CSA Unit 21 - Space Heaters and Fireplaces Chapter 1

Gas technicians and fitters need to be thoroughly familiar with the capabilities and uses of space heaters to ensure customer satisfaction. This presentation covers the general requirements, types, installation considerations, and maintenance procedures for various space heaters including room heaters, wall furnaces, baseboard heaters, infrared heaters, and construction heaters.

MK
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Objectives

List General Requirements

Understand the general requirements and code compliance for space heaters

Describe Room Heaters

Identify types, components, and maintenance procedures for room heaters

Describe Wall Furnaces

Understand the installation and operation of wall furnaces

Describe Baseboard Heaters

Learn about direct-vent baseboard heaters and their wiring

Describe Infrared Heaters

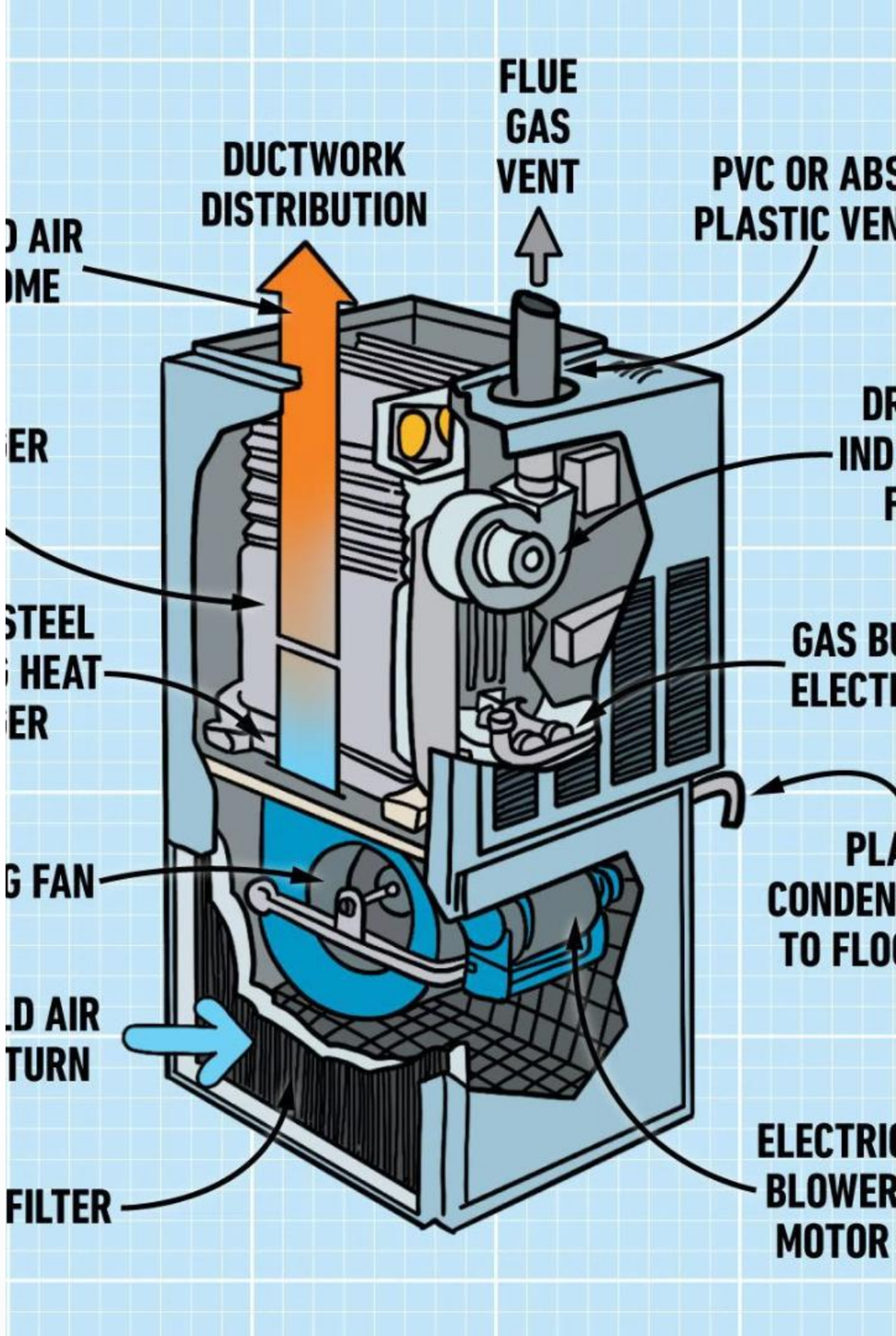
Understand the principles and applications of infrared heating

Describe Construction Heaters

Learn about temporary heating solutions for construction sites

Terminology

Term	Definition
Flash back	A loud ignition noise followed by a hissing sound
Heat anticipator	An electrical resistor device on many mechanical thermostats that fine tunes the point at which the thermostat turns off the furnace burners
Room heater	A self-contained, free-standing, non-recessed, gas-burning appliance that furnishes direct warm air to the space in which it is installed without ducting
Space heater	See room heater
Spalling (in chimney flue liner)	When due to corrosive chemicals and moisture from combustion, pieces of the chimney flue liner flake off or delaminate
Tip-over switch	A switch that stops the flow of gas when the heater is accidentally knocked over



CSA Gas Trade Training Materials

Red Seal Alignment

The space heater training materials align with Red Seal Block tasks including safety-related functions, maintenance of tools and equipment, and installation planning.

CSA Gas Trade Unit

Space Heaters and Decorative Appliances are covered in Unit 23 of the CSA Gas Trade training materials.

Related Units

Other related units include Venting Practices, Forced Warm-air Heating Systems, and Controls: Fundamentals.

General Requirements for Space Heaters

Read Product Specifications

Before installation or service, read all product specifications and instructions to ensure maximum benefits and safety.

Check Certification

For safety reasons, verify that the space heater is certified by CSA Group or another certifying agency.

Follow Code Requirements

Install according to CSA B149.1, national and provincial building codes, and electrical codes.

Proper Sizing

Ensure the appliance can provide the expected heat requirements for the space.

Code Requirements

Follow CSA B149.1

Space heaters must be installed according to the national gas code

Comply with Building Codes

National and provincial building codes must be followed

Meet Electrical Codes

All electrical connections must comply with electrical codes

Apply Most Stringent Requirements

If there is a discrepancy between manufacturer's instructions and codes, the most stringent requirements shall prevail

Appliance Selection and Sizing

Check Rating Plate

Before installing the heating unit, check the rating plate for the rated output and ensure that the appliance can provide the expected heat requirements.

For example, the customer may have purchased the heating unit expecting it to heat a very large room, but its rating is only enough to heat a small room.

Avoid Oversizing

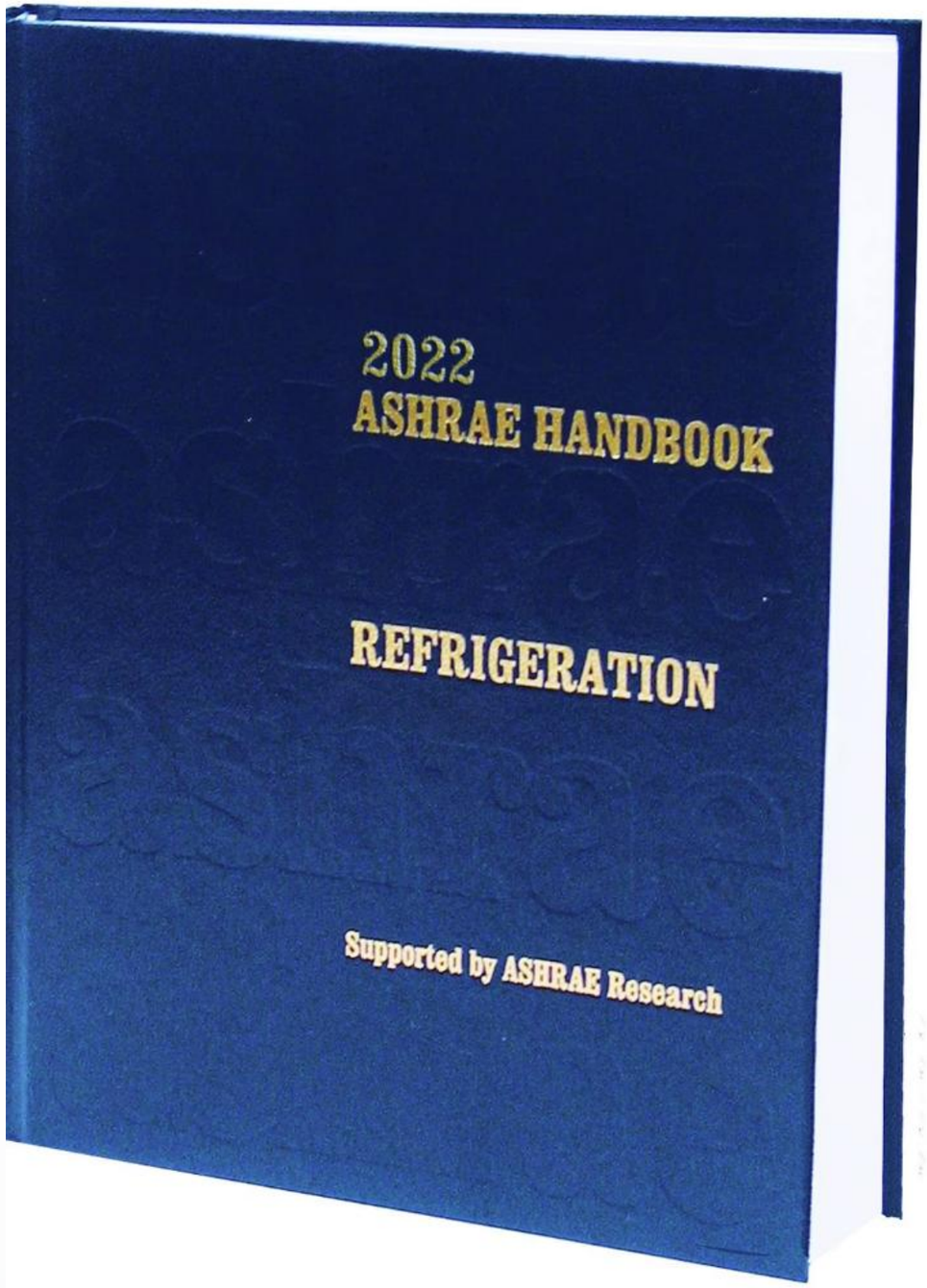
If it is a large-input heater, check that the room is big enough so that the unit will operate efficiently. If the unit is too large, it will operate for only short periods of time before being shut off by the thermostat.

The ASHRAE Handbook — HVAC Systems and Equipment has produced a heater sizing guide that summarizes studies on the use of gas-fired, in-space supplemental heaters in test houses.

Heater Sizing Guide

Type	AFUE	Steady state Eff. (%)	Older bungalow outside air temp. (°F)			Energy efficient house outside air temp. (°F)		
			5	30	50	5	30	50
Vented	54.6	73.1	6.5	3.8	1.6	2.8	1.6	0.7
Unvented	90.5	90.5	6.0	3.5	1.5	2.6	1.5	0.6
Direct-vent	76.0	78.2	5.9	3.4	1.5	2.1	1.2	0.5

Gas input required for in-space supplemental heaters (Btu/h per cu ft house volume)



Venting Classification

Unvented

Unvented space heaters are designed so that the room within which the appliance is installed both provides the combustion air and has the flue products exhausted into it.

It is not permissible to install unvented space heaters in residential buildings in most provinces of Canada.

Direct-vent

Direct-vent space heaters have combustion air supplied directly from the outside and the flue products are also exhausted to the outdoors. The exhaust vent and combustion air inlet are often combined in one unit.

Vented

Vented appliances take the combustion air from the room and exhaust the products of combustion to the outdoors.

Venting Requirements

Follow Manufacturer's Instructions

Installation instructions provide specific information on venting materials and installation parameters

Wall Thickness

Maximum and minimum wall thickness allowed for direct-vent appliances

Vent Material

B, BW, single wall within heated space; special venting for outdoor use

Starter Vent Kit

Manufacturers often provide a starter vent kit with the appliance including vent, spacers, collars, terminals, etc.

Masonry Chimney Requirements

Do

- Inspect the masonry chimney before installing the unit
- Make sure that the chimney's clay flue liner is not cracked, soft, or spalled
- Verify that mortar joints between liner sections are in place and tight
- Clean creosote from the top, sides, and back of a masonry firebox before installing a non-vented decorative appliance
- Check whether your local codes require the fireplace damper to be clamped open or removed

Do Not

- Share a gas-fired appliance flue with a wood-burning appliance

Proper vent termination for any gas-fired appliance is critical to the overall safe and efficient functioning of the venting system. The vent terminal clearance criteria for space heaters follows standard practice as outlined in Unit 22 Venting Practices.

General Installation Considerations

1 Location

Due to high temperatures, the appliance should be located out of traffic and away from furniture and draperies.

2 Clear Area

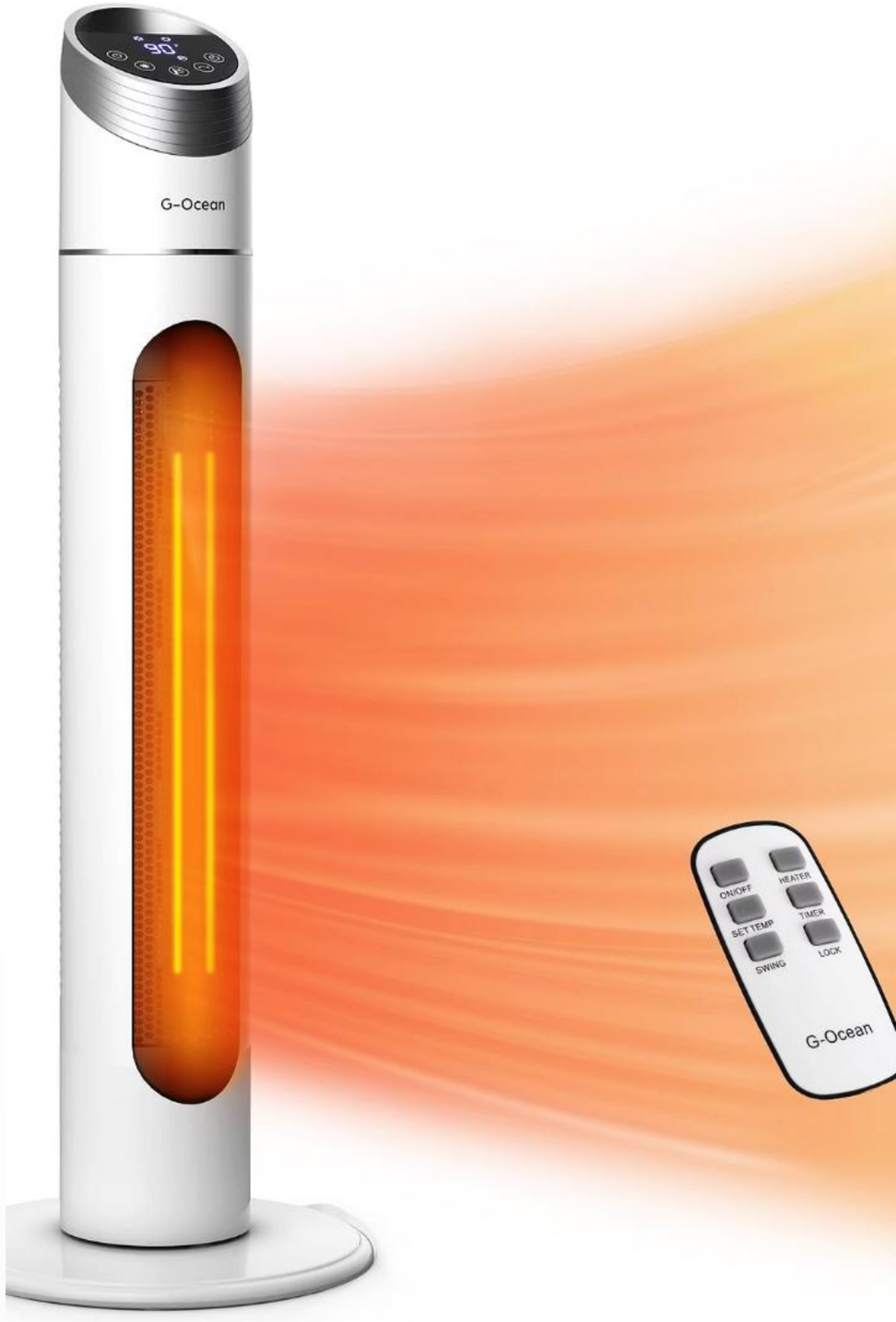
The appliance area must remain clear and free from combustible materials, gasoline, and other flammable vapours and liquids.

3 Glass Integrity

If the appliance has glass, it should not be operated with the glass removed, cracked, or broken. Replacement of the glass should be done by a licensed or qualified service person.

4 Floor Protection

If installing the heating appliance on carpet, vinyl tile, or any combustible material, it must be first installed on a metal or wood panel extending the full width and depth of the appliance.



Installation in Special Locations

Garage Installation

If installed in a residential garage, the heater must be protected from damage and must be located no less than 18 inches (396 mm) above the floor.

Sleeping Room Installation

A room heater may be installed in a sleeping room provided that it is of the automatic temperature control type, is equipped with a pressure regulator, has a 100% safety shut-off, and is vented.

Bathroom Installation

Space heaters installed in a bathroom must be of the direct-vent type.

Combustion Air Requirements

Air Supply

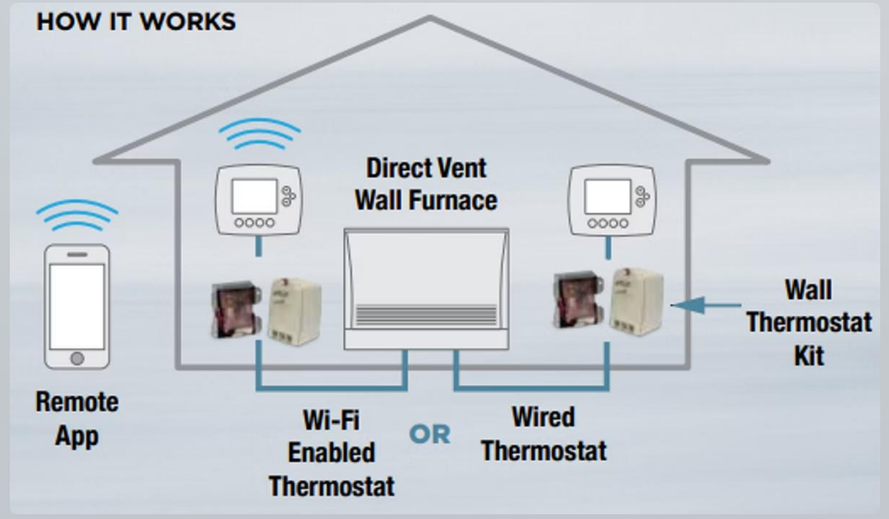
Because many space heaters receive their combustion air from the room, it is very important that the air supply inlets at the front or side of the appliance remain free from obstruction.

Room heaters should not be used in a room that has limited air exchange with adjacent spaces, since combustion air is required for the space.

Customer Instructions

Typically, the manufacturer's instructions provide cautions concerning any potential dangers:

- Children and adults should be alerted to the hazards of high surface temperature and stay away to avoid burns or clothing ignition
- Young children need careful supervision when in the same room as the heating unit
- Clothing and other flammable material should not be placed on or near the heating unit



Thermostat Installation

Position on Inside Wall

Install external thermostat on an inside wall in the same room as the heater

Proper Height

Position about 5 ft (150 cm) above the floor

Easy Access

Ensure position provides ready access to wiring, temperature adjustment, and servicing

Avoid Problem Areas

Do not locate in unusually warm/cold areas, direct sunlight, near heat sources, or areas with poor air circulation

Millivolt Thermostats

Special Requirements

The requirements for locating millivolt thermostats are somewhat different because the power supply is self-generated, and the system can therefore power only a limited number of components.

Since the thermostat wire in the system adds resistance — resulting in a voltage drop - the size of the wire is proportional to the distance between the thermostat and the appliance. For example, a larger gauge of wire has less resistance, therefore the thermostat can be located further from the appliance.

Size of copper wire (solid or stranded)	Distance between thermostat and heater
14 GA	100 ft (30 m)
16 GA	64 ft (19.2 m)
18 GA	40 ft (12 m)
20 GA	25 ft (7.5 m)
22 GA	16 ft (4.8 m)

Programmable Thermostats

Compatibility with Millivolt Systems

Some electronic programmable thermostats are compatible with millivolt systems since many now utilize a battery backup power supply.

No Transformer Required

Many modern programmable thermostats do not require a 24-volt transformer to power the thermostat.

Verification Required

Always confirm the thermostat compatibility prior to installation.

General Maintenance Considerations

Regular Cleaning

Space heaters require regular cleaning, both inside and out. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, etc.

Safety First

Before cleaning and inspecting, make sure the appliance is cool to the touch. At least one hour before, have the customer turn off the heater.

Replace Safety Components

Any safety screen, guard, or glass removed for servicing the heating units must be replaced before operating the appliance.

Annual Inspection

The heating unit should be inspected before use and at least annually.

Maintenance Requirements

Keep Clean

Control compartments, burners, and circulating air passageways of the appliance must be kept clean and clear from obstruction.

Check for Leaks

After inspection and cleaning, use a leak detector or soap solution to check for gas leaks at all joints before restarting the appliance.

Maintain Seals

Re-seal the silicone seal where the igniter wire and the thermocouple or thermopile wires enter the combustion chamber if broken during maintenance or servicing.

Apply Sealant

Apply high-temperature silicone sealant to ensure a total seal is maintained.

Typical Maintenance Procedure

Turn Off Power

Turn off the electrical power to the appliance

Remove Panels

Remove cabinet or panels

Inspect Interior

Examine the inside of the cabinet for foreign objects

Clean Components

Vacuum dust and lint from the control compartment and heat exchanger area

Check Venting

Carefully examine the venting system

Burner and Blower Maintenance

Burner Cleaning

Clean the burner and burner ports if required. A cast-iron burner that has lint under the burner ports can be cleaned by running water through the top of the burner and out through the throat.

Blower Maintenance

Clean the blower assembly with a brush and vacuum.

Clean glass components used for observing the flame with fireplace glass cleaner since ammonia-based glass cleaners may harm the specialty glass.

Note: Do not use abrasives on the cabinet or glass. It will scratch the surface finish and glass.

Room Heaters

Definition

A room heater — also referred to as a space heater — is a self-contained, free-standing, non-recessed, gas-burning appliance that furnishes direct warm air to the space in which it is installed without ducting.

Heat Transfer

It converts the fuel energy to convection and radiant heat by transferring heat from flue gases to the circulating air through a heat exchanger. The heated air can be distributed through natural convection or with a circulating air blower.

Types of Room Heaters

Gravity Vented

May be equipped with an optional circulating air fan, but they perform satisfactorily with or without a fan.

Fan-Type Vented

Equipped with an integral circulating air fan, which is necessary for satisfactory performance.

Unvented

In some jurisdictions, unvented radiant or convection heaters are permitted. These heaters range in size from 10,000 to 40,000 Btu/h (3 to 12 kW) and may require an outside air intake.

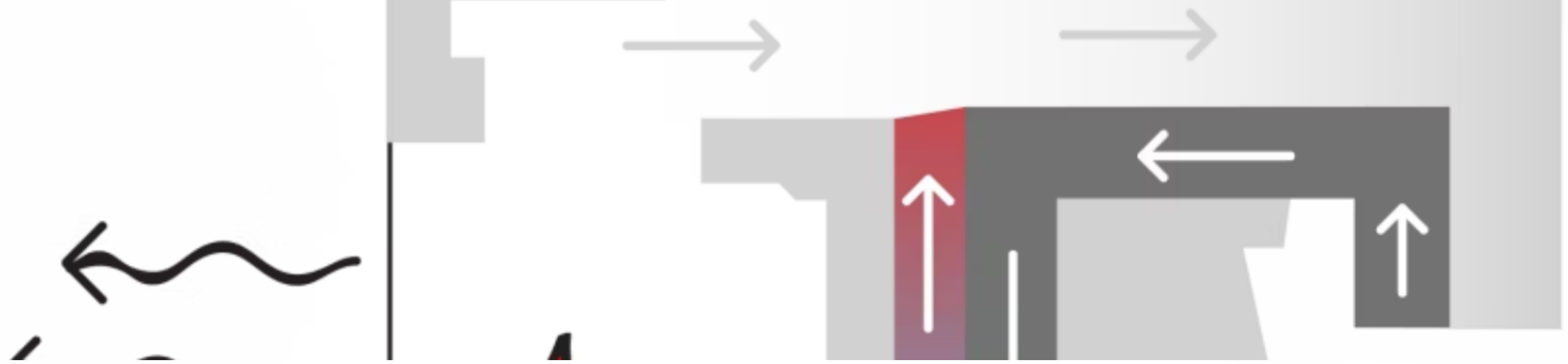
Fan Operation in Room Heaters

Electrical Requirements

When fitted with a fan, the room heater must be electrically connected and grounded in accordance with the Canadian Electrical Code.

Fan Switch Positions

- In the AUTO position, the fan comes on automatically once the heater has reached a certain temperature. The fan automatically shuts off once the temperature of the heater decreases.
- The MAN position is for constant fan operation, mainly in the summer.



Venting for Room Heaters

Venting Options

Vented room heaters are vented through a listed B vent, a factory-built chimney, or a lined masonry chimney.

Code Compliance

Installations must be done according to CSA B149.1 for clearances from combustibles, horizontal runs and changes in direction, and flue pipes in unheated areas.

Oxygen Depletion Sensor

Unvented gas-heating equipment must include a device that shuts off the heater if the oxygen in the room becomes inadequate.

Installation Restrictions

Unvented room heaters may not be installed in hotels, motels, or rooms of institutions such as hospitals or nursing homes.

Combustion Air for Room Heaters

Air Exchange Requirements

Room heaters should not be used in a room that has limited air exchange with adjacent spaces, since combustion air is required for the space.

These heaters have a draft relief opening under the hood at the back of the unit. This must not be altered or obstructed, and the unit must be installed so the hood is in the same atmospheric pressure zone as the combustion air inlet to the burner.

Verifying Proper Draft

You can verify the draw of the flue gases by holding a smoking match near the draft diverter opening. If smoke is not drawn into the draft diverter, turn the unit off and check for the problem causing lack of draft.

The draft diverter may be reversible so that the vent can be connected vertically or horizontally. The manufacturer will have limitations on the length of the horizontal run.

Gas Valves for Room Heaters

Type	Description
Single-stage control valve	The full on-off single-stage valve is controlled by a wall thermostat. Models are available that are powered by a 24 V supply or are self-generating.
Two-stage control valve	The two-stage type (with hydraulic thermostat) fires at either full input (100% of rating) or at some reduced stop, which can be as low as 20% of the heating rate. The amount of time at the reduced firing rate depends on the heating load and the relative oversizing of the heater.
Modulating control valve	The modulating control valve (with hydraulic thermostat) starts on to a low fire and then either cycles off and on at the low fire (if the heating load is light), or gradually increases its heat output to meet any higher heating load that cannot be met with the low firing rate.
Manual control valve	The manual control valve is controlled by the user rather than the thermostat. The user adjusts the fuel flow and, thus, the level of fire to suit heating requirements.

Thermostats for Room Heaters

Wall Thermostat

The wall thermostat turns the automatic valve to either full on or full off. These thermostats are available in 24 V and millivolt systems. The 24 V system requires an external power source and a 24 V transformer. Wall thermostats respond to temperature changes and turn the automatic valve to either full on or off.

The millivolt system requires no external power, since the power is generated by a thermopile. Thermopiles are commonly available in 250 or 750 millivolt sizes. Choose the size that will supply sufficient power for the system components.

Built-in Hydraulic Thermostat

Built-in hydraulic thermostats are available in two types:

- Snap-action thermostats built with a liquid-filled capillary tube that responds to changes in temperature and turns the valve to either full on or full off.
- Modulating thermostats are similar to the snap-action type, except that the valve comes on and shuts off at a preset minimum input. The temperature alters the input anywhere from full on to the minimum input. When the heating requirements are satisfied, the unit shuts off.

Room Heater Maintenance

Keep Critical Areas Clean

The most important areas to keep clean of dust and lint are:

Burner Components

Burner ports and air inlets, orifices, pilot orifice and hood

Shields and Grilles

Top of burner shield and grilles

Control Area

Gas control area

Note: Any safety screen or guard removed for servicing the room heater must be replaced before operating the heater.

Unit Heaters

Applications

Power-vented, low static axial fan unit heaters are now available for residential and commercial/industrial use. Approved for utility applications such as residential garages, these units provide an affordable way to heat a space such as a garage when fast and intermittent heat is needed.

Installation Considerations

Units should always be installed following all codes and the manufacturer's certified instructions. Arrange to blow toward or along exposed wall surfaces, if possible. Where two or more units are installed in the same room, a general scheme of air circulation should be maintained for best results.

Suspended heaters are most effective when located as close to the working zone as possible; keep this in mind when determining the mounting heights to be used.

Unit Heater Placement

Optimal Positioning

Care should be exercised to avoid directing the discharged air directly onto the room occupants.

Avoid Obstructions

Consider partitions, columns, counters, or other obstructions when locating the unit heater so that a minimum quantity of air flow will be deflected by such obstacles.

Center Placement

When units are located in the center of the space to be heated, the air should be discharged toward the exposed walls.

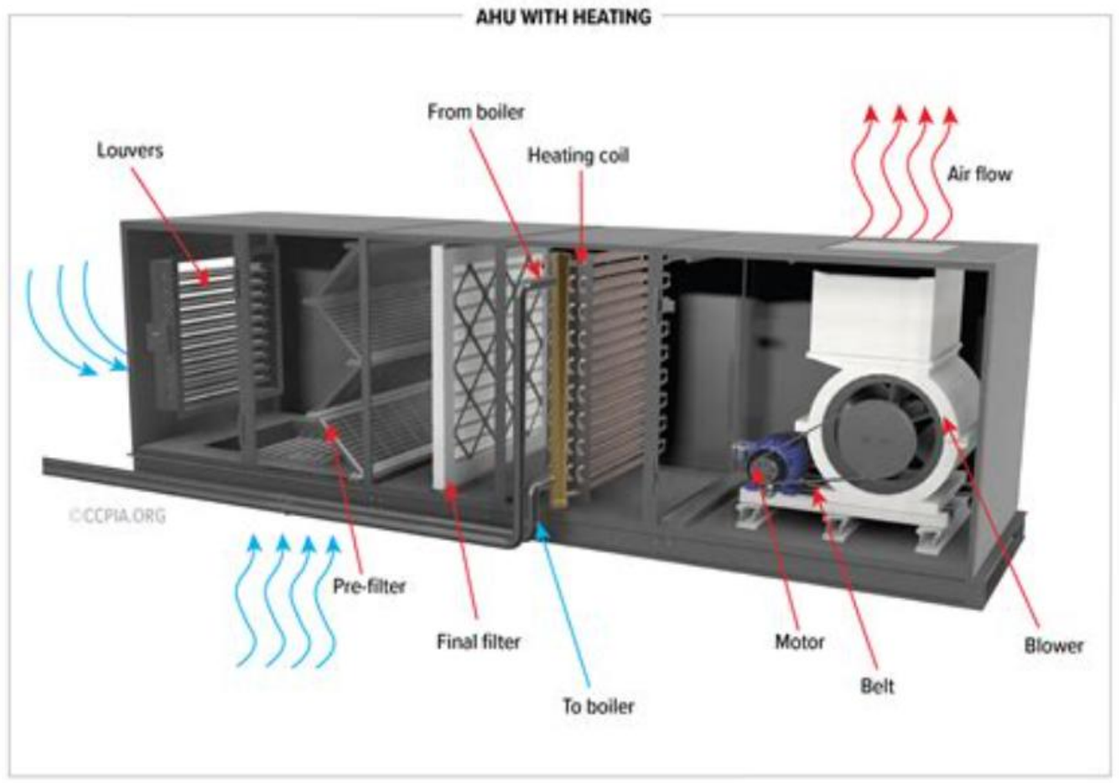
Cold Air Sources

At those points where infiltration of cold air is excessive, such as at entrance doors and shipping doors, it is desirable to locate the unit so that it will discharge directly toward the source of cold air.

Types of Gas Unit Heaters: Airflow Fans

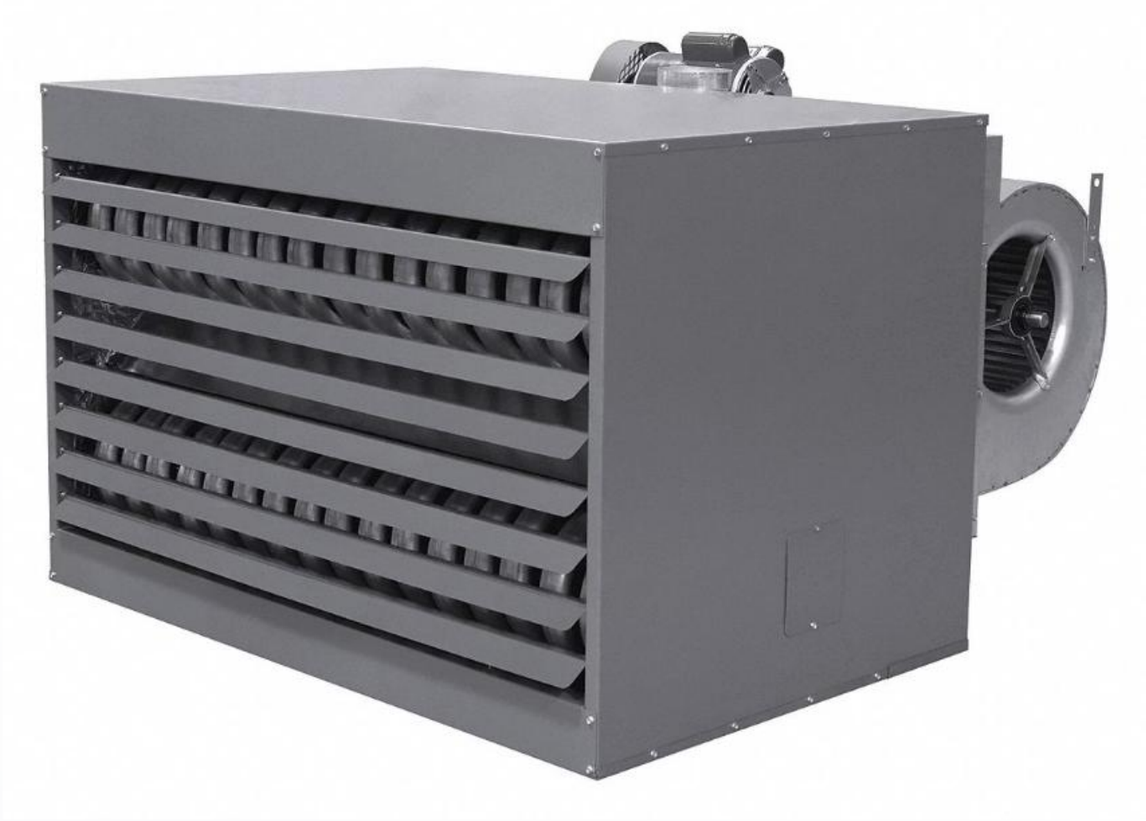
Axial Fans

Axial fans produce low-pressure, high-volume air flows which are designed to be suspended within the space to be heated. These types of units are not to be connected to ductwork; they are well suited to space heating in the same area where the unit is located.



Blower Type Units

Blower type units, or centrifugal fans, are designed for heavy duty applications such as continuous operation or where a single unit heater must do the entire heating job in a large area. They can be used with the standard adjustable louvres, with short duct runs, or with discharge nozzles for spot heating.



Types of Gas Unit Heaters: Vent Types

Gravity Vented Units

Older technology with low efficiency (approx. 80%).

Power Vented Models

With motorized vent exhausters increase efficiency (approx. 84%) and permit the use of horizontal venting or in areas of slight depressurization.

Types of Gas Unit Heaters: Combustion Air Supply

Conventional Units

Draw their combustion air from the same zone as where the unit is installed.

Separated Combustion Units

Designed to be installed where dusty, dirty, or mildly corrosive conditions exist or where high humidity or slightly negative pressures prevail. Units are supplied with outside air via a separate air pipe, which may be connected to a common concentric termination kit.

Types of Gas Unit Heaters: Efficiency

Non-condensing Power Vented Units

Achieve efficiencies of approximately 84%; the remaining exhausted heat is necessary to keep the products of combustion from condensing and possibly corroding the unit and/or venting system.

Condensing Units

For efficiencies above 90%, the unit will need to extract part of the latent heat from the products of combustion. This process forms condensation, which is collected and directed to a drainage point inside the unit.

These units will be equipped with a location at the base of the unit for connecting to a condensate drain. There will also be a special venting system as the vent system will be operating at a positive pressure.

Condensate Drain Requirements

Avoid Copper

Do not use copper for condensate drains as the water condensed from the products of combustion will be acidic.

Liquid Traps Required

Condensate drains will also require liquid traps to prevent vent gas from exiting into the drainage system.

Neutralization May Be Required

Some jurisdictions may require the condensate to be neutralized prior to connecting to the building drainage system.

Check Local Requirements

Check the local by-laws and with the authority having jurisdiction.

Unit Heater Temperature Control

Single-stage Control

Units have a simple on/off gas valve activated by a low voltage single-stage thermostat. Units with a summer fan option (G thermostat connection) require a thermostat with a Fan Auto-On switch, so the unit's fan can be energized without a call for heat.

Two-stage Control

Units require a digital two-stage thermostat to switch between high and low firing rates.

Multiple Heater Control

Units with a multiple heater control option can use one thermostat to control multiple heaters.

Electronic Modulating Control

Units have an electronic modulating gas valve that will require a matching modulating thermostat to adjust the firing rate from approximately 40% to 100%, which will vary the discharged air temperature to more closely match the needs of the space.

High Limit Control for Unit Heaters

Purpose

All units are equipped with a temperature-activated auto reset limit control. This safety device provides protection in case of motor failure or lack of airflow due to a restriction at the inlet or outlet.

Operation

The control is factory-set and is non-adjustable. If the setpoint is reached, the limit control will interrupt the electric supply to the gas valve.

Wall Furnaces

Definition

A wall furnace is a self-contained vented appliance with grilles that is designed to be permanently installed against or within an inside wall of a building. It furnishes heated air that is circulated by natural or forced convection.

Capacity Range

Wall furnaces range from 10,000 to 90,000 Btu/h (3 to 26 KW) and are classified as:

- Conventional; or
- Direct-vent

Conventional Wall Furnaces

Air Circulation

In conventional units, the cool room air enters at the bottom and is warmed as it passes over the heat exchanger, entering the room through the grillwork at the top of the heater.

Top-Vent Design

The flue gases exit at the top of the vent at the top of the heater; for this reason, they are also referred to as top-vent wall furnaces.

Counterflow Option

Some conventional units are available as counterflow units, which use fans to reverse the natural flow of air across the heat exchanger. Air enters at the top of the furnace and discharges at or near the floor.

Mounting Options

Wall furnaces come in recessed or surface mounted models. The top vented recessed wall furnace is designed to fit in a wall cavity and is vented with a BW type vent.

BW Vent for Wall Furnaces

BW Vent Design

The BW vent is similar to the B vent, except that it is oval and is designed to fit inside a 2 × 4 stud wall.

The counterflow models are only partially recessed to conceal the vent.

Dual-Wall Models

Dual-wall or double-sided models can heat two separate rooms as they are installed into the wall of the adjacent rooms.

Direct-Vent Wall Furnaces

Combustion Air Source

Direct-vent wall furnaces are constructed so that combustion air comes directly from outside, and all flue gases discharge into the outside atmosphere.

Installation Flexibility

These appliances normally have an exterior outdoor exposure and can be used in extremely tight (well-insulated) rooms because combustion air is not affected by room pressures.

Built-in Grilles

These appliances are complete with grilles to extend the heating surface into the room.

Air Quality Concerns

Air surrounding the venting, and vent termination(s) is used for combustion and must be free of any compounds that cause corrosion of internal components.

Wall Furnace Features

Natural Convection

Some direct-vent heaters are designed for natural convection and can operate without a power supply.

Modulating Fan

Other units may be equipped with a modulating fan for better temperature control.

Smart Controls

Programmable Wi-Fi enabled thermostats allow for remote control and scheduling.

Air Quality Features

Some models include humidifiers and air filters for improved indoor air quality.

Wall Furnace Controls

Basic Controls

The controls for conventional wall furnaces (thermostats and gas valves) are very basic and similar to room heaters.

Counterflow units have a fan that will be activated by a heat sensor switch will start the fan once the unit warms up.

Advanced Controls

Units with additional efficiency and accessories will have an electronic module to control the modulating gas valve, combustion fan motor, convection fan motor, spark ignition, and temperature and pressure sensors.

Wall Furnace Venting and Combustion Air

Air Supply Requirements

The appliance must be installed in a location with sufficient air supply for combustion and venting. The installer must refer to and comply with CSA B149.1 for minimum sizes and positions of air supply openings. This air must not be restricted.

Venting Options

Conventional wall furnaces use B or BW type venting. The type of vent used must be approved by the manufacturer.

Direct-vent wall furnaces have specialized venting systems that combine the exhaust and intake functions.

Wall Furnace Installation

Wood Floor Installation

The furnace can be installed directly on a wood floor.

Combustible Floor Protection

When installed on carpeting, tile, or other combustible flooring other than wood, it must be installed on a metal or wood panel that extends the full width and depth of the appliance.

Alternative Arrangement

An alternative arrangement includes raising the wall furnace at least 2 inches (5 cm) above the combustible floor to prevent discoloration and provide enough clearance.

Safe Placement

The heater must be located to prevent hazard to walls, curtains, furniture, and doors.

Baseboard Heaters

Applications

Direct-vent baseboard heaters are generally used to supply supplemental heat to a room, but they can also be used as the primary source of heat.

Multiple Unit Installation

Depending on the size of the space and the amount of heat required, a number of baseboard heaters can be wired together to provide the required output.

The installation, venting, and maintenance of baseboard heaters follow the manufacturer's certified installation instructions, codes, and standard procedures outlined for space heaters.

Wiring of Baseboard Heaters

Thermostat Options

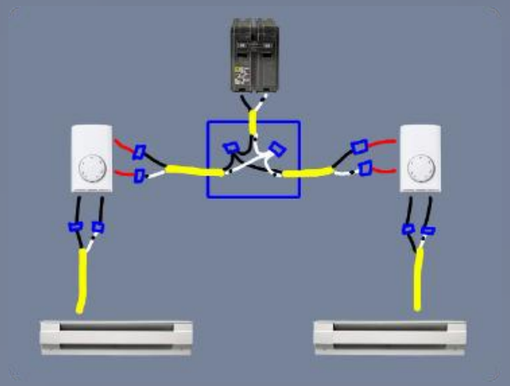
The direct-vent baseboard heater is designed to operate with a 24 V thermostat.

In retrofit situations, however, it can also be connected to an existing 120 V thermostat. In this case, the thermostat is already connected to the 120 V power line and the heater is wired to the lines from the junction box.

Power Cord Options

Baseboard heaters that come with power cord already assembled:

- Do not need to be hard-wired
- Can simply be plugged directly into a wall receptacle



Wiring Multiple Baseboard Heaters

Thermostat Limitations

Up to three baseboard heaters may be controlled from a single thermostat if all the heaters are in the same room.

Note: No more than three heaters should be controlled from a single thermostat.

120V Supply Requirements

If wiring more than one heater from a 120 V supply, all heaters must use the same circuit.

24V Thermostat Wiring

If wiring more than one heater to a single 24 V thermostat, do not use extension cords; the heaters must be hard-wired in parallel.

Heat Anticipator Settings

Purpose

If using a thermostat with a heat anticipator, it should be set to the total current draw for the heaters.

Setting Guidelines

Manufacturers provide guidelines for setting the anticipator based on the number of heaters and their current draw.

The size of the wire is proportional to the distance between the thermostat and the appliance. A larger gauge of wire has less resistance, therefore the thermostat can be located further from the appliance.

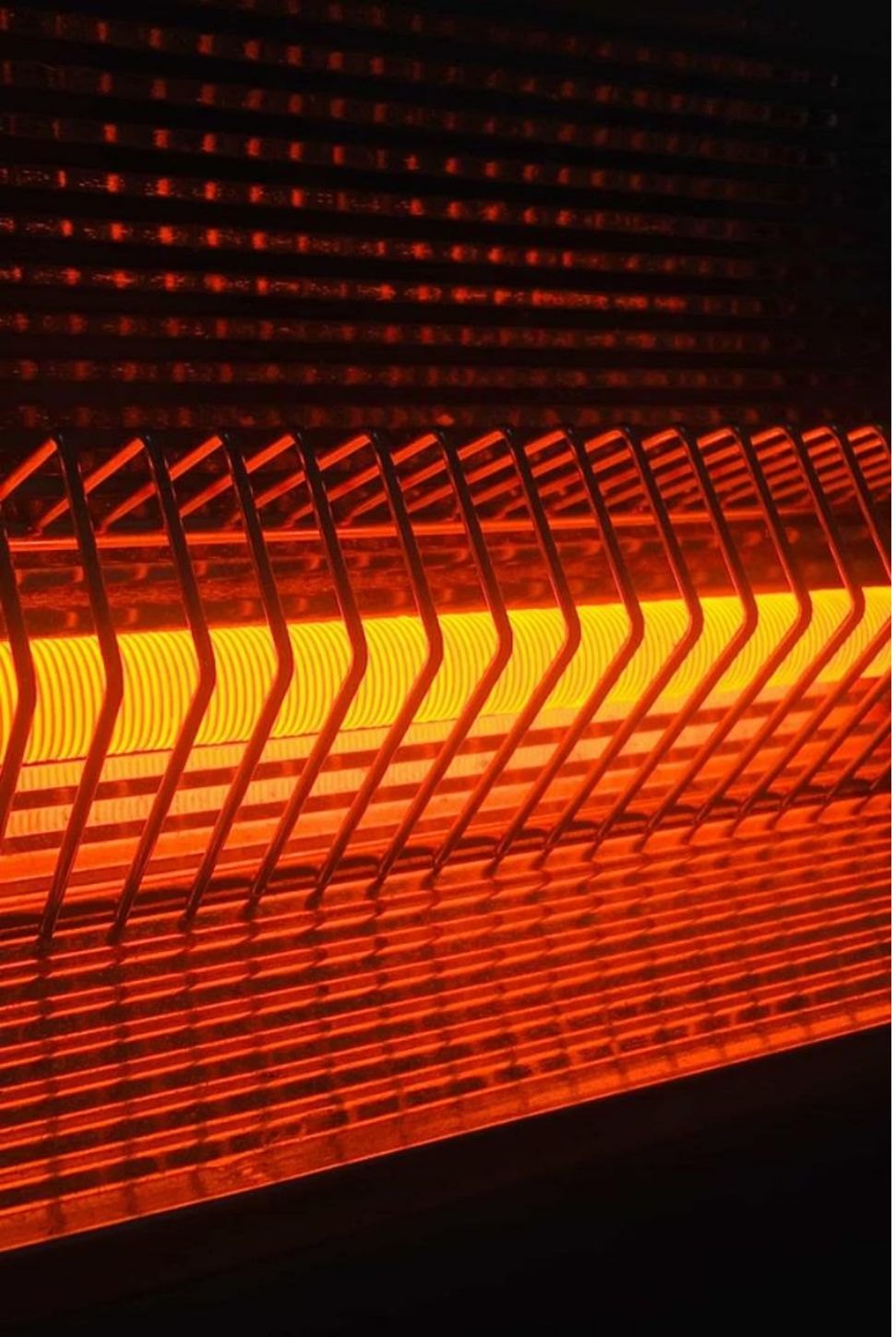
Infrared Heaters: Principles

How Infrared Heating Works

Infrared heaters transfer heat directly to people and objects in their path rather than heating the air. This makes them efficient for spot heating or in areas with high air exchange rates.

Advantages

- Instant heat without warm-up time
- Directional heating capability
- Effective in drafty areas
- Energy efficient for spot heating
- No moving parts in many models



Infrared Heaters: Types

High-Intensity

Operate at higher temperatures (1800°F+) and produce more intense infrared radiation. Often used in outdoor or industrial applications.

Low-Intensity

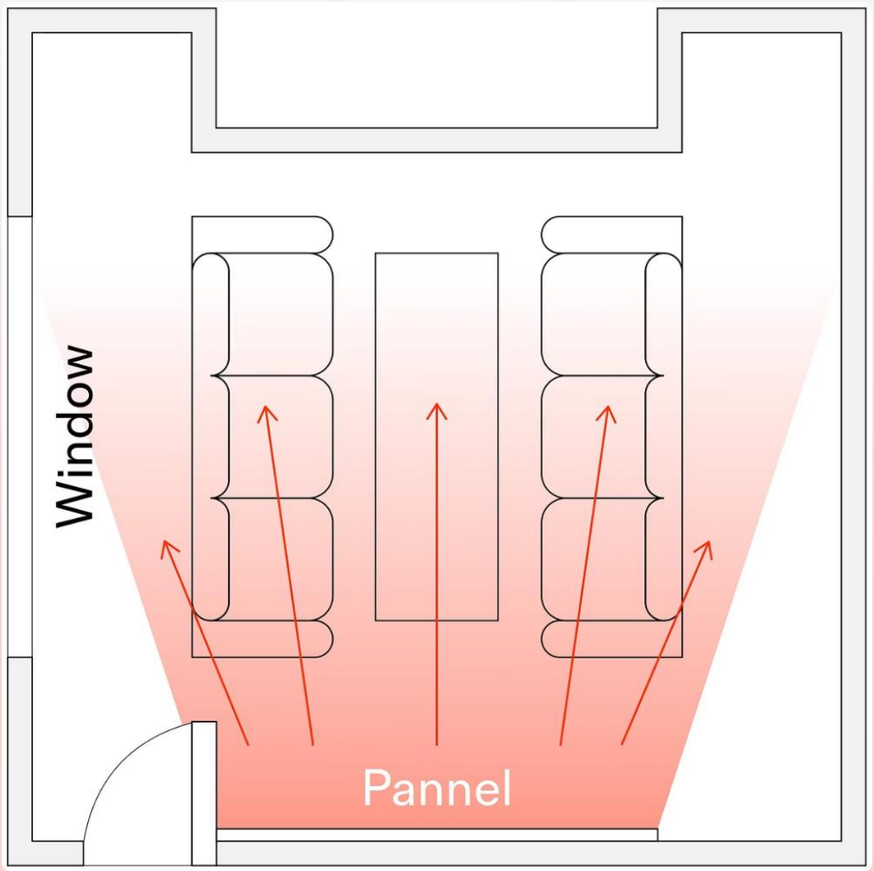
Operate at lower temperatures and distribute heat more evenly. Common in residential and commercial spaces.

Tube Heaters

Use a burner to heat a long metal tube that radiates infrared heat. Ideal for large open spaces like warehouses.

Ceramic Infrared

Use ceramic elements that emit infrared radiation when heated. Often used in more controlled environments.



Infrared Heaters: Installation Considerations

Mounting Height

Critical for proper coverage and intensity. Follow manufacturer's specifications.

Angle and Direction

Position to direct heat where needed without creating hot spots.

Clearances

Maintain proper clearances from combustible materials.

Ventilation

Some models require venting for combustion products.

Infrared Heaters: Applications

Warehouses

Efficient for large, high-ceiling spaces

Outdoor Spaces

Patios, restaurant seating areas

Manufacturing

Spot heating for work stations

Garages

Quick heat for intermittent use

Construction Heaters: Overview

Purpose

Construction heaters provide temporary heating during building construction, renovation, or in emergency situations. They help maintain workable temperatures, allow materials to cure properly, and protect against freezing.

Key Features

- Portable and durable design
- High BTU output
- Quick setup and operation
- Weather-resistant construction
- Safety features for construction environments

Construction Heaters: Types

Direct-Fired

Combustion occurs in the open, with all heat and combustion products entering the space. Requires adequate ventilation. Highest efficiency but limited to well-ventilated areas.

Indirect-Fired

Combustion occurs in a sealed chamber with heat exchanger. Combustion products are vented outside. Safer for enclosed spaces but less efficient.

Radiant/Infrared

Heats objects directly rather than the air. Good for spot heating or areas with high air exchange.

Convection

Heats air that circulates naturally. Often used in smaller enclosed spaces.

Construction Heaters: Safety Considerations

1 Ventilation

Ensure adequate fresh air, especially for direct-fired heaters that produce carbon monoxide.

2 Clearances

Maintain proper clearances from combustible materials as specified by manufacturer.

3 Fuel Storage

Store fuel properly away from heat sources and according to regulations.

4 Monitoring

Never leave heaters unattended; use carbon monoxide detectors in enclosed spaces.

5 Stability

Ensure heaters are placed on stable, level surfaces to prevent tipping.

Construction Heaters: Installation

Site Assessment

Evaluate the space size, insulation, ventilation, and power/fuel availability to determine appropriate heater type and size.

Placement

Position heaters according to manufacturer guidelines, considering air circulation patterns and maintaining required clearances.

Fuel/Power Connection

Connect to appropriate fuel source (propane, natural gas, diesel) or electrical supply, ensuring all connections are secure and compliant with codes.

Ventilation Setup

Install any required venting for combustion products and ensure adequate fresh air intake.

Construction Heaters: Maintenance

Regular Inspection

Check for damage, leaks, or wear before each use

Cleaning

Keep air intakes, burners, and heat exchangers clean

Filter Replacement

Replace or clean filters according to schedule

Connection Check

Verify fuel connections are tight and undamaged

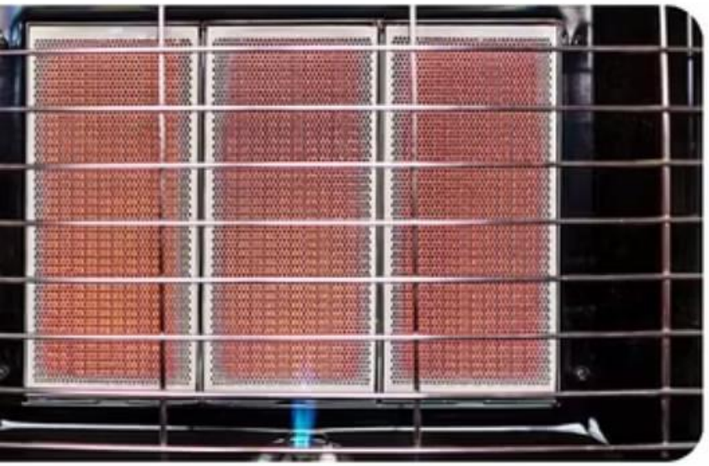
Proper Storage

Store in dry location when not in use

SOR

TYPES (

fan space heater



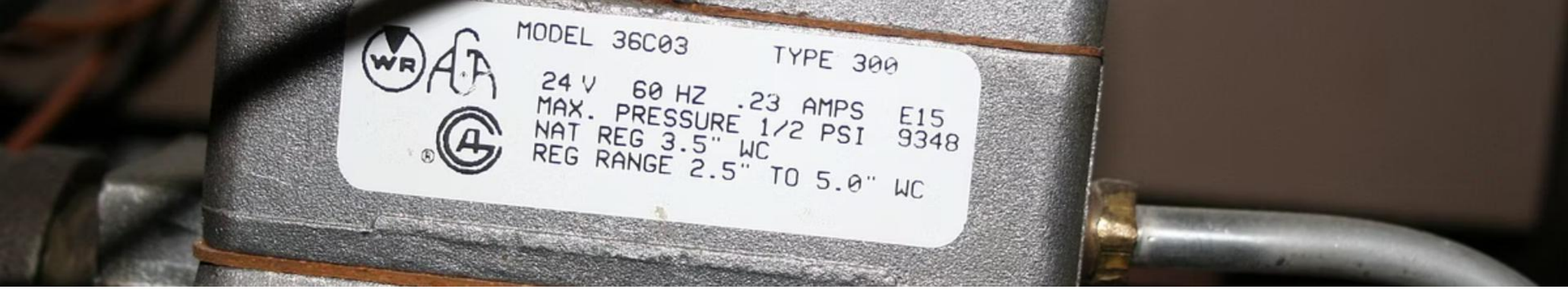
propane space heater

Summary: Space Heater Selection Guide

Heater Type	Best Applications	Key Advantages	Considerations
Room Heaters	Single room heating	Self-contained, portable	Limited to one room
Wall Furnaces	Permanent installation in small spaces	Space-saving, efficient	Requires wall installation
Baseboard Heaters	Supplemental or zone heating	Low profile, multiple units can be linked	Limited capacity per unit
Unit Heaters	Garages, workshops, warehouses	Powerful, suspended installation	Requires proper mounting
Infrared Heaters	Spot heating, drafty areas	Direct heating of objects/people	Limited area coverage
Construction Heaters	Temporary heating needs	Portable, high output	Typically not for permanent use

Infrared Heaters and Construction Heaters

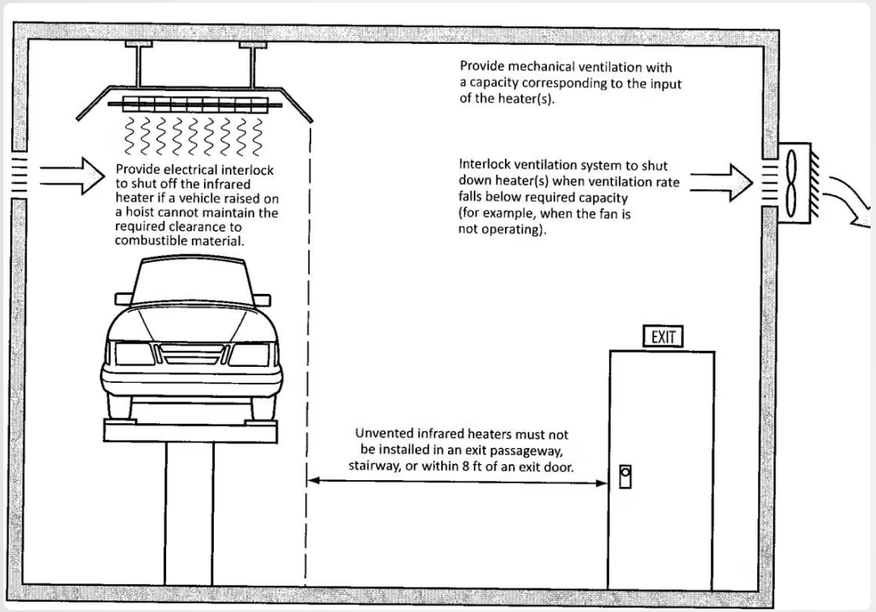
This presentation covers the types, installation requirements, and maintenance procedures for infrared heaters and construction heaters used in commercial and industrial applications.



Anticipator Settings for Multiple Heaters

Number of heaters	Anticipator setting
1	0.35
2	0.7
3	1.05

When installing multiple heaters controlled by a single thermostat, the anticipator setting must be adjusted according to the number of heaters in the system.



Infrared Heater Applications

Outdoor Seating and Eating Spaces

Provides comfortable heat for patrons in outdoor dining areas

Large Indoor Spaces

Aircraft hangars, public garages, arenas, and loading docks

Spot Heating

Targeted heating for specific work areas or zones

Infrared heaters are typically suspended from beams or joists and radiate heat toward the ground. They are usually controlled by a wall thermostat or a toggle switch.

Code Requirements for Infrared Heaters

Must

- Be protected from physical damage
- Have a mechanical ventilation system that removes combustion products outdoors
- Have an interlocking ventilation system
- Have adequate air supply openings
- Have proper clearance from combustibles

Must Not

- Be installed where combustible vapors, dust fibers, or explosive mixtures are present
- Be installed in residential or institutional buildings
- Be installed in an exit passageway or stairway within 8 ft (2.5 m) of an exit door

Ventilation Requirements

Ventilation System Capacity

Must have 300 cu ft/min per 100,000 Btu/h (29 kW) of gas input

CO2 Levels

Must be able to maintain a 5,000 ppm CO2 reading 6 ft (2 m) above the work area

Interlocking System

Any reduction in the volume of ventilation air flow must shut down the heater

Special Installation Requirements

Minimum Height

Must be located a minimum of 8 ft (2.5 m) above the floor if installed in a repair or shop area that communicates with an aircraft hangar

Vehicle Clearance

When installed in a garage or car wash, clearance from the highest vehicle must not be less than the clearance from combustible material as indicated on the appliance

Protective Measures

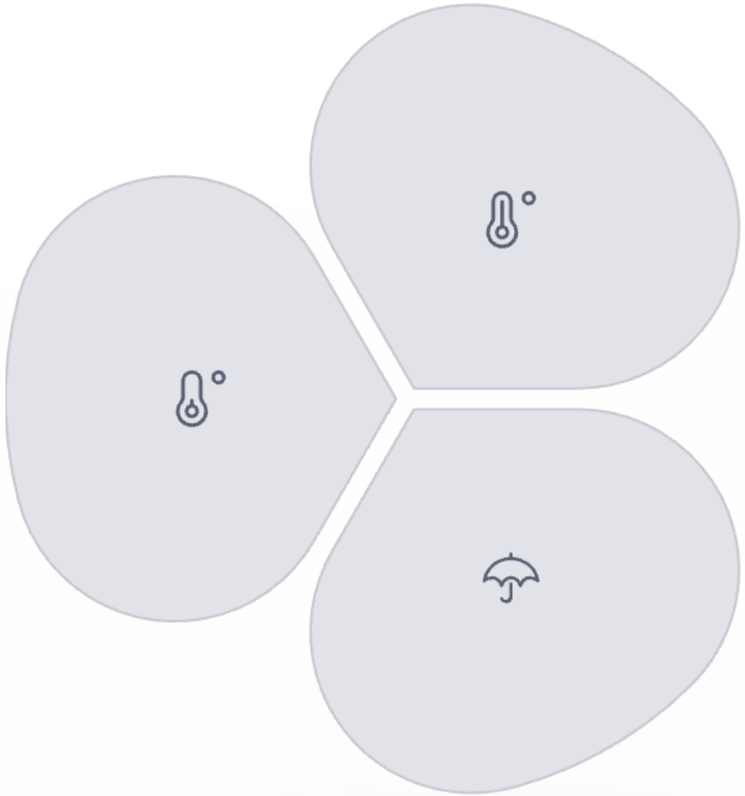
Provision must be made to maintain minimum specified clearances by an interlock that shuts off the gas supply when clearances are not maintained

Types of Infrared Heaters

Low-Intensity

Radiating surface between flame and heated area

Surface temperature up to 1200°F (650°C)



High-Intensity

Direct flame heating radiating surface

Surface temperature up to 1800°F (980°C)

Parasol Heaters

Specialized for patio areas

Cylindrical radiant emitter mesh

Low-Intensity Infrared Heaters

Gas Burner

Fully automatic control fires into the mouth of a radiant tube

Vent Fan

Hot gases are drawn through the tube by a vent fan

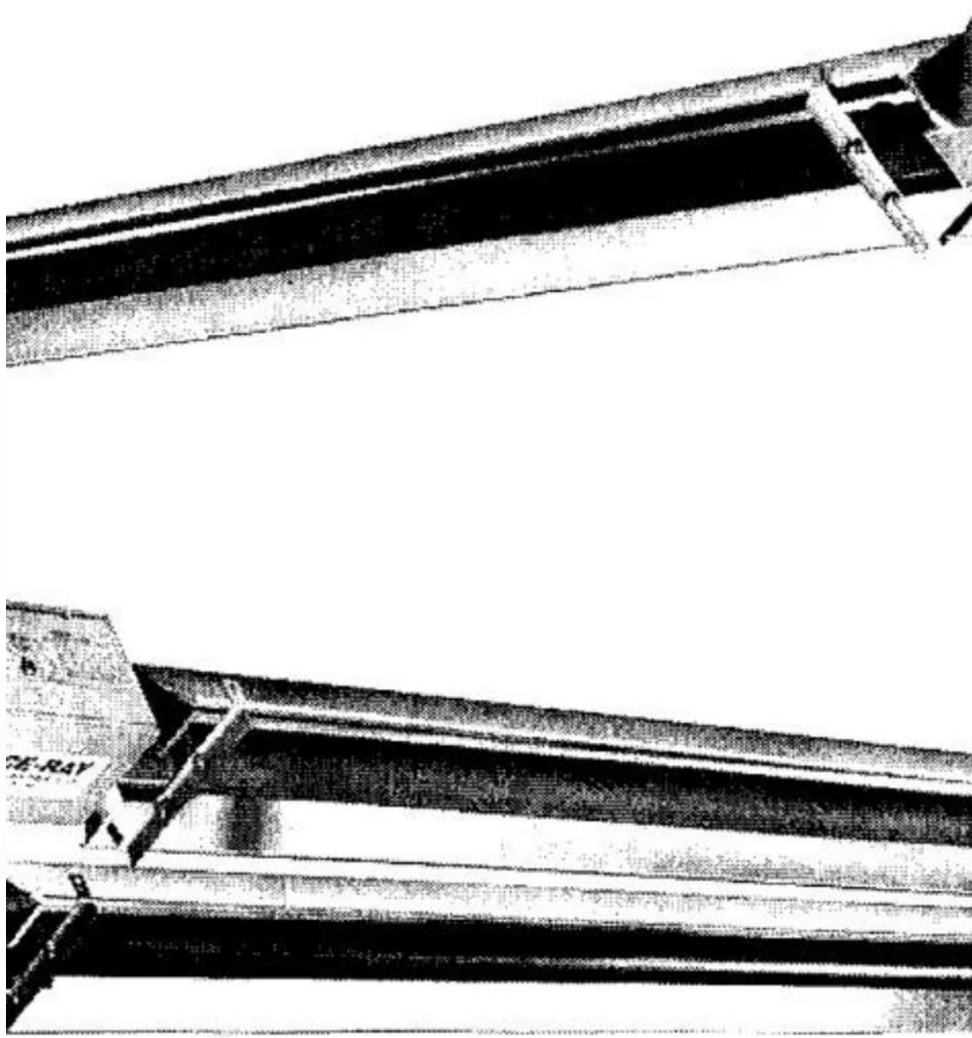
Radiant Tube

Quickly reaches operating temperature and emits infrared heat

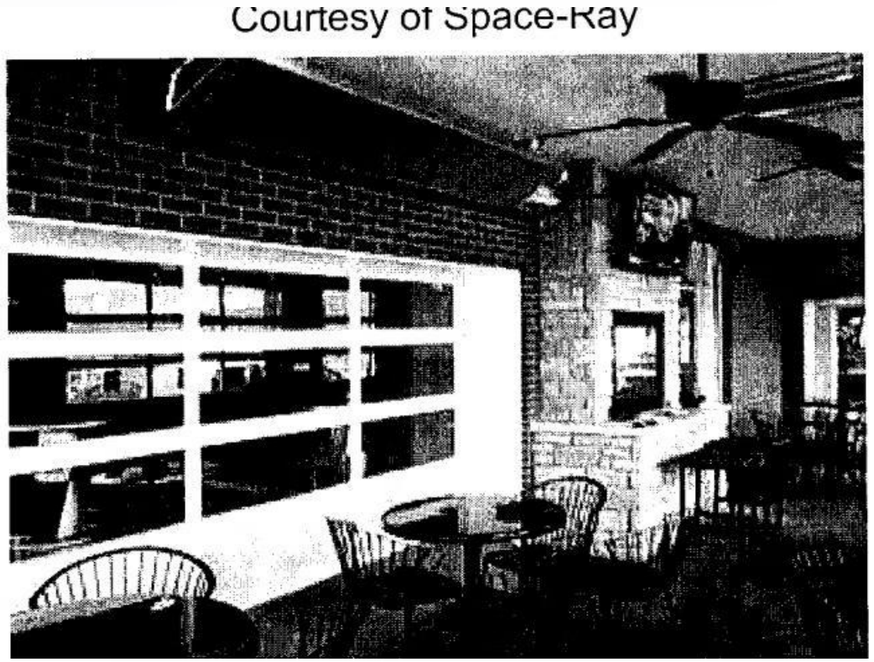
Reflector

Directs heat downwards from above the radiant tube

Figure 1-20
Low-intensity infrared heater
Courtesy of Space-Ray



Low-Intensity Heater Configurations



Vacuum (Pull-Through)

Creates negative pressure in the radiant tube

Power Exhaust (Push-Through)

Creates positive pressure in the radiant tube

Straight Configuration

Length increases with higher input ratings

U-Tube Configuration

Allows for more compact installation in the same space

Custom Layouts

Can be built to better match the area being heated

Figure 1-21 shows two low-intensity heaters in a restaurant patio with emitter guard kits installed to cover the bottom of the exposed area of the heater for cosmetic and safety purposes.

High-Intensity Infrared Heaters

Material Construction

Made of porous ceramic, drilled port ceramics, stainless steel, or a metallic screen

Combustion Process

A combustible mixture of gas and air enters the enclosure and flows through the refractory material, where the gas ignites

Heat Generation

Gas is evenly spread on the exposed surface, creating a steady flame that heats the surface to temperatures as high as 1800°F (980°C)

High-Intensity Heater Operation

Primary Air Supply

All or almost all air for combustion is supplied as primary air

Radiating Screen

Metal screen placed near ceramic surface also becomes heated to incandescence

Short Flames

Flames are short and retained in the surface of the ceramic

Incandescence

Ceramic surface heats to incandescence

The high operating temperature of the ceramic is desirable because the flame is retained more reliably on the burner surface and radiating efficiency is improved.

Parasol Heaters

Figure 1-23
Infrared freestanding parasol heaters

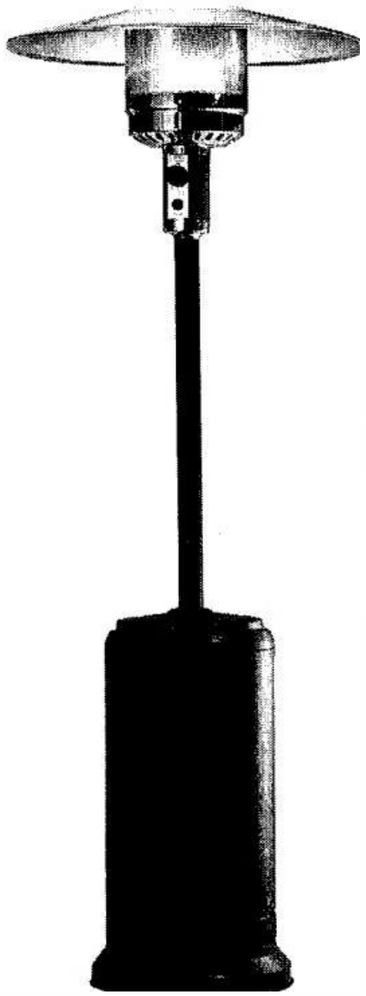
Design Features

- Cylindrical radiant emitter mesh
- Combustible mixture flows through mesh
- Specifically designed for patio areas

Installation Options

- Freestanding units
- Permanent post installations
- Portable propane units with 20 lb cylinder base
- Natural gas models supplied by hose or permanent piping
- Suspended units with supporting framework

Suspended Parasol Heaters



Combustion Air Supply Requirements

1 ## Loose Buildings

May not require additional air supply if infiltration rates are sufficient

2 ## Balanced System

A balanced exhaust/inlet air system is required to ensure negative pressure is not created

3 ## High-Intensity Units

Volume of combustion and ventilation air must be compatible with the exhaust fan

4 ## Outside Air Supply Required

When the building is of tight construction or contaminants such as halogenated hydrocarbons are present in the air

Combustion Air Duct for Low-Intensity Heaters

Duct Size

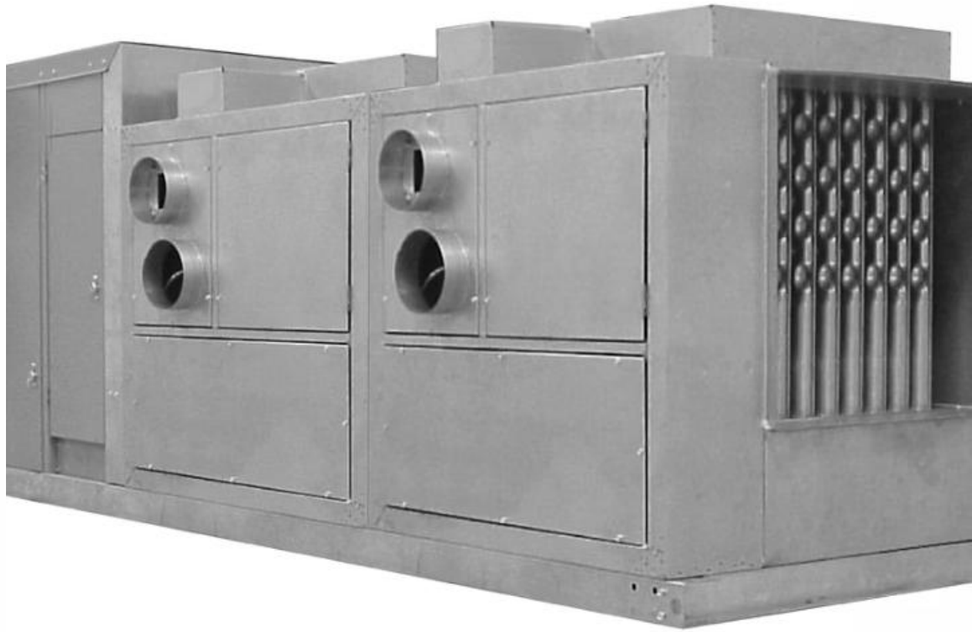
A 4 inch (10 cm) O.D. single-wall pipe may be attached to the heater

Insulation

Duct may require insulation to prevent condensation on the outer surface

Length Limitations

Manufacturers will specify the maximum and minimum lengths of the combustion air duct



Heater Suspension Requirements

Load Capacity

Check that the supporting structure has sufficient load-carrying capacity

Mounting Angle

Typically up to 30° on the short axis, with the long axis horizontal

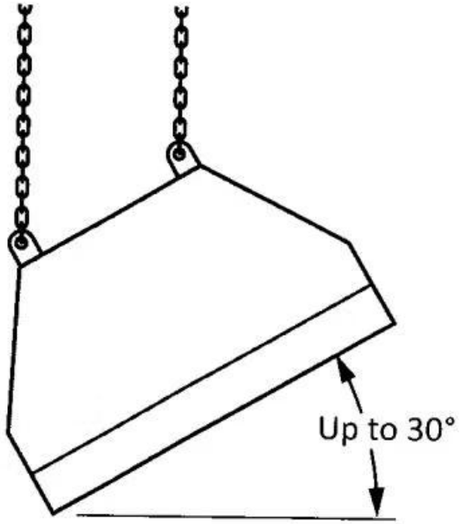
Slope Considerations

A slight slope may be required to control flue gas condensate

Suspension Method

Typically suspended by chain, though rigid suspension may be required for seismic or wind conditions

Figure 1-25
Unit angled on short axis



Gas Supply Connection

Hose Type

Suspended infrared heaters are commonly connected to the gas supply by means of a Type 1 gas hose that is certified as being in compliance with CSA 8.1

Hose Length

The length of this hose should be 36 inches ± 6 inches (90 ± 15 cm) as specified in Clause 7.23.3 of CSA B149.1

Venting Options for Infrared Heaters

Unvented

With adequate ventilation

Horizontal

Through wall to outside

Vertical

Through roof to outside

The chosen method will depend upon a number of factors, including building ventilation, available access points in walls and ceilings, number of burners installed, installation codes, etc.

General Venting Requirements

1 Vent Adapter Installation

Install the vent adapter with the seam on top to prevent condensation from leaking out of the adapter

2 Terminal Opening

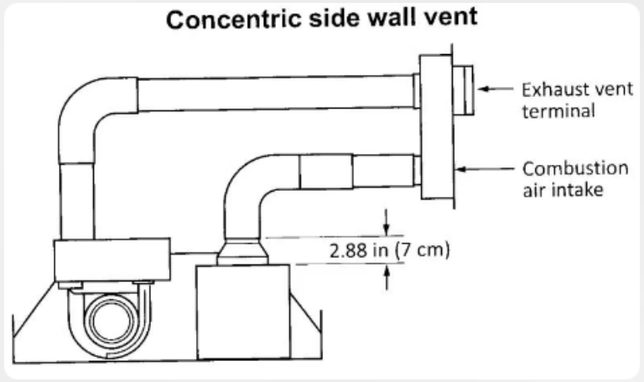
The vent terminal opening must be beyond any combustible overhang

3 Condensation Management

If condensation in the vent is a problem, the vent length should be shortened or insulated

4 Outside Air Supply

For ducted outside air supply installations, the outside air supply terminal must not be installed more than 1 ft (30 cm) above the vent terminal



Horizontal Venting Requirements

Wall Penetration

In combustible or non-combustible walls, use an insulated vent terminal

Height Considerations

The vent terminal should be installed at a height sufficient to prevent blockage by snow and at least 3 ft (1 m) above grade

Building Protection

Building materials should be protected from degradation by vent gases

Clearances

The vent terminal must be installed no less than 3 ft (1 m) from any building opening and at least 6 ft (2 m) from the combustion air opening of this unit or any other appliance

Vertical Venting Requirements

Vent Type

A type B vent, at a minimum, must be used outdoors

Thimble Requirement

An insulating thimble might be required to pass through combustible structures

Horizontal Run Limitation

The horizontal run to vent must never exceed 75% of the vertical height of the vent

Common Vent Sizing

The open area of common vent must equal the sum of the open areas of individual vents connected to it

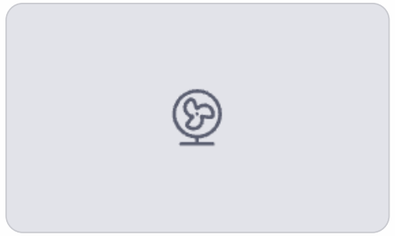
Control Requirements

Heaters sharing a common vent must be controlled by the same thermostat

Connection Positioning

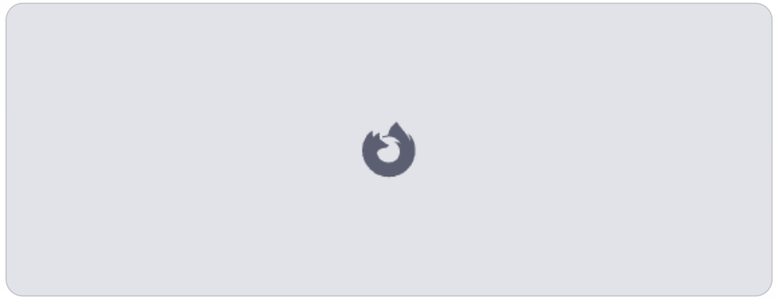
Connections to common stack must be positioned to avoid direct opposition between streams of combustion gases

Maintenance of Low-Intensity Heaters



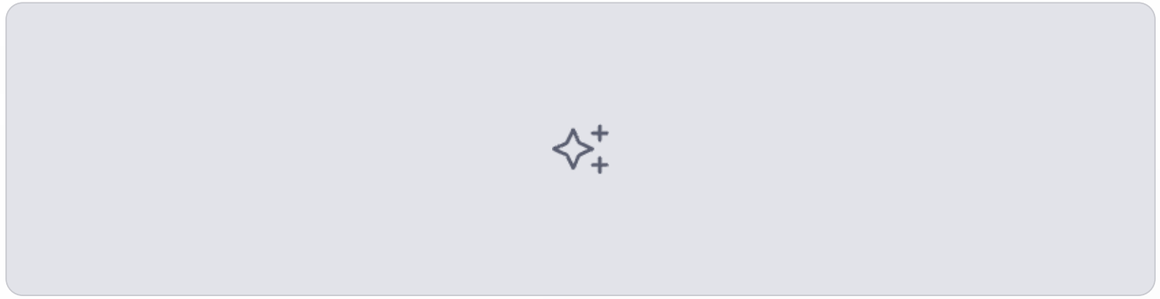
Blower Maintenance

Check the condition of the blower scroll and motor; clean with compressed air or vacuum



Burner Inspection

Check the condition of the burner and carefully remove any dust or debris from inside the burner box or burner cup



Igniter Check

Inspect the igniter and replace if there is excessive carbon residue, erosion, breakage, or other defects

For best performance, maintenance should be performed before each heating season. Always ensure gas and electrical supplies to heater are off before performing any service or maintenance.

Additional Maintenance Tasks

1 Firing Tube Inspection

Check the inside of the firing tube with a flashlight; if carbon or scale are present, scrape out the deposits with a wire brush or rod

2 Observation Window

Check to see that the burner observation window is clean and free of cracks or holes

3 Flue Pipe

Check the flue pipe for soot or dirt and clean as necessary

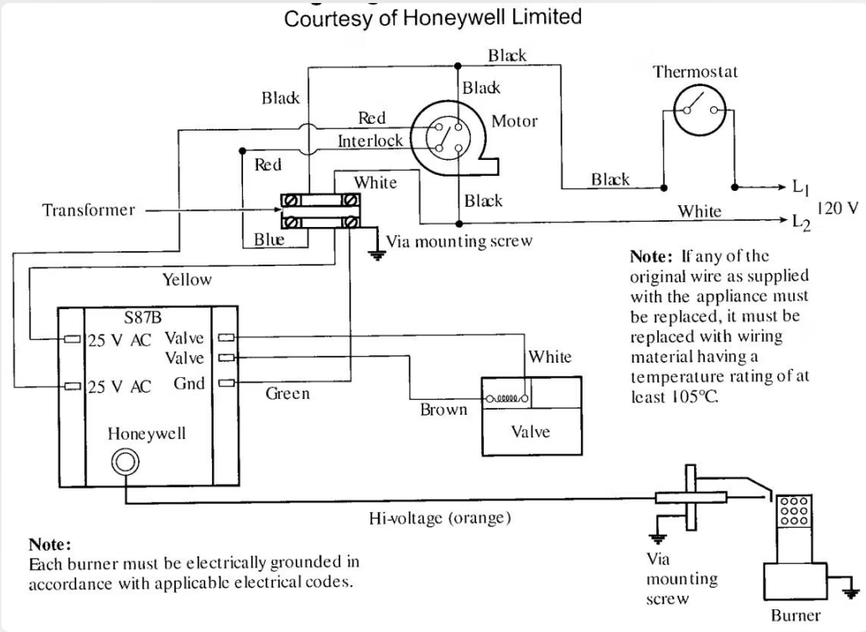
4 Reflector Cleaning

Outside surfaces of the heater reflector may be cleaned by wiping with a damp cloth

5 Vent Terminal Check

Check the vent terminal and fresh-air inlet to ensure they have not become blocked during the non-heating season

Servicing Low-Intensity Heaters



Manufacturer's Instructions

The details for servicing low-intensity heaters are typically included in the manufacturer's instructions

Wiring Diagram

Figure 1-27 shows a wiring diagram for a low-intensity infrared heater that would be used for installation and troubleshooting purposes

Documentation

Always refer to the specific model's documentation for proper servicing procedures

Figure 1-28
Components of high-intensity unit heater

Maintenance of High-Intensity Heaters

Cleaning Frequency

In normal atmospheric conditions in manufacturing plants, cleaning is suggested once per year

Special Environments

If the atmosphere is particularly dirty from welding or similar contaminants, more frequent cleaning may be required

Cleaning Process

Clean the ceramic mat with compressed air (below 20 psi), clean the burner head, and clean reflectors with a soft cloth and mild soap solution

Caution! Be sure the gas and the electrical supply to the heater are off before performing any service or maintenance.

Cleaning the Burner Head

First Direction

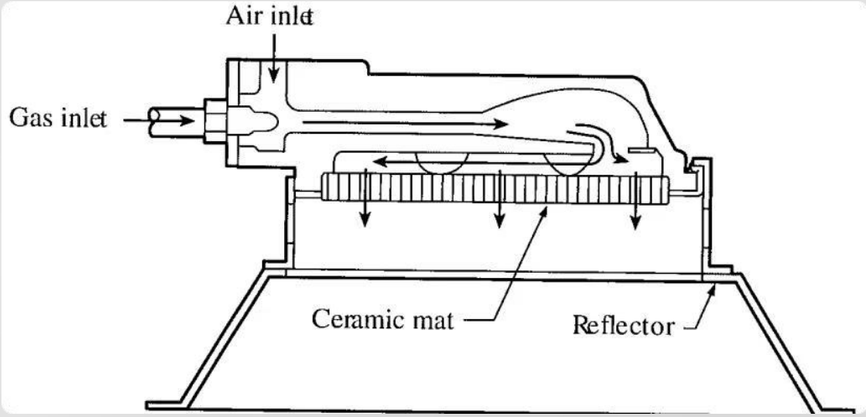
Direct the compressed air nozzle through the venturi air inlet to blow the dust from the heater body through the tile openings into the atmosphere

Reverse Direction

Direct the compressed air nozzle at the face of the tile so that any loosened dirt is blown back through the venturi opening

Reflector Cleaning

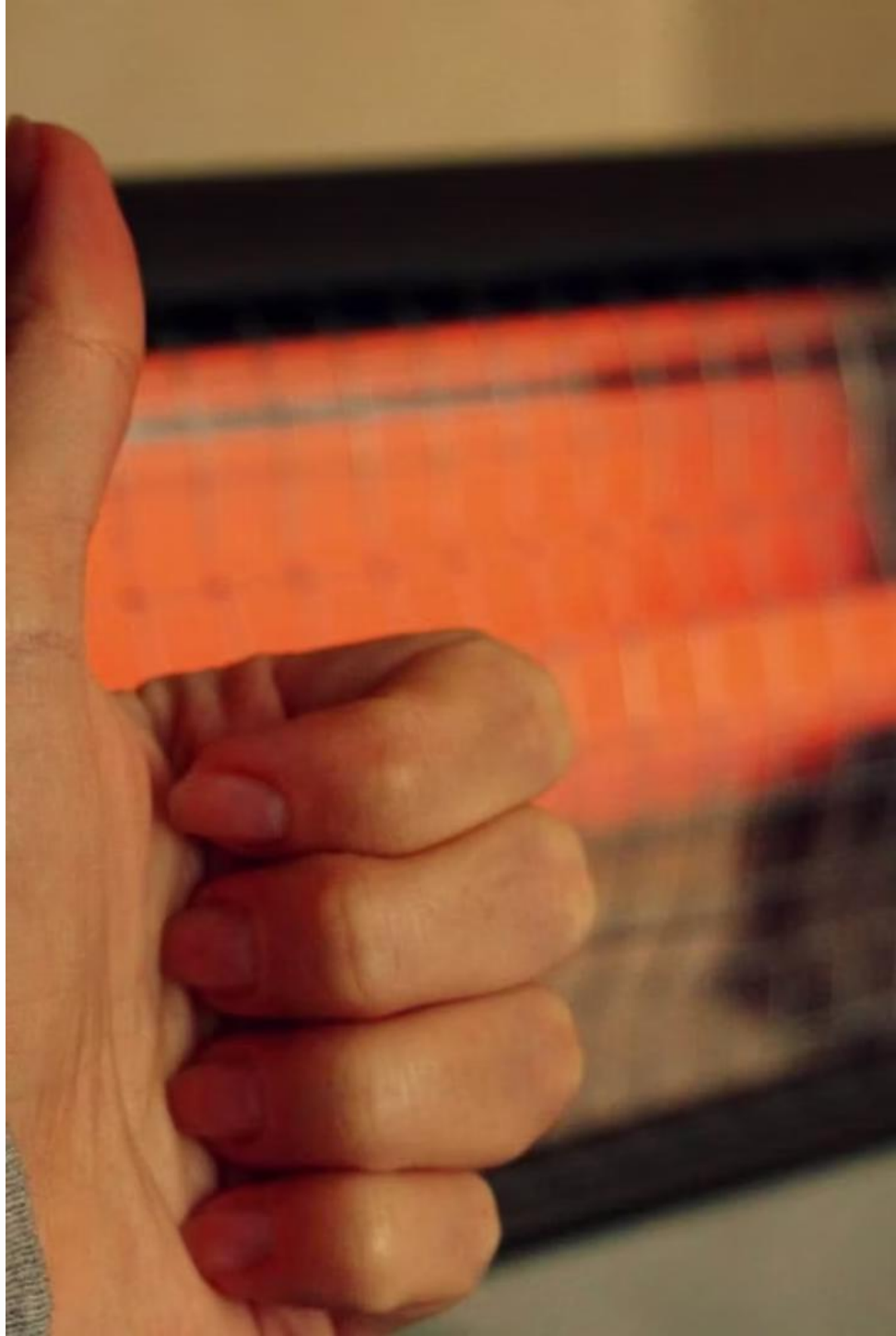
Clean the reflectors with a soft cloth and a mild soap solution



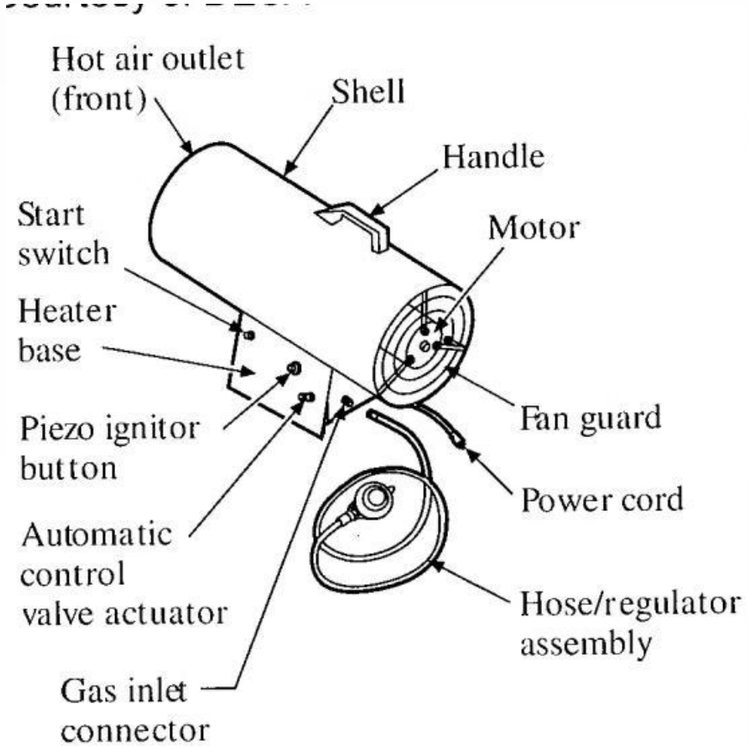
Servicing High-Intensity Heaters: Flash Back

Causes of flash back	Corrective action
Improper pressure entering the venturi tube	Check the burner gas pressure
Broken or cracked ceramic tile	Replace the cracked or broken ceramic tile
Faulty sealing of the ceramic tile to the burner body caused by a breakdown of the gasket material	Contact the heater distributor

Flash back is a loud ignition noise, followed by a hissing sound. There is no visible burning on the ceramic tile and combustion is taking place inside the burner body. If the heater flashes back during operation, turn it off immediately.



Construction Heaters: Overview



Purpose

The construction heater is a direct-fired gas heater only intended to temporarily heat buildings under construction, alteration, or repair

Limitations

Not designed for use in inhabited homes, inhabited parts of buildings, or recreational vehicles

Safety Warning

Improper use of the construction heater can cause serious injury or death from burns, fire, explosion, electrical shock, or carbon monoxide

Combustible Materials

Keep solid combustibles (building materials, paper, or cardboard) away from the heater

Prohibited Environments

Never use the heater in spaces that may contain volatile or airborne combustibles, or products such as gasoline, solvents, paint thinner, etc.

Construction Heater Components

Fan Guard

Protects the user from rotating fan blades and keeps combustible items from being drawn into the burner flame

Motor

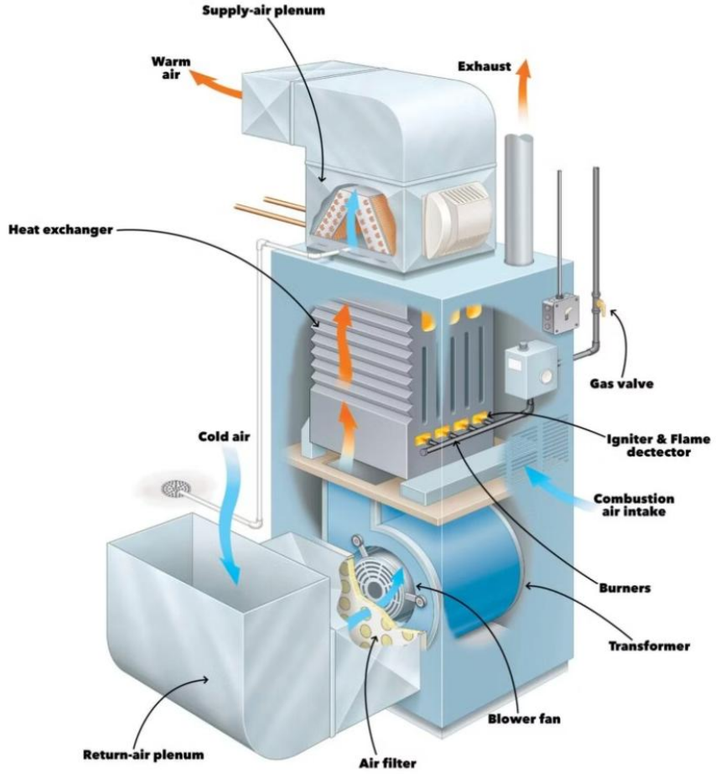
Turns a fan that pushes air in and around the combustion chamber, then pushes heated air into the room

Piezo Igniter Button

Uses pressure on a crystal igniter to induce a spark that ignites the burner

High Limit Switch

Temperature-actuated switch that shuts the burner down if the temperature rises above the setpoint



Additional Construction Heater Components

Air Switch

An air switch interlock ensures that there is sufficient combustion air to provide complete combustion. If the air is insufficient, the interlock switch shuts down the burner.

Tip-over Switch

Some construction heaters are equipped with a tip-over switch that stops the flow of gas when the heater is accidentally knocked over. When the heater is knocked over, simply stand it up again.

Before attempting to relight, make sure the tip-over switch is in an upright position held in a clip with leads coming from the bottom and that the leads are connected to adapter leads.

Tip-over Switch Connections

Proper Positioning

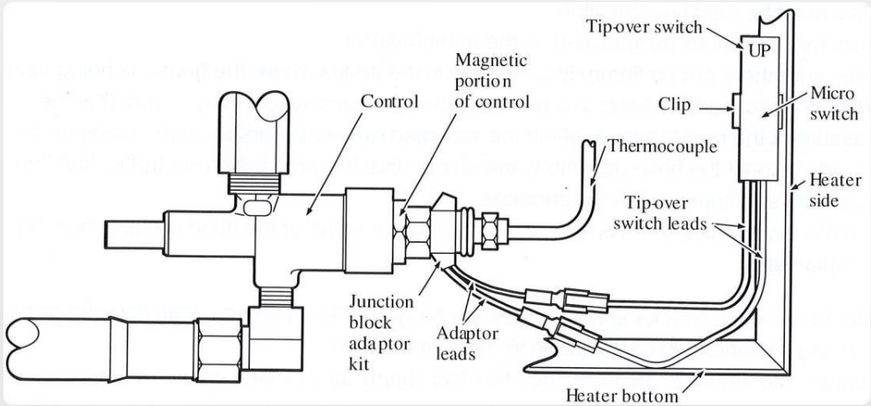
The tip-over switch must be in an upright position

Mounting

Must be held in a clip with leads coming from the bottom

Connections

Leads must be connected to adapter leads as shown in Figure 1-30



The tip-over switch is an important safety feature that prevents gas flow when the heater is not in its proper upright position.

Code Requirements for Construction Heaters

Connection Standard

The heater must be connected in accordance with CSA B149.1

Location Requirements

Must be located to minimize the danger of mechanical damage and upset, and be installed on a solid, level, and non-combustible base

Piping Requirements

Piping, tubing, hose, and fittings must be supported, secured, and protected from damage and strain

Hose Maintenance

If and when the hose or hose connector shows signs of wear, it should be replaced immediately

Clearance Requirements

Combustible material such as straw, canvas, wood, and debris should be kept clear from the heater, in accordance with the clearance requirements on the rating plate

Ventilation for Construction Heaters

Adequate Ventilation

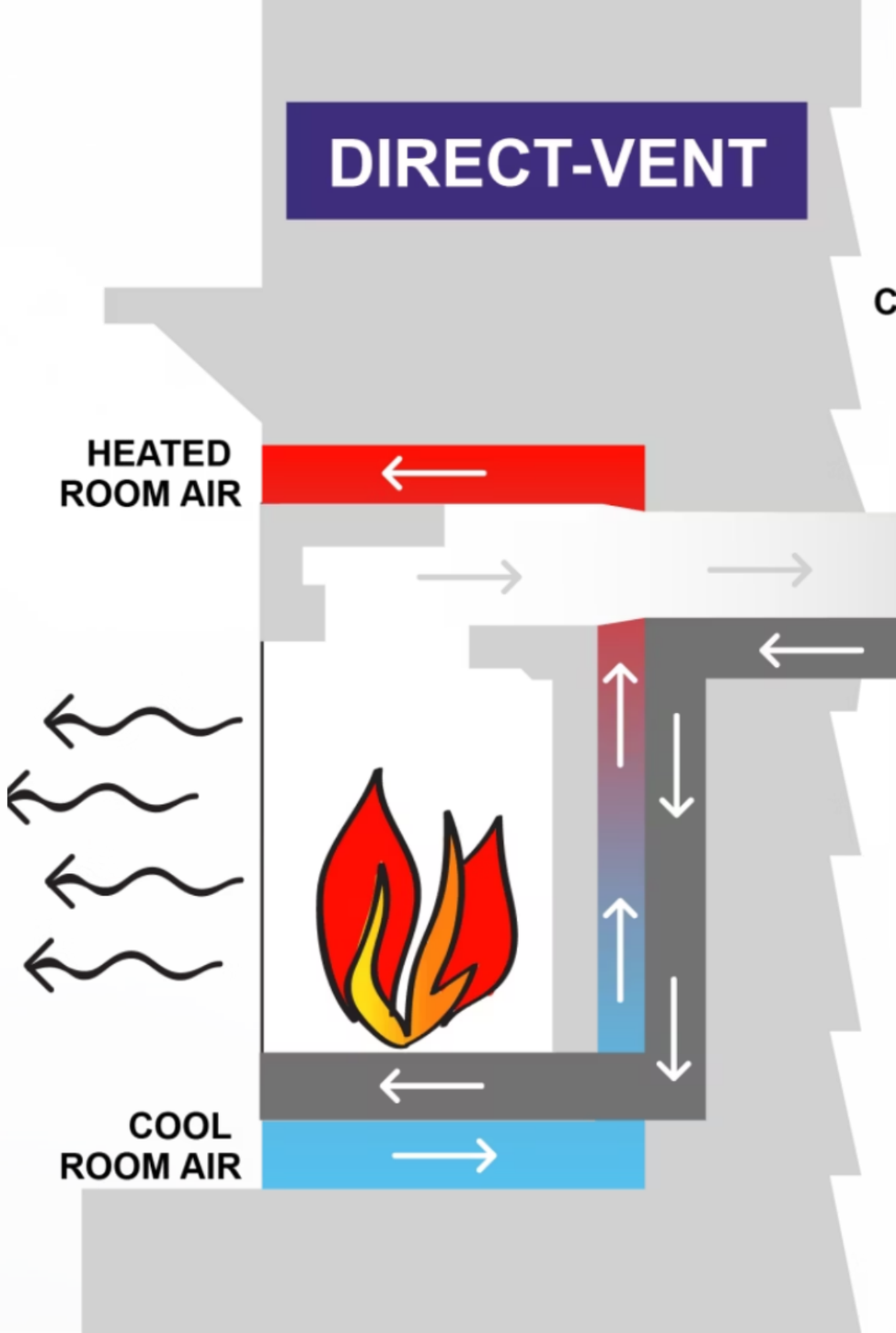
Since products of combustion are vented into the area being heated, it is imperative that adequate ventilation be provided

Unobstructed Flow

The flow of supply air and combustion gases must not be obstructed in any way

No Ductwork

Do not use the heater with ductwork as this will restrict the flow of supply air



Construction Heater Installation Steps

Positioning

Install the heater in a horizontal position at least 6 ft (2 m) from any LP gas container

Gas Connection

If operating on natural gas from a building branch line, a 1/4 turn manual shut-off valve must be readily accessible

Clearances

Allow for clearances as specified by the manufacturer

Environment Check

Make sure there are no flammable vapors in the space where the heater is being used

Gas Pressure and Hose Inspection

Pressure Requirements

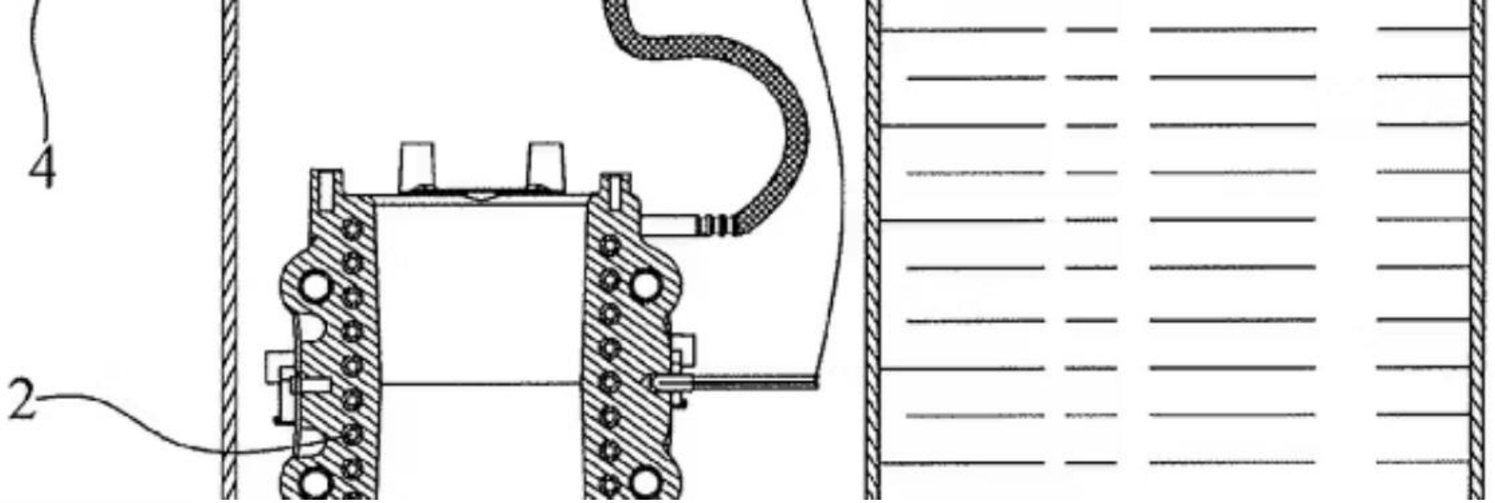
When connecting the heater to a natural gas or propane supply line, ensure that the pressure at the heater inlet is within the specified range as marked on the rating plate.

Hose Inspection

Visually inspect the hose assembly and ensure that it is protected from traffic, building materials, and contact with hot surfaces.

If it is evident that there is excessive abrasion or wear, or the hose is cut, it must be replaced.

After installation, check the hose assembly for gas leaks by using a leak detector or by applying a water and soap solution to each connection.



Electrical Connection and Placement

1 **Electrical Supply**

Connect the heater to an adequate electrical supply as specified on the rating plate

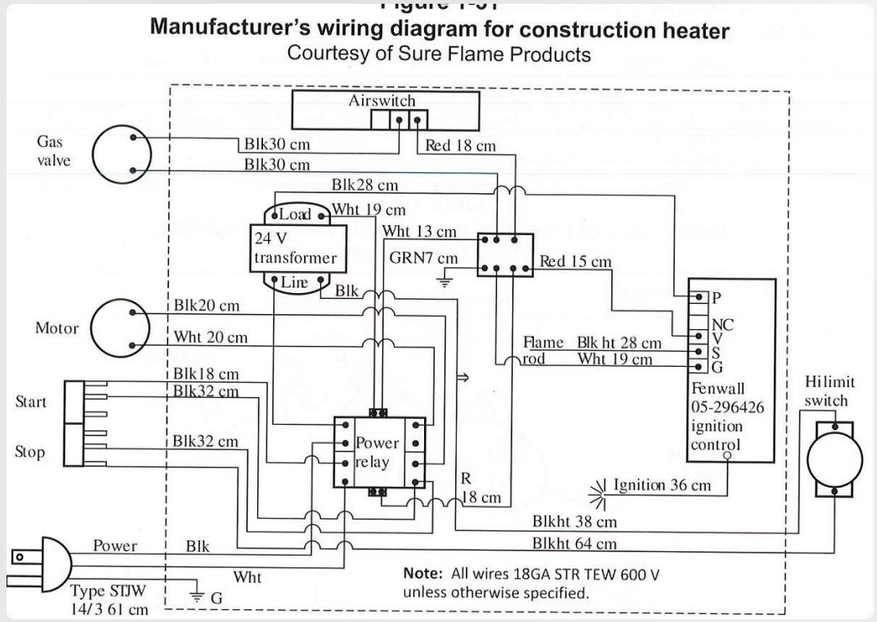
2 **Shock Protection**

For protection against shock hazard, the supply cord must be plugged directly into a properly grounded receptacle

3 **Water Protection**

In all applications, install the heater in such manner that it is not directly exposed to water spray, rain, and/or dripping water

Construction Heater Wiring Diagram



Manufacturer's wiring diagram for construction heater
Courtesy of Sure Flame Products

Manufacturer's Diagram

Figure 1-31 shows a typical manufacturer's wiring diagram used in the installation of a construction heater

Installation Reference

This diagram provides essential information for proper electrical connections during installation

Troubleshooting Aid

The wiring diagram is also valuable for diagnosing electrical issues during maintenance and repair

Propane Cylinder Selection

Fuel Type Selection

The majority of construction heaters are designed to be used with propane cylinders, though some are designed to operate on either natural gas or propane

Gas Selector Valve

After making the appropriate connections, make sure the gas selector valve (if provided) is turned to the correct gas before lighting

Vapor Withdrawal

Arrange the propane supply system to provide for vapor withdrawal from the operating container

Liquid Propane Warning

Supplying liquid propane to the heater is dangerous and will damage the components

Propane Cylinder Capacity

Size and Capacity

Ensure that the size and capacity of the propane supply container can provide the rated Btu/h for the surrounding temperature

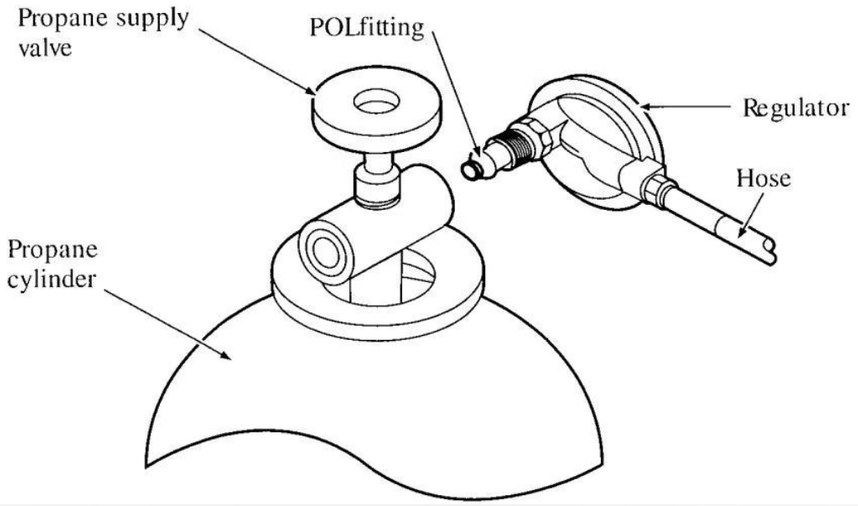
Regulator Requirements

Connect the POL fitting on the hose/regulator assembly and use the manufacturer's supplied or recommended regulator

Regulator Positioning

Position the regulator so that the hose leaving the regulator is horizontal, placing the regulator vent in the proper position to protect it from the weather

Figure 1-32
Installation of regulator assembly to propane cylinder
Courtesy of DESA Industries of Canada Inc.



Propane Connection Procedure

POL Fitting Connection

Turn the POL fitting counterclockwise into the threads on the cylinder and tighten firmly using a wrench

Hose Connection

Connect the hose to the inlet connector on the heater and tighten firmly using a wrench

Gas Supply Valve

Open the propane supply valve slowly and check all connections for leaks with a leak detector or soap solution

Valve Closure

Close the propane supply valve at the container when the heater is not in use

Note: The propane cylinder should always be kept in an upright position to prevent liquid propane from flowing to the heater.

Radiant Construction Heaters

Figure 1-33
Natural gas radiant construction heater
Courtesy of Space-Ray

Benefits of Infrared Heat

- Minimizes moisture buildup within the building under construction
- Aids in drying out new building materials and concrete

Heating Capacity

Figure 1-33 shows an infrared construction heater that radiates 250,000 Btu/h at 360-degrees heat over a 5,000-square-foot area.

These heaters are popular with construction rental companies due to their efficiency and the convenience of a consistent fuel supply.

Natural Gas Models for Construction

Temporary Installation

These heaters can be disconnected when construction is finalized

Permanent Connection

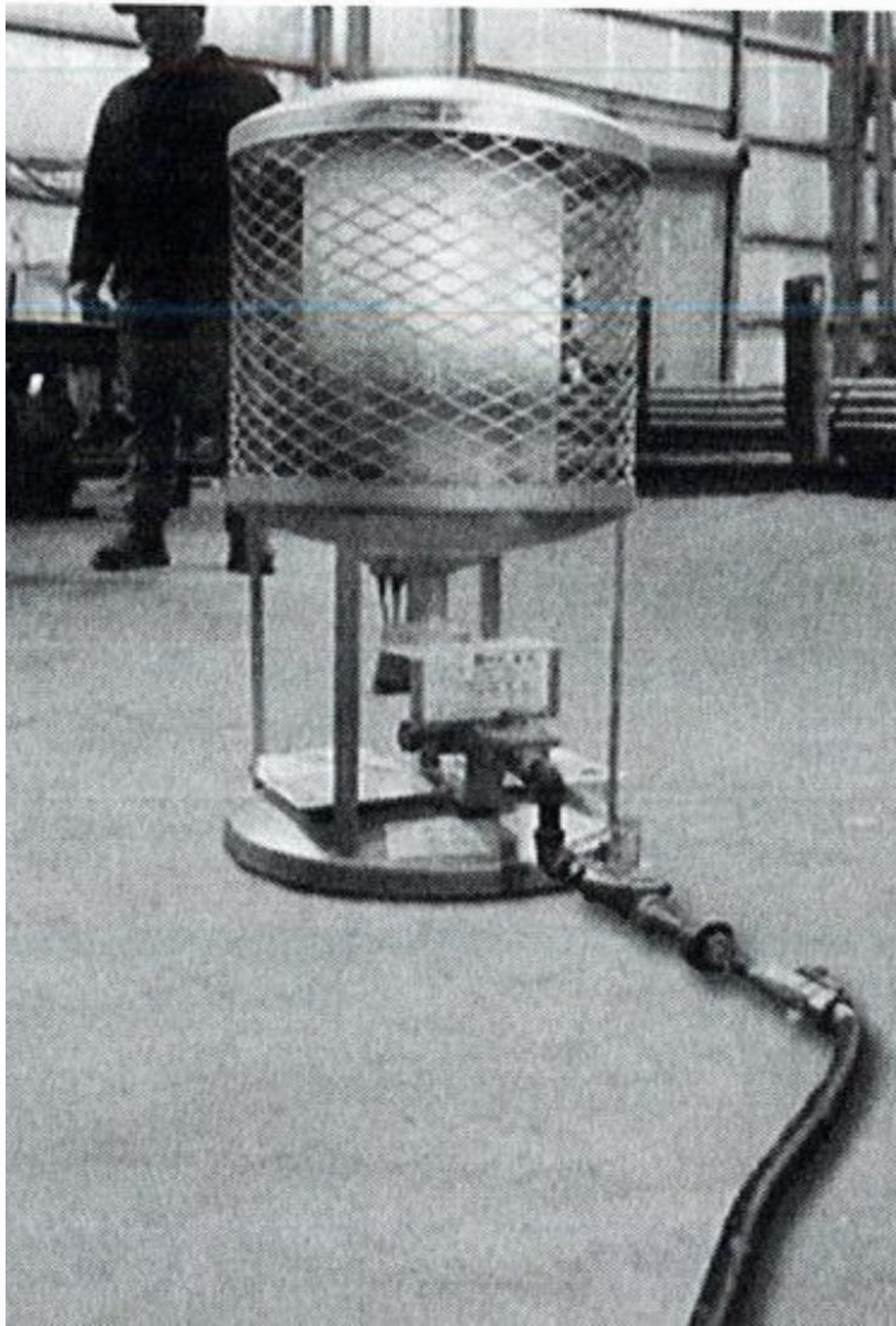
The furnace can then be connected to the meter supply

Utility Procedures

Gas utilities have policies and procedures in place for the connection and activation of these heaters and the coordination of meter activation

Familiarization

You should familiarize yourself with the procedures set by the utility in your area



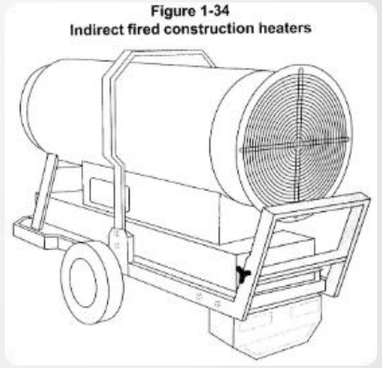


Figure 1-34
Indirect fired construction heaters

Indirect Fired Construction Heaters

Applications

Used for applications that call for clean air, free from moisture and contaminated fumes

Fuel Options

Available as dual fuel heaters that will operate on propane and natural gas

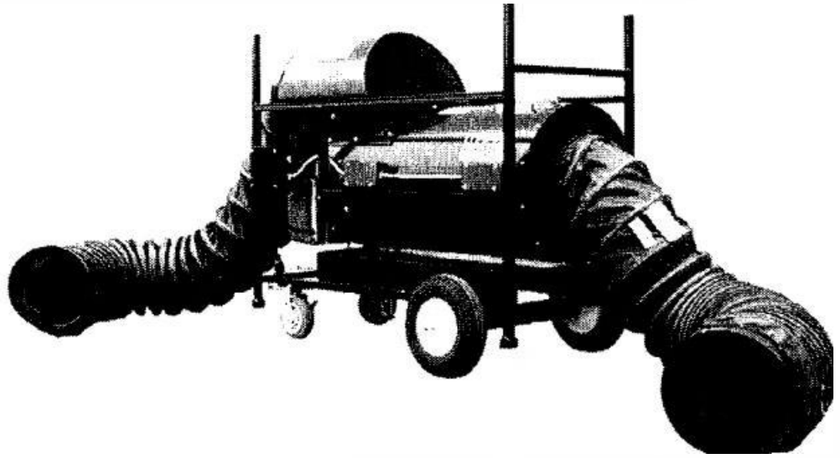
Fuel Selection

To change fuels, a selector valve must be turned to the proper position and the safety lock engaged

Size Range

Units come in a range of sizes, from smaller units of approximately 400,000 Btu/h up to much larger skid mounted units with millions of Btu/h capacity

Ducting for Construction Heaters



Flexible Ducting

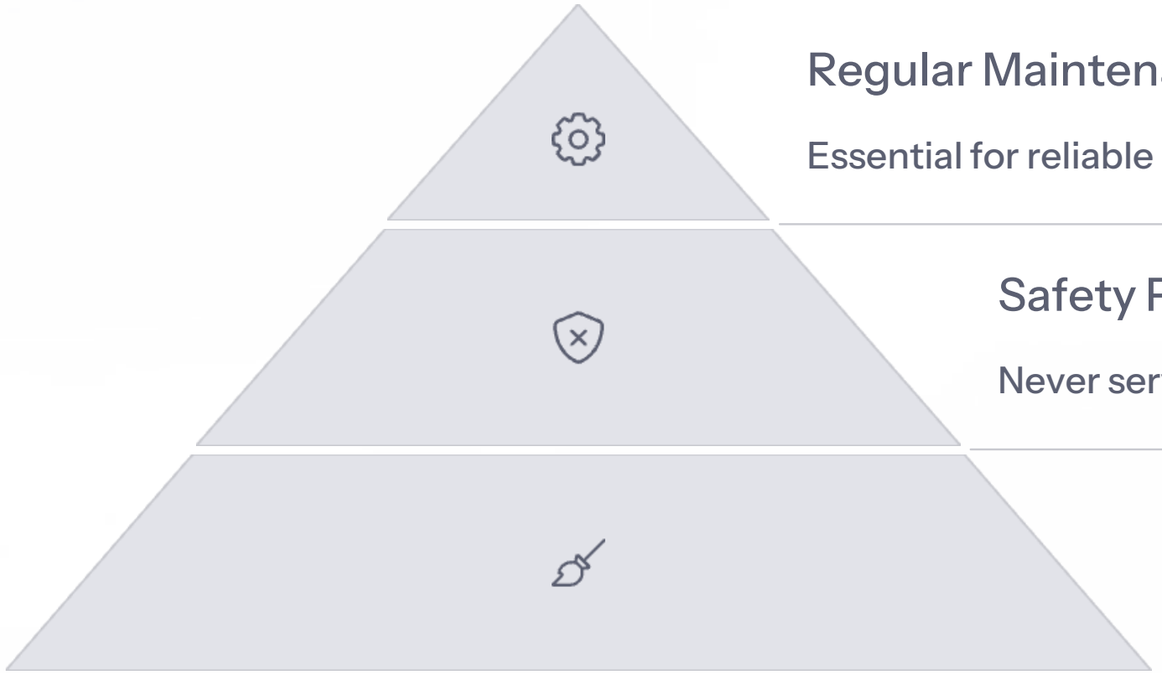
Flexible ducting is used to bring the warm air into the building and may also be used for some applications to return air to the heater.

Figure 1-35 shows a construction heater ducted for supply and return.

Venting Requirements

The vent outlet pipe will require a minimum of 2 ft vertical flue pipe, and indoor installations will require adherence to the maximum length limitations specified by the manufacturer.

Construction Heater Maintenance Overview



Regular Maintenance

Essential for reliable performance

Safety Precautions

Never service while connected or hot

Basic Cleaning

Keep the heater clean and inspect regularly

Construction heaters are built to withstand the rigours of operation on construction sites, for mining applications, and in a multitude of other locations where heaters are used. To maintain reliable performance, it is necessary to do a certain amount of preventive maintenance.

Caution! Never service a heater while it is plugged in, connected to the gas supply, operating or hot. Severe burns and electrical shock can occur.

Basic Maintenance Tasks

1 Cleaning

Keep the heater clean; if dirty, clean it with a damp cloth and use household cleaners on difficult spots

2 Regular Inspection

Inspect the heater before each use

3 Component Checks

Visually check cords and connectors, wiring and conduit, heater shell, and control box

4 Hose Assembly

Inspect the hose/regulator assembly before each use

5 Interior Cleaning

Keep the inside of the heater free from combustibles and foreign objects; remove the motor and other internal parts if necessary to clean inside the heater

6 Fan Maintenance

Clean the fan blades each season or as needed

Extensive Maintenance Procedures

Compressed Air Cleaning

Blow compressed air on the outside of the unit, along the burner face, and through the venturi from the control end

Component Cleaning

Clean the orifice, thermocouple lead, flame rod and insulator, and spark plug

Control Box Maintenance

Clean the inside of the control box using a dry cloth or by blowing compressed air; do not use any liquid or aerosol spray cleaners

Motor Maintenance

Check the motor and oil if required, check the tightness of the set screw on the fan motor, and run the heater to check for fan vibration

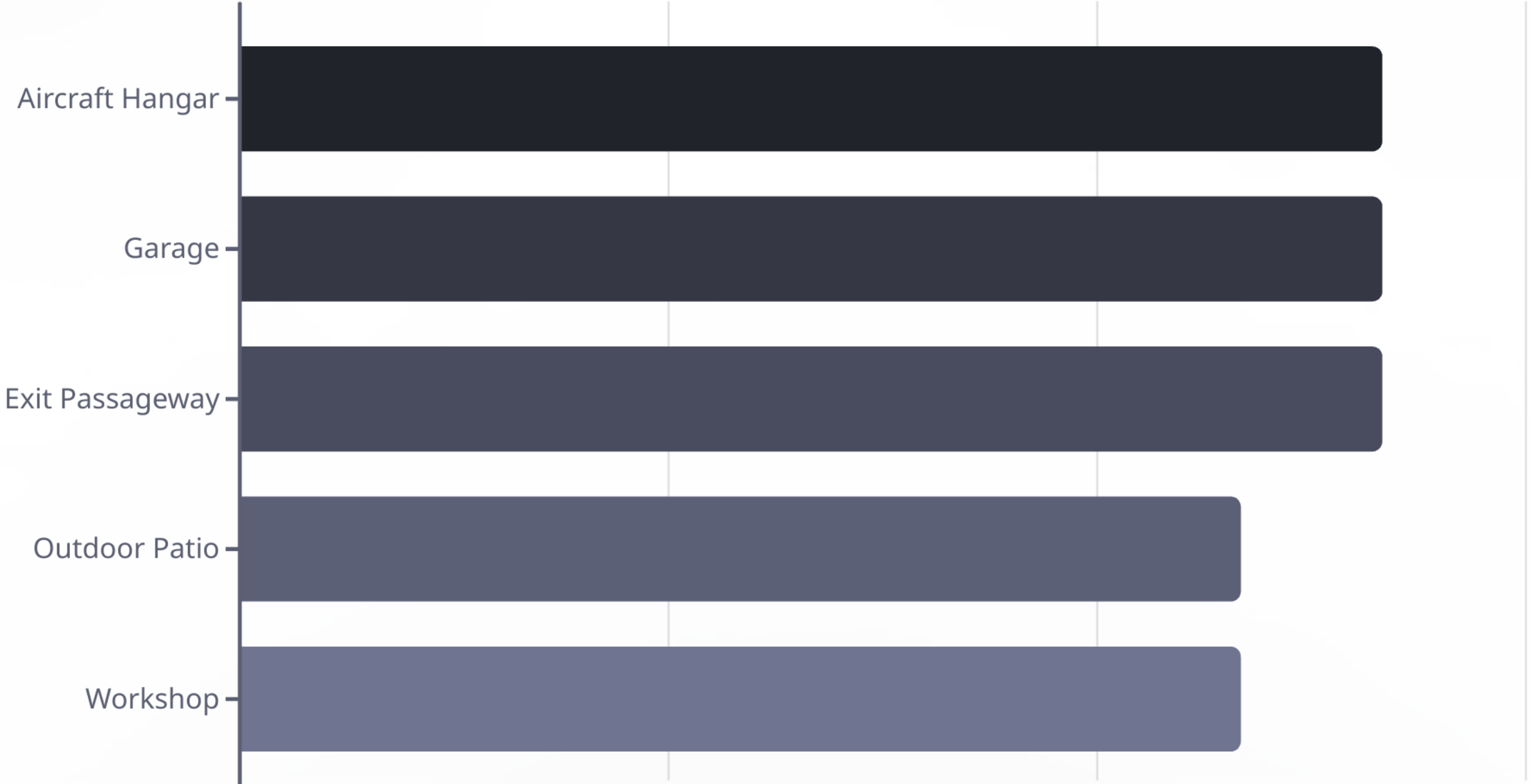
Anticipator Settings for Multiple Heaters

1	2	3
Single Heater	Two Heaters	Three Heaters
Anticipator setting of 0.35	Anticipator setting of 0.7	Anticipator setting of 1.05

When installing multiple heaters controlled by a single thermostat, it's important to adjust the anticipator setting according to the number of heaters in the system to ensure proper cycling and temperature control.

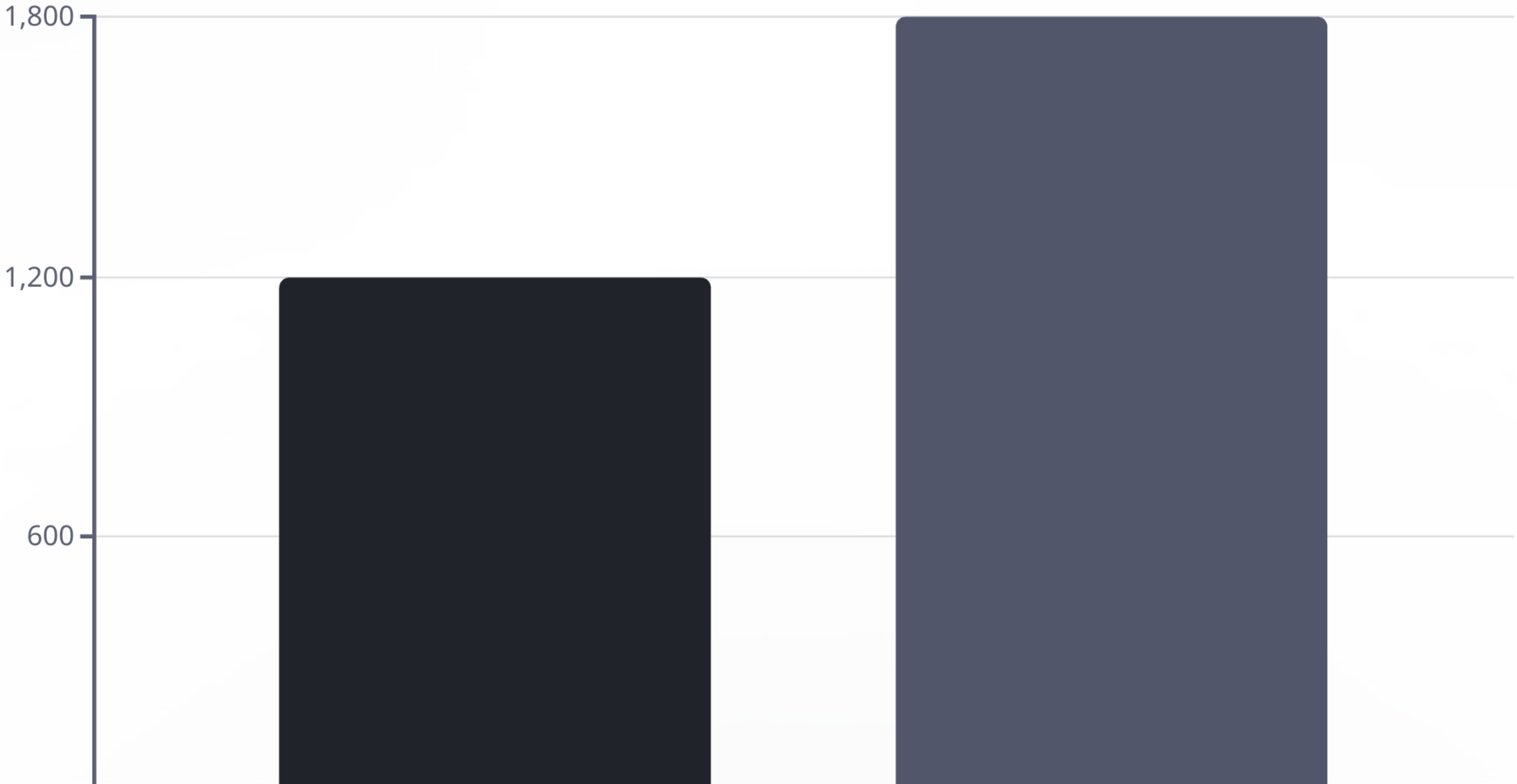
Infrared Heater Applications

Infrared Heater Mounting Heights

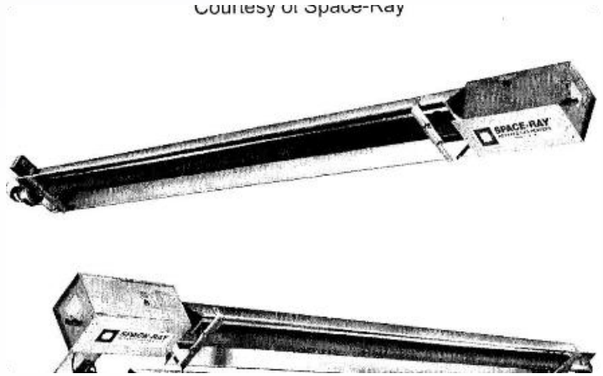


Ventilation Requirements for Infrared Heaters

Infrared Heater Surface Temperatures

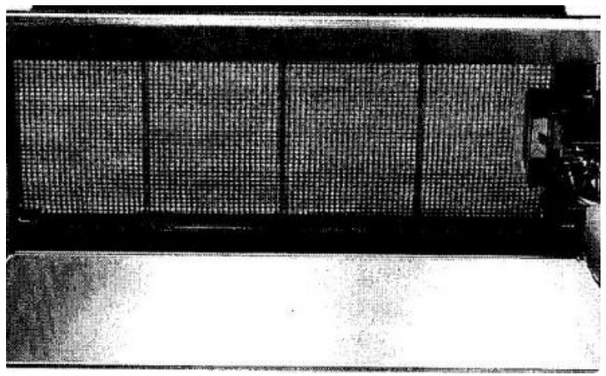


Types of Infrared Heaters



Low-Intensity Tube Heater

Features a radiant tube with reflector that directs infrared heat downward. Used in commercial buildings and factories.



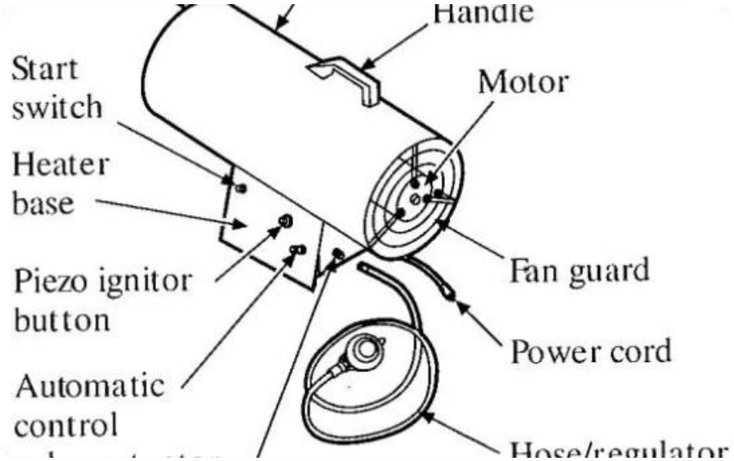
High-Intensity Ceramic Heater

Uses porous ceramic or metallic screen with direct flame heating. Surface temperatures reach up to 1800°F (980°C).

Parasol Heater

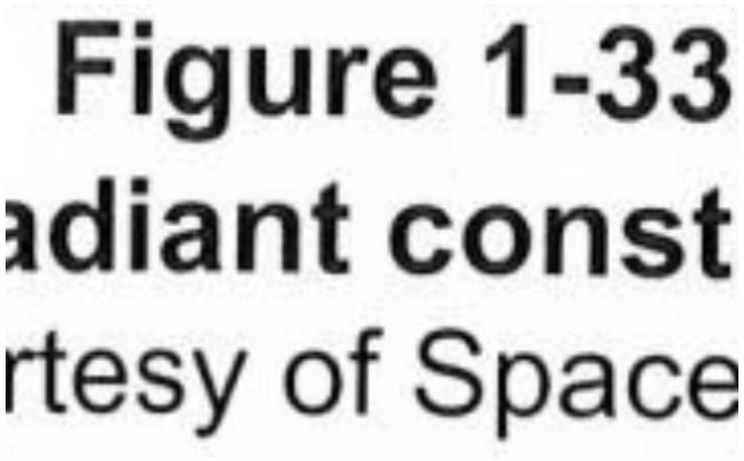
Designed specifically for patio areas with a cylindrical radiant emitter mesh. Available in freestanding or suspended configurations.

Construction Heater Types



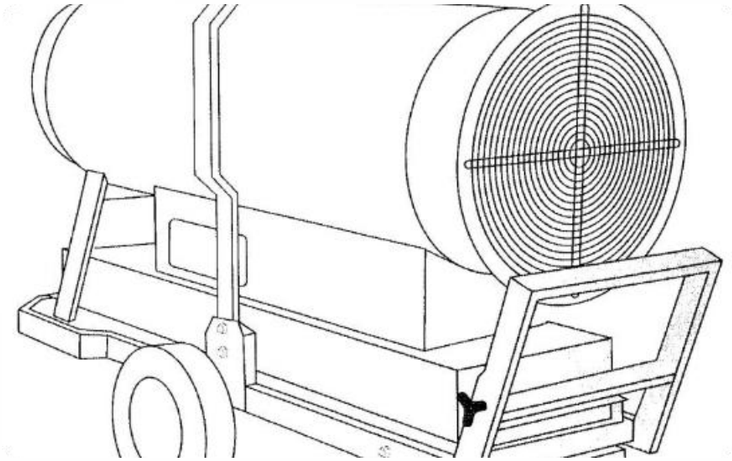
Direct-Fired Construction Heater

Products of combustion are vented into the area being heated. Requires adequate ventilation.



Radiant Construction Heater

Provides 360-degree radiant heat. Helps minimize moisture buildup and aids in drying building materials.



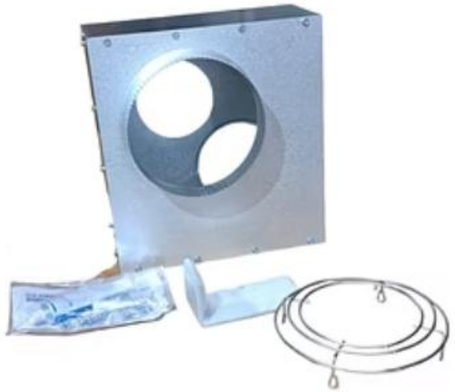
Indirect-Fired Construction Heater

Provides clean air free from moisture and contaminants. Available as dual fuel units operating on propane or natural gas.

Heater Maintenance Comparison

Maintenance Task	Low-Intensity Infrared	High-Intensity Infrared	Construction Heater
Cleaning Frequency	Before each heating season	Once per year in normal conditions	Before each use
Burner Cleaning	Remove carbon/scale with wire brush	Clean with compressed air (below 20 psi)	Blow with compressed air
Fan/Blower	Clean with compressed air or vacuum	Not applicable	Clean each season or as needed
Reflector	Wipe with damp cloth	Clean with soft cloth and mild soap	Not applicable

Venting Options for Infrared Heaters



Infrared heaters may be vented in one of three ways: unvented (with adequate ventilation), horizontal, or vertical. The chosen method depends on factors including building ventilation, available access points in walls and ceilings, number of burners installed, and installation codes.

Horizontal Venting Requirements

3

Minimum Height

Vent terminal must be at least 3 ft above grade

3

Building Opening Clearance

Vent terminal must be at least 3 ft from any building opening

6

Combustion Air Separation

Vent must be at least 6 ft from combustion air opening of this unit or any other appliance

When installing horizontal venting for infrared heaters, these minimum clearances must be maintained. Additionally, in combustible or non-combustible walls, an insulated vent terminal must be used, and the vent terminal should be installed at a height sufficient to prevent blockage by snow.

Vertical Venting Requirements

Vent Type

Type B vent minimum for outdoor use

Thimble Requirement

Insulating thimble for combustible structures

Common Vent Control

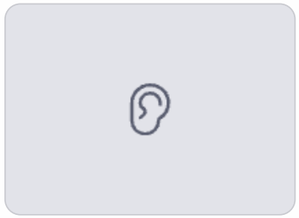
Shared thermostat for common vent

Horizontal Run Limitation

Maximum 75% of vertical vent height

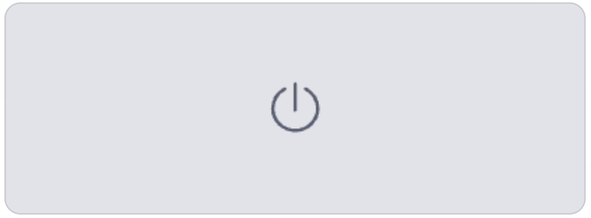
For vertical venting installations, these requirements must be followed to ensure proper and safe operation. The open area of a common vent must equal the sum of the open areas of individual vents connected to it, and connections must be positioned to avoid direct opposition between streams of combustion gases.

Troubleshooting Flash Back in High-Intensity Heaters



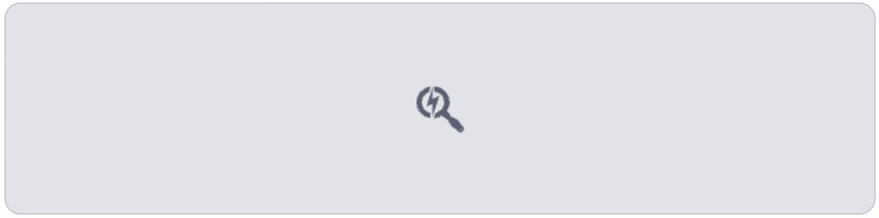
Identify the Problem

Flash back produces a loud ignition noise followed by a hissing sound with no visible burning on the ceramic tile



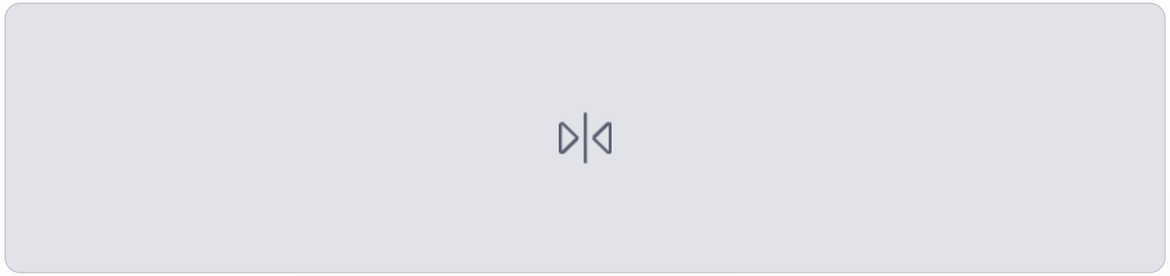
Immediate Action

Turn off the heater immediately if flash back occurs during operation



Check for Causes

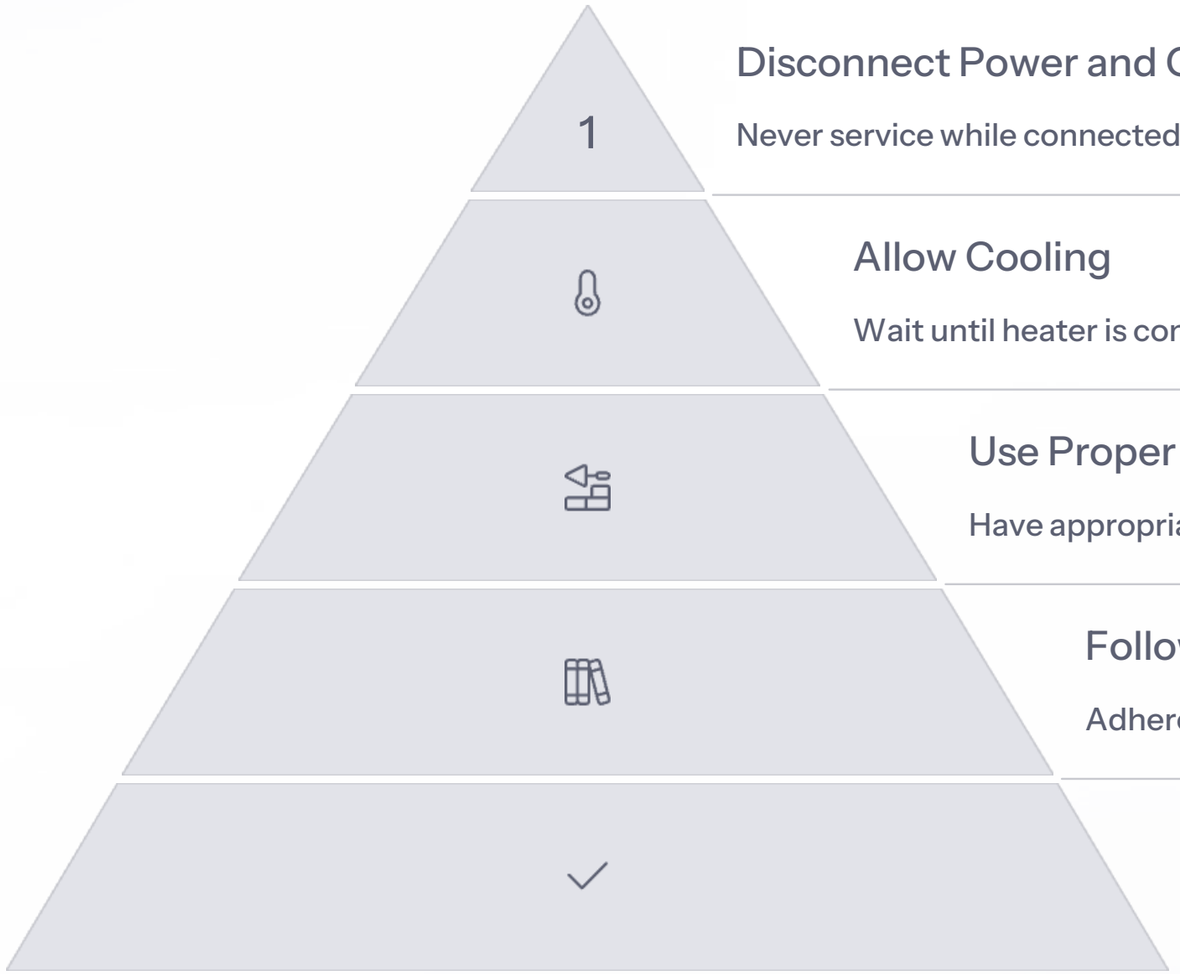
Inspect for improper pressure, broken ceramic tiles, or faulty sealing



Take Corrective Action

Adjust pressure, replace broken tiles, or contact distributor for gasket issues

Safety Precautions for Heater Maintenance



Disconnect Power and Gas

Never service while connected

Allow Cooling

Wait until heater is completely cool

Use Proper Tools

Have appropriate equipment ready

Follow Instructions

Adhere to manufacturer guidelines

Verify Operation

Test after maintenance is complete

Caution! Never service a heater while it is plugged in, connected to the gas supply, operating, or hot. Severe burns and electrical shock can occur. Always follow the manufacturer's maintenance procedures and safety guidelines to ensure safe and effective operation of the heater.

CSA Unit 21

Chapter 2 Gas Fireplaces: Types, Venting, and Controls

Gas fireplaces are popular additions to homes, providing both ambience and supplemental heating. This presentation explores the different types of gas fireplaces, their venting requirements, control systems, and installation considerations to ensure safe and efficient operation.

Purpose of Gas Fireplaces

Decorative Gas Fireplaces

Typically not designed for efficiency or intended for use as heaters

Used to add atmosphere and ambience to a room

Will not have a thermostat

Heating Gas Fireplaces

Also known as vented gas fireplace heaters

Have higher efficiency ratings

Include additional temperature controls

Designed to provide supplemental zone heating

Important Safety Considerations

Certification

Check that the gas fireplace is certified by the CSA Group or other certifying agency

Follow Instructions

Read all product specifications and instructions to ensure maximum benefits and safety

Vent-Free Caution

Vent-free gas fireplaces are not approved for use in Canada due to serious indoor air-quality and moisture problems

Code Compliance

Gas fireplaces must be installed according to CSA B149.1, national and provincial building codes, and electrical codes

Energy Efficiency Considerations

EnerGuide Rating

The EnerGuide label displays the model's Fireplace Efficiency (FE) as a percentage

Models on the market have FE's ranging from 30% to 70%

Heating Efficiency

An efficient gas fireplace can lower a home's overall energy consumption when located in a major living area

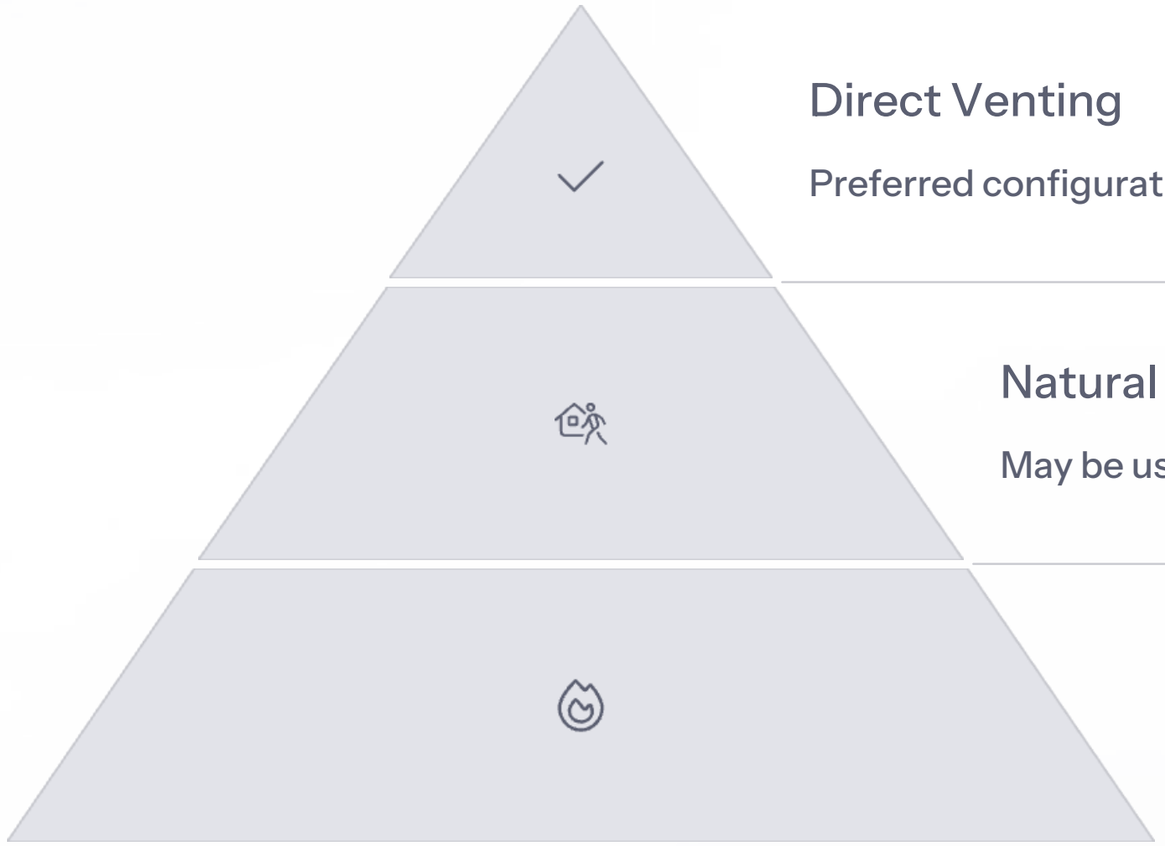
Heating gas fireplaces must have a minimum FE of 50% as per CAN/CSA P.4.1

Primary vs. Secondary Heat

In a large space with multiple rooms, a gas fireplace is not an efficient primary heating source

An energy-efficient furnace is usually a better choice for primary heating

Venting Requirements



Direct Venting

Preferred configuration for all modern gas fireplaces

Natural Draft

May be used for replacement of existing natural draft vented gas fireplaces

Fireplace Inserts

May be installed in masonry chimney with manufacturer's recommended flue liner

For safety reasons, direct venting is the preferred configuration for all modern gas fireplaces. This system provides a sealed combustion chamber that draws air from outside and vents exhaust gases directly outdoors. Natural draft gas fireplaces may be used for replacement of existing natural draft vented gas fireplaces, but are not recommended for new installations.

Masonry Chimney Considerations

Do

- Inspect the masonry chimney before installing the unit
- Make sure the chimney's clay flue liner is not cracked, soft, or spalled
- Ensure mortar joints between liner sections are in place and tight
- Clean creosote from the top, sides, and back of a masonry firebox
- Check whether local codes require the fireplace damper to be clamped open or removed

Do Not

- Share a gas-fired appliance flue with a wood-burning appliance
- Allow products of combustion from a decorative fireplace to enter an existing masonry chimney without proper modifications
- Install in a chimney vulnerable to flue gas condensation and inadequate draft

Installation Requirements

Bathroom Installation

Gas fireplace installations in a bathroom are only allowed if it is a direct-vent type

Bedroom Installation

Installation in a bedroom or bed-sitting room is only permitted if the appliance rating plate states "also certified for installation in a bedroom or bed-sitting room"

Certification

Must conform to both Clause 7.24 and 7.25 of CSA B149.1

Clearances

Must maintain proper clearances from combustible materials as specified by manufacturer

Flame Characteristics

Traditional Design

Originally, gas fireplaces were not designed to produce an efficient flame, but rather to emulate a wood fire

The primary concern was to have flame characteristics that are tall, yellow, and flickering

Modern Options

With added convenience, cleanliness, and increased efficiency, gas fireplaces have become very popular

There are now many different flame styles available to suit the user's taste

Modern designs balance aesthetics with efficiency

Types of Burners: Tube Burner

Construction

The burner consists of a steel tube, closed at one end, and an air shutter at the other end

The tube may be a variety of configurations: straight, U-shaped, H-shaped, or S-shaped

Ports

Ports of different sizes are drilled or punched in the tube at different locations and in different patterns

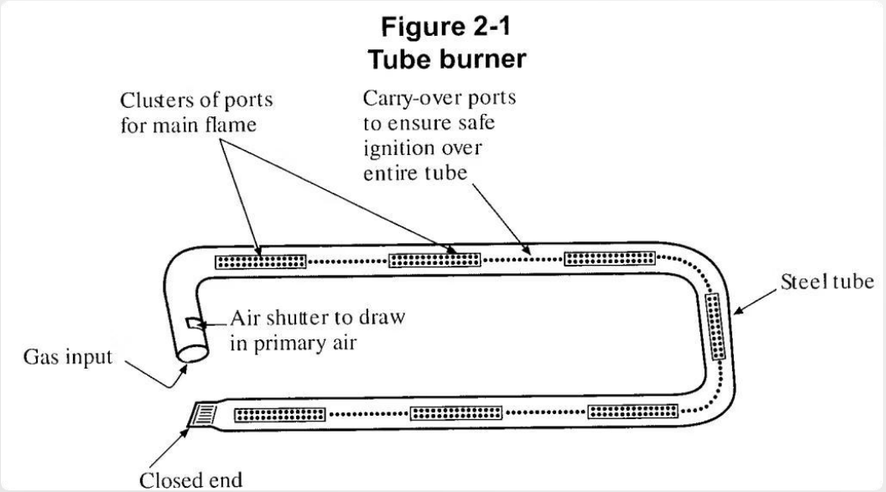
Clusters of larger ports are where the majority of the flame will be

Small, single rows of ports between the larger clusters are called carry-over ports

Air Shutter

The air shutter draws primary air into the burner and mixes it with the gas

Manufacturers adjust the air shutters to their proper position and usually fix that position



Types of Burners: Box Burner

Construction

Box burners are made of sheet metal that is slotted or punched to form ports and then bent into a box shape

Design Features

The holes and slots can be arranged to give a specific flame pattern

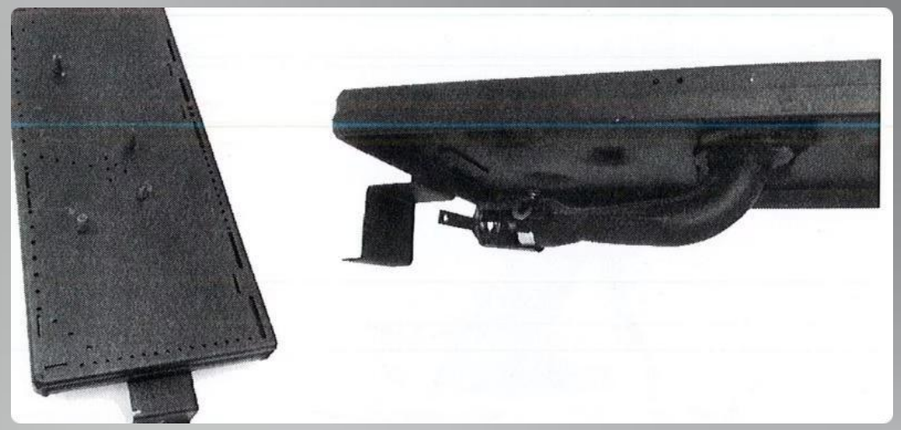
The burner may have pins on the top to help position the simulated logs

Gas-Tight Seams

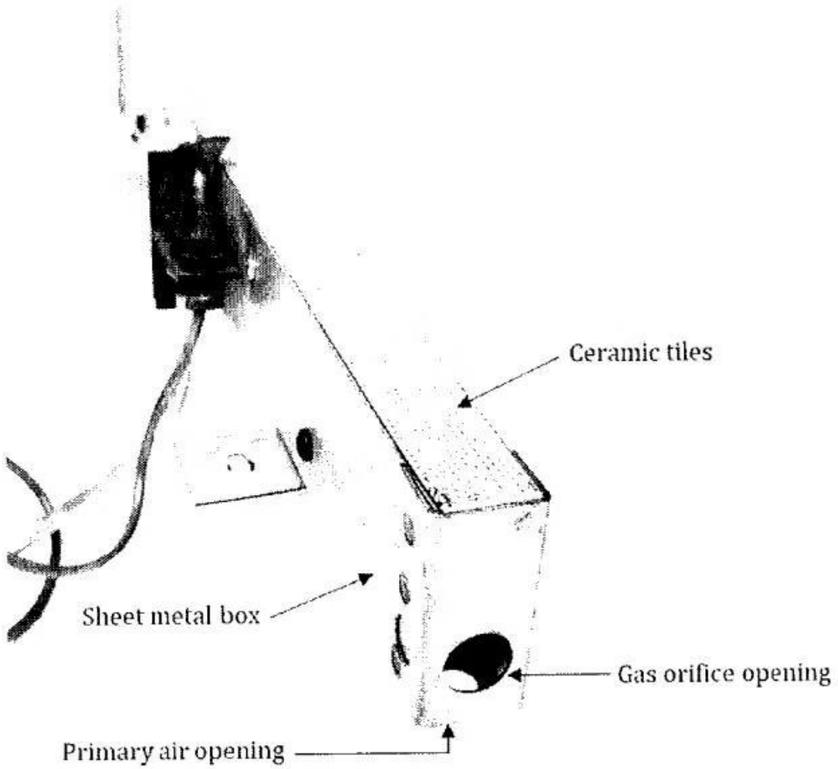
After it is bent into a box shape, the box seams are made to be gas-tight

Air Mixture

Like a tube burner, a box burner has an air shutter attached to it, or a separate venturi tube and air shutter can be connected to the box



Types of Burners: Ceramic Tile Burner



Construction

Ceramic tile burners consist of a ceramic tile mounted in a sheet metal box

The ceramic tile has many small ports arranged in a very uniform pattern

The box holds the ceramic tile and provides a space into which the gas and primary air mixture flow

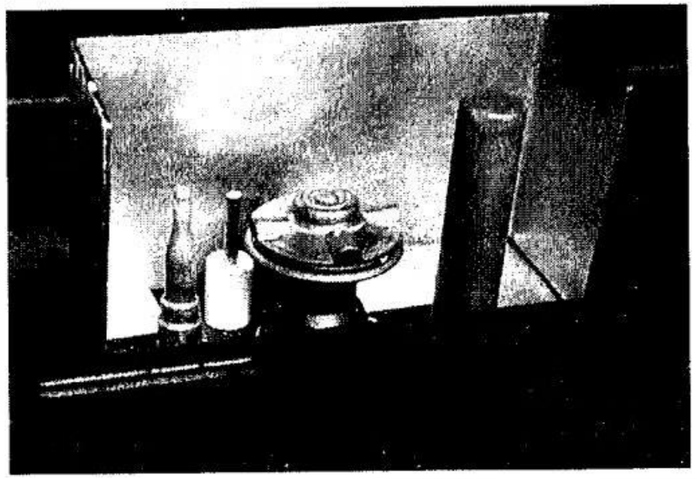
Key Differences

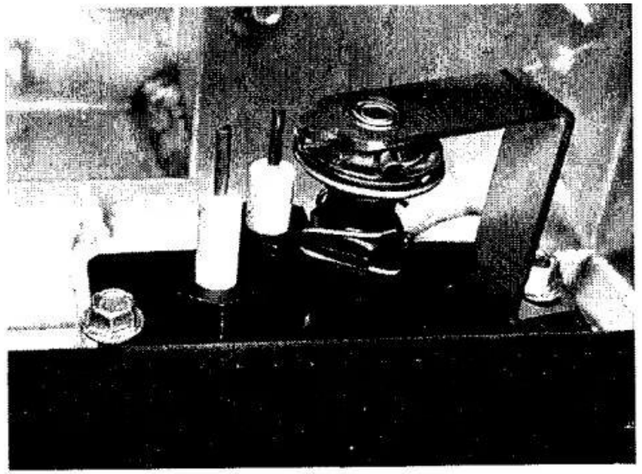
The ceramic tile is brittle and can crack

Bending or prying the ceramic burner can cause gas to leak around the ceramic tile

Gas leaks can change the flame appearance and could make the gas appliance unsafe to use

Pilot Burner Assemblies





Continuous Pilot

Also known as standing pilot

Energizes the millivolt control system

Can increase energy costs

Advantage of operating as an auxiliary heat source not dependent on electricity

Most provinces have adopted energy efficiency standards that ban the sale of continuous pilot fireplaces

Intermittent Pilot

Automatically ignited when the fireplace is called on to operate

Extinguished when the main burner operating cycle is complete

Modern electronic burner controls can operate on low DC voltage

Can use common dry cell batteries as backup or main power source

Provides the same auxiliary heat benefit as continuous pilot models

Types of Gas Fireplaces

Gas Fireplace Inserts

Convert existing wood-burning masonry or factory-built fireplaces to gas

Gas Log Sets

Strictly classified as decorative

Zero-Clearance Gas Fireplaces

Used in installations where there's no existing fireplace

Free-Standing Gas Fireplaces

Resemble wood-burning stoves and often referred to as gas stoves

Energy Efficiency Requirements

Efficiency Standards

Decorative gas fireplaces do not have a minimum efficiency requirement

Heating gas fireplaces must have a minimum FE of 50% as per CAN/CSA P.4.1

Venting Requirements

Must have a direct vent configuration, unless marked for replacement use only

Pilot Light Requirements

As of January 1, 2010, for new installations, gas fireplaces must have one of several pilot flame control mechanisms

Gas Log Sets

Design

A gas flame provided by a bar-type burner is placed under an arrangement of ceramic logs

As the flame plays over the logs, it is luminous due to the disturbance in flame pattern caused by the logs

Closely approximates a wood flame in appearance

Installation Requirements

Must be installed only in a vented, wood-burning fireplace with a working flue

Fireplace must be constructed of non-combustible material

The fireplace damper must be locked fully open when gas logs are installed

Limitations

Provide no real heat to the house

Can cause venting system problems, particularly in colder regions

Gas Log Maintenance

Inspect

Visually inspect the gas line and connections

Protect

Cover the pilot burner with a plastic bag to prevent material from falling into the burner and orifices

Clean

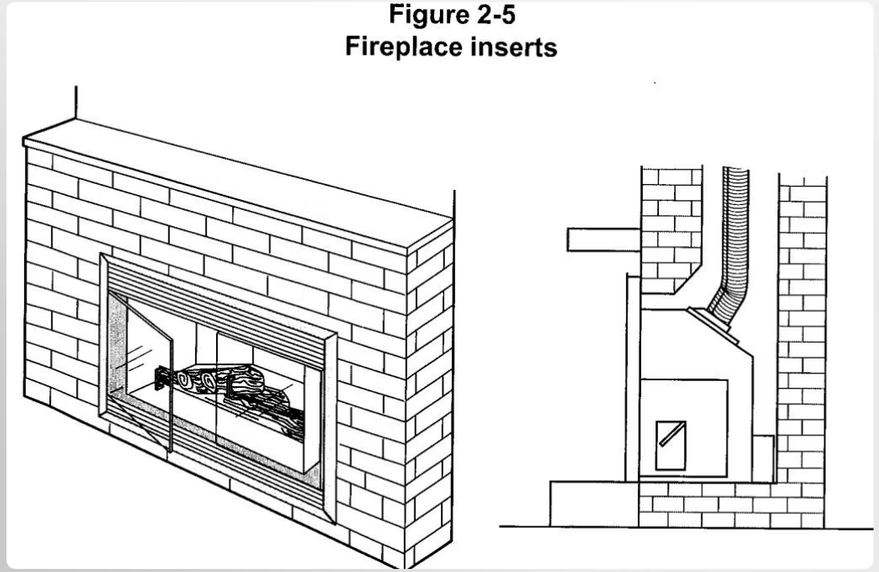
Clean the logs of soot deposits

Check

Check the pilot burner to make sure it is clear of obstructions

Caution! Do not handle logs until they have cooled.

Gas Fireplace Inserts



Purpose

Used to convert existing wood-burning masonry or factory-built fireplaces to gas

Once converted, the fireplace can no longer be used to burn solid fuel

Design

Gas burner and simulated logs are contained in a special metal housing (engine) that fits into the existing fireplace cavity

Some designs extend part of the heat exchange surface into the heating space for radiant heat

Caution

Do not insulate around the fireplace insert as it results in overheating and possible malfunction of the circulating fan

Combustion Air for Fireplace Inserts

Natural Draft Type

Designed to draw air in from the front and outer perimeters of the fireplace

This air provides:

- Combustion air
- Dilution air for proper venting
- Air heated over the heat exchanger

It is very important that an adequate air supply be available

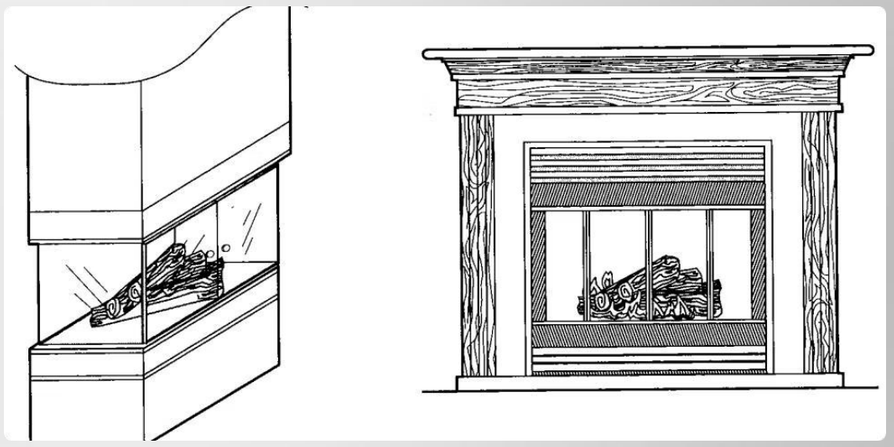
Direct-Vent Units

Preferred for new, tightly sealed and insulated homes

Have a dedicated combustion air supply duct from the outside

Provide better efficiency and safety

Required for installation in R-2000 homes



Zero-Clearance Gas Fireplaces

Application

Used in installations where there's no existing fireplace

Usually installed during construction of new homes or renovation of existing homes

Installation Flexibility

Can be built into a wall, a corner, a peninsula, or even an island in the home

Involves building the space and framing in the unit

Important Considerations

Manufacturer's instructions must be followed carefully

Ensure proper clearances from combustibles

Use only approved venting materials

Caution! The glass used with these fireplaces is a special, high-temperature, ceramic glass. If glass is damaged it should be replaced with a complete glass and frame assembly purchased from an authorized dealer. Substituting lower grade glass could cause injury or property damage.

Free-Standing Gas Fireplaces

Appearance

Typically resemble wood-burning stoves and therefore are often referred to as gas stoves

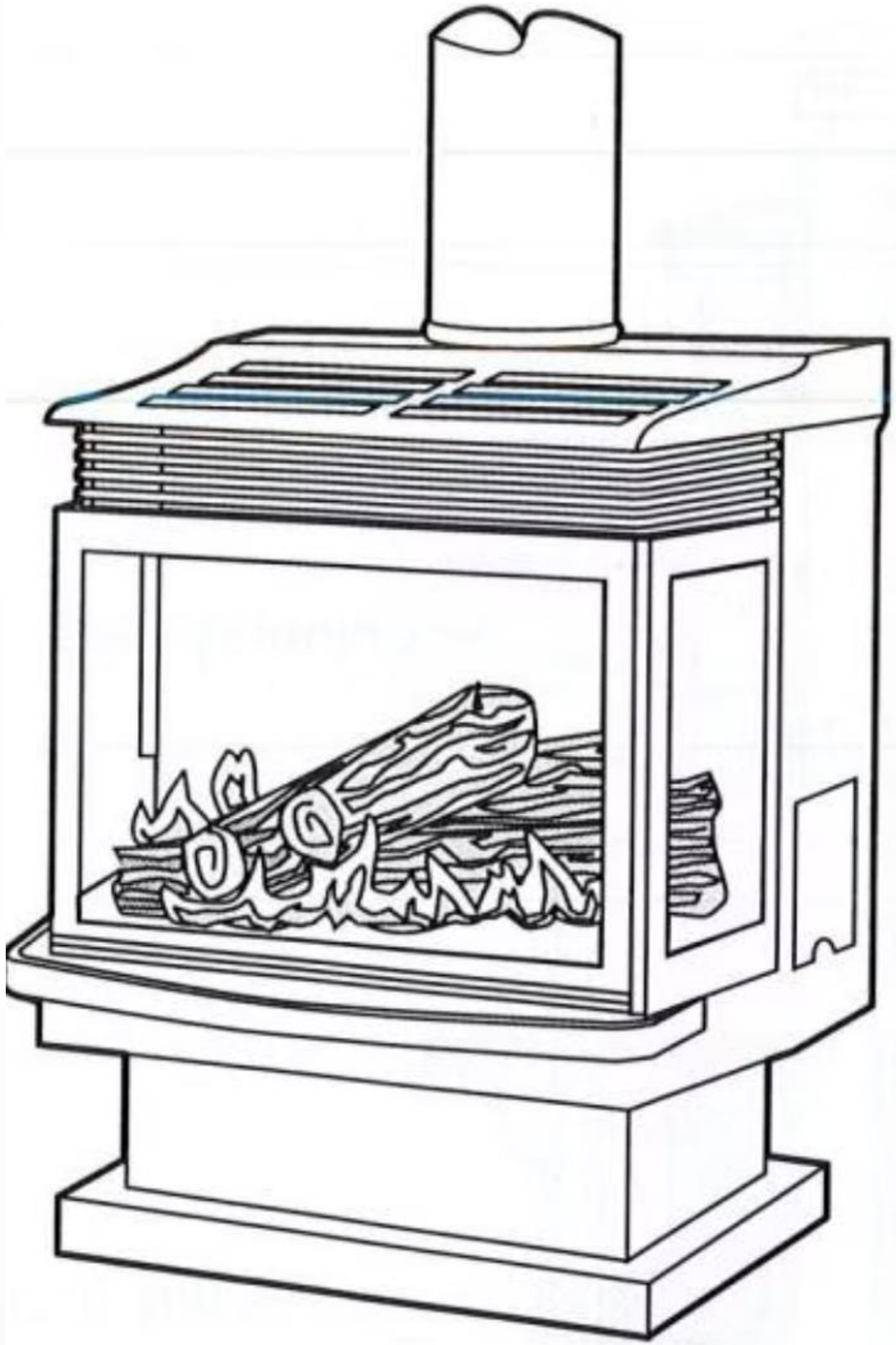
Heat Efficiency

Tend to be effective in supplying heat to the house, since all of the fireplace's surfaces are exposed to the room

Installation

Usually require no framing construction

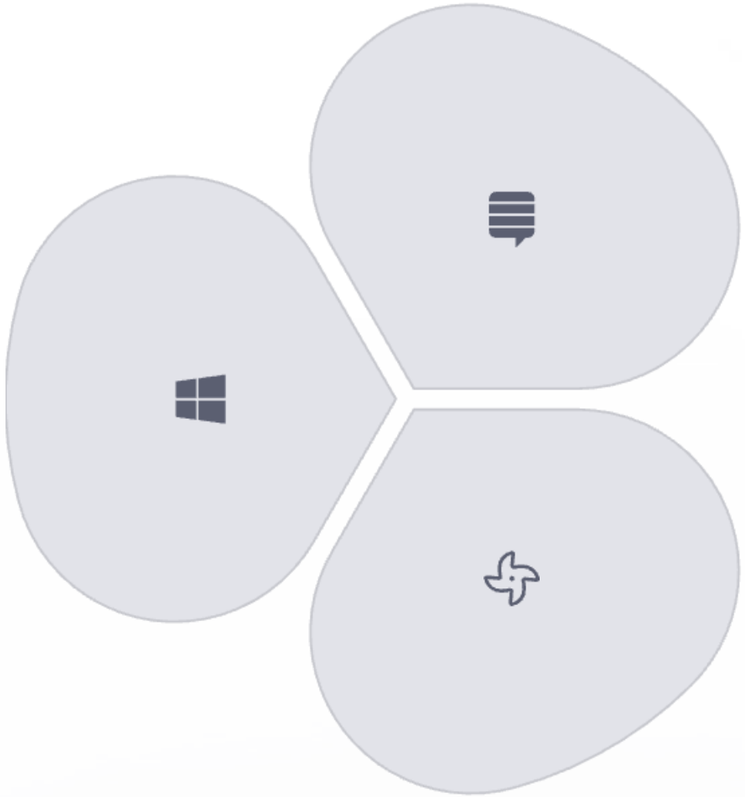
Some units may require the installation of insulating materials to protect combustible walls and floors from high temperatures



Venting Options for Gas Fireplaces

Natural Draft Venting

Uses a vertical chimney to take advantage of the fact that hot air rises



Direct Venting

Outdoor combustion air is drawn directly into the firebox through one pipe, while combustion products are exhausted through another

Power Venting

Uses an electrical fan to assist the venting process

Caution! Vent-free gas fireplaces offer no venting capacity. This means that harmful combustion by-products, including possible deadly carbon monoxide, are released directly into a home. These units are not only unacceptable and uncertified for Canadian housing, but they can be dangerous.

Natural Draft Venting

Operation

Uses a vertical chimney to take advantage of the fact that hot air rises

Creates a natural draft of hot combustion gases up the flue to the outdoors

Requires a draft hood that uses house air to isolate the burner from outside pressure fluctuations

Components

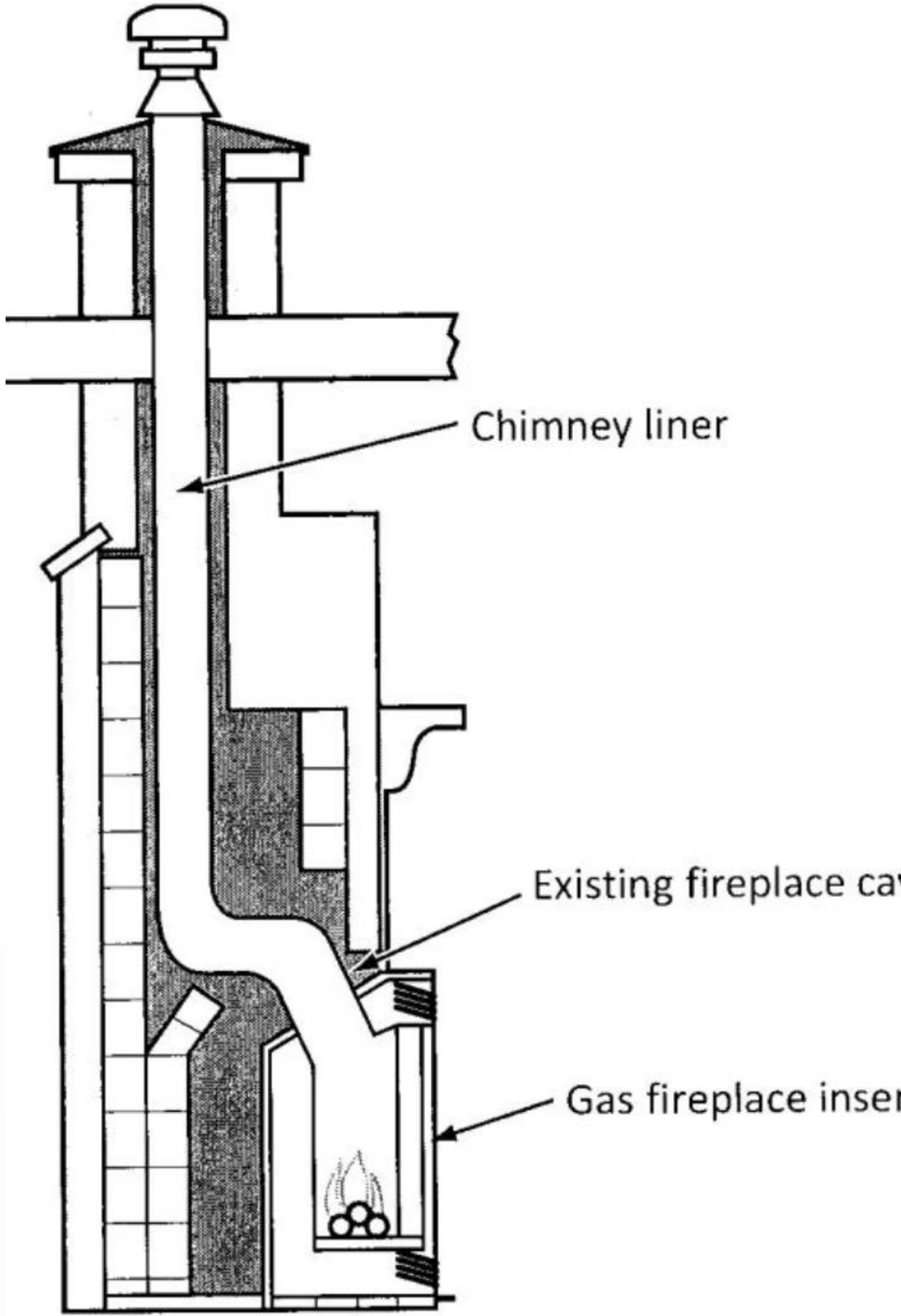
Typically uses a B-vent or, in an existing chimney, an approved metal liner

May include a B-vent or a flexible metal liner

Considerations

Less efficient than direct venting as it uses heated indoor air

Requires proper chimney height and draft



Natural Draft Venting Installation

1 Transition Hardware

Manufacturers supply the vent hardware to transition from the fireplace insert's flue collar through the existing fireplace damper

2 Relining System

Manufacturers may require or recommend a vent relining system for many existing fireplace vent systems

3 Code Compliance

The venting system must be installed in accordance with CSA B149.1

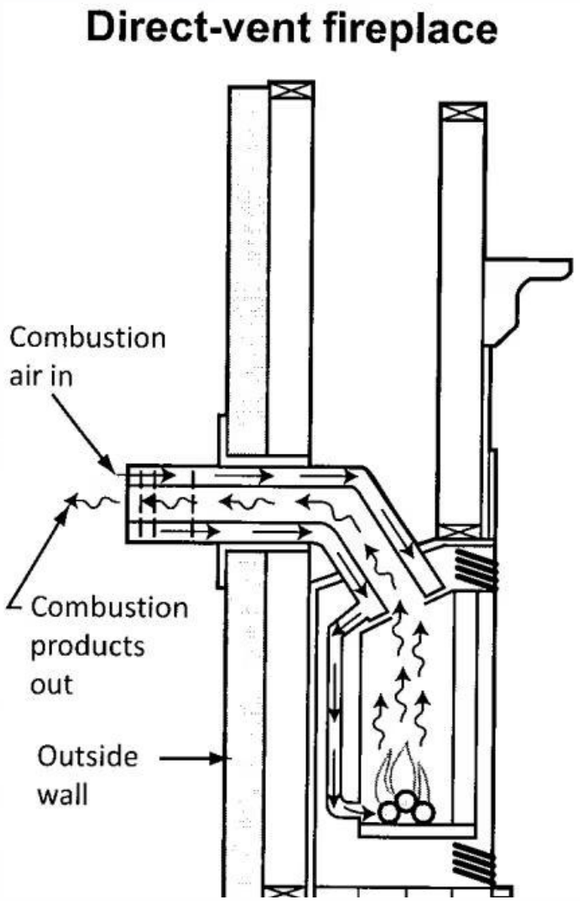
4 Clearances

Minimum clearances to combustible materials are 1 inch (2.5 cm) for B vents and 6 inches (15 cm) for single-wall vents

5 Vent Cap Height

The vent cap must always extend a minimum of 2 ft (60 cm) above any structure within a 10 ft (3 m) horizontal plane

Direct Venting



Key Benefits

The sealed firebox generally makes these units safer since they require no room air for combustion

The units are more energy-efficient because there is no loss of heated room air out the vent

Direct-vent fireplaces are typically installed on an outside wall, with the vent running directly through the wall

Some models are approved for extended horizontal and vertical flues

R-2000 Homes

To be installed in an energy-efficient R-2000 home, a gas fireplace must be direct-vented (sealed)

This provides an additional level of protection against spillage of combustion products

Helps increase the appliance's efficiency

Essential for modern, tightly-sealed homes

Types of Direct Venting

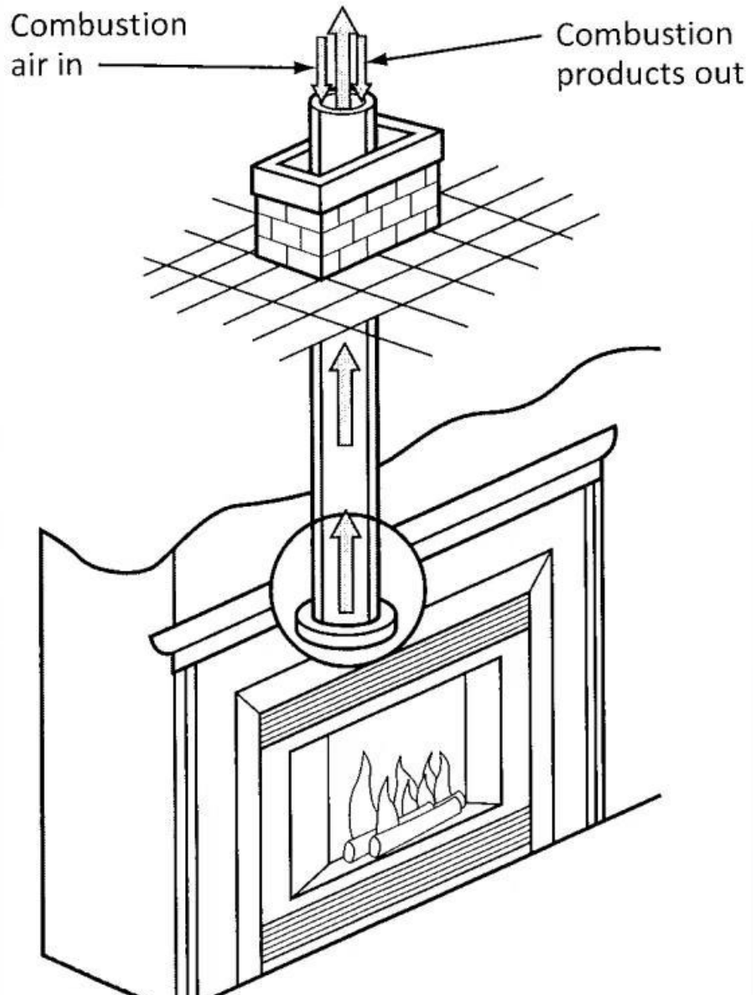
Coaxial Venting

Uses two concentric pipes

The outer pipe brings combustion air in from the outdoors

The inner pipe exhausts the combustion products

This is the method commonly used for sidewall venting



Collinear Venting

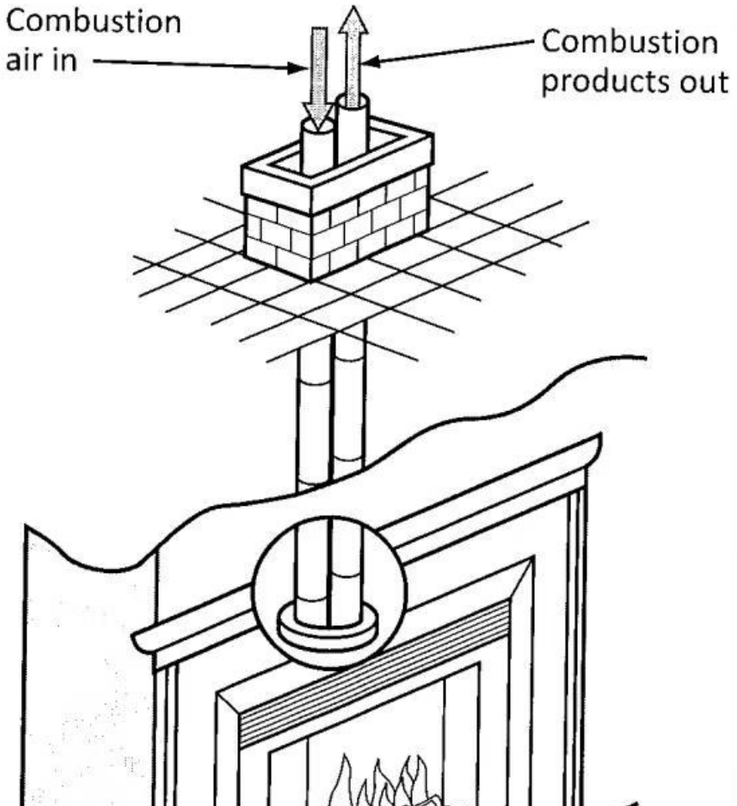
Uses two completely separate pipes to:

- Supply outside combustion air
- Exhaust combustion products

Most often used where there are space limitations when an existing fireplace and chimney have been retrofitted with a gas insert

Used where long vent distances and cold temperatures make condensation and vent icing a potential concern

Figure 2-11
Collinear venting



Power Venting Applications

Operation

Uses an electrical fan to assist the venting process

Installation Flexibility

Allows units to be installed with longer horizontal runs

Can be used in areas of a home where a conventional flue cannot be used

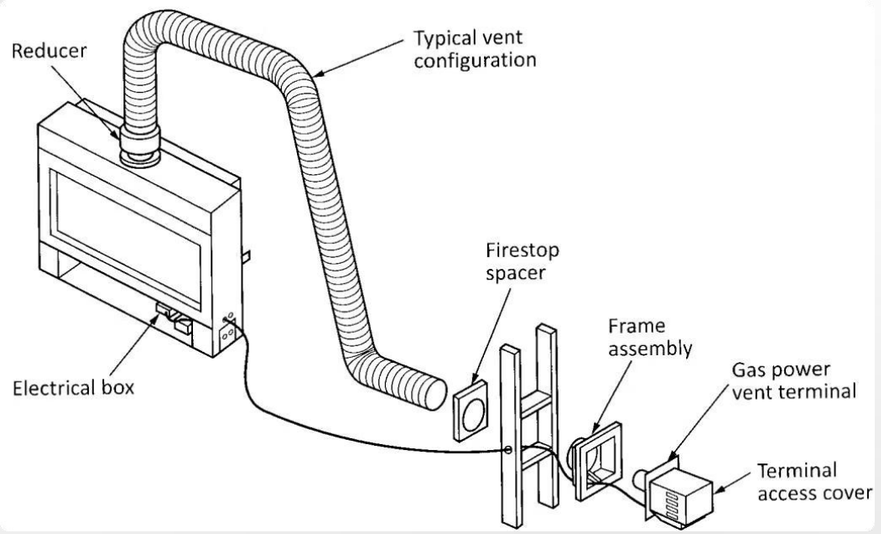
Approval

The power vent kit must be approved for the specific fireplace

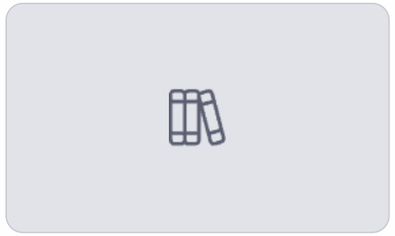
Safety Interlock

The power vent fan kit must be interlocked with the fireplace controls

Ensures that the fireplace cannot light unless the power vent is functioning

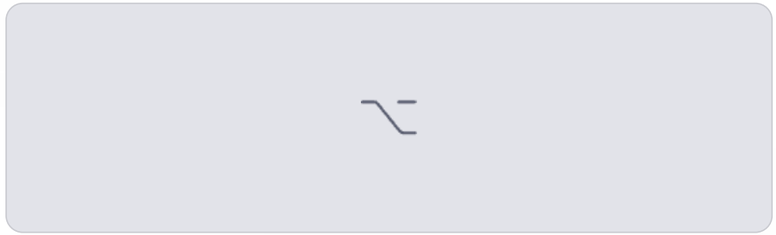


Vent Installation Considerations



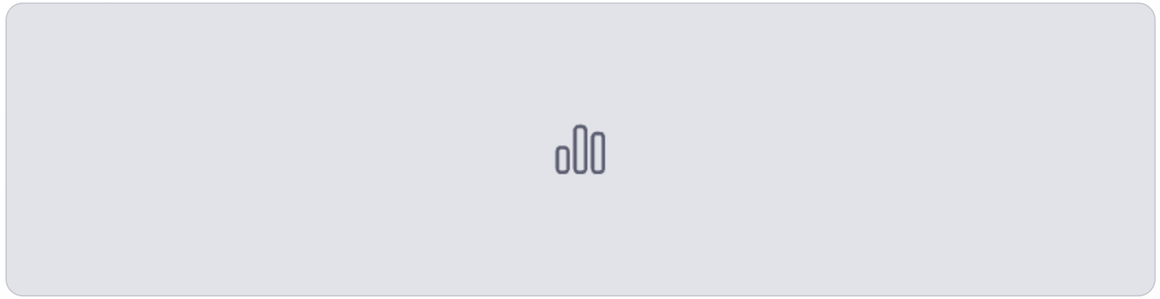
Follow Instructions Exactly

One of the most important parts of the installation



Multiple Venting Options

A single model may have several approved configurations



Use Diagrams and Charts

Follow manufacturer's venting instructions and flow charts

The installation of the venting system is one of the most important parts of the installation. Manufacturers' instructions must be followed exactly. Many manufacturers are designing fireplaces with multiple venting options to give owners and installers the maximum amount of flexibility.

Venting Configuration Options

Multiple Configurations

A single model of gas stove may be approved for multiple venting options

Direct Vent Options

Direct vent coaxial top exit horizontal or vertical termination

Direct vent coaxial rear exit horizontal or vertical termination

Direct vent collinear top exit, vertical termination

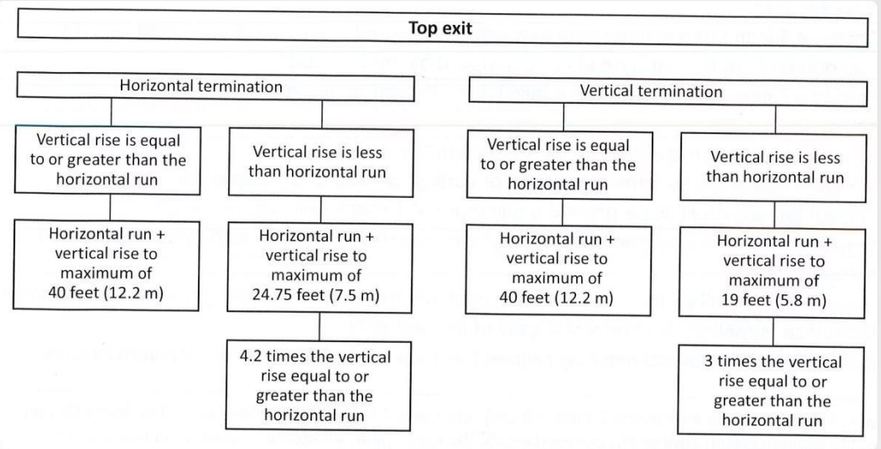
Other Options

Direct vent power vent

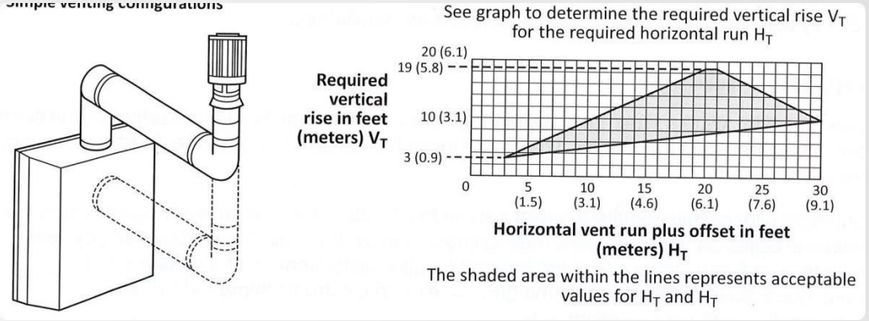
Natural draft B-vent

Compatibility

Different venting manufacturer's components must not be combined



Vent Length Considerations



Vent Length Graphs

Manufacturers provide graphs for selecting an acceptable combination of horizontal and vertical vent lengths

These must be followed precisely for proper operation

Slope Requirements

Horizontal runs must slope upward a minimum of 1/4 inch per foot, or 1 in 50

Vent Restrictor

Installations with vertical rise may require the installation or adjustment of a vent restrictor

Typical Venting Installation Instructions

1 Use Approved Components

Under no conditions should any venting material other than manufacturer brands and components be approved in these instructions

2 Follow Procedures

Follow the installation procedure provided by the venting manufacturer

3 Use Proper Adapters

An appropriate starter adapter will be required; once the preferred manufacturer's appliance adapter has been attached, the remainder of the system must be that of the same manufacturer

4 Secure Connections

Fasten a 4 inch (10 cm) inner vent joint with three sheet metal screws and seal with the appropriate high-temperature silicone supplied by the manufacturer

5 Clean Cuts

All cuts in the vent material must be smooth and clean

Control Systems Overview

Continuous Pilot Systems

Not dependent on electricity for burner operation

Control circuit is powered by the thermocouple and continuous pilot

Being phased out in many jurisdictions

Intermittent Pilot Systems

Require a power source to operate

Automatically ignite when the fireplace is called on to operate

Extinguish when the main burner operating cycle is complete

Flame safety circuit can be conventional thermocouple or electronic flame rod system

Control Circuit Components

Power Source

AC power, batteries, or thermocouple-generated electricity

Safety Devices

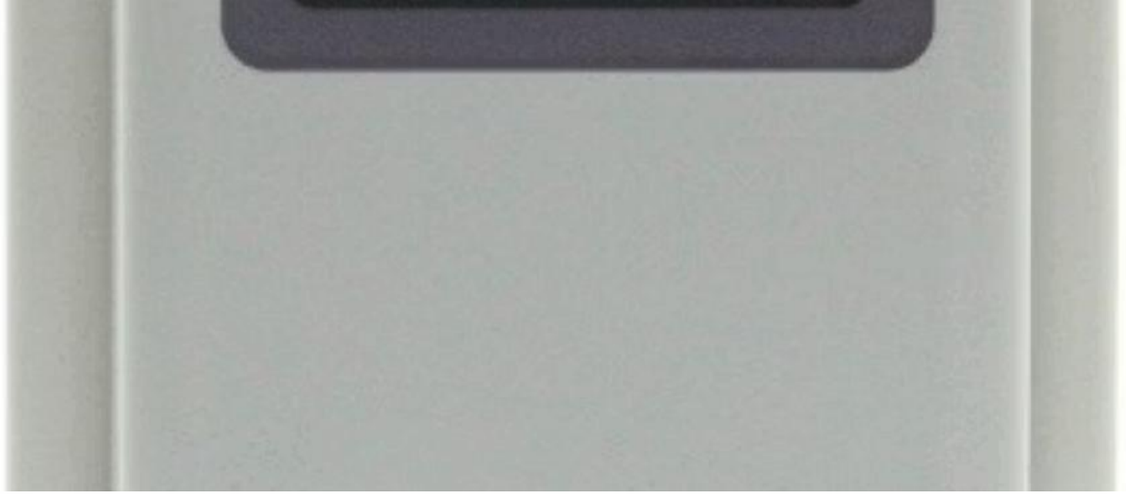
Thermocouple or flame rod for flame supervision

Gas Valve

Controls gas flow to the main burner

Control Switch

Manual on-off switch or thermostat



Thermostat Controls

On-Off Switch

Some models are supplied with a simple on-off switch

Integral Thermostat

Some units have a built-in thermostat that turns the main burner on or off

Wall Thermostat

Others are intended to be connected to an external thermostat

The gas valve may be automatically operated with a wall thermostat suitably located to sense ambient temperature

Remote Control Systems

Transmitter/Handset

The hand-held control that allows for on-off operation and temperature control

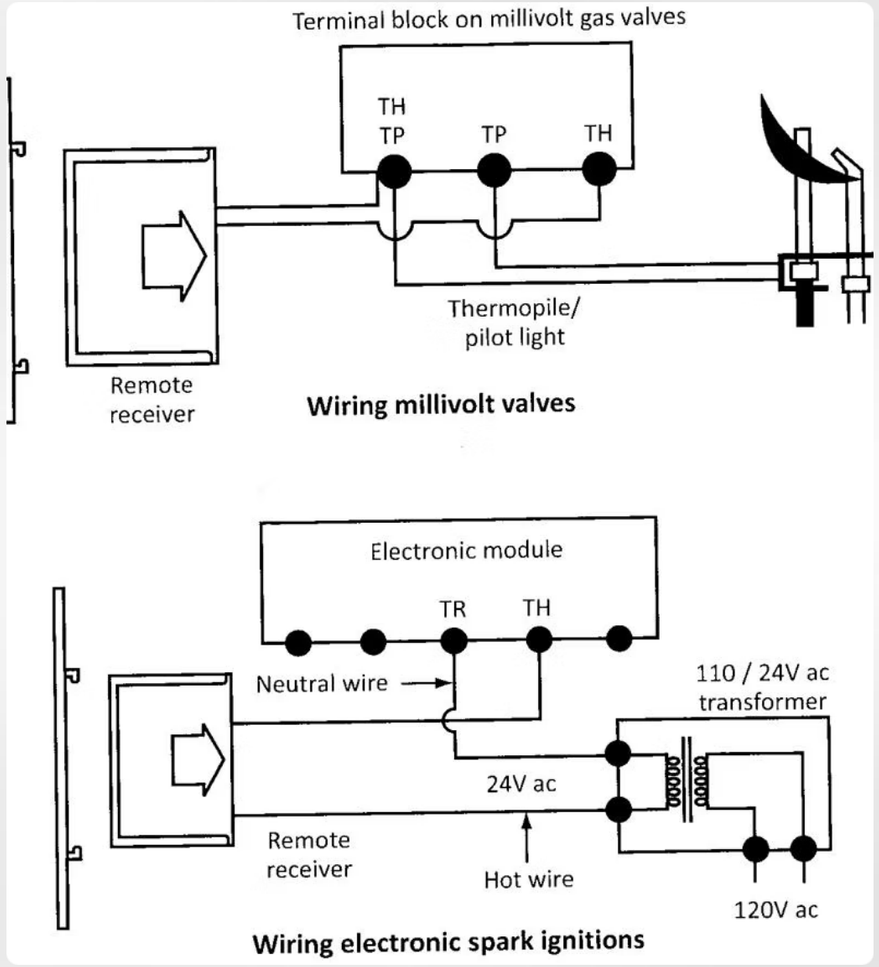
Battery powered, needs replacement every six months

Receiver

Attached to the fireplace and synched to the transmitter

Enables the two components to communicate

Also battery powered, needs replacement every six months



Electronic Ignition Systems

Power Requirements

Electronic modules typically operate on 24 VAC supplied from a step-down transformer

These systems rely upon a 120 VAC power supply to operate

Remote Control Integration

Modern systems often include remote control capabilities

Wiring diagrams show how the remote receiver connects to the electronic module

Safety Features

Include flame supervision and automatic shutdown if flame is not detected

Safety and Comfort Controls

Vent Safety Switch

Some units are equipped with a vent safety shutdown switch

This switch is factory installed, wired, and tested

Check and make sure the switch and wires are positioned according to the manufacturer's specifications

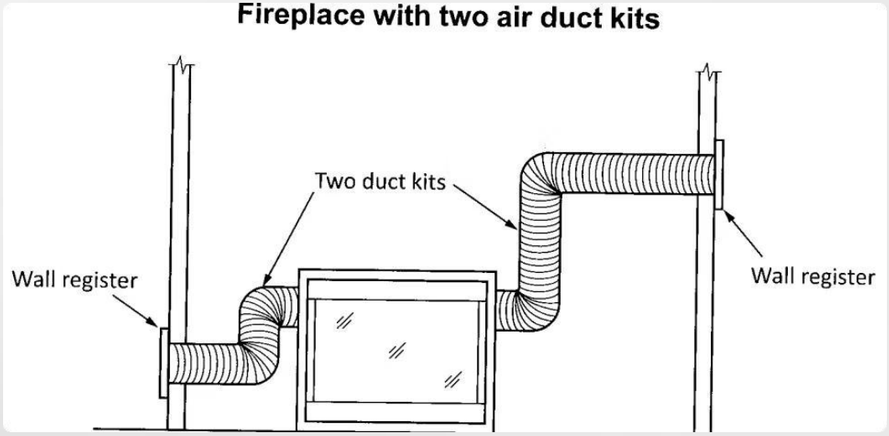
Temperature-Sensitive Switch

Some gas fireplaces are available with an optional temperature-sensitive switch

Turns the blower on and off thermostatically

When the blower speed control is turned on, the blower will come on automatically when the fireplace reaches its optimum operating temperature

When the unit is shut down and the temperature decreases, the blower will automatically turn off



Blower Systems

Availability

Many fireplace manufacturers offer blowers that are installed at the factory or made available as aftermarket options

Thermal Activation

The blower is thermally activated

Will automatically start approximately 10 minutes after lighting the fireplace

Will run for approximately 30-45 minutes after the fireplace has been turned off

Benefits

Use of the fan increases the output of heat distribution

Requirements

The fireplace installation requires a 120 V power source to accommodate the blower

Air Duct Kits

Purpose

Some models of zero-clearance gas fireplaces have knockouts on the exterior for the connection of air ducts

Used to disperse warm air from the fireplace to remote locations in the same room or other rooms

Requirements

These duct systems must be specifically approved for the gas fireplace

Each duct kit will have its own fan assembly

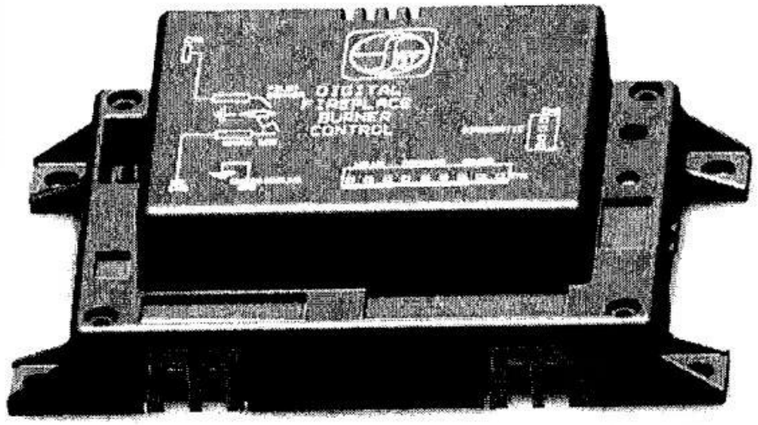
Operation

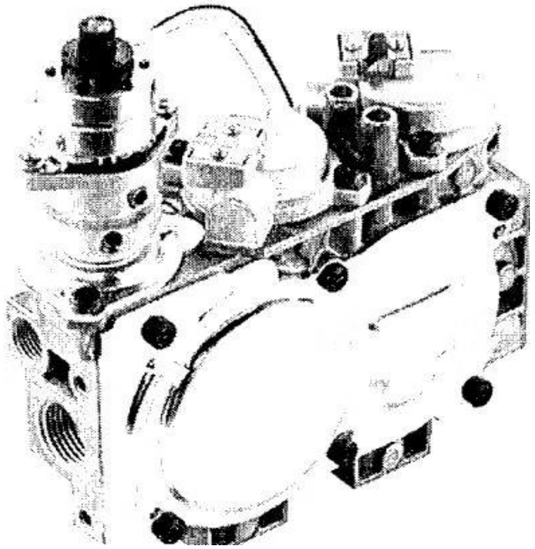
The internal fireplace blower cannot be operated when the duct kit is operating

Figure 2-18
Fireplace with two air duct kits

DC Digital Controls

Figure 2-19
VDC fireplace controls
Courtesy of SIT S.p.A.





Low Voltage Operation

Modern fireplace electronic burner controls can operate on low DC voltage

Can use common dry cell batteries as the backup or main power source

Gives intermittent pilot models the same auxiliary heat benefit as the continuous pilot models

System Integration

All components of the system are designed to work with each other on 6 VDC

The control module will have a compartment to install 4 AA batteries

May also use a separate battery holder that will be plugged into the module

Battery Power for Controls

Battery Options

Control module may have a compartment to install 4 AA batteries

May also use a separate battery holder that plugs into the module

Power Backup

Provides operation during power outages

Essential for emergency heating capability

Maintenance

Batteries should be replaced regularly, typically every six months

Part of regular fireplace maintenance

Smart Controls and Apps

Mobile Applications

Fireplace control manufacturers are creating apps to enable owners to use their personal devices to control the gas fireplace

The myfire app shown is one example of this technology

Features

Remote temperature control

Flame height adjustment

Timer functions

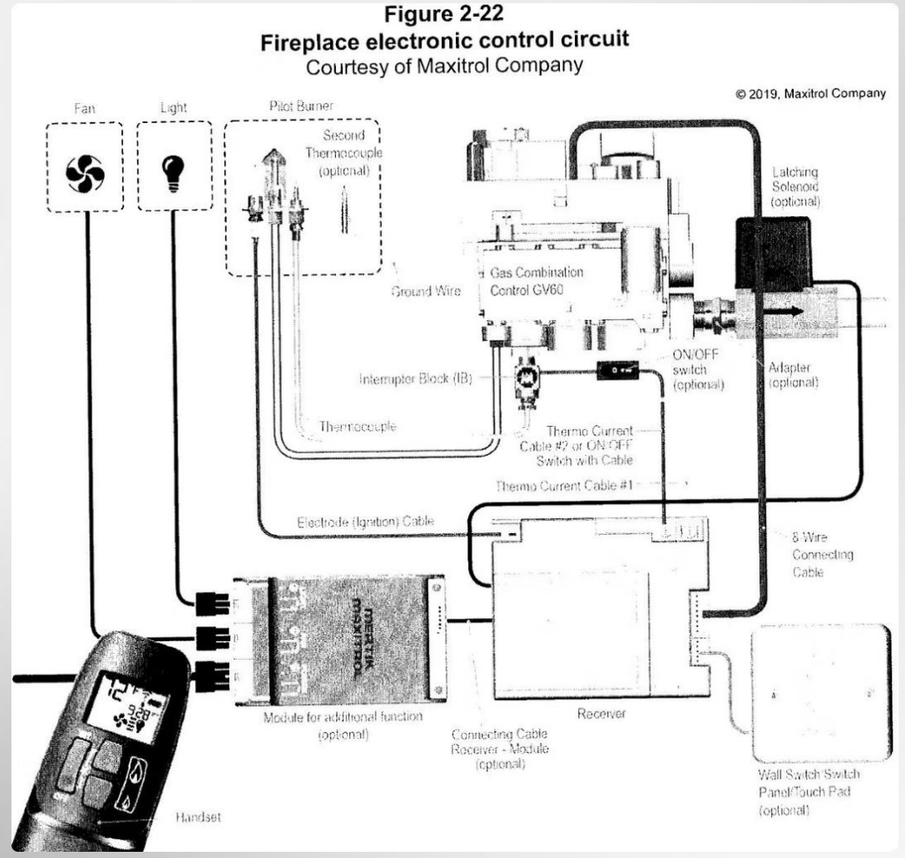
Programming capabilities

Benefits

Convenient control from anywhere in the home

Enhanced energy efficiency through better temperature management

Modern user experience



Electronic Control Circuits

Modern Technology

The electronic control circuit of a gas fireplace shows how the technology has evolved

Includes options that people expect in all modern home appliances

Integration

Controls may integrate with home automation systems

Can include Wi-Fi connectivity

User Interface

Modern controls offer intuitive interfaces

May include touchscreen displays or app control

Advanced Features

Programmable schedules

Zone control capabilities

Energy usage monitoring

General Assembly Considerations

Follow Manufacturer's Instructions

Each fireplace will have some unique installation, operation, and maintenance procedures

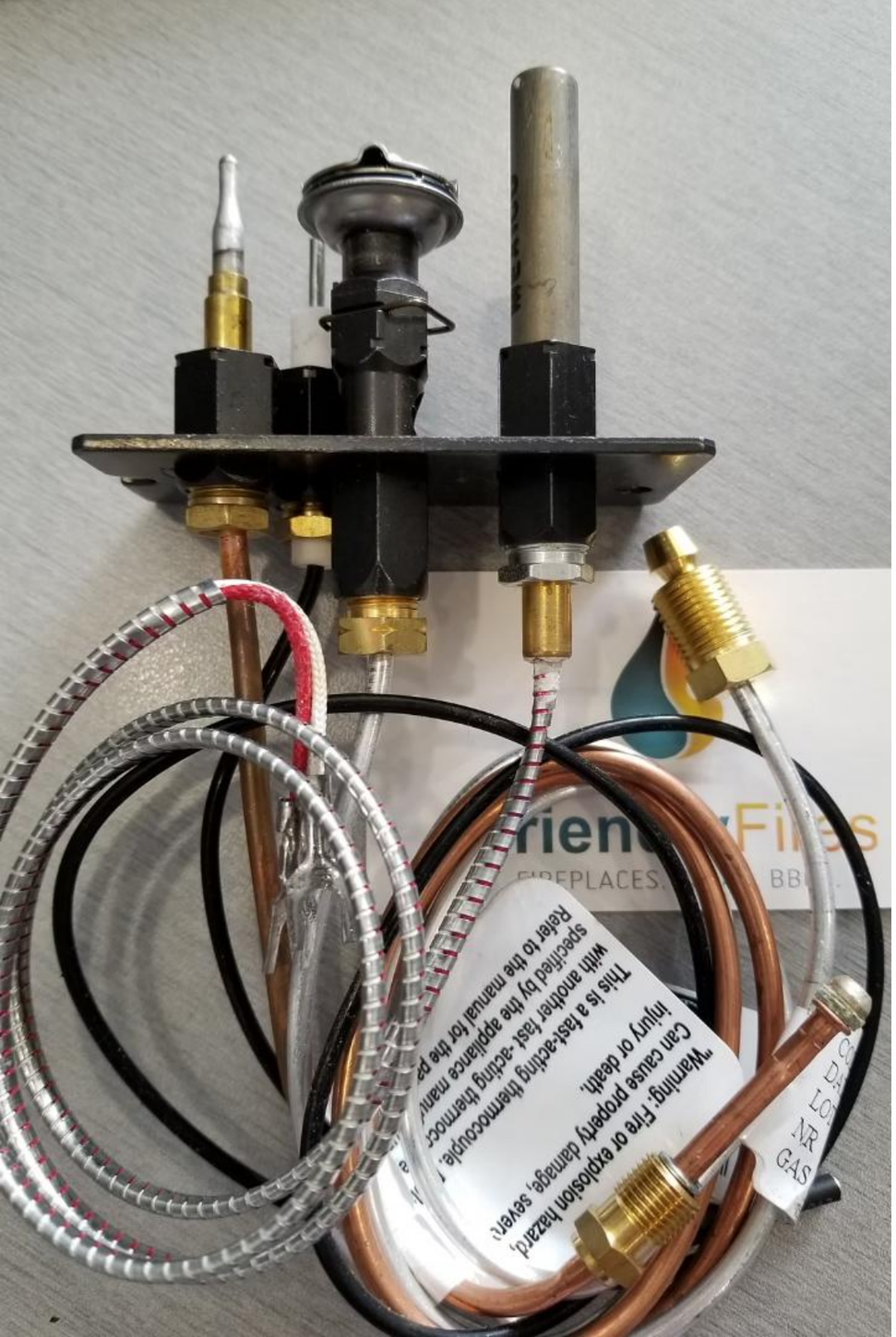
It is important that installers follow the manufacturer's instruction exactly

Instruct Homeowners

Properly educate homeowners on operation and maintenance of the unit

Onsite Assembly

The amount of installer onsite assembly varies with different types of fireplaces and optional features



Common Assembly Items

1 Blower Installation

Install the circulating blower kit if separately supplied

Ensure that there is a 120V AC power supply outlet

2 Log Placement

Follow the log or ceramic stone placement instruction and diagram

Blocked burner ports can cause an incorrect flame pattern, carbon deposits, and delayed ignition

3 Seal Inspection

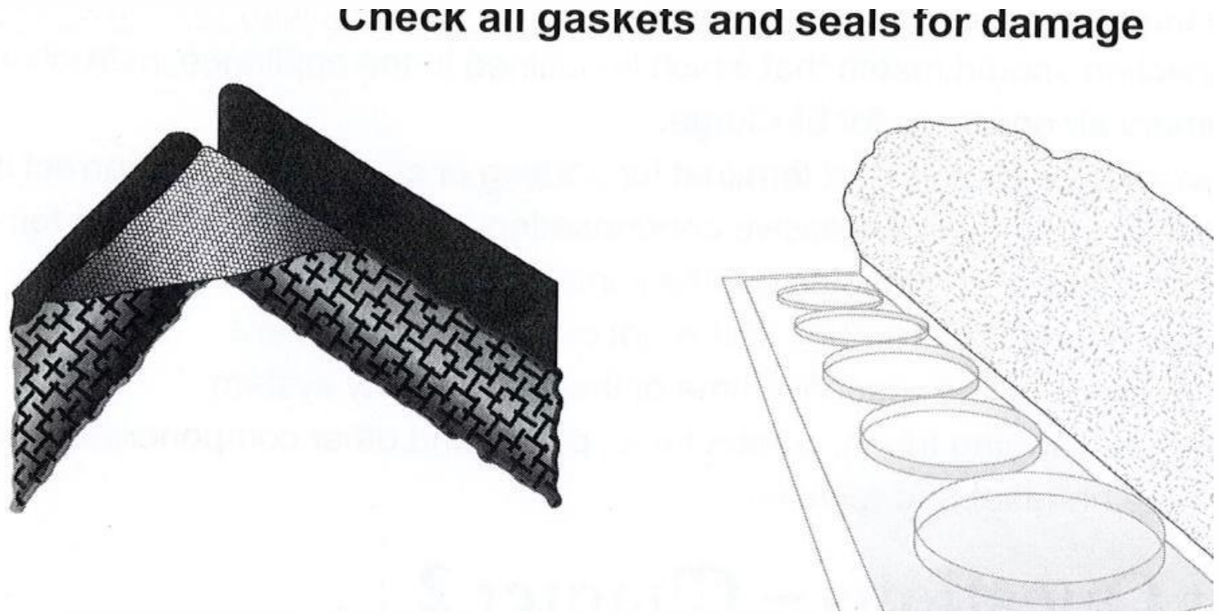
Check that the relief door fibreglass seals are intact

Inspect the glass door gasket

4 Safety Barrier

Install the wire mesh safety barrier designed to reduce the risk of burns from the hot viewing glass

Gaskets and Seals



Relief Door Seals

Check that the relief door fibreglass seals are intact

These are critical safety components

Damaged seals must be replaced before operation

Glass Door Gasket

Inspect the glass door gasket for damage or wear

Install the glass door as per the manufacturer's instructions

Proper sealing is essential for safe and efficient operation

Operation Procedures

Verify Correct Firing

Before leaving the unit, ensure that the appliance is firing correctly

Explain Operation

Fully explain the start-up, shutdown, and operation to the owner

Discuss Initial Use

Inform about vapors released during first use due to curing compounds

Review Safety Precautions

Cover all safety guidelines with the homeowner

PS TO A NEW GAS FIRE

3.

Design & choose your surround

4.

Organise your trades

First-Time Operation

Curing Process

When operating the new fireplace for the first time, some vapours may be released due to the burning of curing compounds used in the manufacture of the appliance

It is also possible that these vapours could set off any smoke detection alarms in the immediate vicinity

Normal Occurrence

These vapours are quite normal on new appliances

Recommend opening a window to vent the room

After a few hours, the vapours will disappear

Glass Cleaning

Clean both sides of the glass after the first 10 hours of operation with a recommended fireplace glass cleaner

Safety Precautions

Flammable Materials

Clothing or flammable material should not be placed on or near the appliance

Furniture Placement

Do not place furniture or any other combustible household objects within 36 inches of the fireplace front

Child Safety

Free-standing fireplaces can be a greater burn hazard

Young children should be carefully supervised when in the same room as the appliance

A physical barrier should be installed to restrict access to the gas stove

Vent Maintenance

Show the owner the location of the external vent cap

Ensure no debris, plants, trees, or shrubs are interfering with the air flow

Seasonal Maintenance

Annual Check-up

Recommend that the homeowner hire a qualified service technician to perform an appliance check-up at the beginning of each heating season

Pressure Relief Mechanism

Inspect and operate the pressure relief mechanism to verify that relief mechanisms are free from obstruction and seals are intact

Flame Safety System

Inspect the operation of the flame safety system pilot or flame rectification device

Vent Inspection

Inspect the condition of the vent and vent terminal for sooting or obstruction and correct if present

Glass Maintenance

Initial Cleaning

Clean both sides of the glass after the first 10 hours of operation with a recommended fireplace glass cleaner

Regular Cleaning

Thereafter, clean as required

If the glass is not kept clean, permanent discoloration and/or blemishes may result

Special Glass

The glass used with these fireplaces is a special, high-temperature, ceramic glass

It should be cleaned with a fireplace glass cleaner to avoid damaging the surface

Replacement

If glass is damaged it should be replaced with a complete glass and frame assembly purchased from an authorized dealer

Substituting lower grade glass could cause injury or property damage

Burner Inspection and Maintenance

Main Burner Lighting

Inspect and ensure that the lighting of the main burner occurs quickly and smoothly

Visual inspection should match that which is outlined in the appliance instruction manual

Air Openings

Inspect primary air openings for blockage

Ensure proper air-to-gas mixture for efficient combustion

Flame Pattern

Check for proper flame characteristics

Flames should be stable and of proper height and color

Vent System Maintenance

Vent Inspection

Inspect the condition of the vent and vent terminal for sooting or obstruction

Correct any issues if present

Check for evidence of excessive condensation, such as water droplets forming in the inner liner and subsequently dripping out the joints

Exterior Vent Cap

Ensure the vent cap is free from:

- Debris
- Plants
- Trees
- Shrubs

These can interfere with proper air flow and create safety hazards

Firebox Cleaning

Debris Removal

Vacuum and clean any debris in the firebox that is not supposed to be there

Log Positioning

Check that logs or ceramic stones are positioned correctly according to the manufacturer's diagram

Burner Ports

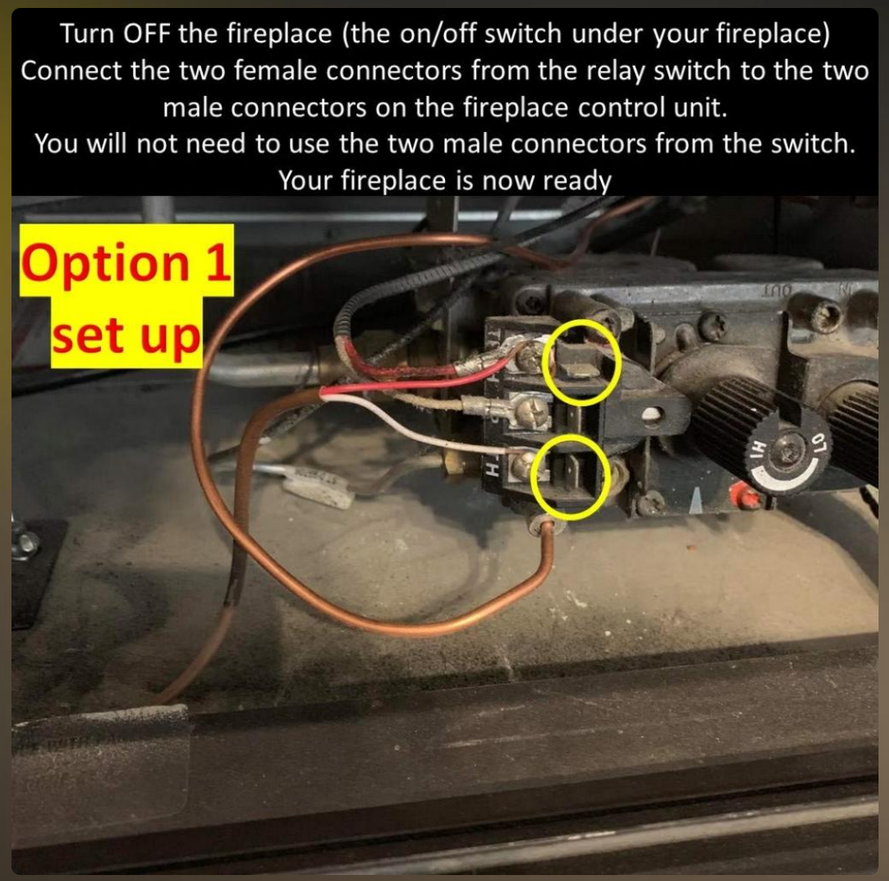
Ensure burner ports are not blocked by debris or misplaced logs

Blocked ports can cause an incorrect flame pattern, carbon deposits, and delayed ignition

Safety Precaution

Always ensure the fireplace is cool before cleaning

Do not handle logs until they have cooled



Safety System Testing

Flame Failure Response

Test and measure the flame failure response time of the flame safety system

This ensures the gas will shut off quickly if the flame is extinguished

Gas Leak Inspection

Check all accessible gas-carrying tubes, connections, pipes, and other components for leaks

Use approved leak detection methods

Control Operation

Verify all controls are functioning properly

Test thermostats, remote controls, and manual switches

Battery Replacement

Remote Handset

Replace batteries in the remote control handset

Typically requires standard batteries that should be changed every six months

Receiver Unit

Replace batteries in the receiver unit

Usually located inside or near the fireplace

Control Module

If the fireplace uses a separate battery pack or control module, replace those batteries as well

Maintenance Schedule

Include battery replacement as part of regular seasonal maintenance

Weak batteries can cause erratic operation

Tube Burner Maintenance

Inspection Points

Check for any damage to the tube burner

Inspect for corrosion or warping that could affect performance

Ensure all ports are clear and properly sized

Verify that carry-over ports are functioning correctly to ensure complete ignition

Air Shutter Adjustment

Verify that the air shutter is in the correct position as specified by the manufacturer

Check that the mechanical stop or screw is secure

Improper air shutter settings can cause sooting, inefficient combustion, or yellow flames

Only adjust if specified in the manufacturer's instructions

Box Burner Maintenance

Seam Inspection

Check that all seams remain gas-tight

Look for any signs of separation or damage

Port Cleaning

Ensure all slots and holes are free from debris

Clean carefully without enlarging the ports

Log Positioning Pins

Verify that any pins used for log positioning are intact and properly positioned

Replace any damaged pins according to manufacturer specifications

Ceramic Tile Burner Maintenance

Handle with Care

The ceramic tile is brittle and can crack

Avoid applying pressure or prying on the ceramic components

Gentle Cleaning

Use only compressed air or a soft brush to clean ports

Never use metal tools or abrasive materials

Check Sealing

Ensure the ceramic tile is properly sealed to the metal box

Gas leaking around the ceramic tile can change flame appearance and create safety hazards

Replacement

If the ceramic tile is cracked or damaged, the entire burner assembly usually needs replacement

Do not attempt to repair ceramic components

Pilot Assembly Maintenance

Inspect Pilot Flame

Check that the pilot flame is properly shaped and engulfs the thermocouple or flame sensor

The flame should be blue with slight yellow tips

Clean Pilot Orifice

If the pilot flame is weak or yellow, carefully clean the pilot orifice

Use compressed air or a fine wire designed for this purpose

Check Connections

Verify all electrical connections to the pilot assembly are secure

For millivolt systems, ensure the thermocouple connection to the valve is tight

Comprehensive Maintenance Checklist

1

Annual Professional Service

Schedule a qualified technician inspection at the start of heating season

2

Safety Systems

Test all safety devices including flame supervision and pressure relief

3

Visual Inspection

Check glass, seals, venting, and flame pattern

4

Battery Replacement

Change all control system batteries every six months

Regular maintenance ensures your gas fireplace operates safely and efficiently. By following this comprehensive checklist, homeowners can enjoy the comfort and ambiance of their gas fireplace while maintaining its performance and extending its lifespan. Always consult the manufacturer's specific instructions for your model and contact a qualified service technician for any repairs or adjustments.