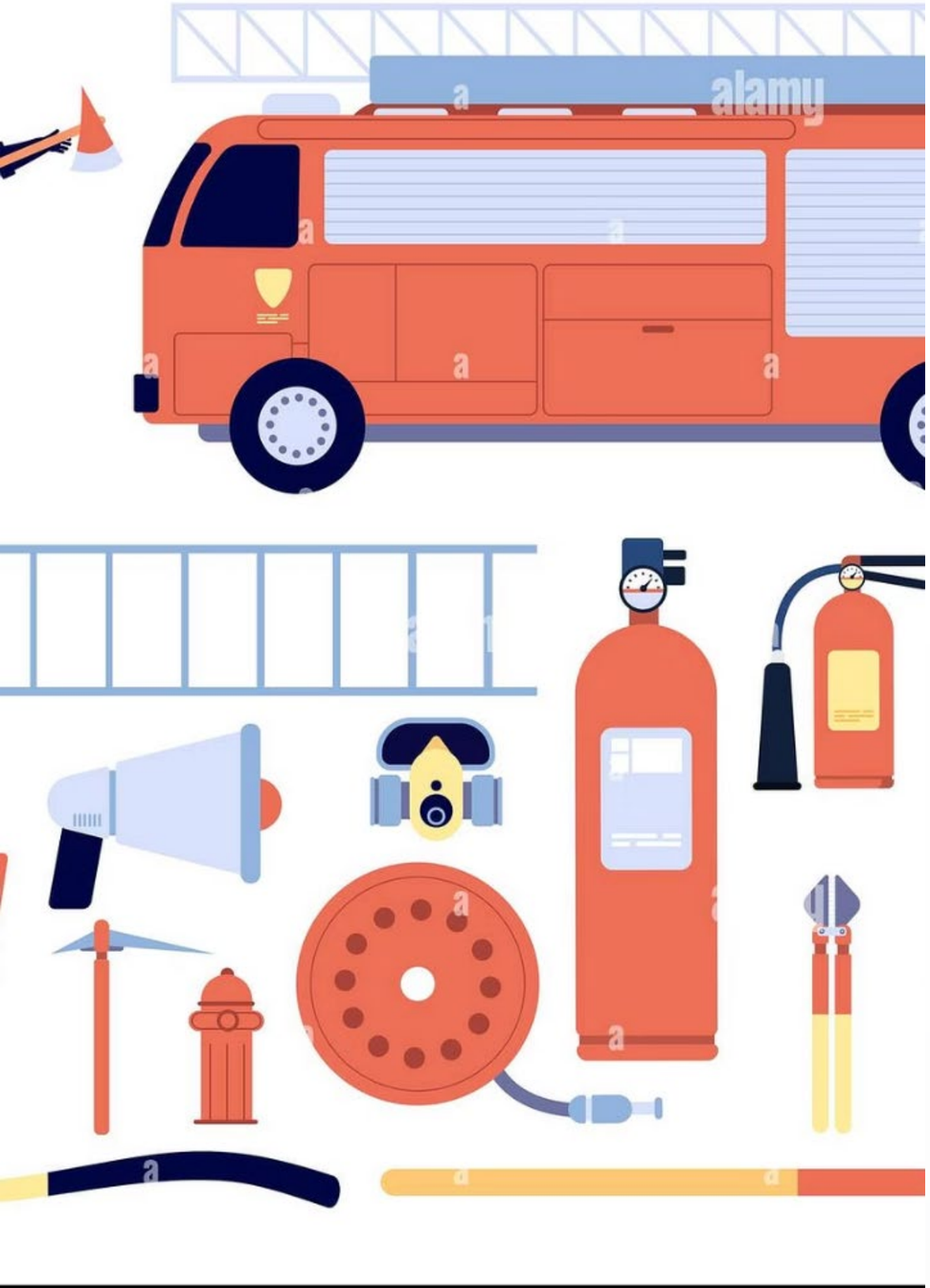
Emergency Response

Knowing what to do in case of exposure or spills

Continuous Learning

Staying updated on regulations and best practices

Gas technicians and fitters must maintain a comprehensive understanding of hazardous materials safety to protect themselves and others. By following proper procedures and staying informed about WHMIS 2015 requirements, workers can minimize risks and respond effectively to hazardous situations.



CSA Unit 1- Safety

Chapter 4
Fire Safety Practices

Gas technicians/fitters are often exposed to hazardous materials that are flammable or potentially explosive. Knowing what preventive measures to take and how to deal with different types of fires will help gas technicians/fitters and the workers around them to avoid serious injury or property damage.

Learning Objectives

Identify Common Fire Hazards

Recognize potential fire risks in the gas industry environment

Identify Classes of Fires

Understand the different classifications of fires and their characteristics

Describe Firefighting Equipment

Learn about various firefighting tools used in the industry

Match Equipment with Class of Fire

Know how to select the appropriate extinguisher for specific fire types

Key Terminology

Term	Definition
Fire extinguisher nameplate	Plate on fire extinguishers which designate, by means of a rating code, the types of fires for which each extinguisher can be used.
First-aid firefighting	Extinguishing a fire in its initial stages by using whatever is readily at hand, before the fire can get out of control.
Oxidation	Union of a substance with oxygen.

Understanding Fire

Fire is the rapid oxidation of a flammable material in the chemical process of combustion, releasing heat, light, and various reaction products. Oxidation is defined as the union of a substance with oxygen.

Oxidation takes place at varying rates, from very slow processes like rusting iron to extremely fast reactions like exploding gunpowder.

The rate of oxidation determines whether a process is considered a fire. While slow oxidation like rusting is not a fire, fast oxidation like burning paper or wood is classified as fire.

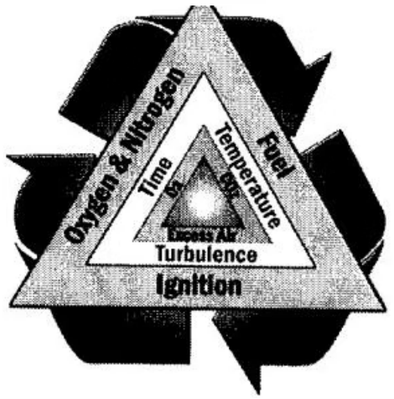
Rates of Oxidation

Rate of oxidation	Example
Very slow	Rusting iron (not fire)
Slow	Spontaneous heating of materials (such as oil-soaked rags)
Fast	Burning paper or wood
Extremely fast	Exploding gunpowder

The Combustion Triangle

Figure 4-1
The combustion triangle and advanced combustion triangle

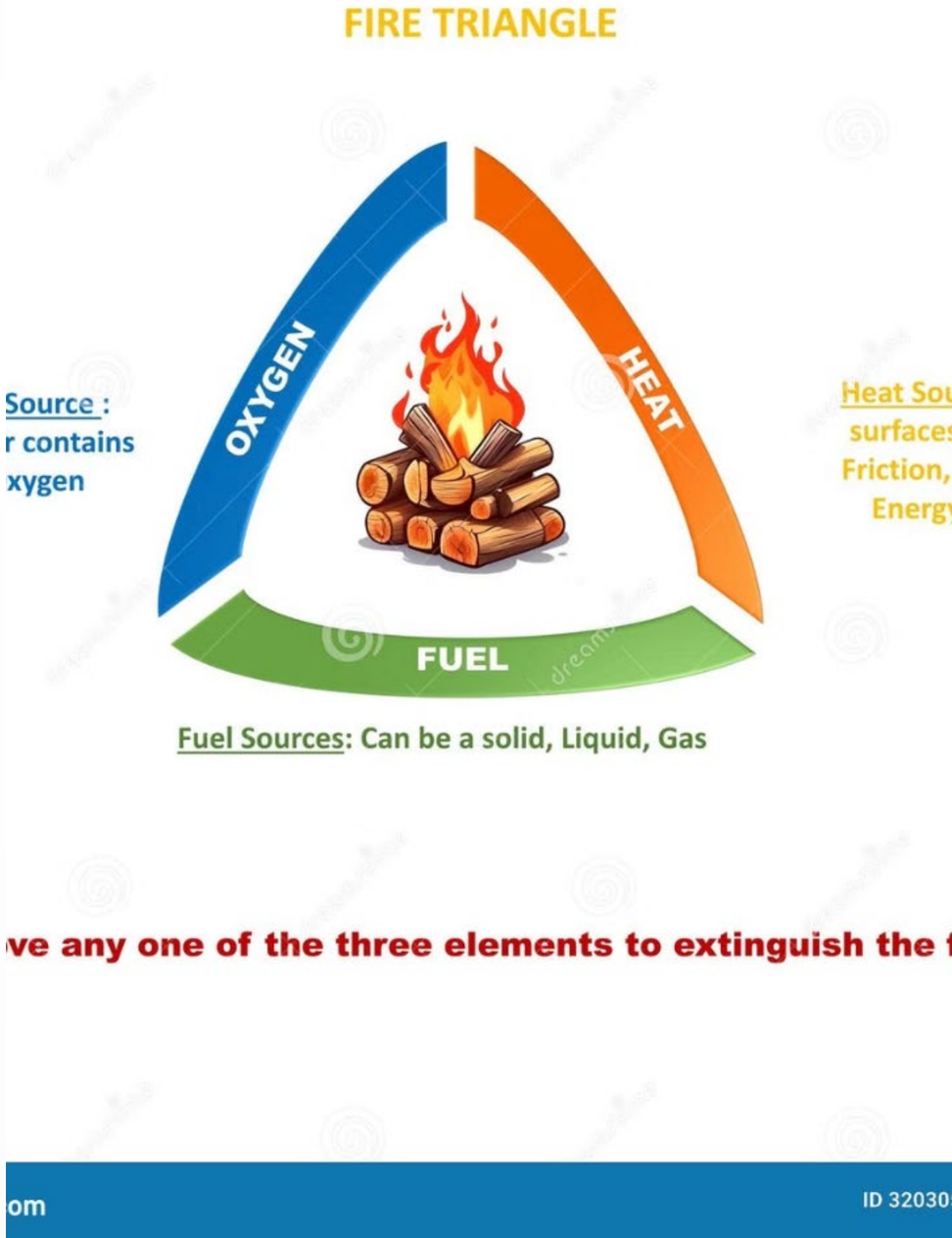
The combustion triangle illustrates the three elements needed for fire: fuel, heat, and oxygen. When these three elements combine, fire can occur.



The advanced combustion tetrahedron adds a fourth element: the uninhibited chemical reaction. This model provides a more complete understanding of fire behavior.

Components of Combustion

Component	What is present
Fuel	Fuel must be a combustible material such as wood, gasoline, paper, or cloth.
Heat (Ignition)	Heat must be sufficient to raise the fuel to ignition temperature.
Oxygen	Oxygen comes usually in the form of air, primarily consisting of oxygen (O2) and nitrogen (N2).
Uninhibited chemical reaction	Chemical, exothermic reaction that is fire.



Fire Prevention Principles

Removing Fuel

Shutting off the valve of the gas main is an example of fuel starvation.

Removing Heat

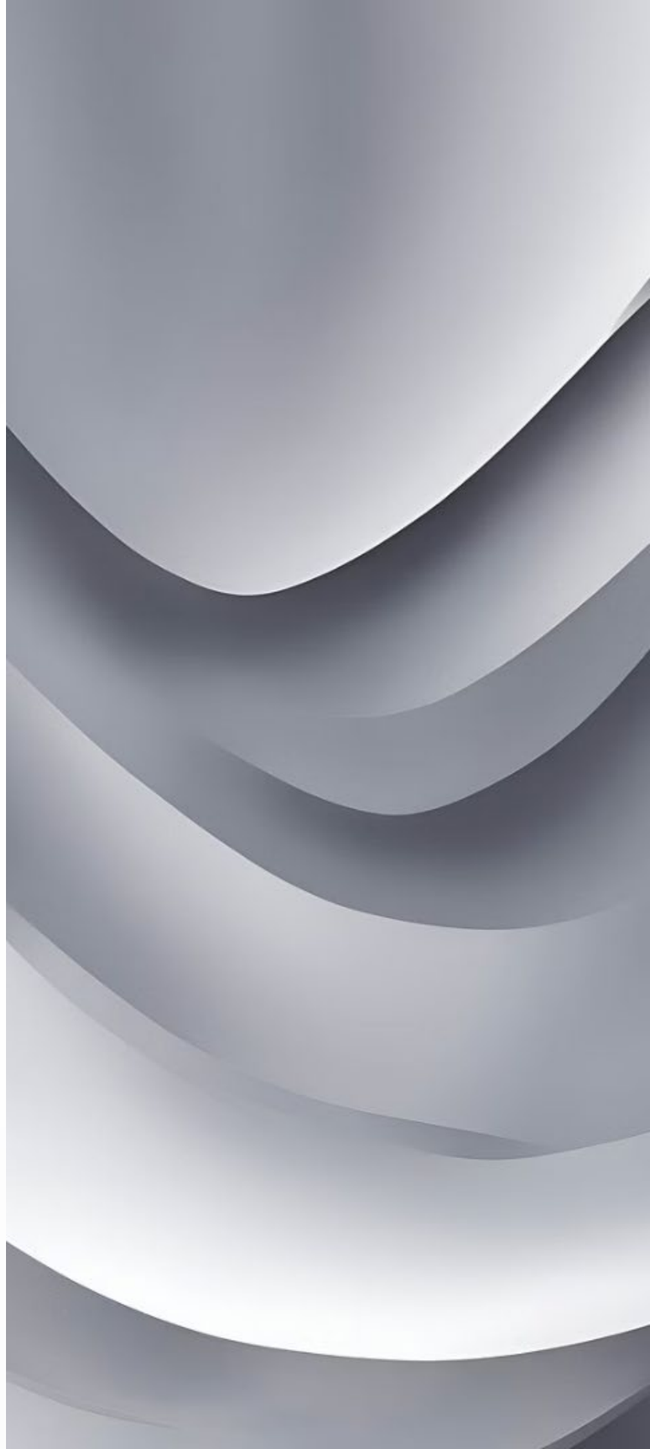
Applying suppressant or water to the fire for cooling.

Removing Oxygen

Covering the fire with a lid, wet blanket, or sand, or use carbon dioxide, foam, or a dry chemical.

Breaking Chemical Reaction

Using a flashback arrestor to interrupt the combustion process.



Principal Causes of Fire in Gas Industry

Combustible Materials Near Open Flame

Materials that can easily catch fire should be kept away from any open flames.

Gas Leaks

Undetected gas leaks can lead to dangerous accumulations of flammable gas.

Improper Cylinder Storage

LP-gas storage cylinders near oxygen cylinders, electrical circuits, welding tools, or flammable liquids.

Defective Venting Systems

Broken or improperly installed venting systems can lead to gas buildup.

More Causes of Fire in Gas Industry

Careless Handling of Gas Cylinders

Improper transportation or handling of gas cylinders can lead to leaks or damage.

Indoor Storage Issues

Storage of gas cylinders in indoor, badly ventilated locations increases fire risk.

Mixed Cylinder Storage

Storage of full and empty cylinders in the same vicinity can create hazardous conditions.

Welding and Burning Fire Hazards

Flying Sparks or Slag

Can travel great distances and disappear through cracks in walls and floors or into ducts, can immediately result in obvious fires or cause smouldering fires.

Welding Against Wood or Dust

Can result in a smouldering fire that does not ignite until several hours after the job is completed.

Poor Grounding

During welding, sometimes causes electrical motor fires.

Soldering and Brazing

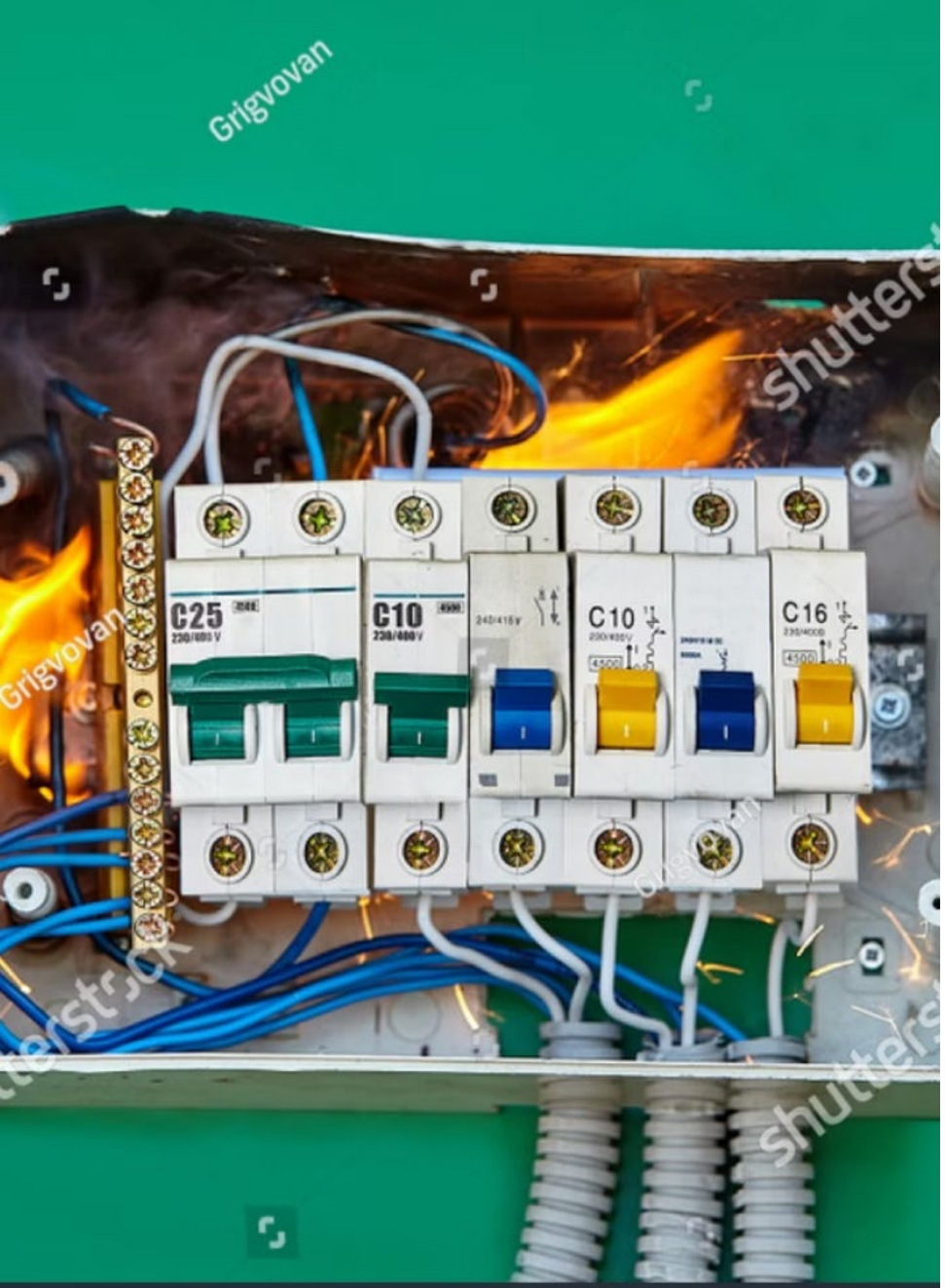
Around flammable materials or dusts can ignite fires.

Improper Torch Use

Improper use of oxyacetylene torches can lead to fires.

Inadequate Ventilation

Of storage areas can lead to dangerous gas accumulation.



Electrical Fire Hazards

Short Circuits and Arcing

Electrical malfunctions that produce heat and sparks capable of igniting nearby materials.

Broken Electrical Wiring

Damaged wires can expose conductors and create fire hazards when in contact with flammable materials.

Light Bulbs Near Flammables

Light bulbs in contact with fine dust or oily surfaces can generate enough heat to cause ignition.

Unprotected Equipment

Unprotected bulbs and unshielded switches in dusty areas create fire risks.

Friction and Worker-Related Fire Hazards

Friction Hazards

- Fallen material resting on fast-moving equipment, such as a belt
- A belt running off-centre and rubbing against a fixed surface
- Hot bearings igniting oil or dust

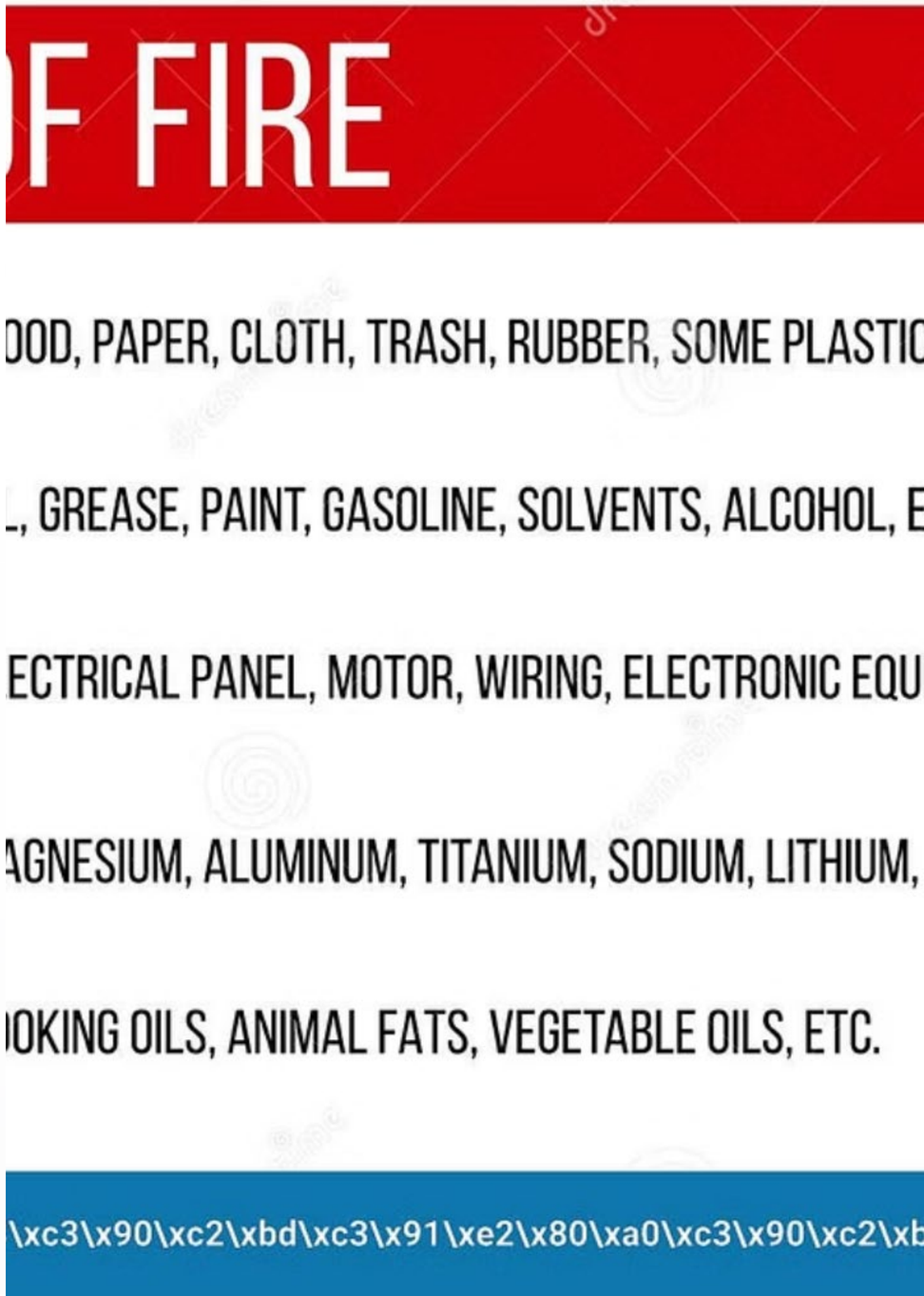
Worker-Engendered Hazards

- Workers ignoring No Smoking signs
- Workers ignoring gas ventilation and dust-abatement regulations
- Workers with sloppy housekeeping practices

Classes of Fires

Fires are divided into main types or classes, which dictate the type of extinguisher required to fight them. Fires are rated by type: A, B, C, D, and K. These designations are also used to rate fire extinguishers.

Understanding these classifications is crucial for selecting the appropriate firefighting equipment. Each class represents different types of fires with specific characteristics and extinguishing requirements.



Class A Fires

Class A fires involve ordinary combustibles such as wood, cloth, paper, rubber, and many plastics. These materials leave ash when they burn.

Symbol

Green triangle with the letter "A"

Pictogram

Burning trash can and wood pile

Extinguishing Agent

A wet or dry formula or other clean agent systems (i.e., halon, nitrogen, argon, and carbon dioxide) that use heat-absorbing (cooling) effects to retard combustion.

Class B Fires

Symbol

Red square with the letter "B"

Pictogram

Burning fuel can

Type of Fire

Flammable or combustible vapors

Extinguishing Agent

Uses extinguishers that prevent these vapors from being released or that interrupt combustion. Extinguishes fires via oxygen depletion.

Class B fires involve flammable liquids such as gasoline, oil, grease, tar, oil-based paint, lacquer, and flammable gases. These fires require special extinguishing agents that can smother the flames by preventing vapor release.

Class C Fires

Class C fires involve energized electrical equipment such as wiring, circuit breakers, machinery, or appliances. The primary danger with these fires is the risk of electrical shock, which requires non-conductive extinguishing agents.

Symbol

Blue circle with the letter "C"

Pictogram

Burning electrical plug and outlet

Extinguishing Agent

Uses non-conductive extinguishing agents to protect the operator (you can use Class A or B extinguishers only when electrical equipment is de-energized).

Class D Fires

Symbol

Yellow star with the letter "D"

Pictogram

None

Type of Fire

Certain combustible metals, such as magnesium, titanium, zirconium, sodium, or potassium

Extinguishing Agent

A dry powder that absorbs heat and smothers the flames, cutting off oxygen. Uses heat-absorbing extinguishing medium not reactive with the burning materials.

Class K Fires

Class K fires involve vegetable oils, animal oils, or fats in cooking appliances. These fires are particularly dangerous in commercial kitchens where they can spread quickly and are difficult to extinguish with conventional methods.

Symbol

Black hexagon with the letter "K"

Pictogram

Burning pan

Extinguishing Agent

A wet chemical that reacts specifically with vegetable oils, animal oils, or fats in cooking appliances to form a foam that blankets the surface of the blazing substance, smothering the fire.

Fire Extinguisher Types

Fire extinguishers are a gas technician/fitter's main firefighting tools of concern. It can be critical that gas technicians/fitters know the location of and method of operating each extinguisher in their workplace.

Water Extinguisher

Effective on Class A fires (ordinary combustibles)

Dry Chemical Extinguisher

Some types are effective on multiple classes of fires

CO2 Extinguisher

Effective on Class B and C fires

Specialized Fire Extinguishers

Class D Extinguisher

Specifically designed for flammable metals

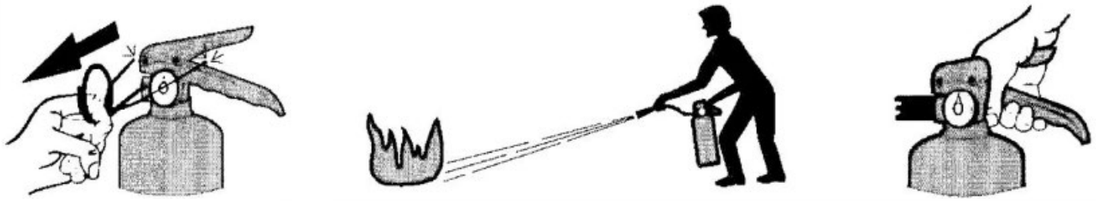
Class K Extinguisher

Designed for cooking oils and fats in commercialkitchens

Multipurpose Extinguisher

Effective on multiple classes of fires

Fire Extinguisher Markings



Since each manufacturer uses a slightly different operating procedure, you should look carefully at the markings and instructions on the extinguisher.

These markings will tell you how you can most effectively use the extinguisher. The nameplate contains important information about:

- The types of fires the extinguisher can be used on
- Operating instructions
- Maintenance requirements
- Testing information

First-Aid Firefighting

Definition

First-aid firefighting is extinguishing a fire in its initial stages by using whatever is readily at hand, before the fire can get out of control.

Home and Office Use

Fire extinguishers used in homes and offices are designed to deal with fires in their infancy. They are still necessary even though sprinkler systems and other devices may protect an area.

Metal Fire Awareness

Although fires fueled by metal are rare, being aware of the potential risks is important. Because people do not expect metal to burn or for the flames to spread so quickly, a small class D fire can soon turn into a very dangerous situation before appropriate action is taken.

Commercial Kitchen Fires

In a commercial kitchen, open flames, red-hot cooking surfaces, and a heavily grease-laden environment combine to make the modern commercial kitchen a potentially dangerous fire hazard. These fires spread quickly and have proven to be very difficult to extinguish, making them the leading cause of structural fire damage.

Fire Extinguisher Ratings

The nameplates of fire extinguishers designate, by means of a rating code, the types of fires for which you can use each extinguisher. Underwriters' Laboratories of Canada (ULC) ratings show the relative hazard, coverage, and travel distance specifications of extinguishers.

Understanding ULC Rating Codes

ULC rating code	Class A Coverage	Class B Coverage	Class C Coverage
1-A 10-B:C	Light hazard-3000 sq ft (27 m^2) of Class A fire 75 ft (23 m) travel distance	Light hazard-10 sq ft (0.93 m^2) of Class B fire 50 ft (15 m) travel distance Ordinary hazard Ordinary hazard- 10 sq ft (0.93 m^2) of Class B fire 30 ft (9 m) travel distance	Sufficient for Class C conditions
2-A 10-B:C	Light hazard-6000 sq ft (55 m^2) of Class A fire 75 ft (23 m) travel distance Ordinary hazard Ordinary hazard-3000 sq ft (27 m^2) of Class A fire 75 ft (23 m) travel distance	Light hazard-10 sq ft (0.93 m^2) of Class B fire 50 ft (15 m) travel distance Ordinary hazard Ordinary hazard- 10 sq ft (0.93 m^2) of Class B fire 30 ft (9 m) travel distance	Sufficient for Class C conditions

Higher ULC Rating Codes

ULC rating code	Class A Coverage	Class B Coverage	Class C Coverage
4-A 40 B:C	Light hazard-11,250 sq ft (1045 m^2) of Class A fire 75 ft (23 m) travel distance Ordinary hazard-6000 sq ft (557 m^2) of Class A fire 75 ft (23 m) travel distance Extra hazard-4000 sq ft (371 m^2) of Class A fire 75 ft (23 m) travel distance	Light and ordinary hazards Exceeds Class B requirements for light and ordinary hazards Extra hazard-40 sq ft (3 m^2) of Class B fire 50 ft (15 m) travel distance	Sufficient for Class C conditions

Class D Fire Extinguishers

Types Based on Metal

The type of class D extinguisher needed depends upon the type of flammable metals at the work area:

- Copper extinguishing medium is used on lithium and lithium alloy metals.
- Sodium chloride extinguisher works better for fires involving magnesium, sodium, potassium, uranium, and powdered aluminum.

Class D fire extinguishers are generally not given a numerical rating and are simply

Class K Fire Extinguishers

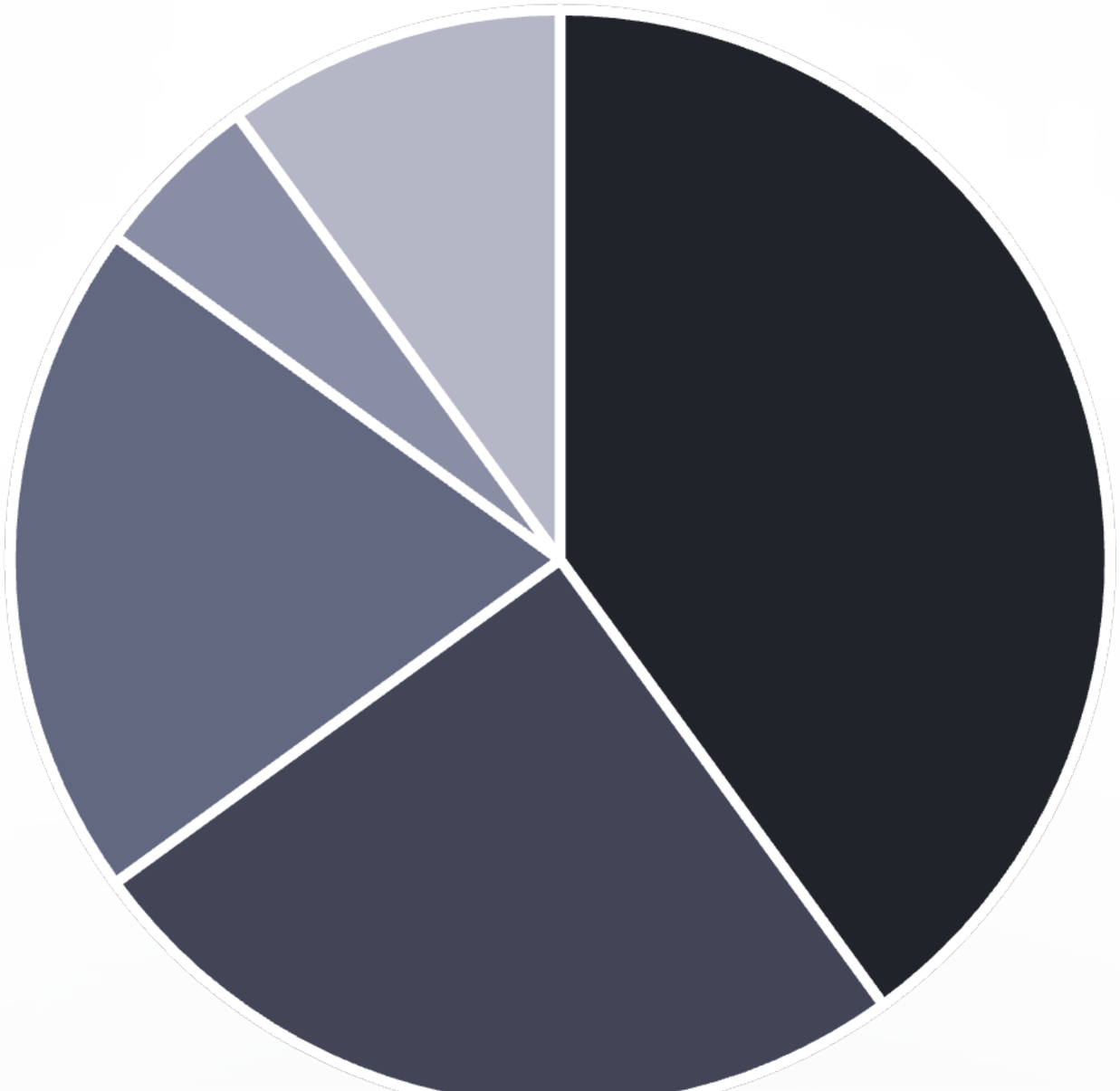
Rating System

Class K fire extinguishers are rated for use on kitchen fires involving cooking oils and deep fryers. Class K is not given a numerical rating.

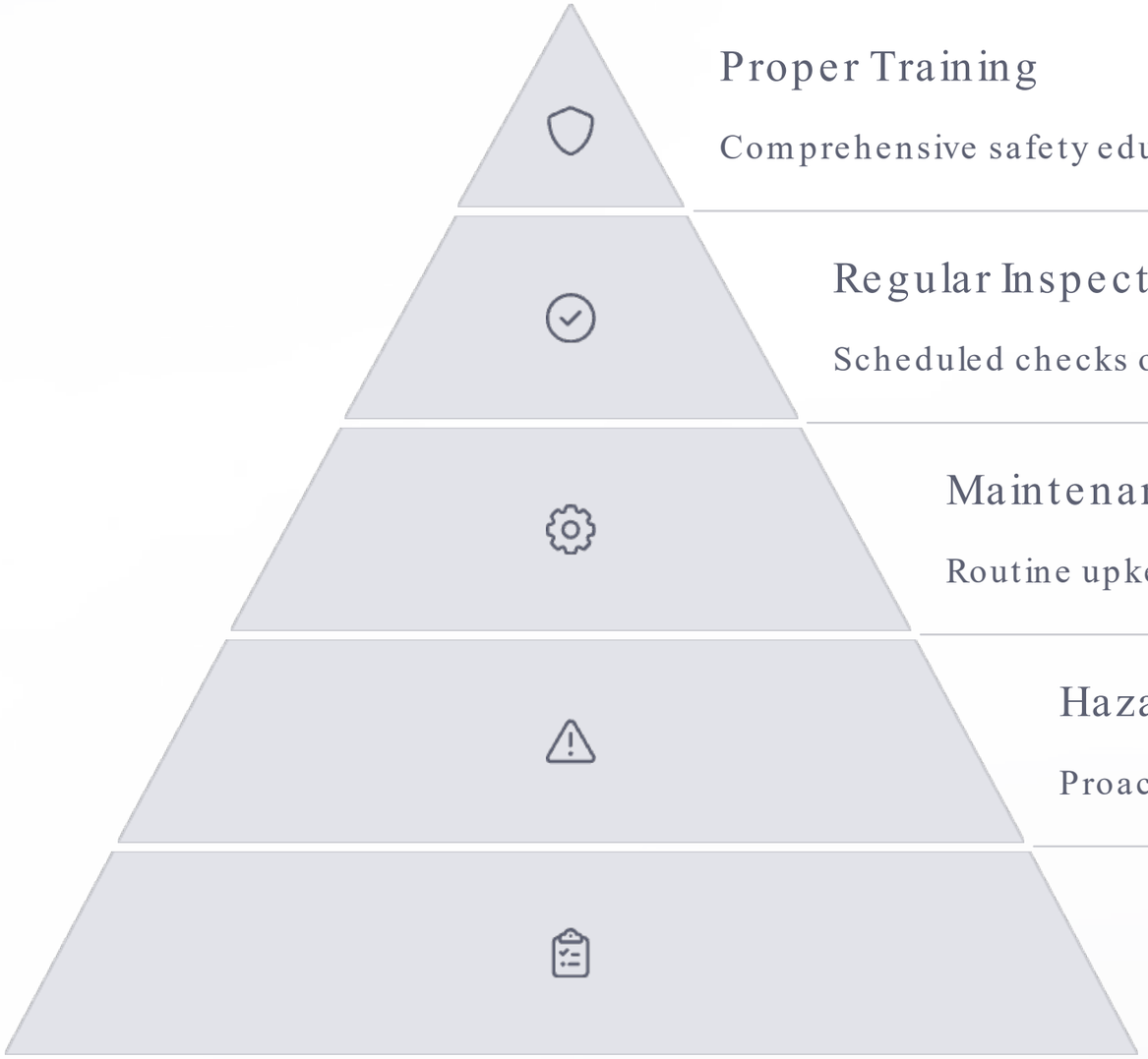
Example Rating

A Fire Extinguisher with a rating of 2A:K would contain the equivalent to 2.5 gallons of water (2 x 1.25) and would also be approved for use on a class K (cooking oil and fats) fire.

Fire Extinguisher Selection Guide



Preventing Fires in the Gas Industry



Proper Training

Comprehensive safety education for all personnel

Regular Inspections

Scheduled checks of equipment and storage areas

Maintenance Procedures

Routine upkeep of all gas systems and equipment

Hazard Identification

Proactive recognition and mitigation of risks

Safety Protocols

Clear procedures for handling gas and related equipment

Proper Storage of Gas Cylinders

Use Well-Ventilated Areas

Always store gas cylinders in areas with adequate ventilation to prevent gas accumulation.

Control Temperature

Keep cylinders away from heat sources and direct sunlight to prevent pressure buildup.

Separate Different Types

Store full and empty cylinders separately and keep incompatible gases away from each other.

Secure Cylinders

Always secure cylinders in an upright position to prevent falling or damage.

Mark Clearly

Ensure all cylinders are properly labeled with contents and hazard warnings.

Safe Handling of Gas Equipment

Inspect Before Use

Always check gas equipment for damage, leaks, or wear before operation. Look for cracked hoses, loose connections, or damaged regulators that could lead to gas leaks.

Use Proper Tools

Only use tools and equipment designed for gas work. Improper tools can create sparks or damage components, leading to dangerous situations.

Follow Procedures

Adhere to established safety protocols when connecting, disconnecting, or operating gas equipment. Never take shortcuts that could compromise safety.

Monitor Continuously

Stay alert for signs of leaks or malfunctions during operation. Use gas detection equipment when appropriate and respond immediately to any safety concerns.

Responding to Gas Leaks

Detect

Identify gas odor or use detection equipment

Shut Off

Turn off gas supply at source if safe to do so

Ventilate

Open windows and doors to disperse gas

Report

Contact emergency services and gas provider

Evacuate

Leave the area until declared safe

Electrical Safety in Gas Work

Proper Grounding

Ensure all electrical equipment is properly grounded to prevent sparks that could ignite gas.

Explosion-Proof Equipment

Use explosion-proof electrical equipment in areas where flammable gases may be present.

Regular Inspections

Frequently check electrical wiring and equipment for damage or wear that could create fire hazards.

Avoid Extension Cords

Minimize use of extension cords which can overheat or create sparking hazards in gas environments.

Proper Circuit Protection

Ensure appropriate fuses and circuit breakers are installed to prevent electrical overloads.

Turn Off Power

De-energize electrical equipment when not in use, especially in areas where gas work is being performed.

Welding Safety in Gas Environments

Pre-Work Inspection

Check area for gas leaks and flammable materials

Fire Watch

Maintain observation during and after welding

Fire Protection

Have appropriate extinguishers readily available

Ventilation

Ensure adequate airflow to prevent gas accumulation

Personal Protection

Wear appropriate PPE for welding operations

Housekeeping for Fire Prevention

Regular Cleaning

Keep work areas free of dust, debris, and flammable materials that could fuel a fire.

Proper Waste Disposal

Dispose of oily rags, combustible waste, and other flammable materials in appropriate containers.

Organized Storage

Maintain clear access to emergency exits, fire extinguishers, and other safety equipment.

Chemical Management

Store chemicals according to compatibility and keep flammable liquids in approved containers.

Emergency Response Planning

Develop evacuation plans

Create clear routes and assembly points

Assign responsibilities

Designate emergency coordinators

3

Provide equipment

Ensure access to appropriate firefighting tools

Conduct drills

Practice emergency procedures regularly

Document procedures

Maintain accessible emergency information

Fire Safety Training for Gas Technicians

100%

Required Training

Percentage of gas technicians who should receive comprehensive fire safety training

4

Key Components

Essential elements of fire safety training: prevention, detection, response, and evacuation

12

Monthly Checks

Recommended frequency for inspecting fire extinguishers and safety equipment

2

Annual Drills

Minimum number of fire evacuation drills that should be conducted each year

PersonalProtective Equipment for Fire Safety

Flame-Resistant Clothing

Specialized garments designed to resist ignition and provide protection from heat and flames. These include coveralls, jackets, and pants made from materials that self-extinguish when removed from a fire source.

Eye and Face Protection

Safety goggles and face shields that protect against sparks, flying debris, and radiant heat. These should be rated for high-temperature environments and provide clear visibility during emergency situations.

Hand Protection

Heat-resistant gloves that allow for dexterity while providing protection from burns and hot surfaces. These should be made from materials that maintain their protective properties even at high temperatures.

Fire Detection Systems

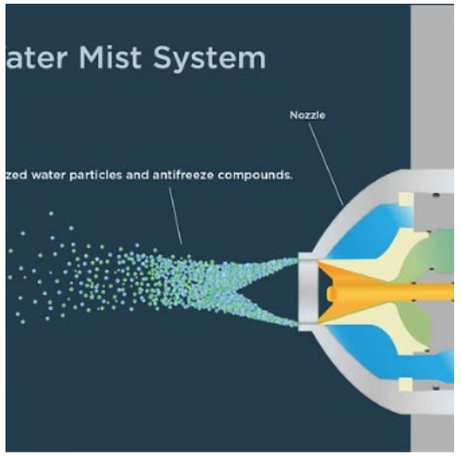
Types of Detectors

- Smoke detectors - Detect visible or invisible particles of combustion
- Heat detectors - Activate when temperature reaches a predetermined level
- Flame detectors - Respond to the optical radiation emitted by flames
- Gas detectors - Identify presence of combustible or toxic gases

Early detection is crucial for preventing small incidents from becoming major fires, especially in gas-related environments where flammable materials are present.

Modern fire detection systems often integrate multiple sensor types to provide comprehensive protection. These systems can be connected to central monitoring stations for immediate response and can automatically trigger suppression systems when necessary.

Fire Suppression Systems



Automatic fire suppression systems provide critical protection in gas industry facilities. These systems can detect and respond to fires without human intervention, often controlling or extinguishing fires before they can spread. Different types of systems use various extinguishing agents depending on the specific fire risks present in the protected area.

Fire Safety Inspection Checklist

1 Fire Extinguishers

Check that extinguishers are properly mounted, accessible, and have current inspection tags. Verify pressure gauges show proper charge and that nozzles and hoses are intact.

Emergency Exits

Ensure all exit doors are unlocked and unobstructed. Verify that exit signs are illuminated and emergency lighting is functional.

Alarm Systems

Test fire alarm systems to confirm proper operation. Check that pull stations are accessible and that audible/visual alarms function correctly.

Gas Equipment

Inspect gas lines, connections, and equipment for leaks or damage. Verify that shutoff valves are accessible and properly labeled.

Electrical Systems

Look for overloaded circuits, damaged wiring, or improper use of extension cords. Ensure electrical panels are accessible and properly labeled.

Documentation and Reporting

Inspection Records

Maintain detailed records of all fire safety inspections, including dates, findings, and corrective actions taken.

Equipment Maintenance Logs

Document all maintenance performed on fire protection equipment, including testing, repairs, and replacements.

Training Documentation

Keep records of all fire safety training provided to employees, including attendance, topics covered, and evaluation results.

Incident Reports

Document all fire-related incidents, including near-misses, with detailed information about causes, responses, and outcomes.

Regulatory Compliance

Maintain documentation demonstrating compliance with all applicable fire safety codes, standards, and regulations.

Emergency Plans

Keep updated copies of emergency response plans, evacuation procedures, and contact information for emergency services.

Regulatory Compliance

Building Codes

Adhere to local building codes that specify fire protection requirements for gas installations.

Industry Standards

Follow industry-specific standards such as those from NFPA, ANSI, and other relevant organizations.

Occupational Safety

Comply with occupational health and safety regulations regarding fire prevention and protection.

Certification Requirements

Maintain required certifications for personnel working with gas systems and fire safety equipment.

Documentation

Keep all required documentation demonstrating compliance with applicable regulations.

Summary of Fire Safety Practices

Key Concepts

- Understanding the combustion process and fire triangle/tetrahedron
- Identifying common fire hazards in the gas industry
- Recognizing different classes of fires (A, B, C, D, K)
- Selecting appropriate firefighting equipment for specific fire types
- Implementing preventive measures to reduce fire risks

Gas technicians/fitters must maintain comprehensive knowledge of fire safety practices to protect themselves, their colleagues, and property. By understanding fire behavior, recognizing hazards, and knowing how to respond appropriately, technicians can prevent fires from occurring and minimize damage when they do occur.