

Sealed Combustion Oil Furnaces

SCH High Boy

SCL Low Boy

KEEP THESE INSTRUCTIONS WITH FURNACE FOR FUTURE REFERENCE.



Furnace Manual

Contents	Page
Read this first!.....	2
1. Prepare furnace location.....	3
2. Prepare furnace and place in position	5
3. Connect supply and return ducts	6
4. Venting – Sealed Combustion System	9
5. Connect fuel oil piping.....	15
6. Wire furnace and burner	16
7. Start-up	18
8. Checkout procedure.....	19
9. Troubleshooting	21
10. Service and maintenance	22
11. Components and replacement parts.....	25
12. Dimensions and ratings	34
13. Owner's information.....	38

Hazard definitions

DANGER

Hazards that **will cause severe** personal injury, death or substantial property damage.

CAUTION

Hazards that **will or can cause minor** personal injury or property damage.

WARNING

Hazards that **can cause severe** personal injury, death or substantial property damage.

NOTICE

Special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

WARNING

INSTALLER – Read all instructions before installing. **Read page 2 first.** Follow all instructions in proper order to prevent personal injury or death.

- Consider ducting, fuel supply, venting and installation when determining furnace location.
- Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

WARNING

USER – Please read the following. Failure to comply could result in severe personal injury, death or substantial property damage.

- **This manual is for use only by your qualified heating installer / service technician.**
- Please see the **Owner's information** only, on back page of this manual.
- Have the furnace serviced by a qualified service technician, at least annually.

WARNING

Do not store or use gasoline or other flammable liquids or vapors near this furnace or any other appliance.

CAUTION

Ventilate house while operating furnace for the first time. Odors may be emitted for a brief period.

WARNING

Do not alter this furnace in any way. The manufacturer will not be liable for any damage resulting from changes made in the field to the furnace or its components or from improper installation. Failure to comply could result in severe personal injury, death or substantial property damage.

WARNING

This manual must only be used by a **qualified heating installer / service technician.** Furnace and burner must be installed and serviced only by a qualified heating installer / service technician. Failure to comply could result in severe personal injury, death or substantial property damage.

NOTICE

When calling or writing about the furnace, please refer to furnace model number and serial number shown on the rating label. You may list the serial number and model number in the space provided on the "Installation and service certificate" found on page 20.

READ THIS FIRST!

WARNING

Failure to adhere to the guidelines below can result in severe personal injury, death or substantial property damage.

Service and maintenance

1. To avoid electric shock, disconnect electrical supply before performing maintenance.
2. To avoid severe burns, allow furnace to cool before performing maintenance.
3. Perform service and maintenance as described in this manual and the burner manual.
4. Do not attempt to make adjustments to the blower or motor while the furnace is in operation. Disconnect power to the furnace and be sure all parts have stopped moving before attempting adjustments or maintenance.
5. The burner must be set up and adjusted using combustion test instruments. Visual examination of the flame alone cannot determine combustion performance.

Operation

6. Do not use the furnace as a construction heater.
7. Do not operate any furnace if the heat exchanger is damaged, corroded or pitted. Toxic flue products could enter the air stream.
8. Do not jumper, attempt to by-pass or override any limit control.
9. Do not block flow of combustion or ventilation air to furnace. Do not block or obstruct the air openings in the furnace casing.
10. Do not store or use combustible materials, gasoline, or other flammable liquids or vapors in the furnace area.
11. Do not operate the furnace if the furnace area will be exposed to air contaminants.
12. Should overheating occur, do not turn off or disconnect electrical supply to furnace. Instead, shut off the oil supply at a location external to the appliance, if possible.
13. Do not use this furnace if any part has been under water. Immediately call a qualified service technician to inspect the furnace and to replace any part of the furnace, control system or burner that has been under water.
14. Do not operate furnace if temperature rise through heat exchanger exceeds 85° F.

15. Inspect, clean and replace (if necessary) return air filter regularly.
16. Do not obstruct return air grills or supply air outlets.
17. Supply only #2 fuel oil to the burner. Never attempt to use gasoline, a mixture of gasoline and oil, waste fuel, refuse or any other substance in the burner of furnace.

Installation

18. Do not block flow of combustion or ventilation air to furnace. Do not block or obstruct the air openings in the furnace casing.
19. Connect furnace only to a functional vent system in good condition. Place the furnace so as to allow proper venting, with the shortest possible venting and minimum number of elbows.
20. Always connect and seal a return air duct to the furnace unless the furnace is located in a large space, such as an unpartitioned basement. Route the return air duct to an adjacent room if no return air manifold is used.
21. Install furnace maintaining minimum clearances for service and separation from combustible surfaces described in this manual.
22. Install, start-up, service and maintain burner per instructions in this manual and the burner manual.
23. Verify burner is properly inserted through the combustion chamber opening.
24. Furnace must be installed so that burner and control system components are protected from dripping, spraying water or rain during operation or service.
25. If installing an air conditioning evaporator coil, install the coil downstream of, or in parallel with, the furnace to prevent condensation in the furnace heat exchanger. If the coil is in parallel, provide means to prevent flow of chilled air into the furnace, including an interlock to prevent simultaneous operation of heating and air conditioning.

NOTICE

Apply the following suggestions to prevent unsatisfactory operation of the furnace.

Installation –

1. Be sure to level the furnace, using a spirit level on the front and one side. If the furnace is not level, oil can drip into the combustion chamber after burner cycling, causing fouling of the heat exchanger and the burner head.
2. Make sure all legs are in contact with the floor to distribute the load and prevent the possibility of undue noise or vibration.
3. Avoid locating return grills in rooms that may contain undesirable odors.
4. Never locate a return air grill closer than approximately 20 feet from the furnace.
5. Locate the furnace near the center of the supply and return duct systems.
6. Always check the size of the ducts on a replacement installation, particularly if adding air conditioning.

1 Prepare furnace location

Pre-installation checklist

Verify code compliance

- Local, state, and national codes, laws, regulations and ordinances
- NFPA-31, Installation of Oil-Burning Equipment
- National Electrical Code
- All local codes and/or regulations take precedence over the instructions in this manual and should be followed accordingly.

NOTICE SCH & SCL furnaces, their burners and controls have met safe lighting and other performance criteria when they underwent tests, specified in Underwriters Laboratories Standard UL727.

Check location and furnace specifications

- Furnace heating capacity
- Space is large enough to provide required clearances
Verify the installation will meet the requirements of this manual:
- Clearances (page 3)
- Combustion/ventilation air openings (page 4)
- Supply air duct (page 7)
- Return air duct (page 7)
- Vent system (page 9)
- Fuel oil piping (page 15 plus burner manual)
- Electrical connection (page 15)

Clearances

Minimum clearances to combustible materials

1. Install the furnace, ductwork and vent such that no combustible surface is closer than indicated in Table 1.

NOTICE Flue pipe clearances must take precedence over jacket clearances (listed below).

Service accessibility clearances

1. Provide no less than the minimum clearances given in Table 1 to ensure the furnace can be properly operated, serviced and maintained.
2. Always apply whichever clearance is **LARGER** – combustible construction or service accessibility.

Flooring and foundation

Flooring

SCH & SCL furnaces are approved for installation on combustible flooring, but must never be installed on carpeting.

WARNING Do not install furnace on carpeting even if foundation is used. Fire can result, causing severe personal injury, death or substantial property damage.

Foundation

1. Provide a solid brick or minimum 2 inch thick concrete foundation pad if any of the following is true:
 - the floor can become flooded.
 - the furnace mounting area is not level.

Residential garage installations

Take the following special precautions when installing the furnace in a residential garage. If the furnace is located in a residential garage:

- Mount the furnace a minimum of 18 inches above the floor of the garage.
- Locate or protect the furnace so it cannot be damaged by a moving vehicle.

Table 1 Minimum clearances

Minimum clearances from furnace, ductwork and vent								
Service accessibility clearances are recommended minimum dimensions to allow access to furnace components (motor, blower, filters, etc.)	SCH-105 (3" vent dia.)		SCH-160 (4" vent dia.)		SCL-105 (3" vent dia.)		SCL-160 (4" vent dia.)	
	To combustible construction	For service accessibility	To combustible construction	For service accessibility	To combustible construction	For service accessibility	To combustible construction	For service accessibility
Side of furnace or supply plenum	1"	24" (one side)	1"	24" (one side)	1"	24" (one side)	1"	24" (one side)
Rear of furnace	1"	24"	18"	24"	1"	24"	18"	24"
Top of furnace casing or supply plenum (warm-air duct within 6 ft. of furnace)	1"	---	2"	---	1"	---	2"	---
Bottom of furnace	0"	---	0"	---	0"	---	0"	---
Front of furnace	1"	24"	24"	24"	1"	24"	24"	24"
Flue pipe	REFER TO SECTION 4 (VENTING)							

1 Prepare furnace location (continued)

Vent pipe clearances

Table 2 Minimum clearances – side-wall venting

	CLEARANCES
Vent pipe, up to vent terminal	3"
Vent terminal	Zero

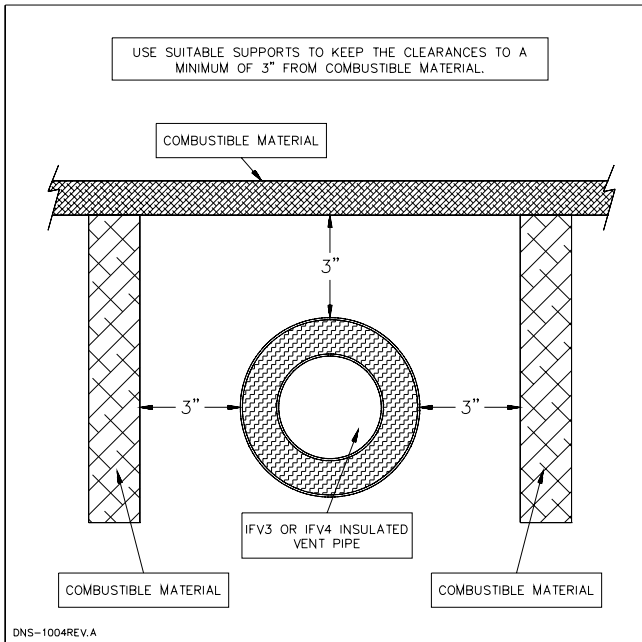


Figure 1

WARNING Do not enclose venting in a ceiling or combustible structure.

Vent terminal location

Select a location for the vent terminal in accordance with all local and national codes. The following requirements shall be considered to be minimum requirements that can be overridden by stricter local and national codes.

Following are excerpts from the NFPA 31 code:

The vent shall terminate at least 3 ft. above any air inlet to the structure that is within 10 ft. of the termination point.

The combustion air inlet and flue gas outlet of a direct vent appliance shall terminate at least 1 ft. (0.3 m) from the soffit of the roof of the structure and at least 3 ft. (0.9 m) from an inside corner of an L-shaped structure.

The vent terminal shall be located at least 1 ft. (0.3 m) from any door, window or air inlet to the structure. The flue gas outlet terminal shall also terminate at least 1 ft. (0.3 m) above grade.

The vent shall not be less than 7 ft. (2.1 m) above grade, when located adjacent to public walkways.

The vent shall terminate at least 5 ft. (1.6 m) from the vent outlet of a supply tank.

CAUTION Most codes have a notwithstanding clause which states that, products of combustion shall not enter the dwelling under any circumstances, even if all other code requirements as to construction and location have been complied with. The installer is ultimately responsible to do whatever is necessary to ensure that flue gases do not enter the dwelling.

2 Prepare furnace and place in position

Inspect & prepare furnace

Remove furnace from carton

Remove the furnace from its shipping carton and inspect thoroughly. Remove access panels to inspect the furnace interior.

NOTICE

Immediately file a claim with the transportation company if you discover concealed damage.

WARNING

Do not install or attempt to operate the furnace if the heat exchanger, burner or controls have been damaged. Immediately contact your furnace supplier. Operating a damaged furnace could result in severe personal injury, death or substantial property damage.

Prepare furnace (SCH models)

SCH furnaces require cutting the return air opening into one side of the furnace. Carefully cut the opening on the correct side of the furnace, using the four knock-outs on the side as guides.

Prepare burner

Remove the burner from its shipping carton and inspect thoroughly. Read the burner manual and follow instructions for preparing and installing the burner.

Install the correct nozzle for the required firing rate, using the burner manual and the information in Section 12 of this manual. Follow the burner manual instructions for nozzle installation. Verify the correct setting of electrodes after nozzle and burner oil tube assembly are in place.

Openings in walls, floor & ceiling

General

Ensure that the finished door opening to the furnace room is large enough to install and remove the furnace, water heater or any other appliances in the room.

Before placing furnace in a closet or small room, cut all openings required in floor, ceiling or walls for ducts and vent. This will simplify the work and prevent construction dust from entering the furnace heat exchanger.

WARNING

Verify that all clearances to combustible construction and as needed for service accessibility will be met. The vent must be no closer than 3 inches to any combustible surface. Failure to comply could result in severe personal injury, death or substantial property damage.

Duct locations and sizing

Verify the size of the supply and return duct system is sufficient for the application. The pressure drop through the duct system must not exceed 0.25 inch water column. The total drop through the duct system and air conditioning evaporator coil (if used) must not exceed 0.5 inch water column.

Openings in walls, floor... (continued)

See suggested duct sizing in this manual. For more detailed sizing information refer to ACCA Manual D.

Return air duct

You must install a return air duct, sealed to the furnace, even if no return manifold is used. The only exception is when the furnace is located in a large unpartitioned room, such as a basement. (A room whose volume is at least 50 cubic feet per 1,000 BTU/h input of all appliances in the room is considered large). For large rooms, return air may be taken directly at the furnace, without a return air duct. No return air register should be within 20 feet of the furnace.

Cut the required opening for the return air duct in the wall (or floor or ceiling) of the room before placing the furnace.

Install filter

Install return air filter of the size listed in Section 12.

You will need to install a filter rack provided with the furnace for Model SCH only.

NOTICE

Verify that the filter will be easily accessible for removal after the furnace is in place.

Install furnace and burner

Place furnace

Place the furnace in the desired location. Measure clearances and verify per page 3 of this manual.

Using a spirit level on the front and one side of the furnace, level it using the 4 or 6 levelling legs. Make sure each of the legs is firmly in contact with the floor.

Inspect combustion chamber

Inspect the combustion chamber. Verify it is in good condition and correctly in position inside the heat exchanger. The burner opening in the chamber must align with the burner heat exchanger opening.

WARNING

The combustion chamber is constructed of ceramic fiber materials. See the WARNING information on page 23 of this manual. Comply with these instructions when handling any ceramic fiber or fiberglass materials. Failure to adhere to these guidelines could result in severe personal injury or death.

Insert burner

Following the burner manual instructions, install the burner and its gasket in the burner opening. Make sure the burner is aligned with the opening in the combustion chamber and that burner insertion corresponds to the value specified in Section 12.

Secure the burner in place with the three nuts and washers provided. Wire and pipe fuel to the burner per burner manual and this manual.

Burner orientation

Always keep the motor shaft in a horizontal position

3 Connect supply and return ducts

Duct sizing

Determine air flow CFM

The temperature rise through the furnace must not exceed 85° F and should be at least 55°F for comfort. When calculating air flow, assume a temperature rise of 70°F.

The sensible heat temperature change for cooling would be approximately 27-30°F. Actual temperature change will be approximately 18-21°F due to humidity of the air.

To calculate the sensible heat temperature change (ΔT), you can use the formula:

$$\Delta T = \text{BTU/h} / (1.1 \times \text{CFM}) \quad \text{Eq. 3-1}$$

To calculate air flow when you know temperature change (ΔT), you can use:

$$\text{CFM} = \text{BTU/h} / (1.1 \times \Delta T) \quad \text{Eq. 3-2}$$

You can estimate air flow using the following rules of thumb:

- Heating: **14 CFM per 1,000 BTU/h** output Eq. 3-3
- Cooling: **400 CFM per ton** air conditioning Eq. 3-4

Determine the required air flow based on whichever is larger – heating mode or air conditioning mode.

Examples:

- What would the temperature rise be for a 100,000 BTU/h output furnace with an air flow rate of 1200 CFM?

Use Equation 3-1 since you know CFM and BTU/h:

$$\Delta T = 100,000 / (1.1 \times 1200) = 76^\circ\text{F}$$

- The temperature rise would be 76°F.
- If the air enters the furnace at 70°F, it would leave the furnace at 70°F + 76°F = 146°F.

- What would the air flow be to obtain a 70°F rise through a 120,000 BTU/h output furnace?

Use equation 3-2 since you know ΔT and BTU/h:

$$\text{CFM} = 120,000 / (1.1 \times 70) = 1,558 \text{ CFM}$$

- The air flow would have to be 1,558 CFM to obtain a temperature rise of 70°F.

- Estimate the required air flow for a 75,000 BTU/h output furnace installed with a 2-ton air conditioning evaporator coil.

Heating mode air flow (use Equation 3-3):

$$\text{CFM} = 75 \times 14 = 1,050 \text{ CFM}$$

Cooling mode air flow (use Equation 3-4):

$$\text{CFM} = 2 \times 400 = 800 \text{ CFM}$$

- The larger number is 1,050 CFM (heating), so the duct system should be sized for 1,050 CFM.
- The supply duct would need to be 16" round or a rectangular equivalent such as 8" x 25" or 12" x 16", using Table 4, page 7.

- Estimate the required air flow for the same furnace installed with a 4-ton air conditioning evaporator coil.

Heating mode air flow is still 1,050 CFM.

Cooling mode air flow (use Equation 3-4):

$$\text{CFM} = 4 \times 400 = 1,600 \text{ CFM}$$

- The larger number is 1,600 CFM (cooling), so the duct system should be sized for 1,600 CFM.
- The supply duct would need to be 18" round or a rectangular equivalent such as 8" x 36" or 12" x 21", using Table 4, page 7.

CAUTION

Always check the size of existing ducts, particularly if you are adding air conditioning. The air pressure loss through the cooling evaporator coil reduces available air flow. If the ducts are too small as well, the system may not work satisfactorily on either heating or cooling.

Determine duct dimensions

Table 4, page 7 and Table 5, page 8, provide typical round and rectangular duct sizes for rectangular and flat oval galvanized ducts. Do not apply these tables to size ductwork if the total equivalent length of the duct exceeds approximately 100 feet. For longer systems or for duct board, fiberglass-lined or flexible duct sizing, use the ACCA Manual D or the ACCA duct sizing slide rule. These tables are based on pressure loss of approximately 0.10 inch water column per 100 feet equivalent length of duct.

Use Table 3 below to size or check sizing of take-offs to supply registers or return grills.

Verify the size and type of registers, diffusers and grills from the manufacturer's ratings. Do not exceed the recommended flow rate. The pressure drop allowance for each should not exceed approximately 0.05 inch water column.

Install a return air filter, sized per specifications in Section 12.

Use only a return air filter mounted to the furnace. Do not add additional filters unless the duct system is carefully sized to allow for the additional pressure drop.

Table 3 Suggested maximum flow to runouts

TAKE-OFF SIZE (Inches)	CFM	
	SUPPLY	RETURN
Sheet metal or ductboard		
5 Round	60	45
6 Round	100	75
7 Round	140	110
8 Round	210	160
3 ¼ x 8 Stack	70	55
3 ¼ x 10 Stack	100	75
3 ¼ x 14 Stack	140	110
2 ¼ x 12 Stack	70	55
2 ¼ x 14 Stack	90	70
Flexible duct (keep bends to minimum)		
6 Round	55	40
8 Round	120	90
10 Round	200	160
12 Round	320	250
14 Round	480	375
16 Round	660	530
18 Round	880	680
20 Round	1200	900

3 Connect supply and return ducts (continued)

Duct sizing (continued)

Table 4 Typical duct sizing for systems not over 100 feet equivalent length – round or rectangular galvanized

Typical duct sizing																		
(For approximately 0.10 inch w.c. in a typical residential installation of galvanized metal duct)																		
CFM	Round duct diameter (inches)	Rectangular duct equivalent sizes																
		Minimum width (inches) for duct heights (inches) of :																
		4	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28	30
		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
45	4	4	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65	5	6	5	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-
100	6	8	6	5	5	4	4	-	-	-	-	-	-	-	-	-	-	-
150	7	12	9	7	6	5	5	5	4	4	-	-	-	-	-	-	-	-
200	8	14	11	9	8	7	6	6	5	4	4	-	-	-	-	-	-	-
250	9	18	13	10	9	8	7	6	6	5	5	4	4	-	-	-	-	-
300	9	20	15	12	10	9	8	7	6	6	5	5	4	4	-	-	-	-
400	10	26	19	15	13	11	10	9	8	7	6	6	5	5	5	4	4	-
500	12	32	23	18	15	13	12	11	9	8	7	6	6	6	5	5	5	5
600	12	38	28	22	18	15	13	12	10	9	8	7	7	6	6	6	5	5
700	12	46	32	25	20	17	15	14	11	10	9	8	7	7	7	6	6	6
800	14	52	36	28	23	19	17	15	13	11	10	9	8	8	7	7	6	6
900	14	58	41	31	25	21	19	17	14	12	11	10	9	8	8	7	7	7
1000	16	64	45	34	28	23	20	18	15	13	11	10	9	9	8	8	7	7
1100	16	72	49	38	30	25	22	19	16	14	12	11	10	9	9	8	8	7
1200	16	-	54	41	33	27	24	21	17	15	13	12	11	10	9	9	8	8
1300	16	-	58	44	35	29	25	22	18	16	14	12	11	10	10	9	9	8
1400	18	-	63	47	38	31	27	24	19	16	14	13	12	11	10	10	9	9
1500	18	-	68	51	40	34	29	25	20	17	15	14	12	12	11	10	10	9
1600	18	-	72	54	43	36	30	27	21	18	16	14	13	12	11	11	10	9
1700	18	-	-	58	45	38	32	28	23	19	17	15	14	13	12	11	10	10
1800	18	-	-	61	48	40	34	29	24	20	17	16	14	13	12	11	11	10
1900	20	-	-	64	51	42	35	31	25	21	18	16	15	14	13	12	11	11
2000	20	-	-	68	53	44	37	32	26	22	19	17	15	14	13	12	12	11
2200	20	-	-	-	59	48	41	35	28	23	20	18	16	15	14	13	12	12
2400	22	-	-	-	64	52	44	38	30	25	22	19	17	16	15	14	13	12
2600	22	-	-	-	69	56	47	41	32	27	23	21	19	17	16	15	14	13
2800	22	-	-	-	-	61	51	44	34	29	25	22	20	18	17	15	15	14
3000	22	-	-	-	-	65	54	47	37	30	26	23	21	19	17	16	15	14
3500	24	-	-	-	-	-	63	54	42	34	29	26	23	21	19	18	17	16
4000	26	-	-	-	-	-	72	61	47	39	33	29	26	23	21	20	19	18

WARNING Do not apply this table for duct systems over approximately 100 equivalent feet length. For longer systems or systems using other duct materials, refer to ACCA Manual D. Incorrectly sizing duct systems can result in unsafe or uncomfortable operation.

3 Connect supply and return ducts (continued)

Duct sizing (continued)

Table 5 Typical duct sizing for systems not over 100 feet equivalent length – round or flat oval galvanized

Typical duct sizing														
(For approximately 0.10 inch w.c. in a typical residential installation of galvanized metal duct)														
CFM	Round duct diameter (inches)	Flat oval duct equivalent sizes												
		Minimum width (inches) for duct heights (inches) of :												
		3 x	4 x	5 x	6 x	7 x	8 x	9 x	10 x	12 x	14 x	16 x	18 x	20 x
45	4	6	5	-	-	-	-	-	-	-	-	-	-	-
65	5	8	6	-	-	-	-	-	-	-	-	-	-	-
100	6	11	8	7	-	-	-	-	-	-	-	-	-	-
150	7	16	11	9	8	-	-	-	-	-	-	-	-	-
200	8	21	15	11	10	8	-	-	-	-	-	-	-	-
250	9	26	18	14	11	10	9	-	-	-	-	-	-	-
300	9	30	20	16	13	11	10	-	-	-	-	-	-	-
400	10	40	26	20	16	14	12	11	-	-	-	-	-	-
500	12	49	32	24	19	16	14	13	12	-	-	-	-	-
600	12	59	38	28	22	19	16	15	13	-	-	-	-	-
700	12	69	44	32	25	21	18	16	15	13	-	-	-	-
800	14	-	50	36	29	24	20	18	16	14	-	-	-	-
900	14	-	56	41	32	26	22	20	18	15	-	-	-	-
1000	16	-	63	45	35	29	24	22	19	17	15	-	-	-
1100	16	-	69	49	38	31	26	23	21	18	16	-	-	-
1200	16	-	75	53	41	33	28	25	22	19	17	-	-	-
1300	16	-	-	58	44	36	30	26	24	20	18	-	-	-
1400	18	-	-	62	47	38	32	28	25	21	18	17	-	-
1500	18	-	-	66	50	41	34	30	26	22	19	18	-	-
1600	18	-	-	71	54	43	36	31	28	23	20	18	-	-
1700	18	-	-	-	57	46	38	33	29	24	21	19	-	-
1800	18	-	-	-	60	48	40	35	31	25	22	20	-	-
1900	20	-	-	-	63	50	42	36	32	26	23	21	19	-
2000	20	-	-	-	67	53	44	38	33	27	24	21	20	-
2200	20	-	-	-	73	58	48	41	36	29	25	23	21	-
2400	22	-	-	-	-	63	52	44	39	32	27	24	22	21
2600	22	-	-	-	-	68	56	48	42	34	29	25	23	22
2800	22	-	-	-	-	-	60	51	44	36	30	27	24	23
3000	22	-	-	-	-	-	64	54	47	38	32	28	26	24
3500	24	-	-	-	-	-	-	63	54	43	36	32	28	26
4000	26	-	-	-	-	-	-	71	61	48	40	35	31	29

WARNING Do not apply this table for duct systems over approximately 100 equivalent feet length. For longer systems or systems using other duct materials, refer to ACCA Manual D. Incorrectly sizing duct systems can result in unsafe or uncomfortable operation.

4 Venting – Sealed Combustion System

WARNING

Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

The furnace can be side-wall vented without the use of a side-wall power vent, using a venting system with the high static pressure Beckett AFII and Riello 40-BF oil burners. Outdoor combustion air must be directly connected to the burner or the venting system will not function..

The notable characteristics of the vent system are as follows:

- Certified for use of the following materials for ducting the intake air from the terminal to the burner: Schedule 40 PCV DWV, Schedule 40 ABS DWV and ASTM D-2729 sewer pipe;
- One hole of minimal size (6 inches) is required to be cut into the side-wall and the terminal is designed to fit through a minimum 2 x 8 joist space.
- Incorporates a vent blockage safety shutdown system. If the vent or intake opening ever becomes partially or fully blocked, the burner will shut down before a #1 smoke condition occurs;
- The intake vent circuits within the terminal can be accessed for cleaning.

There are three main components to the venting system:

- Vent terminal kit VTK-1 for the 105 series models or VTK-2 for the 160 series models.
- Flexible insulated venting material for IFV3 for the 105 series models or IFV4 for the 160 series models
- Field supplied 3 inch PVC or ABS intake piping.

WARNING

Poisonous carbon monoxide gas hazard.

Even though the flexible venting is insulated, it must not run through an unheated space.

To do so can cause residual condensation inside the stainless steel liner, which may eventually perforate the liner and allow vent gases to enter the dwelling, which can result in personal injury and/or death or property damage.

Insulated flexible venting

The certified venting materials come in 3 lengths, Model # IFV3-15, IFV3-23 and IFV3-30 for the 105 model series or IFV4-15, IFV4-23 and IFV4-30 for the 160 model series, correspond to 15, 23 and 30 feet of continuous lengths of vent. The vent construction is coaxial and incorporates a stainless steel corrugated, flexible liner, surrounded by a thick insulation blanket and covered with an outer layer of flexible corrugated aluminum sleeve to protect the insulation.

Splicing vent lengths together is prohibited. The maximum and minimum continuous vent lengths permitted for installation are:

5 feet minimum 30 feet maximum

Side-wall venting installation

WARNING

Cut and abrasion hazard.

Always wear protective gloves and eye protection when handling the vent material.

The process of cutting and fitting the flexible vent material exposes the installer to sharp edges that can cause severe cuts to the skin.

Connection to the furnace breach

- Determine in which direction the venting will be routed from the furnace;
- The flexible venting has 4 pieces of corrugated spin sleeve that has been temporarily screwed over top of it. Remove the spin sleeve completely by unscrewing it in a counter-clockwise direction;
- Using tin snips, cut the aluminium outer sleeve back by 5 inches on the IFV Series vent (see Figure 1.1). Ensure the snips are well adjusted and sharp or the cut end of the venting will be too jagged to start the threads of the spin sleeve (see Figure 1.1).
- Prepare the furnace breach end of the insulated flex vent by first screwing the spin sleeve onto the corrugated aluminum jacket (see Figure 1.2) until the trailing edge of the spin sleeve is about 12 inches from the end of the vent (see Figure 1.3).
- Pull the insulation back to expose the corrugated stainless steel core.
- Cut the corrugated stainless steel core back by 3 inches on the IFV Series vent. You should now have about 3 inches of insulation hanging out past the stainless steel core (see Figure 1.4);
- Push the stainless steel core onto the breach pipe as far as it will go (see Figure 1.5) and mechanically attach the vent to the breach using three of the #8 x 1/2" self-drilling screws provided with the VTK Series kit. The screws should be equally spaced around the circumference of the stainless steel core, starting with the first screw at top dead center. Start the drill point of the screws in the valleys of the corrugations at 3/8"-5/8" back from the end of the stainless steel core, so the screw heads can be properly sealed in the forthcoming operations (see Figure 1.6);
- With the stainless steel core now firmly attached to the breach, apply sealant all around the joint, where the corrugated stainless steel core meets the smooth outer surface of the breach pipe (see Figure 1.7). In other words, the sealant must be centered over the joint;
- Also, make sure that the heads of the self-drilling, stainless steel screws are completely covered with the sealant;
- Two stainless steel band clamps are provided with the VTK Series kits. Position one stainless steel band clamp over the sealant, so that the edge of the clamp closest to the breach lines up with the sealant that is closest to the breach. Ensure that the band will close with an action of one strip sliding over the other - not under the gear head of the draw clamp (see Figure 1.8). Tighten the band clamp with considerable torque to cause the sealant to be squeezed into all crevices and to ooze out of the edge of the clamp closest to the breach (see Figure 1.9);
- The seal is permanent and should never need to be broken, since the breach plate can be removed for cleaning and inspection using the 4-bolt joint;
- Tuck the vent insulation into the breach collar;
- Screw the spin sleeve tightly into the breach collar for a finished appearance. Wrap the other end of the spin sleeve with aluminum tape to cover any metal burrs that may be present (see Figure 1.10);
- Bend the venting into the desired radius coming off the breach.

4 Venting – Sealed Combustion System (continued)

Connection to the vent terminal

1. Prepare the terminal end of the insulated flex vent by first screwing the spin sleeve onto the corrugated aluminum jacket until the trailing edge of the spin sleeve is about 10 inches from the end of the vent;
2. Using sharp tin snips, cut the aluminum outer sleeve back by 5 inches on the IFV Series vent;
3. Pull the insulation back to expose the corrugated stainless steel core;
4. Cut the corrugated stainless steel core back by 3 inches on the IFV Series vent. You should now have about 3 inches of insulation hanging out past the stainless steel core;
5. Push the stainless steel core onto the pipe on the back of the terminal as far as it will go and mechanically attach the vent to the terminal using three of the #8 x 1/2" self-drilling screws provided with the VTK Series kit. The screws should be equally spaced around the circumference of the stainless steel core, starting with the first screw at top dead center. Start the drill point of the screws in the valleys of the corrugations at 3/8"-5/8" back from the end of the stainless steel core;
6. With the stainless steel core now firmly attached to the terminal, apply sealant all around the joint where the corrugated stainless steel core meets the smooth outer surface of the breach pipe (see Figure 1.7). In other words, the sealant must be centered over the joint;
7. Also, make sure that the heads of the self-drilling, stainless steel screws are completely covered with the sealant;
8. Position the other stainless steel band clamp over the sealant so that the edge of the clamp closest to the terminal lines up with the edge of the sealant that is closest to the terminal. Tighten the band clamp with considerable torque to cause the sealant to be squeezed into all crevices and to ooze out of the end of the clamp closest to the terminal (see Figure 1.11);
9. The seal is permanent and should never need to be disconnected as the end of the terminal can be opened for cleaning and inspection by removing the screened end-cone assembly. Tuck the vent insulation into the recess in the terminal body;
10. Screw the spin sleeve tightly into the recess for a finished appearance. Wrap the other end of the spin sleeve with aluminum tape to cover any metal burrs that may be present (see Figure 1.12);
11. Bend the venting into the desired radius coming off the terminal.
3. Remove the 2 screws fastening the end cone in place and remove the cone;
4. Remove the 2 screws fastening the stabilizer shroud in place and remove the stabilizer shroud;
5. Insert the main body of the terminal through the wall plate so that the end of the terminal extends about 2 inches past the outside wall;
6. Install the stabilizer shroud and replace the two mounting screws. (see Figure 1.13);
7. On concrete and block wall installations in particular, if it appears that the flange on the back of the stabilizer shroud is not large enough to cover the irregularities in the hole, a field fabricated wall plate can be constructed out of 304, 316, or 316L stainless steel;
8. Silicone seal the circumference of the joint where the stabilizer shroud connects to the main body of the terminal;
9. Apply caulking to the back plate of the stabilizer shroud and push the terminal back firmly against the wall, making sure the pressure switch is located at the top, in a horizontal position;
10. While pushing down gently on the top of the stabiliser shroud, install the 3 stainless steel 2 inches screws provided with the kit to secure the back of the shroud to the wall. Do not overtighten the screws or it will distort the stabiliser shroud. The screws will not be necessary in a concrete or block wall as the mortar can provide positive positioning;
11. Tighten the clamp on the wall plate to secure the terminal in place;
12. Apply more caulking all around the seam where the stabilizer shroud meets the wall. It is important to have a good seal to prevent water from entering the dwelling (see Figure 1.14). A considerable amount of caulking may be necessary for irregular wall surfaces such as lapped siding;
13. Install the end cone and replace the two mounting screws;
14. Support the vent and intake air piping so that a 1/4" to 1/2" downward slope (toward the outside) results for proper drainage out the terminal body.

Ducted outdoor combustion air (Sealed Combustion System)

The burners are set up to duct outside combustion air directly to the burner: the Beckett AFII and the Riello 40-BF for side-wall venting.

CAUTION

The use of ducted outside combustion air is mandatory with side-wall venting systems. The system operates on a balanced flue principle and will not function properly if the combustion piping is not attached and sealed at all connections between the vent terminal and burner inlet.

The venting system is a sealed system and completely isolates the furnace from the interior of the building. The burner is totally unaffected by any pressure fluctuations within the building which makes it ideal for tight home construction.

Installing terminal in the wall

1. Cut a 6 inch hole in the side-wall in accordance with the location considerations outlined in the previous section;
2. Fasten the wall plate to the inside-wall using 4 field-provided fasteners, appropriate for the material behind the wall plate. Depending on the angle of access, the pressure control bracket may need to be removed to access the top right wall plate screw hole. For concrete and block, Tapcon™ screws or equivalent are recommended. Install the wall plate so that the top of the hole in the wall plate is positioned 1/8" lower than the top of the 6 inch hole in the wall. This will accommodate the proper downward slope of the terminal, in the direction from the inside to the outside;

4 Venting – Sealed Combustion System (continued)

The venting system requires additional parts, which are not included with the kit. These parts must be constructed of 3 inch Schedule 40 PVC, PVC-SWV, 26-SDR, SDSR-21, Septic Sewer Pipe or ABS plastic pipe, fittings and sealant. Also, installation procedures, piping and fittings must conform to the following ANSI/ASTM standards:

PVC	ASTM D-1785
SDR-26, SDR-21	ASTM D-2241
Septic Sewer Pipe	ASTM D-2729
PVC-DWV	ASTM D-2665
PVC Primer and Solvent Cement	ASTM D-2564
ABS Pipe and Fittings	ASTM D-2235
Procedure for Cementing Joints	ASTM D-2855

Additional parts required (not included in VTK kit)

- 3 inch elbow fitting as required;
- 3 inch plastic pipe;
- 3 inch 90° elbow, female-female (for terminal);
- 3 inch female to 2 inch female reducer (Riello 40-BF burner only);
- 2 inch 90° elbow, street type, female-male (Riello 40-BF burner only);
- 3 inch female-female PVC or ABS coupling, not sewer pipe (Beckett AFII burner only);
- Transition bushings to go from PVC or ABS to ASTMD-2279 Septic Sewer Pipe (if applicable).

If PVC fittings are mixed with ABS fittings, use solvent cement that is approved for bonding the two plastics.

Intake pipe length

The venting system has been certified for 120 equivalent feet of 3 inch intake pipe. Count a 90° elbow as 10 equivalent feet and a 45° elbow as 5 equivalent feet in the calculation.

For example:

1 length of 5 feet	= 5 equivalent feet
2 lengths of 10 feet	= 20 equivalent feet
3 elbows, 90°	= 30 equivalent feet
2 elbows, 45°	= 10 equivalent feet
1 elbow, 90° (terminal)	= 10 equivalent feet
1 elbow, 90° (Riello burner)	= 10 equivalent feet

Total: = 85 equivalent feet, which is less than 120 feet and therefore acceptable.

Intake pipe installation

Obtain the necessary additional parts, to complete the installation and start by piping at the burner. If the optional vestibule was installed, remove the appropriate knockouts in the side panels of the vestibule. The lower 5 inch knock outs in the right-hand panel is used for the Beckett AFII burner. The higher 5 inch knockouts on the right and left-hand panels are for right or left connection to the Riello 40-BF burner.

Beckett AFII burner

Remove the burner intake cover by removing 3 screws securing it in place. Discard the cover and screws. Apply silicone liberally around the end of a 3 inch coupling and fully insert the siliconed end into the burner opening. Fasten securely with 3 self-tapping sheet metal screws.

Riello 40-BF burner

Fully insert the female end of the 2 inch, 90° street elbow into the combustion air fitting on top of the burner. Fasten securely with 3 self-tapping sheet metal screws. Cement the 2 inch end of the 3 inch female to 2 inch female reducer into the male end if the 2 inch 90° street elbow. If the parts are not easily obtained, use a 3 inch 90° street elbow with the male end fitted over the combustion air fitting. The fitting will have to be silicone sealed, as the fit will be a bit loose. Fasten securely with 3 self-tapping sheet metal screws.

Terminal connection

Insert the 3 inch 90° female-female elbow onto the stainless steel air intake fitting located on the right side of the vent terminal (viewed from the rear). Fasten with 3 self-tapping sheet metal screws.

Intermediate piping

Pipe as required between the terminal and the burner. Ensure that the 3 inch piping is routed and supported in accordance with local and national codes. Obey minimum furnace clearances to combustibles when routing any section of 3 inch piping in the vicinity of the furnace. If Septic Sewer Pipe is to be used, install transition bushings at the 3 inch female ends of the fittings at the burner and at the terminal. Transition bushings are readily available and are required because 3 inch PVC and ABS pipes have a typical outside diameter of 3.5 inches, whereas Septic Sewer Pipe has a typical outside diameter of 3.25 inches.

FIGURE 1.1



FIGURE 12

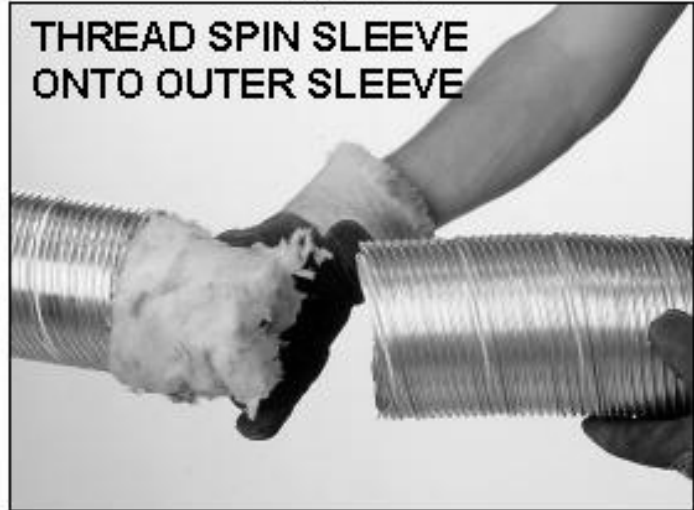


FIGURE 13



FIGURE 14



FIGURE 15



FIGURE 16



FIGURE 1.7



FIGURE 1.8



FIGURE 1.9



FIGURE 1.10



FIGURE 1.11

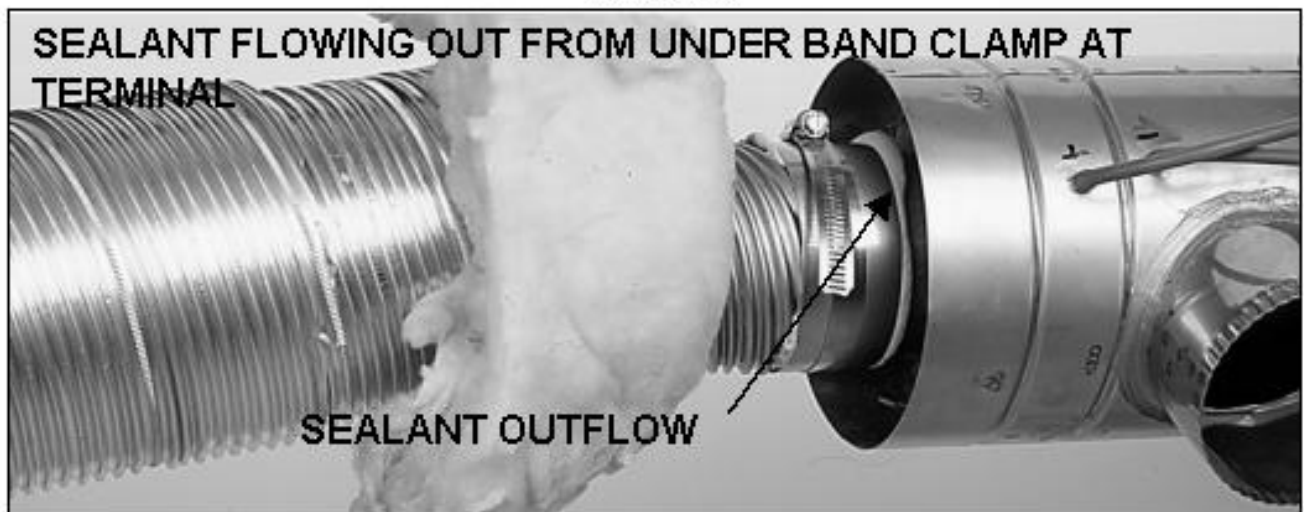


FIGURE 1.12

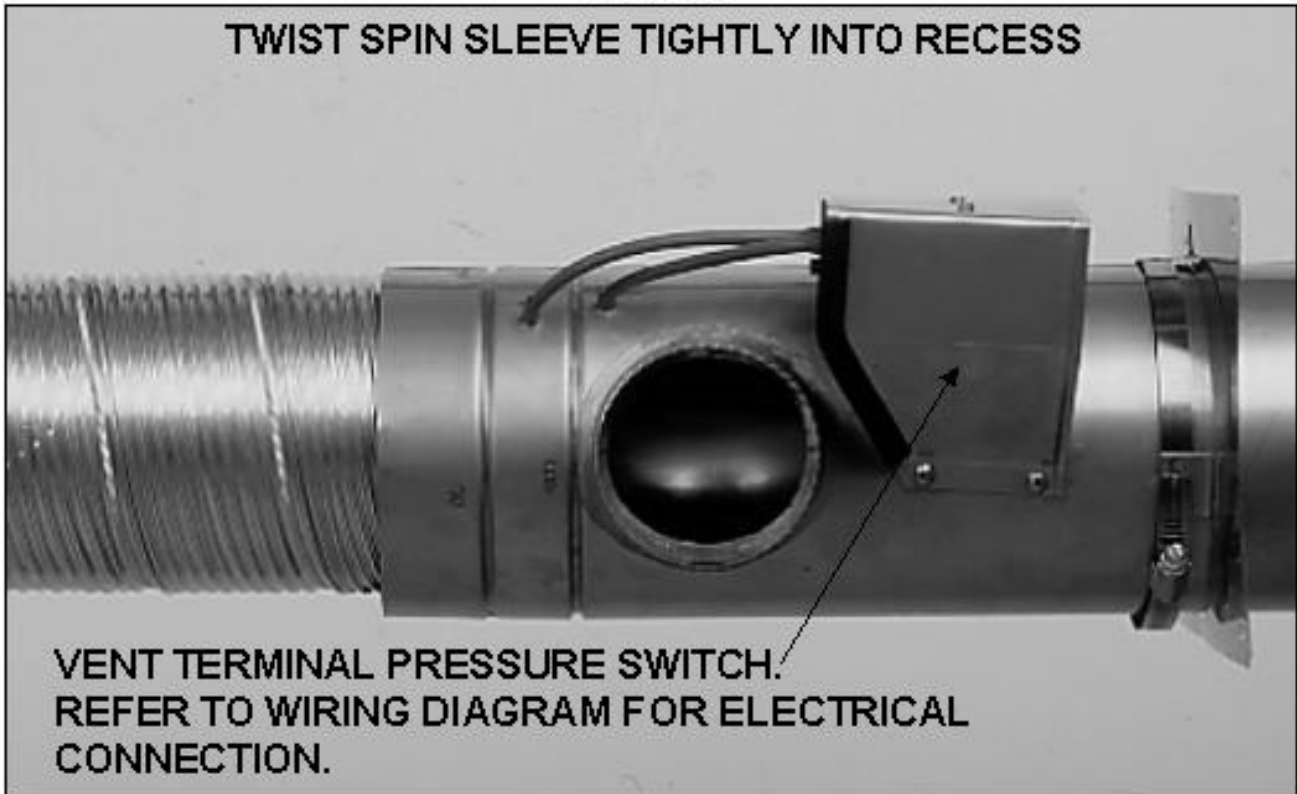
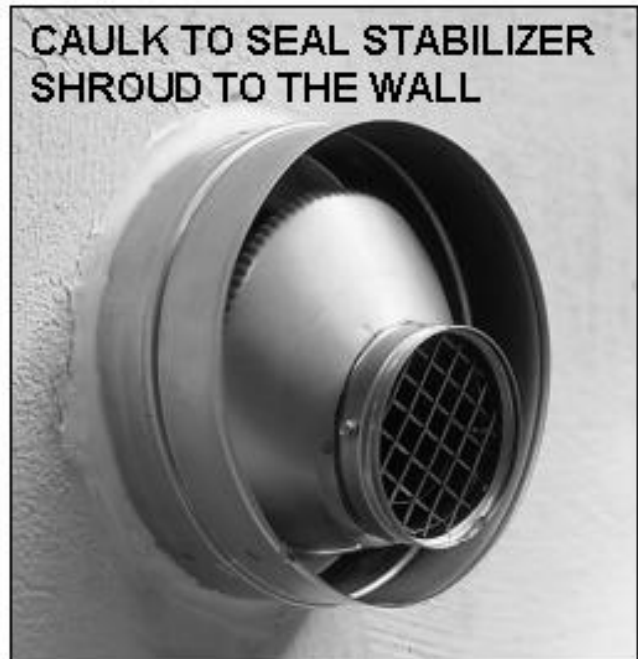


FIGURE 1.13



FIGURE 1.14



5 Connect fuel oil piping

General oil piping requirements

- Location and installation of oil tanks, oil piping and burners must follow:
 - NFPA 31, Standard for the Installation of Oil-Burning Equipment.
 - In Canada, CSA B139, Installation of Oil-Burning Equipment.
 - Local codes and regulations.
 - Information provided with burner and fuel pump.
- If any part of fuel oil tank is above level of burner, an anti-siphon device must be used to prevent flow of oil in case of oil line break.
- Support oil lines as required by codes.
- Make tank connections with swing joints or copper tubing to prevent breaking in case the tank settles. Make swing joints so they will tighten as tank settles. Non-hardening pipe joint compounds should be used on all threads.

WARNING Do not use Teflon tape as an oil pipe sealant. It can cause valves to fail, creating hazards. Use only flare fittings. Do not use compression fittings. Failure to comply could result in severe personal injury, death or substantial property damage from oil leakage and/or fire hazard.

- Underground pipe must be run in a casing to prevent oil leaking into ground or under floor. Check local codes for information.

Oil piping connection at burner

- Connect oil line to burner using a flare fitting.

WARNING Use of any connection other than a flare fitting at the oil connection to the burner could result in a fuel oil leak, with the potential for severe personal injury, death or substantial property damage.

- See local codes for appropriate arrangement and piping of filter, control valves, etc. connecting to oil tank.
- Refer to burner manual for oil system requirements. Verify that suction lift does not exceed stated limit. Where lift exceeds limit for a one-pipe system, use a two-pipe system as directed in burner manual.

WARNING Electric shock hazard. Can cause severe personal injury or death if power source, including service switch on furnace, is not disconnected before installing or servicing.

6 Wire furnace & burner

Wire burner

The burner harness is factory-wired to the furnace at the factory. Plug the burner harness into the mating burner connector to wire the burner. Refer to the wiring diagram on pages 16 and 17 for further information.

Install and wire thermostat / shut-off system

Mount the room thermostat on an interior wall in the natural circulating path of room air. Do not locate the thermostat so it is exposed to cold air infiltration, drafts from windows or doors, air currents from supply or return air registers, behind obstructions, on a shelf, in a closet, or in a corner.

Ensure that the thermostat will not be exposed to heat from a nearby fireplace, radio, television, lamp or rays from the sun. Do not mount the thermostat on a wall over a supply or return duct, chimney or vent.

Wire thermostat to the vent terminal pressure switch and to the furnace electrical box (refer to wiring diagram). Set thermostat anticipator as shown on wiring diagrams on pages 16 and 17.

Connect power wiring

All wiring must conform to:

- National Electrical Code, ANSI/NFPA 70, latest edition and any additional national, state or local codes.
- In Canada, CSA C22.1 Canadian Electrical Code Part One and any local codes.
- Wiring must be N.E.C. Class 1. If original wire as supplied with furnace must be replaced, type 105° C wire or equivalent must be used. Supply wiring to furnace must be sized for the load required (see Section 12).
- Provide electrical ground at furnace as required by codes.

Connect 120 VAC/60 Hertz, single phase separate electrical line from the main house panel to the power leads in the furnace electrical box as shown on wiring diagram, pages 12, 13, 14 and 15. Provide a fused disconnect in the power wiring, following all local codes.

Ensure the wire size and type are adequate for the electrical load (see Section 12 and furnace nameplate for value).

Limit control

The furnace is equipped with a fan switch/limit control. This control limits the air leaving the heat exchanger to 200° F or less. The fan switch continues fan operation until the air drops to a preset temperature. For most installations, set the blower ON setting at 110° F and blower OFF setting at 90° F. If a longer cool down period is desired, lower the OFF setting.

6 Wire furnace & burner (continued)

SCHEMATIC WIRING DIAGRAM

SCL-105-DD-R-S2/SCL-160-DD-R-S2
 SCH-105-DD-S2/SCH-160-DD-S2

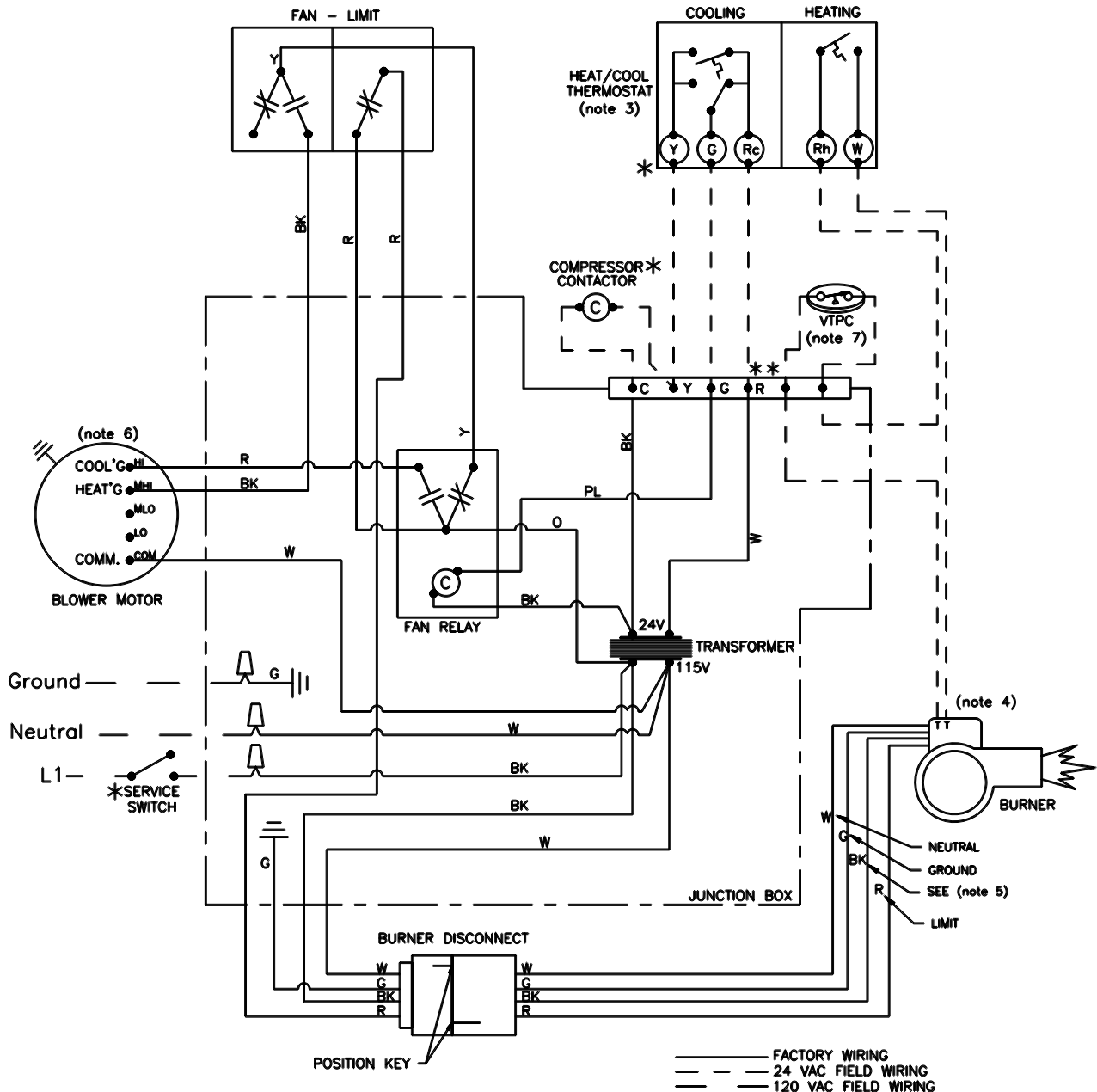


Figure 2 Wiring – SCH & SCL furnaces with direct-drive blower

NOTES:

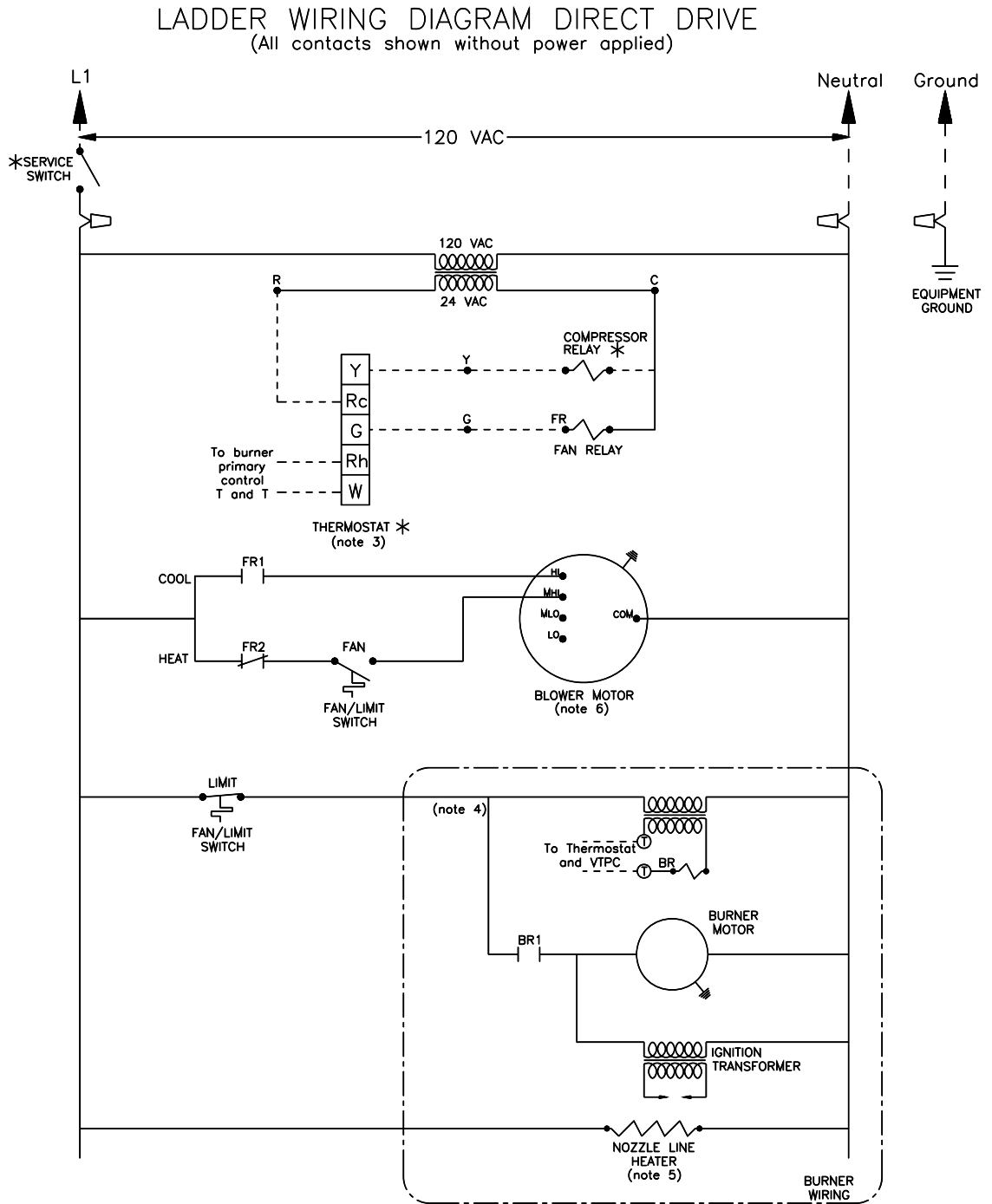
1. All wiring must be installed in accordance with: N.E.C. And any other national, state, or local code requirements.
2. If any of the original wire as supplied with the appliance must be replaced, use minimum 105°C wire or equivalent.
3. Thermostat anticipator setting – 0,20 amp.
4. Refer to control component instructions packed with the furnace burner for application information.
5. Black wire is continuous electric power used only with post purge burner control or burner with electric damper if required. Leave wire capped and unattached if not used.
6. Refer to technical specification for blower speed adjustment.
7. VTPC = Vent Terminal Pressure Control electrical connection mandatory.

- * Items not provided
- ** Low voltage terminal strip

DNS-0988 Rev. D

6 Wire furnace & burner (continued)

Figure 3 Ladder wiring – SCH & SCL furnaces with direct-drive blower



DNS-0890 Rev. C

7 Start up

DANGER

Follow information below to prevent severe personal injury, death or substantial property damage:

- Do not use gasoline, crankcase drainings or any oil containing gasoline. See burner manual for proper fuel oil.
- Do not attempt to start burner when excess oil has accumulated, when unit is full of vapor or when combustion chamber is very hot.
- Do not start burner unless collector box, breeching and burner mounting plate are secured in place.
- Never burn garbage or paper in the furnace.
- Never leave combustible material around it.

To start furnace

1. Factory burner adjustment and settings may not be suitable for specific job conditions. Refer to burner manual for burner start up, adjustment and checkout procedures.
2. Set room thermostat to call for heat.
3. Start burner as described in burner manual.
4. The furnace blower will delay for a short time after burner starts, until the limit/fan switch senses air temperature above the fan ON setting.
5. Set room thermostat to its lowest setting. Burner should turn off.
6. Furnace blower will continue to run until the limit/fan switch senses air temperature below the fan OFF setting.
7. Set the room thermostat to call for heat again. Allow furnace to heat to design temperature. Then adjust burner for correct combustion, using combustion test equipment. Adjust burner for: CO₂: between 10 % and 11½ %, with 0 smoke.

To take an overfire pressure reading, replace the sight glass assembly with the washer supplied with the appliance.

After having taken the reading, put the sight glass back (see Figure 2).

To start furnace (continued)

WARNING

Make final burner adjustments using combustion test equipment to assure proper operation.

8. Check furnace and duct system for proper operation and conditions.
9. Inspect vent system for proper operation.
10. To set limit/fan switch:

The blower operates until the air temperature drops below the fan OFF setting. If the air at the supply registers is too warm at blower start up or shutdown, lower the fan OFF and ON settings on the limit/fan switch.

To check operation of the limit switch, slide a piece of cardboard into the furnace filter slot. After a few minutes of operation (not more than 5 minutes), the burner should shut off (limit switch open). The blower will operate until the furnace cools down. Remove cardboard when finished.

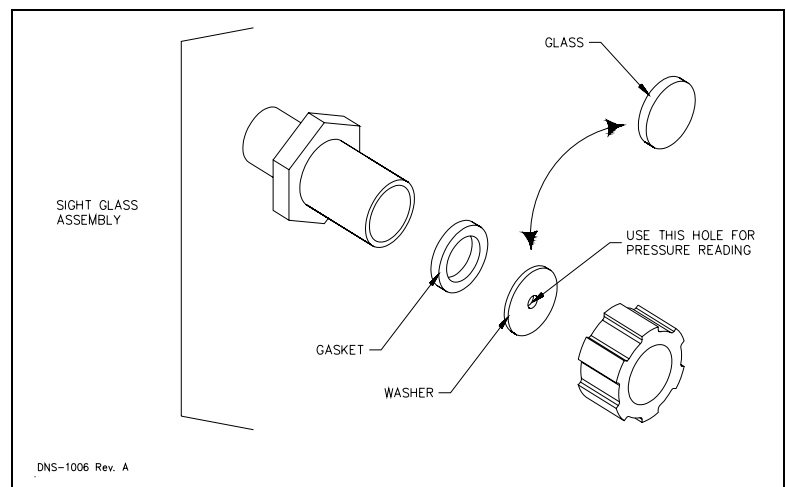
11. Check the proper operation of the vent pressure switch by completely blocking the outlet of the vent terminal with a metal plate. The burner must shut-off immediately and remain in the pre-purge mode without firing.
12. Complete testing of the burner cad cell control, using the instructions in the burner manual.

To shut down furnace

1. Set the room thermostat to its lowest setting.
2. Turn off the disconnect switch in the 120-VAC power line to the furnace.
3. If the burner will be shut down for an extended time, tightly close all oil valves.
4. Refer to burner manual for any additional instructions.

Figure 2

Sight Glass Assembly



8 Checkout procedure

Furnace selection

- ..1. Heat loss BTU/h at °F outdoor design temperature.
- ..2. Furnace model..... output.....BTU/h.
- ..3. Burner model nozzle: gph ° type..... .
- ..4. Burner pump pressure psig.

Furnace installation

- ..5. Furnace level and all legs in contact with floor?
- ..6. Return and supply ducts securely attached to furnace?
- ..7. Fuel filter and fuel lines installed per burner manual and inspected?
- ..8. Furnace and burner wired per wiring diagram?
- ..9. 120 VAC wiring: type ... size ... AWG

Vent and combustion air

- ..10. Existing chimney/vent system inspected and in good condition?
- ..11. New vent piping installed, sealed and in good condition?
- ..12. Vent sizing checked against furnace manual and codes?

Ductwork

- ..13. Duct sizing checked against furnace manual and/or ACCA Manual D?
- ..14. Supply and return registers checked for size based on air flow?
- ..15. Balancing dampers installed as needed?
- ..16. Ductwork sealed and insulated as needed?

Furnace operation

- ..17. Clean air filter in place?
- ..18. Temperature rise through furnace checked (not to exceed 85° F) and blower speed adjusted if necessary?
- ..19. Thermostat heat anticipator set per wiring diagram?
- ..20. Burner started and tested per burner manual?
- ..21. Proper draft and burner flame? Final adjustment made with combustion test equipment?
- ..22. Air purged from oil piping? Piping checked for leaks?
- ..23. Burner sealed to furnace and nuts tight? Burner harness securely plugged in?

WARNING

Obtain gas-tight seal at burner flange, cleanout plates and/or flue collector box to prevent possible flue gas leakage and carbon monoxide emissions, leading to severe personal injury or death.

- ..24. Limit control tested per “To start furnace” in this manual?
- ..25. Did the burner shut-off immediately when the vent terminal was completely blocked?
- ..26. Furnace cycled with thermostat? Raise to highest setting and verify furnace goes through normal start up cycle. Lower to lowest setting and verify furnace goes off.
- ..27. Observed several operating cycles for proper operation?
- ..28. Set room thermostat(s) to desired room temperature?

After installation

- ..29. Complete “Installation and service certificate” below.
- ..30. Review Owner’s information in this manual with owner or maintenance person and instruct person to keep for future reference.
- ..31. Replace all instructions provided with furnace for future reference.



Installation and service certificate

Furnace model _____ Series _____

Serial number _____ Date installed _____

- Installation instructions have been followed.
- Checkout sequence has been performed.
- Above information is certified to be correct.
- Information received and left with owner / maintenance person.

Installer _____
Company

Address

Phone

Installer's signature

9 Troubleshooting

Before beginning these troubleshooting procedures, ALWAYS :		
<ul style="list-style-type: none"> Check 120 volt supply to furnace. If there is no supply voltage, check fuses and service switch. CAUTION : When testing electrical equipment, always follow standard electrical safety procedures. 	<ul style="list-style-type: none"> To successfully service the oil furnace, you must have these instruments : <ul style="list-style-type: none"> smoke tester carbon-dioxide (CO₂) or oxygen (O₂) analyzer pressure gauge (scale should read from -0.25" w.c. to +0.25" w.c.) volt/OHM/milliamper multimeter pressure gauge capable of reading 0-200 lb/sq. inch (for oil only) Be familiar with these instruments as well as the burner manufacturer's recommended settings. 	
<ul style="list-style-type: none"> Make sure thermostat is calling for burner operation. 		
<ul style="list-style-type: none"> Check oil supply and make sure all valves are open. 		
Burner motor does not start.	<ul style="list-style-type: none"> Check fuses and make sure service switch is on. 	<ul style="list-style-type: none"> Check for voltage from primary relay to burner motor. Make sure the primary relay has not locked out on safety.
	<ul style="list-style-type: none"> Check for line voltage into furnace junction box. 	<ul style="list-style-type: none"> Make sure the thermostat is calling for heat and that the wiring to the thermostat is correct.
Burner short cycles or locks out on primary relay safety.	<ul style="list-style-type: none"> If the primary relay control is not popping out the reset button, measure the milliamperage at the thermostat and set the heat-anticipator accordingly. Also check wiring from the thermostat to the burner. 	<ul style="list-style-type: none"> Check the alignment of the cad cell to assure it is aimed at the fire.
	<ul style="list-style-type: none"> Check nozzle and electrode position. (Reference burner manufacturers instructions). 	<ul style="list-style-type: none"> Check ignition transformer output
Unable to achieve clean combustion by setting air adjustments.	<ul style="list-style-type: none"> Check tube insertion and alignment. 	<ul style="list-style-type: none"> Check nozzle and electrode position (Reference burner manufacturer's instructions).
	<ul style="list-style-type: none"> Replace nozzle. 	<ul style="list-style-type: none"> Check pump pressure (varies with manufacturer and application; see burner manual).
	<ul style="list-style-type: none"> Check overfire draft. 	
To check CAD cell operation, use the following procedure :	<ol style="list-style-type: none"> Remove CAD cell leadwires from the f-f terminals on the primary safety control, then start burner. Shortly after burner starts, place a temporary jumper between terminals f-f. Connect ohmmeter across CAD cell leadwires-resistance should be under 1,600 ohms. 	<ol style="list-style-type: none"> With burner off, check dark cell resistance across CAD cell leadwires. Resistance should be greater than 20,000 ohms. If cell resistances are different from above, recheck wiring and location of cell, etc. If necessary, replace plug-in portion of cell.
	<ol style="list-style-type: none"> Stop burner and remove temporary jumper. 	<ol style="list-style-type: none"> Also use procedure described in Honeywell R7184 instruction manual.
Symptom – Furnace blower	Possible corrections :	
Furnace blower will not start.	<ul style="list-style-type: none"> Check belt and pulleys. 	<ul style="list-style-type: none"> Check for 120V to the blower motor. If present, replace motor.
	<ul style="list-style-type: none"> Check wiring from Fan and Limit control. See if blower motor will run when it is switched on manually at the thermostat sub-base (if sub-base is installed). 	
Blower cycles on and off after the burner has shut down.	<ul style="list-style-type: none"> Adjust fan "off" setting to 90° and adjust fan "on" setting to 110°. 	
Blower short cycles on limit control.	<ul style="list-style-type: none"> Return ducts may be undersized. 	

10 Service and maintenance

Annual service and start-up

WARNING Follow the “Service and maintenance” procedures given throughout this manual and in component literature shipped with the furnace. Failure to perform the service and maintenance could result in damage to the furnace or system. Failure to follow the directions in this manual and component literature could result in severe personal injury, death or substantial property damage.

WARNING The furnace should be inspected and started annually, at the beginning of the heating season, only by a qualified service technician. In addition, the maintenance and care of the furnace outlined in the table below, and explained on the following pages must be performed to assure maximum furnace efficiency and reliability. Failure to service and maintain the furnace and system could result in equipment failure.

WARNING This furnace contains fiberglass and ceramic fiber materials. These materials require special attention. Please refer to the WARNING and guidelines given on page 20. Failure to comply could result in severe personal injury, death or substantial property damage.

Service technician annual maintenance/start up (see following pages and burner manual for instructions)	
Service and maintenance	Annual start up
<p style="text-align: center;">Furnace and air system</p> <ul style="list-style-type: none"> <input type="checkbox"/> Consult with homeowner to see if there were any problems with furnace or system during the prior heating season (or cooling season) <input type="checkbox"/> Clean, inspect, and lubricate blower motor and wheel <input type="checkbox"/> Check condition of electrical wiring and tightness of terminals and connectors <input type="checkbox"/> Clean and inspect heat exchanger and combustion chamber <input type="checkbox"/> Clean and inspect system accessories <p style="text-align: center;">Vent system</p> <ul style="list-style-type: none"> <input type="checkbox"/> Clean and inspect flue pipe, chimney/vent, and draft regulator <p style="text-align: center;">Fuel oil system</p> <ul style="list-style-type: none"> <input type="checkbox"/> Check oil tank and piping for leaks <input type="checkbox"/> Replace oil filter <p style="text-align: center;">Oil burner</p> <ul style="list-style-type: none"> <input type="checkbox"/> Clean and inspect oil burner assembly <input type="checkbox"/> Bleed system of air (single-pipe system) <input type="checkbox"/> Check oil pump pressures <input type="checkbox"/> Check combustion air ducts, grilles, etc. (if applicable) 	<p style="text-align: center;">Check operation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Check sequence of operation <input type="checkbox"/> Check flame characteristics <input type="checkbox"/> Perform combustion checks/tests per burner manual and furnace manual <input type="checkbox"/> Check temperature rise <input type="checkbox"/> Check thermostat heat anticipator setting <input type="checkbox"/> Check safety controls (high-temperature limit switch, flame cutoff time, vent pressure switch, etc.)

Handling ceramic fiber and fiberglass materials

HANDLING OR REMOVAL OF COMBUSTION CHAMBER

WARNING

The combustion chamber in this product contains ceramic fiber materials. Ceramic fiber can be converted to cristobalite in very high temperature applications. The International Agency for Research on Cancer (IARC) has concluded, "Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)".

- Avoid breathing dust and contact with skin and eyes.
 - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for cristobalite at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at <http://www.cdc.gov/niosh/homepage.html>. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
 - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Apply enough water to the combustion chamber lining to prevent airborne dust.
- Remove combustion chamber lining from the furnace and place it in a plastic bag for disposal.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid.

- Eye: Irrigate immediately
- Breathing: Fresh air.

HANDLING OR REMOVAL OF FIBERGLASS WOOL – OR – INSTALLATION OF FIBERGLASS WOOL OR COMBUSTION CHAMBER:

WARNING

This product contains fiberglass jacket insulation and ceramic fiber materials in combustion chamber. Airborne fibers from these materials have been listed by the State of California as a possible cause of cancer through inhalation.

- Avoid breathing dust and contact with skin and eyes.
 - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at <http://www.cdc.gov/niosh/homepage.html>. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
 - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Operations such as sawing, blowing, tear out, and spraying may generate airborne fiber concentration requiring additional protection.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH stated First Aid.

- Eye: Irrigate immediately
- Breathing: Fresh air.

10 Service and maintenance (continued)

Service/maintenance procedures

To inspect blower motor

Belt-drive motor – Blower bearings and the motor are permanently lubricated and do not require oiling. Verify that the blower, motor pulleys and belt are in good condition. Replace if necessary.

Direct-drive motor – Blower bearings and the motor are permanently lubricated and do not require oiling.

Clean blower wheel – Vacuum dust from blower wheel blades and surrounding area.

To clean heat exchanger

WARNING The heat exchanger must be cleaned and/or inspected at least once each year. Operating the furnace with a fouled or leaking heat exchanger could result in severe personal injury, death or substantial property damage.

WARNING The combustion chamber contains ceramic fiber materials. Wear a NIOSH-approved respirator while cleaning the furnace and follow WARNING on page 20 for proper handling.

1. Remove the burner.
2. Inspect the heat exchanger using a mirror inserted through the burner opening.
3. Using a brush on a flexible handle, loosen the soot on the inside of the heat exchanger.
4. Remove the soot with a vacuum. Be careful not to damage the combustion chamber while cleaning the heat exchanger.
5. Open the heat exchanger cleanout cover, if present. Using a brush on a flexible handle, loosen the soot from the heat exchanger surfaces. Remove as much soot as possible using a vacuum.
6. Close cleanout cover.
7. Inspect combustion chamber and replace with a new one if chamber is damaged in any way.
8. Re-install burner.

WARNING Obtain gas-tight seal at burner flange and cleanout plates to prevent possible flue gas leakage and carbon monoxide emissions, leading to severe personal injury or death.

Inspect vent system

Thoroughly inspect the entire vent system at least annually. Ensure vent system is repaired or replaced if necessary before placing furnace in operation.

Oiled-bearing burner motors

The burner may need to be lubricated if motor is equipped with oiling cups. Refer to burner manual for specific instructions. If instructed, apply a few drops only of S.A.E. 20 detergent oil (never use household oils). Do not attempt to “fill up” the oil cup. Over-oiling can damage the motor.

Annual start up

DANGER

Follow information below to prevent severe personal injury, death or substantial property damage:

- Do not use gasoline, crankcase drainings or any oil containing gasoline. See burner manual for proper fuel oil.
- Do not attempt to start burner when excess oil has accumulated, when unit is full or vapor or when combustion chamber is very hot.
- Do not start burner unless vent and burner mounting plate are secured in place.
- Never burn garbage or paper in the furnace.
- Never leave combustible material around it.

To start furnace

1. Factory burner adjustment and settings may not be suitable for specific job conditions. Refer to burner manual as well as the “Dimensions and Ratings” section of this manual for burner start up, adjustment and checkout procedures.
2. Set room thermostat to call for heat.
3. Refer to burner manual for start up.
4. The furnace blower will delay for a short after burner starts, until the limit/fan switch senses air temperature above the fan ON setting.
5. Set room thermostat to its lowest setting. Burner should turn off.
6. Furnace blower will continue to run until the limit/fan switch senses air temperature below the fan OFF setting.
7. Set the room thermostat to call for heat again. Allow furnace to heat to design temperature. Then adjust burner for correct combustion, using combustion test equipment. Adjust burner for: CO₂: between 10 % and 11 ½ %, with 0 smoke.
8. Take an overfire pressure reading (refer to Section 7)

WARNING

Make final burner adjustments using combustion test equipment to assure proper operation.

8. Check furnace and duct system for proper operation and conditions.
9. Inspect vent system for proper operation.
10. To set limit/fan switch:

The blower operates until the air temperature drops below the fan OFF setting. If the air at the supply registers is too warm at blower start up or shutdown, lower the fan OFF and ON settings on the limit/fan switch.

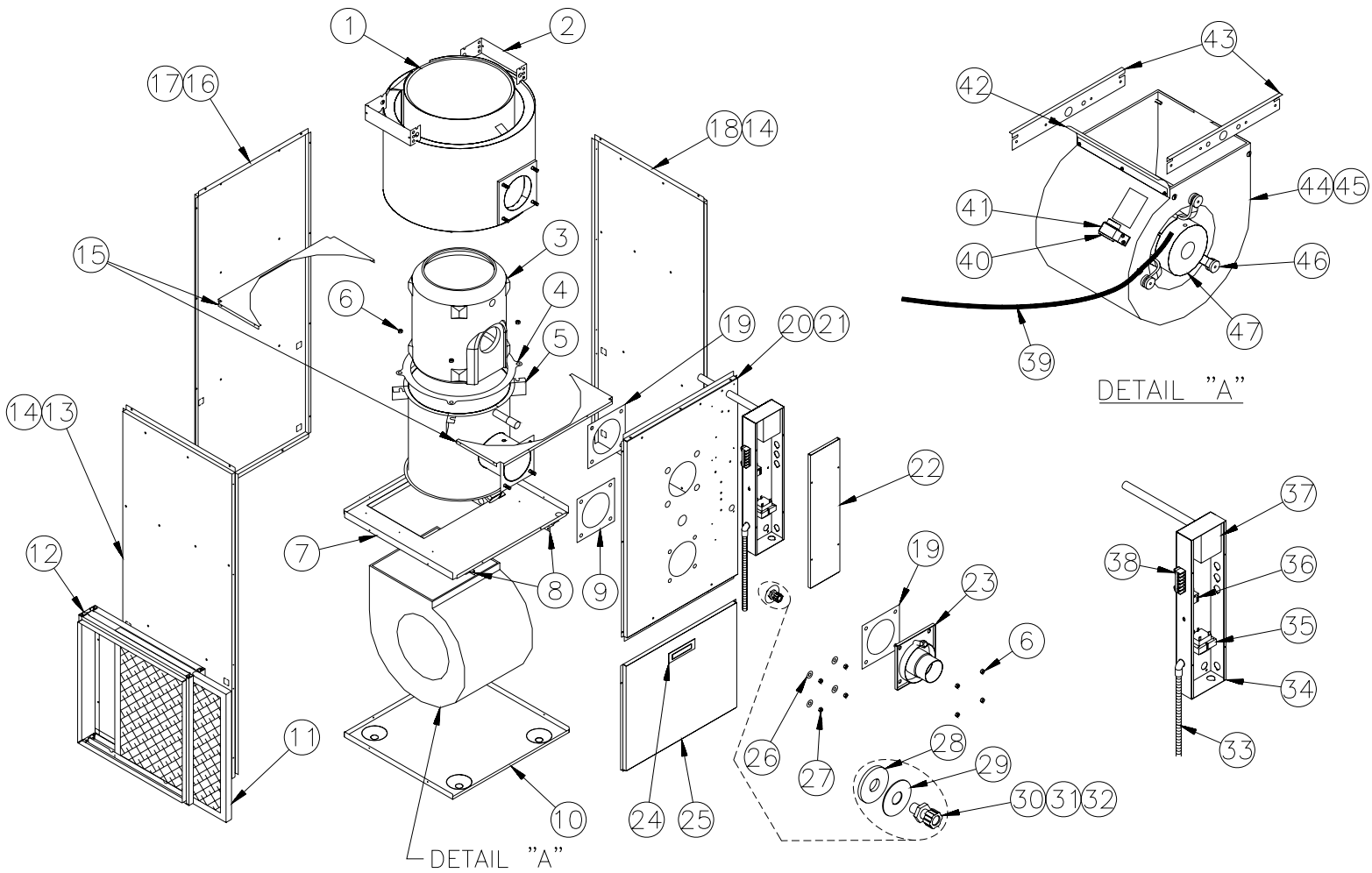
To check operation of the limit switch, slide a piece of cardboard into the furnace filter slot. After a few minutes of operation (not more than 5 minutes), the burner should shut off (limit switch open). The blower will operate until the furnace cools down. Remove cardboard when finished.

11. Complete testing of the burner cad cell control using the instructions in the burner manual.

COMPONENTS
AND
REPLACEMENT PARTS

11 Components and replacement parts

Figure 3 Model SCH-105 furnaces – Component locations



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11 Components and replacement parts (continued)

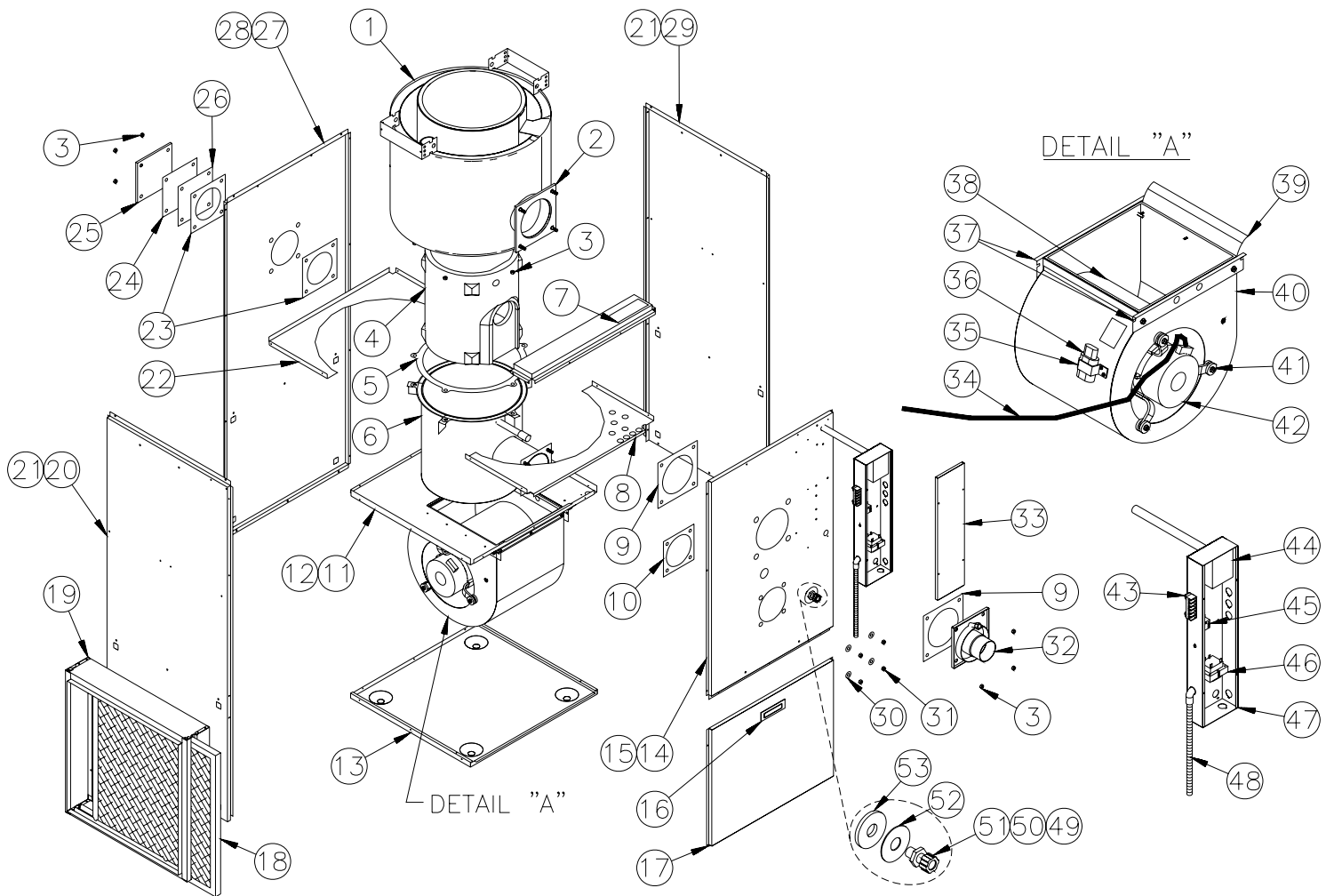
Model SCH-105 furnaces – Replacement parts list

ITEM	PART NUMBER	DESCRIPTION
1	B30756-01	HEAT EXCHANGER ASSEMBLY
2	B30465-01	HEAT EXCHANGER ASSEMBLY, TOP
3	B30518	COMBUSTION CHAMBER ASSEMBLY
4	B30517	GASKET, HEAT EXCHANGER ASSEMBLY
5	B30757	HEAT EXCHANGER ASSEMBLY, BOTTOM
6	F07O001	FLANGE NUT, HEXAGONAL 3/8"-16NC BRASS
7	B30431	PANEL, DIVIDER
8	B30513	SLIDE SUPPORT, BLOWER
9	B30534	GASKET, BURNER
10	B30430	FLOOR
11	Z04F004	PAPER FILTER 20" x 20" x 1"
12	B30083	FILTER RACK ASSEMBLY
13	B30458-04	PANEL ASSEMBLY, LEFT SIDE
14	B30418	PANEL INSULATION, LEFT SIDE
15	B30426	BAFFLE
16	B30457-01	PANEL ASSEMBLY, REAR
17	B30419	INSULATION, REAR PANEL
18	B30458-03	PANEL ASSEMBLY, RIGHT SIDE
19	B30415-02	GASKET, HEAT EXCHANGER
20	B30812-01	PANEL ASSEMBLY, FRONT
21	B30761	INSULATION, FRONT PANEL
22	B30808	ELECTRICAL BOX COVER ASSEMBLY
23	B30515-01	FLANGE 3", FLUE OUTLET ASSEMBLY
24	Z99F050	RECESSED HANDLE, BLACK
25	B30455-01	BOTTOM FRONT PANEL ASSEMBLY
26	F06F005	WASHER, 3/8" BOLT ZINC AA
27	F07F024	HEX NUT 3/8"-16NC BRASS
28	B30753	WASHER GASKET, OBSERVATION TUBE
29	B30752-01	WASHER, OBSERVATION TUBE
30A	K30011	PEEP HOLE KIT ASSEMBLY
30B	K30012	PRESSURE TEST KIT
31	B30055	GASKET, 1.062" OD WINDOW
32	B30041-01	WINDOW, NEOCERAM 1.031" DIA
33	B30796	BURNER, ELECTRICAL WIRE KIT
34	B30806	ELECTRICAL BOX
35	L01F009	TRANSFORMER 120-24Volts, 40VAC
36	L01H009	RELAY SPDT 24 VAC
37	R02I005	FAN-LIMIT 8" HON L6064A
38	L05F011	TERMINAL STRIP 90 DEGREES, 6 POSITIONS
39	B30809-02	ELECTRICAL KIT, BLOWER
40	L01I002	CAPACITOR, 7.5 MF
41	B01024	CAPACITOR HOLDER
42	B01291-01	SEAL STRIP 1-1/2" x 13-1/8"
43	B30433	BLOWER SLIDE RAILS
44	Z01L002	BLOWER WHEEL GT10-10DD
45A	Z01I004	BLOWER GT10-10DD
45B	B01979-01	BLOWER REPLACEMENT ASSEMBLY
46	B01888	BELLY BAND ASSEMBLY
47	L06H004	MOTOR 1/2 DD 4V

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11 Components and replacement parts

Figure 4 Model SCH-160 furnaces – Component locations



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11 Components and replacement parts (continued)

Model SCH-160 furnaces – Replacement parts list

ITEM	PART NUMBER	DESCRIPTION
1	B30786-01	HEAT EXCHANGER ASSEMBLY
2	B30597	HEAT EXCHANGER ASSEMBLY, TOP
3	F07O001	FLANGE NUT, HEXAGONAL 3/8"NPT 16NC BRASS
4	B30531	COMBUSTION CHAMBER ASSEMBLY
5	B30532	HEAT EXCHANGER GASKET ASSEMBLY
6	B30787	HEAT EXCHANGER, BOTTOM
7	B30639	BAFFLE, TOP
8	B30618	BAFFLE, FRONT
9	B30589-01	GASKET, HEAT EXCHANGER
10	B30534	GASKET, BURNER
11	B30627	DIVIDER PANEL
12	B30625	BLOWER SLIDE SUPPORT
13	B30628	FLOOR
14	B30816-01	FRONT PANEL ASSEMBLY
15	B30779	INSULATION, FRONT PANEL
16	Z99F050	RECESSED HANDLE, BLACK
17	B30651-01	PANEL ASSEMBLY, FRONT BOTTOM
18	Z04F011	PAPER FILTER 24" x 24" x 1"
19	B30656	FILTER SUPPORT
20	B30653-04	PANEL ASSEMBLY, LEFT SIDE
21	B30658	PANEL INSULATION, LEFT SIDE
22	B30619	REAR BAFFLE
23	B30415-02	ACCESS COVER GASKET
24	B30415-01	ACCESS COVER GASKET
25	B30487-01	BREECH PLATE WITHOUT HOLES
26	B30533	BREECH PLATE GASKET
27	B30652-01	REAR PANEL ASSEMBLY
28	B30659	REAR PANEL INSULATION
29	B30653-03	PANEL, RIGHT SIDE
30	F06F005	WASHER 3/8" ZINC
31	F07F024	HEX NUT 3/8"-16NC BRASS
32	B30647-01	4" BREECH PLATE
33	B30807	COVER, ELECTRICAL BOX
34	B30809-03	ELECTRICAL KIT, VENTILATOR
35	B01024	CAPACITOR HOLDER
36	L011003	CAPACITOR 10MF
37	B30626	BLOWER SLIDE SUPPORT
38	Z01L003	BLOWER WHEEL G12-10DD
39	B01291-01	SEAL STRIP 1-1/2" x 13-1/8"
40A	B02167-01	BLOWER ASSEMBLY REPLACEMENT
40B	Z01I008	BLOWER GT12-10DD
41	B01889	BELLY BAND ASSEMBLY
42	L06K001	MOTOR 0.85 DD
43	L05F011	TERMINAL STRIP 90 DEGREES , 6 POSITIONS
44	R02I005	FAN-LIMIT CONTROL 8" HON L6064A
45	L01H009	RELAY SPDT 24 VAC
46	L01F009	TRANSFORMER 120-24Volts, 40VAC
47	B30806	ELECTRICAL BOX
48	B30796	ELECTRICAL KIT, BURNER
49A	K30011	OBSERVATION PORT
49B	K30012	PRESSURE TEST KIT
50	B30055	GASKET, 1.062" OD WINDOW
51	B30041-01	WINDOW, NEOCERAM 1.031" DIA
52	B30752-01	WASHER, OBSERVATION TUBE
53	B30753	WASHER GASKET, OBSERVATION TUBE

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11 Components and replacement parts (continued)

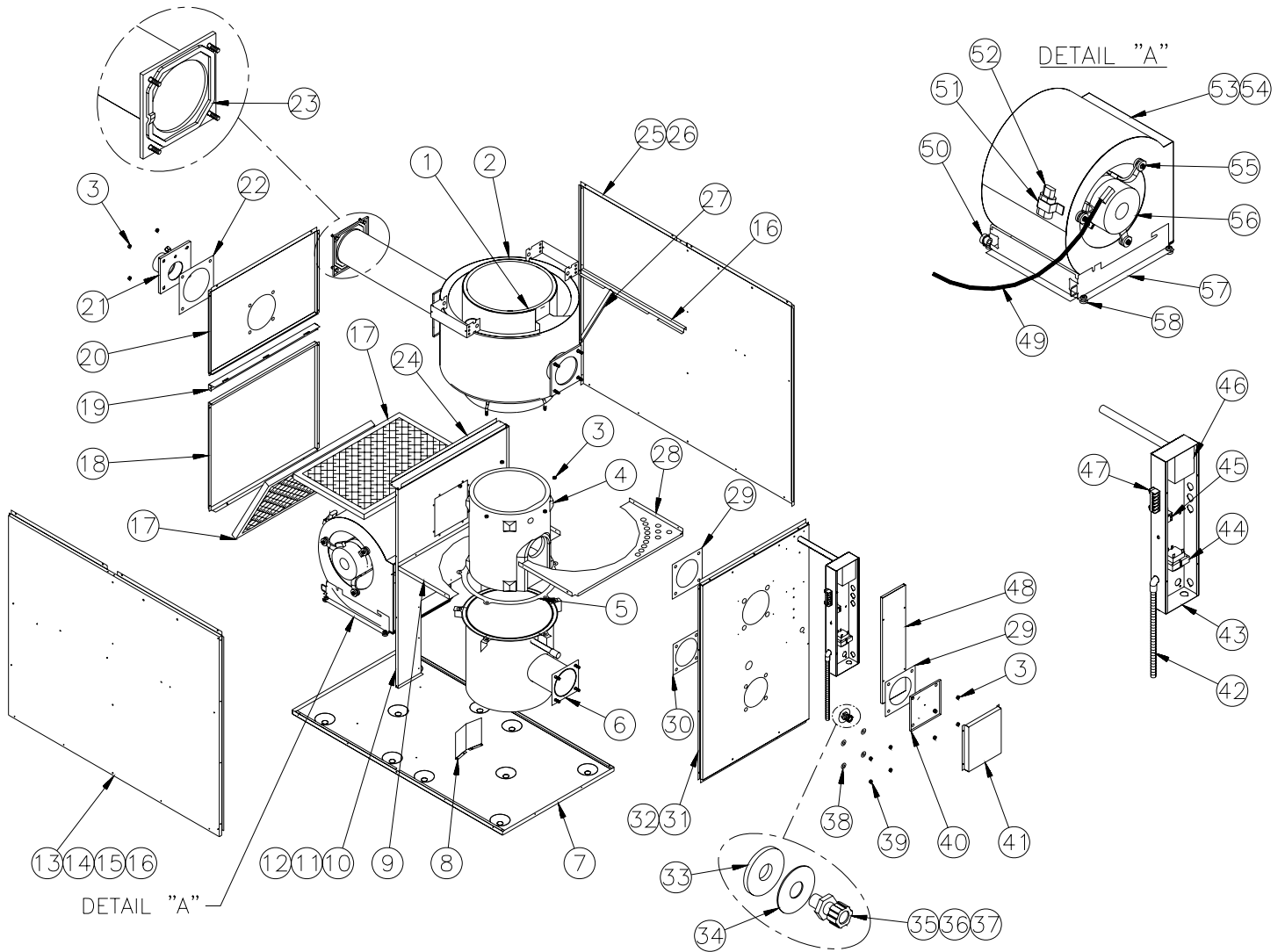
Model SCL-105 Rear furnaces – Replacement parts list

ITEM	PART NUMBER	DESCRIPTION
1	B30756-02	HEAT EXCHANGER ASSEMBLY
2	B30465-02	HEAT EXCHANGER ASSEMBLY, TOP
3	B30518	COMBUSTION CHAMBER ASSEMBLY
4	B30517	GASKET, HEAT EXCHANGER ASSEMBLY
5	B30757	HEAT EXCHANGER ASSEMBLY, BOTTOM
6	B30472	FLOOR
7	B30481	BAFFLE, BLOWER
8	B30488	DIVIDER PANEL
9	B01291-01	SEAL STRIP 1-1/2" x 13-1/8"
10	B01025-99	STRIP
11	B30509-04	PANEL ASSEMBLY, LEFT SIDE
12	B30493-04	PANEL INSULATION, LEFT SIDE
13	B30479-02	FILTER SUPPORT, LEFT
14	B30512-01	BLOWER DOOR ASSEMBLY
15	B30489-01	PANEL, TOP REAR
16	F07O001	FLANGE NUT, HEXAGONAL 3/8"-NC BRASS
17	B30515-01	BREECH PLATE ASSEMBLY 3" DIA. DV
18	B30415-02	GASKET, HEAT EXCHANGER
19	B30478	DIVIDER, PLENUM
20	J06L002	SEAL STRIP 1/4" x 1/8"
21	B30507-01	AIR FILTER DRAWER ASSEMBLY
22	Z04F004	PAPER FILTER 20 x 20 x 1
23	B30479-01	FILTER SUPPORT, RIGHT
24	B30509-03	PANEL ASSEMBLY, RIGHT SIDE
25	B30493-03	PANEL INSULATION, RIGHT SIDE
26	B30534	GASKET, BURNER
27	B30808	COVER, ELECTRICAL BOX
28	B30533	GASKET, SEALING PLATE
29	B30415-01	GASKET, HEAT EXCHANGER
30	B30486-01	COVER
31	B30487-01	BREECH WITHOUT HOLES
32	F07F024	HEX NUT 3/8-16NC BRASS
33	F06F005	WASHER 3/8 BOLT ZINC
34	B30814-01	PANEL, FRONT
35	B30762	PANEL INSULATION, FRONT
36	B30753	WASHER GASKET, OBSERVATION TUBE
37	B30752-01	WASHER, OBSERVATION TUBE
38A	K30011	PRESSURE TEST KIT
38B	K30012	PEEP HOLE KIT
39	B30055	GASKET, 1.062" OD WINDOW
40	B30041-01	WINDOW, NEOCERAM 1.031" DIA.
41	L01I001	CAPACITOR 5 MF
42	B01024	CAPACITOR HOLDER
43	B01890-01	MOTOR 1/3 HP DD ASSEMBLY
44	Z01L002	BLOWER WHEEL GT10-10DD
45A	Z01I004	BLOWER GT10-10DD
45B	B02919	BLOWER REPLACEMENT
46	B01888	BELLY BAND ASSEMBLY
47	Z01F006	RUBBER GROMMET
48	B30473	BLOWER SUPPORT BRACKET
49	B30809-01	BLOWER ELECTRICAL KIT
50	F11F007	CABLE TIE
51	R02I005	FAN-LIMIT 8" HON L6064A
52	L01H009	RELAY SPDT 24 VAC
53	L01F009	TRANSFORMER 120-24Volts, 40VAC
54	B30806	ELECTRICAL BOX
55	B30796	BURNER ELECTRICAL WIRE KIT
56	L05F011	SINGLE TERMINAL STRIP 90 DEGREES, 6 POSITIONS

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11 Components and replacement parts

Figure 6 Model SCL-160 Rear furnaces – Component locations



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11 Components and replacement parts (continued)

Model SCL-160 Rear furnaces – Replacement parts list

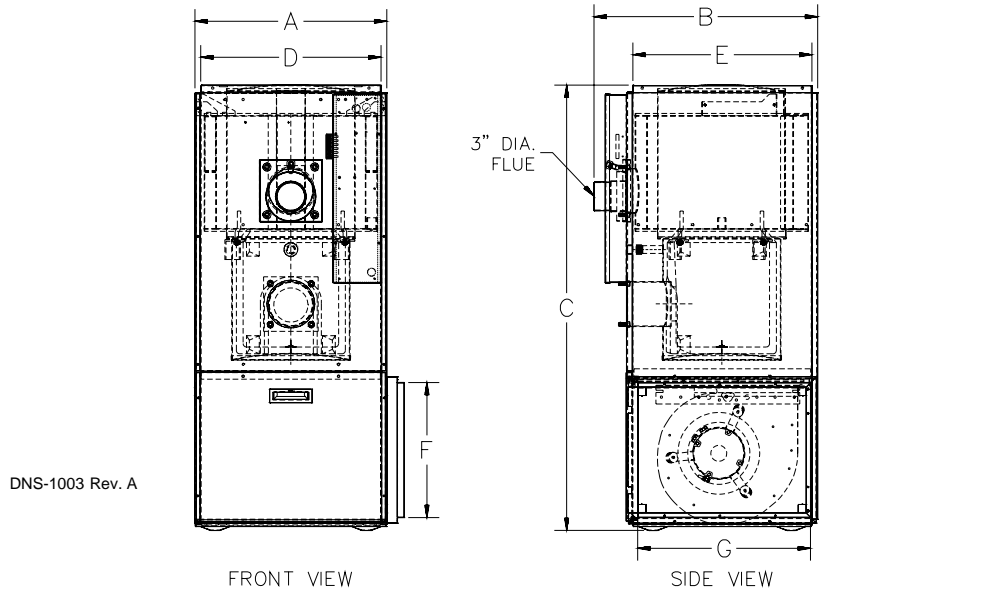
ITEM	PART NUMBER	DESCRIPTION
1	B30786-02	HEAT EXCHANGER ASSEMBLY
2	B30596	HEAT EXCHANGER ASSEMBLY, TOP
3	F07O001	FLANGE NUT, HEXAGONAL 3/8"-16NC BRASS
4	B30531	COMBUSTION CHAMBER ASSEMBLY
5	B30532	GASKET, HEAT EXCHANGER ASSEMBLY
6	B30787	HEAT EXCHANGER ASSEMBLY, BOTTOM
7	B30663	FLOOR
8	B30481	BAFFLE, BLOWER
9	B30664	BAFFLE, REAR
10	B30666	PANEL, DIVIDER
11	B10256-99	STRIP
12	B01291-02	SEAL STRIP 1.500" x 14.250"
13	B30680-04	PANEL ASSEMBLY, LEFT SIDE
14	B30686-02	INSULATION, LEFT SIDE PANEL
15	B30668-02	FILTER SUPPORT, BOTTOM LEFT
16	B30667	FILTER SUPPORT, TOP
17	Z04F007	PAPER FILTER 16" x 24" x 1"
18	B30683-01	BLOWER DOOR ASSEMBLY
19	B30678-01	AIR FILTER DRAWER ASSEMBLY
20	B30674-01	PANEL, TOP REAR
21	B30647-01	BREECH PLATE ASSEMBLY 4" DIA. DV
22	B30589-01	GASKET, HEAT EXCHANGER
23	J06L002	SEAL STRIP 1/4"x 1/8"
24	B30669	DIVIDER, PLENUM
25	B30680-03	PANEL ASSEMBLY, RIGHT SIDE
26	B30686-01	PANEL INSULATION, RIGHT SIDE
27	B30668-01	FILTER SUPPORT, BOTTOM RIGHT
28	B30665	BAFFLE, FRONT
29	B30415-02	GASKET, HEAT EXCHANGER
30	B30534	GASKET, BURNER
31	B30818-01	PANEL ASSEMBLY, FRONT
32	B30780	INSULATION, FRONT PANEL
33	B30753	WASHER GASKET, OBSERVATION TUBE
34	B30752-01	WASHER, OBSERVATION TUBE
35A	K30011	PEEP HOLE KIT
35B	K30012	PRESSURE TEST KIT
36	B30055	GASKET, 1.062" OD WINDOW
37	B30041-01	WINDOW, NEOCERAM 1.031" DIA.
38	F06F005	WASHER, 3/8" BOLT ZINC AA
39	F07F024	HEX NUT, 3/8-16NC BRASS
40	B30676	FLANGE PLATE ASSEMBLY
41	B30486-01	COVER
42	B30796	ELECTRICAL WIRE KIT, BURNER
43	B30806	ELECTRICAL BOX
44	L01F009	TRANSFORMER 120-24Volts, 40VAC
45	L01H009	RELAY SPDT 24 VAC
46	R02I005	FAN-LIMIT 8" HON L6064A1086B
47	L05F011	SINGLE TERMINAL STRIP 90 DEGREES, 6 POSITIONS
48	B30807	COVER, ELECTRICAL BOX
49	B30809-01	ELECTRICAL KIT, BLOWER
50	L04I010	STRAIN RELEASE BUSHING SR-9P-2
51	B01024	CAPACITOR HOLDER
52	L01I005	CAPACITOR 15 MF
53A	B01406-06	BLOWER REPLACEMENT ASSEMBLY
53B	Z01I008	BLOWER GT12-10DD
54	Z01L003	BLOWER WHEEL G12-10DD
55	B01889	BELLY BAND ASSEMBLY
56	L06I004	MOTOR 3/4 DD 4V

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SCH & SCL Oil Furnaces – Furnace Manual

12 Dimensions and ratings

Figure 7 Model SCH-105 / 160 dimensional data – ALL DIMENSIONS IN INCHES



Model	Furnace casing			Warm air supply (top)		Return air (side)		Flue pipe dia.
	Width A	Depth B	Height C	Width D	Depth E	Width F	Depth G	
SCH-105	21"	24½"	48"	19 ¾"	19¾"	18¾"	18-11/16"	3"
SCH-160	25"	28½"	58¾"	23¾"	23¾"	22"	21-11/16"	4"

Model	Input	Output	Nozzle installed		Flue draft	Overfire pressure	AFUE %	Blower Size	Blower Motor HP / Speed	Blower speed	Blower CFM with filter		Maximum Cooling Capacity
			Beckett Burner	Riello Burner							at 0.25"WC	at 0.50" WC	
Ratings & Performance													
Direct drive units													
SCH-105	70 000	59 800	0.50-60W	X	+0.04 to +0.16	+0.10 to +0.25	81.5	10 x 10	1/2-4speeds	Low	960	920	3.0 tons with high blower speed
	88 200	74 600	0.50-60W	0.50-60W			81.0			Low	960	920	
	105 000	87 800	0.60-60W	X			80.3			Med. - Low	1 100	1 000	
	100 800	83 900	X	0.60-60W			80.3			Med. - Low	1 100	1 000	
SCH-160	119 000	97 000	0.75-70B	0.75-70B	+0.04 to +0.18	+0.10 to +0.25	82.2	12 x 10	0.85-4speeds	Med. - Low	1 350	1 310	5 tons with high blower speed
	135 800	110 000	0.85-70B	0.85-70B			81.5			Med. - Low	1 350	1 310	
	159 600	127 000	1.00-70B	1.00-70B			80.3			Med. - High	1 605	1 510	

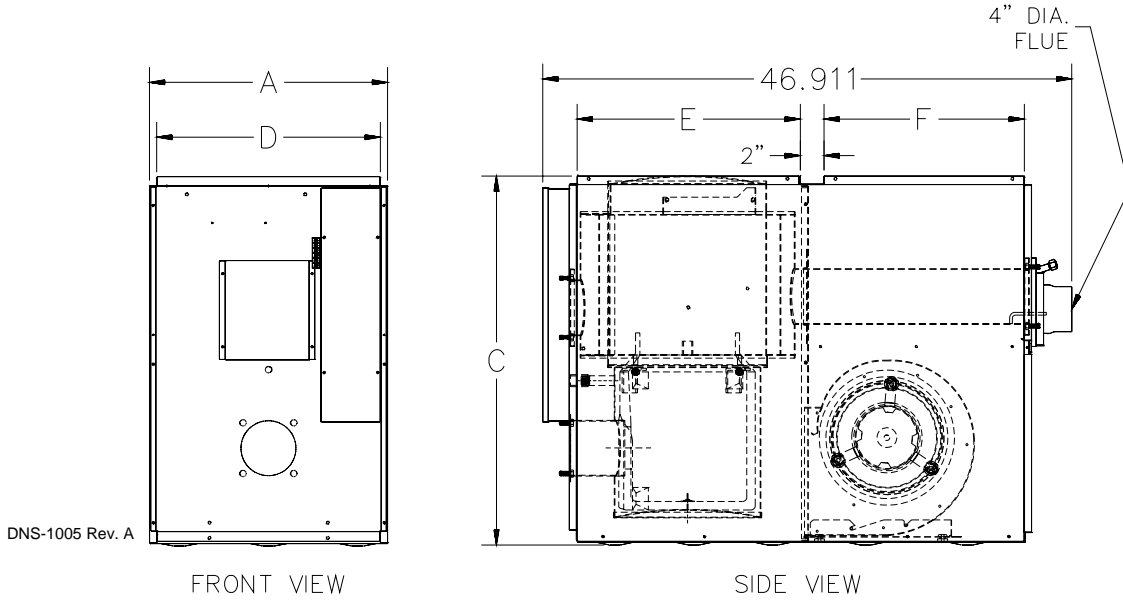
Model	Max. temp. rise (°F)	Filter quantity and size	Volt-Hertz-Phase	Electrical load (amps)	Min. ampacity for wire sizing	Max. fuse size (amps)	Shipping weight (pounds)
SCH-105	52 - 75	(1) 20 x 20	115- 60 -1	15.4	17.7	20	200
SCH-160	50 - 80	(1) 24 x 24		16.9	19.5	20	260



NOTICE: SCH furnaces are CSA design certified for installation on combustible flooring.

12 Dimensions and ratings (continued)

Figure 8 Model SCL-105 / 160 Rear dimensional data – ALL DIMENSIONS IN INCHES



DNS-1005 Rev. A

Model	Furnace casing			Warm air supply (top)		Return air (top)		Flue pipe dia.
	Width A	Depth B	Height C	Width D	Depth E	Width D	Depth F	
SCL-105	21"	47"	32"	19 3/4"	19 3/4"	19 3/4"	17 3/4"	3"
SCL-160	25"	55"	40"	24"	23 3/4"	24"	21 3/4"	4"



Model	Input	Output	Nozzle installed		Flue draft	Overfire pressure	AFUE %	Blower Size	Blower Motor HP / Speed	Blower speed	Blower CFM with filter		Maximum Cooling Capacity
			Beckett Burner	Riello Burner							at 0.25"WC	at 0.50" WC	
Ratings & Performance													
Direct drive units													
SCL-105	70 000	59 400	0.50-60W	X	+0.04 to +0.16	+0.10 to +0.25	81.5	10 x 10	1/3-4 speeds	Low	850	700	3.0 tons
	88 200	73 200	0.50-60W	0.50-60W			81.0			Med.- High	1 090	1 000	with high
	105 000	88 200	0.60-60W	X			81.0			Med.- High	1 090	1 000	blower
	100 800	84 200	X	0.60-60W			80.3			Med.- High	1 090	1 000	speed
SCL-160	119 000	97 000	0.75-70B	0.75-70B	+0.04 to +0.22	+0.10 to +0.25	82.2	12 x 10	3/4-4 speeds	Med. - Low	1 360	1 350	5 tons
	135 800	110 000	0.85-70B	0.85-70B			81.5			Med. - High	1 625	1 540	with high
	159 600	127 000	1.00-70B	1.00-70B			80.3			Med. - High	1 625	1 540	blower speed

Model	Max. temp. rise (°F)	Filter quantity and size	Volt-Hertz-Phase	Electrical load (amps)	Min. ampacity for wire sizing	Max. fuse size (amps)	Shipping weight (pounds)
SCL-105	52 - 75	(1) 20 x 20	115- 60 -1	12.2	13.7	15	207
SCL-160	50 - 80	(2) 16 x 24		15.7	18.1	20	271



NOTICE: SCL furnaces are CSA design certified for installation on combustible flooring.

12 Dimensions and ratings (continued)

Model SCH & SCL-105 burner data

BECKETT BURNER - Model AFII-85 (3450 RPM) - Tube insertion 4-15/16"

Model	Input BTU/h	Firing rate USGPH	Nozzle (Delavan)	Pump pressure (PSIG)	Head	Combustion air adjustment (Screw / Dial)
SCH / SCL 105	70 000	0.50	0.50-60W	100	HLX70HD	3 / 1.5
	88 200	0.63	0.50-60W	156	HLX70HD	3 / 3.0
	105 000	0.75	0.60-60W	156	HLX70HD	3 / 4.5

RIELLO BURNER - Model 40-BF3 - Tube insertion 5-3/16"

Model	Input BTU/h	Firing rate USGPH	Nozzle (Delavan)	Pump pressure (PSIG)	Combustion air adjustment (Turbulator / Band)
SCH / SCL- 105	88 200	0.63	0.50-60W	156	0 / 6.0
	100 800	0.72	0.60-60W	145	0 / 7.5

Model SCH & SCL-160 burner data

BECKETT BURNER - Model AFII-150 (3450 RPM) - Tube insertion 6-5/8"

Model	Input BTU/h	Firing rate USGPH	Nozzle (Delavan)	Pump pressure (PSIG)	Head	Combustion air adjustment (Screw / Dial)
SCH / SCL- 160	119 000	0.85	0.75-70B	130	FB3	2.75
	135 800	0.97	0.85-70B	130	FB3	4.25
	159 600	1.14	1.00-70B	130	FB3	6.75

RIELLO BURNER - Model 40-BF5 - Tube insertion 6-5/8"

Model	Input BTU/h	Firing rate USGPH	Nozzle (Delavan)	Pump pressure (PSIG)	Combustion air adjustment (Turbulator / Band)
SCH / SCL- 160	119 000	0.85	0.75 - 70B	130	1 / 3.0
	135 800	0.97	0.85 - 70B	130	1 / 4.0
	159600	1.14	1.00-70B	130	2 / 4.5

12 Dimensions and ratings (continued)

Air delivery in CFM – with air filter installed

SPEED	SCH-105		SCH-160	
	EXTERNAL STATIC PRESSURE WITH AIR FILTER		EXTERNAL STATIC PRESSURE WITH AIR FILTER	
	0.25" W.C.	0.5" W.C.	0.25" W.C.	0.5" W.C.
LOW	960	920	1080	990
MED-LO	1100	1000	1350	1310
MED-HI	1300	1150	1605	1510
HIGH	1550	1350	2060	1825

SPEED	SCL-105		SCL-160	
	EXTERNAL STATIC PRESSURE WITH AIR FILTER		EXTERNAL STATIC PRESSURE WITH AIR FILTER	
	0.25" W.C.	0.5" W.C.	0.25" W.C.	0.5" W.C.
LOW	850	700	1100	1020
MED-LO	940	750	1360	1350
MED-HI	1090	1000	1625	1540
HIGH	1390	1300	2100	1850

13 Owner's information

The furnace must be inspected and started by a qualified service technician only, at the beginning of the ANNUAL heating season. The service technician must perform annual service and maintenance on the furnace to ensure reliable operation. Failure to service and maintain the furnace and system could result in equipment failure, causing severe personal injury, death or substantial property damage.

As the owner, you need to be aware of the following requirements. You must inspect and clean or replace the furnace filter monthly, as described below, and perform the other inspection procedures as well. Failure to maintain a clean filter will result in cycling of the furnace and could lead to a no-heat condition. Failure to perform this maintenance could result in substantial property damage.

Follow all of the procedures below. Failure to comply could result in severe personal injury, death or substantial property damage.

Operating the furnace

1. The furnace should operate automatically on call for heat from the room thermostat.
2. If the furnace oil burner should shut down on flame failure, the burner primary control will lock out. Ask your service technician to show you the correct procedure to reset the primary control button. NEVER push the button more than once in an attempt to start the burner after lockout. Continued lockout of the control means something is wrong with the burner, controls or oil system. The condition must be corrected by a qualified service technician.

Daily inspection

1. Verify there are no combustible materials in the furnace room or near the furnace.
2. Verify the air openings to the furnace room are not obstructed in any way.
3. Verify the furnace seems to be operating normally. Notify your service technician immediately if you notice any abnormal behavior.
4. Verify that there are no obstructions to the vent termination/air intake on the outside of the building.

Monthly – inspect and clean/replace filter

1. Ask your service technician to show you the correct way to remove and clean your furnace filter. Replace the filter if you are unable to thoroughly clean it.

To shut down furnace

1. Set the room thermostat to its lowest setting.
2. Turn off the disconnect switch in the 120-VAC power line to the furnace.
3. If the burner will be shut down for an extended time, tightly close all oil valves.
4. Refer to burner manual for any additional instructions.

