7) What are the installer's responsibilities regarding the propane supply system when conducting a conversion from propane to natural gas and the propane tank is no longer going to be used?
   a) Shut off all valves, disconnect the pipe or tubing, plug the openings
   b) Shut off all valves and dispose of the tank
   c) Nothing, the tank is the customer's responsibility

8) Who must test and label the appliance if the manufacturer does not make a similar model in the fuel the appliance is to be converted to?
   a) The person doing the conversion
   b) The homeowner
   c) The inspection authority or an agency authorized by the inspection authority (field approved)

9) What must be done after any conversion to ensure the input is correct?
   a) Test the manifold pressure
   b) Visually check the flame
   c) Check the safety system works properly (thermostat, high limit)

7. Reactivation of appliances

Overview

Purpose

There are a series of checks that a gas technician/fitter must perform before lighting up an appliance to ensure that the reactivation occurs safely and that the appliance operates efficiently and safely.

Objectives

At the end of this Chapter, you will be able to:

- describe the pre-reactivation checklists; and
- describe how to reactivate gas appliances.

Always consult the appliance manufacturer before attempting any unusual conversions to avoid problems and save time.

Assignment Questions – Chapter 6

1) Complete the following sentence:
Only authorized individuals are permitted to perform fuel type conversion on appliances with inputs of _____.
   a) 400 000 Btu/h or more
   b) 200 000 Btu/h or less
   c) 400 000 Btu/h or less
   d) 200 000 Btu/h or more

2) Which of the following factors does not affect the sizing of the burner orifice?
   a) Type of gas
   b) Position of the burner in relation to the pilot
   c) Appliance input
   d) Manifold pressure

3) Under what conditions may an appliance not certified for conversion be converted?
   a) The conversion must be tested and labelled by the inspection authority or an agency authorized by the inspection authority
   b) The orifice must be properly sized and the pressure properly regulated

4) If gas supply piping must be changed when converting an appliance, what must be done with the old piping?
   a) The old piping can be cleaned and restocked for further use with the same fuel it was used for previously
   b) The piping cannot be used for the same fuel
   c) Old piping is to be removed or abandoned in a safe manner

5) What device is normally used to check the manifold gas pressure of a newly converted appliance?
   a) A manometer
   b) A spring gauge

6) Where would you find information on propane orifice sizing?
   a) The manufacturers and the propane storage and handling code
   b) The manufactures and the propane storage and handling regulation
   c) The propane storage and handling regulation and the propane storage and handling code

Terminology

Term	Abbreviation (symbol)	Definition
Flame impingement		Touching the flame produced by the burners to the heating surfaces

Pre-reactivation checklists

In most jurisdictions where a Gas Trade 3 (Gas Fitter B – level 1) is recognized, a Gas Technician 3 may perform the reactivation of a gas appliance under the supervision of a higher licensed gas technician/fitter. The gas technician/fitter needs to be familiar with local regulations to understand which qualifications are required to perform various activities associated with installation, servicing, and reactivation of natural gas and propane equipment.

Before lighting up the appliance, the gas technician/fitter must perform a series of checks to ensure that the reactivation occurs safely and that the appliance operates efficiently and safely.

Venting system checklist

The venting system is the first system to check before reactivating an appliance.

The most common cause of carbon monoxide poisoning from gas equipment is due to venting system problems. A complete venting system examination includes the following.

Step 1—Check vents

1) Check that the area of the vent meets the Code requirements for the input of the appliance.
2) Check that the venting material meets the Code requirements for the type of appliance and the expected flue temperatures.

Step 2—Check exterior venting system

1) Visually check the inside of the vent or chimney to ensure there are no obstructions, soot or creosote, or deterioration.
2) Check the exterior venting portion to ensure it is in acceptable condition:

For...	Check for...
Masonry chimneys	Eroded or cracked mortar
Metal chimneys	Corrosion

3) Check termination height and required distances from other vertical surfaces.
4) Check for proper termination caps. If a masonry chimney has a metal liner, check to make sure the top seal plate is in place to prevent air flow through the chimney that can result in condensation and corrosion of the metal liner.

Step 3—Check interior venting system

1) Check the interior venting portion to ensure it is in acceptable condition:

For...	Check...
Masonry chimneys	The type of lining tile and its condition
Metal chimneys	For corrosion

2) Visually check the inside of the vent or chimney to ensure there are no blockages:
   a) Use a mirror to check the condition of the liner for obstructions, soot or creosote, or deterioration.
   b) Examine and empty any debris from the chimney cleanout opening and make sure the door is tight fitting.

3) Check for unapproved dampers and other devices.
4) Inspect the draft hood for any signs of carbon (black powder). Carbon deposits could be a sign of incomplete combustion, and burner adjustments may be required.
5) For plastic venting systems, inspect for leaks at joints and cracks or distortion along the vent length.

Additional checklist

Once you're satisfied that the venting system has adequate sizing and is in good condition, perform other checks before reactivation.

1) Check that combustion and ventilation air openings meet the Code requirements.
2) Check the appliance combustion chamber and surrounding area for:

Check for...	Which indicates...	Then...
Scorching	Overheating	Check appliance is not overfiring. Check for restrictions in flue and vent passages.
Sooting	Incomplete combustion	Check appliance input rate and burner operation, for adequate air supply and possible restrictions in flue or vent passages.
Scaling	Corrosion	If rust flakes build up inside the top section of a heat exchanger, incomplete combustion and carbon monoxide could result. If advanced, flame roll-out could also occur.

Check for...	Which indicates...	Then...
Burnt wiring	Overheating condition	May result from flame roll-out
Heat exchanger cracks, etc., by visual inspection or other test method	Heat exchanger cracks	**Note**: There are many methods to test, but generally, you can perform a combination of suggested methods to confirm before proceeding.

3) If any of the above conditions exist, you must correct the problem, either before or after reactivation, depending on the nature of the problem.
4) Check available gas pressure and pipe size.
5) Connect the gas supply to the appliance.
6) Test and purge the gas supply according to the Code requirements (see Unit *8 Introduction to piping and tubing systems*).

Furnace cleaning

You should clean these three parts of the furnace:

- filter system;
- blower; and
- motor.

⚠ Always ensure that the power supply is turned off before beginning these furnace cleaning steps!

Step 1—Clean filter system

You should replace the furnace filter.

1) To check the filter:
   a) Take it out and hold it up to the light.
   b) If it looks clogged, replace it with a new filter of the same type and size regardless of the length of time it has been used:

Filter type	Description
Disposable furnace filter	• Consists of a fibre mesh in a cardboard frame • The size of the filter is printed on the edge of the frame. • An arrow on the edge of the frame indicates the correct direction of air flow through the filter. – Air flows from the return-air duct toward the blower. – The arrow on the filter should point away from the return-air duct and toward the blower.
Permanent filter	• Usually sprayed with a special filter-coating chemical, available at hardware stores and home centers • Clean this type of filter according to the manufacturer's instructions, which are usually attached to furnace housing.

2) To replace a filter:
   a) An electronic air cleaner should have:
      • cartridges cleaned in accordance with the manufacturer's instructions; and
      • permanent screen filters removed and cleaned.

Step 2—Clean blower

You must clean the blower assembly, belts and pulleys to the blower, and motor housing.

Cleaning the blower is critical if the furnace has a squirrel-cage fan because openings in this type of blower often become clogged with dirt.

1) To clean the blower:
   a) Remove the panel that covers the filter to gain access to the blower or panel on the front of the furnace.
      • This panel may be slip-fit on hooks or held by a series of retaining screws.
      • Sliding out the fan Unit, which is held on track by screws, may help you gain access to inside of the blower.

Step 3—Clean motor

1) It may be necessary to swing out an electrical panel or module control on high-efficiency Units.
2) Check the condition of fan belt if equipped.
3) Maintain the fan motor with oil, if the manufacturer advises.
4) Other items of concern are the underside of air-conditioning A-coils, as they can become clogged with dirt and act as a dirty filter would.
   a) Additionally, on high-efficiency Units the secondary heat exchanger, which you can access while the blower assembly is removed, may require cleaning in order to remove dirt build up on the coil surface.
   b) You should clean the condensate drain tubing, specifically on high-efficiency Units, and confirm it to be free running all the way to the floor drain to ensure trouble-free drainage.

Reactivating gas appliances

When the appliance is ready for reactivation, you must re-check the system after its gasification and before you light up the appliance.

In all cases, you must perform combustion analysis to determine the completeness of combustion and to test for toxic gases before leaving the appliance in operation.

Note: *You should turn on the main valve to a natural gas regulator/meter set slowly when reactivating a system. If turned on too quickly, the regulator will not have time to react, which could cause over-pressure damage to the meter diaphragm, regulator, and other downstream gas controls.*

Checking system once gasified

1) Visually check the piping to ensure there are no openings in the system from which gas could escape.
2) Check for shut-off valve seepage (see the *8 Introduction to piping and tubing systems* Unit).
3) Shut off the appliance.
4) Install a manometer or pressure gauge at the gas meter outlet.
5) Introduce gas into the system:
   a) Listen for the gas flow to stop.
   b) Monitor the gas meter test dial to ensure that no gas is escaping.
6) Turn off the meter valve. The system contains the gas, under pressure.
7) Maintain the gas pressure indicated on the manometer or pressure test gauge for a minimum of 10 minutes. (If the manometer or pressure gauge decreases, indicating that there is a leak, see Unit *8 Introduction to piping and tubing systems*.)
8) Upon successfully completing the test, use a soap solution to perform a leak test of all control valves and appliance piping not previously tested under normal operating pressure to ensure they are gas tight.

Additional procedures when reactivating from a tank or cylinder

1) Do a valve seepage test on each stage (see the *8 Introduction to piping and tubing systems* Unit).
2) Place a pressure gauge on each stage.
3) Turn off the manual shut-off valve at the appliance.
4) Pressurize the system with the gas.
5) Shut off supply valve.
6) Monitor gauges for a decrease in pressure, which indicates external leakage.

Lighting up appliance

Upon completing all necessary checks, light up the appliance following manufacturer's instructions.

With the main burner operating, do the following:

1) Check the manifold gas pressure with a manometer. Adjust the regulator if necessary.
2) Observe the main flame:
   a) Check for flame stability.
   b) Check for flame impingement, lift-off, or roll-out.

3) Check venting action for:
   a) proper draft; and
   b) no spillage.

4) Always analyze the flue products to check for complete and efficient combustion.
5) Check and confirm the proper operation of all safety controls on the Unit, such as:
   a) high limits, flame safeguards;
   b) pressure switches; and
   c) auxiliary limits.

6) Before leaving the appliance, check the input:

If a meter...	Then...
Is available	Check the input by measuring the flow rate through the meter by monitoring the test dial ("clocking the meter").
Is not available	Make sure that the installation of the proper orifice and the maintenance of the manifold pressure are in accordance with the manufacturer's specified rating.

Assignment Questions – Chapter 7

1) The venting system is the first system to check before reactivating an appliance. Put the following checks in the order they should be performed:

   a) Check exterior venting systems: Step 1

   b) Check vents: Step 2

   c) Check interior venting systems: Step 3

2) What does scorching on the appliance combustion chamber or surrounding area indicate?
   a) Overheating
   b) Incomplete combustion
   c) Corrosion