

58DX Procedures for Downflow Condensing Furnaces

Application Data and Installation Guidelines

→ INTRODUCTION

NOTE: Read the entire instructions before starting the installation.

Portions of the following instruction have been adopted in part from the current edition of the National Fuel Gas Code NFPA No. 54-1988/ANSI Z223.1-1988. For further details, consult this publication, or the current edition available from National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269, or American Gas Association, 1515 Wilson Boulevard, Arlington, VA 22209.

These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances, especially those that may not have kept pace with changing residential construction practices. We require these standard procedures as a minimum for a safe installation.

Installation must comply with regulations of the serving gas supplier and the local building, heating, plumbing, or other codes in effect in the area in which the installation is made. In the absence of local codes, installation must comply with National Fuel Gas Code, ANSI Z223.1-1989.

⚠ CAUTION

Application of this furnace should be indoors with special attention given to vent sizing and material, gas input rate, air temperature rise, and unit sizing. Improper installation or misapplication of the furnace can require excessive servicing or cause premature component failure.

→ This furnace is designed for a minimum continuous return air temperature of 60 degrees F DB or an intermittent operation down to 55 degrees F DB such as when used with a thermostat night setback. Return air temperature must not exceed a maximum of 85 degrees F DB.

⚠ WARNING

Never store anything on, or in contact with, the furnace, such as:

Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners, or other cleaning tools.

Soap powders, bleaches, waxes or other cleaning compounds, plastic or plastic containers, gasoline, kerosene, cigarette lighter fluid, dry-cleaning fluids, or other volatile fluids.

Paint thinners and other painting compounds, paper bags or other paper products.

A failure to adhere to this warning can cause corrosion of the heat exchanger and vent system, fire, personal injury, or death.

These instructions have the following sections:

- I. Inspection
- II. Furnace Location
- III. Gas Piping
- IV. Combustion-Air and Vent Piping
- V. Condensate Piping
- VI. Startup, Adjustment, and Safety Check

I. INSPECTION

Check the available power supply to be sure that it meets the specifications on the furnace rating plate and all motors in the equipment.

Check the available gas supply to see that it conforms to the gas specification on the A.G.A. rating plate.

II. FURNACE LOCATION

Locate the furnace as near the center of the air distribution system as possible.

This furnace may be located in a confined space without special provisions for dilution or ventilation air.

⚠ CAUTION

The furnace must not be installed in an unconditioned space with possible ambient temperatures of 32 degrees F or lower.

NOTE: For proper furnace operation, the furnace must be installed within 1/2 in. of level.

→ Provide ample space for servicing and cleaning. Always comply with the minimum fire protection clearances shown on the unit rating plate and in Table 1. This furnace must NOT be installed directly on carpeting, tile, or any combustible material other than wood flooring. If installed on wood flooring, an optional downflow furnace subbase is required, it can be obtained from your Distributor or branch.

→ **For non-manufactured (mobile) home installations**—When a furnace is installed so that the supply ducts carry air to areas outside the space containing the furnace, the return air must also be handled by duct(s) sealed to the furnace casing and terminating outside the space containing the furnace to ensure there will not be a negative pressure condition within the equipment room or space.

→ **For manufactured (mobile) home installations**—The furnace must be installed so the negative pressure created by the circulating air blower does not affect the combustion air supply of other gas appliances inside the structure. When installed in a closet with a nondirect vent gas appliance, the furnace must not be placed in operation unless the blower door is properly installed and the return air system is sealed, ducted, and terminated outside the closet.

FILE
COPY

→ Table 1—Clearances (In Ins.)

SIZE	040, 060, 080, & 100
Sides	0
Back	0
Top of Plenum	1
Vent Connector	0
Front—Casing	3
Service	30

A. Furnace Location Relative to Cooling Equipment

The cooling coil must be installed parallel with, or on the downstream side of, the furnace to avoid condensation in the heat exchanger. When installed parallel with a furnace, dampers or other means used to control the flow of air must prevent chilled air from entering the furnace. If the dampers are manually operated, they must be equipped with means to prevent operation of either unit unless the damper is in the full-heat or full-cool position.

B. Special Locations

When the furnace is installed in a residential garage, it must be installed so that it is protected from physical damage by vehicles.

When a furnace is installed in public garages, airplane hangars, or other buildings having hazardous atmospheres, the unit must be installed in accordance with the requirements of the National Fire Protection Association, Inc.

III. GAS PIPING

Gas piping must be installed in accordance with national and local codes.

The gas supply line should be a separate line running directly from the meter to the furnace, if possible. Refer to Table 2 for the recommended gas pipe sizing. It is best to slope all pipe 1/4 in. in 15 ft to prevent traps. All horizontal runs should slope away from the meter to risers. Risers should be used to connect to the furnace and to the meter.

Joint compounds (pipe dope) should be applied sparingly and only to the male threads of the joints. Consult your local gas supplier for the type of compound to be used. This pipe dope must be resistant to the action of propane gas.

Install a sediment trap in the riser leading to the furnace. This trap will serve as a trap for dirt and condensate. The trap can be installed by connecting a tee to the riser leading to the furnace, so that the straight-through section of the tee is vertical. Then connect a capped nipple into the lower end of the tee. The capped nipple should extend below the level of the gas controls. See Fig. 1.

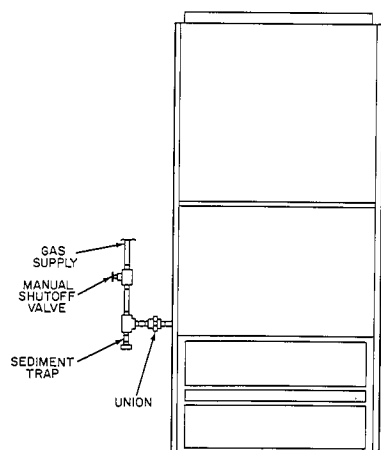


Fig. 1

Where a gum filter is required by local codes, install it in accordance with their requirements.

→ An accessible manual shut-off valve **MUST** be installed upstream of the furnace gas controls and within 6 ft of the furnace. A 1/8-in. NPT plugged tapping, accessible for test gauge connection, **MUST** be installed immediately upstream of the gas supply connection to the furnace and downstream of the manual shut-off valve.

Place a ground joint union between the gas control manifold and the manual gas shut-off valve. See Fig. 1.

Table 2—Maximum Capacity of Pipe*

Nominal Iron Pipe Size Inches	Internal Diameter Inches	Length of Pipe, Feet				
		10	20	30	40	50
1/2	0.622	175	120	97	82	73
3/4	0.824	360	250	200	170	151
1	1.049	680	465	375	320	285
1-1/4	1.380	1400	950	770	660	580
1-1/2	1.610	2100	1460	1180	990	900

Ref: Table C-4 NFPA 54-1988

*Cubic ft of gas per hour, for gas pressures of 0.5 psig (14-ins. wc) or less, and a pressure drop of 0.5 in. wc (based on a 0.60 specific gravity gas).

⚠ CAUTION

Use a backup wrench when connecting gas pipe to furnace to avoid damaging gas controls.

⚠ WARNING

Use the proper length of pipes to avoid stress on the gas control manifold. A failure to adhere to this warning can cause a gas leak resulting in a fire, explosion, physical injury, or death.

Protect all segments of the piping system against physical and thermal damage. Support all piping with appropriate straps, hangers, etc. Use a minimum of one hanger every 6 ft. For pipe sizes larger than 1/2 in., follow the recommendations of national codes.

⚠ CAUTION

If a flexible connector is required or allowed by the authority having jurisdiction, black iron pipe must be installed at the gas valve and extend a minimum of 2 ins. outside the furnace casing.

Piping should be pressure-tested in accordance with local and national plumbing and gas codes before the furnace has been attached. If the pressure exceeds 0.5 psig (14 ins. wc), the gas supply pipe must be disconnected from the furnace before the pressure test. If the test pressure is equal to or less than 0.5 psig (14 ins. wc), close the manual shut-off valve located on the gas valve before the test. It is recommended that the ground joint union be loosened before pressure testing.

⚠ WARNING

Never purge a line into a combustion chamber. Never use matches, candles, flame, or other sources of ignition to check for gas leakage. Use a soap-and-water solution to check for leaks. A failure to adhere to this warning can cause a fire, explosion, physical injury or death.

After final connection to the furnace has been made, purge the lines and check for leakage with regulated gas supply pressure.

→ IV. COMBUSTION-AIR AND VENT PIPING

The combustion-air and vent pipe and fittings must conform to American National Standards Institute (ANSI) standards and American Society for Testing and Materials (ASTM) standards D1785 (schedule-40 PVC), D2665 (PVC-DWV), D2441 (SDR-21 and SDR-26 PVC) or D2661 (ABS-DWV). Pipe cement and primer must conform to ASTM standards D2564 (PVC) or D2235 (ABS). See Table 4 for pipe sizing and Figs. 2 through 4 for exterior piping arrangements.

The accessory vent terminal kit must be used in constructing the vent terminal for this unit. Pipes must terminate through either the roof or the sidewall; roof termination is preferable. Locate sidewall terminations to prevent damage to shrubs, condensing unit, and siding materials. Table 3 gives clearance requirements.

Table 3—Combustion-Air and Vent Terminal Clearances

Location	Clearance Ft
Dryer vent	3
From plumbing vent stack	3
Gas appliance vent terminal	4
From any opening where vent gases could enter building	1
Above grade and anticipated snow depth	1
Above grade when adjacent to public walkway	7

⚠ CAUTION

Combustion-air must **not** be taken from inside the structure because that air frequently is contaminated by halogens, which include fluorides, chlorides, bromides, and iodides. These elements are found in aerosols, detergents, bleaches, cleaning solvents, salts, air fresheners and other household products. Vapors from these products are highly corrosive to gas-fired furnaces, even in extremely low concentrations (as low as 0.5 ppm).

Maintain a minimum of 36 ins. between combustion-air inlet and clothes-dryer vent.

Locate the combustion-air inlet as far as possible from the swimming pool and swimming pool pump house.

⚠ CAUTION

When the vent pipe is exposed to temperatures below freezing i.e. when it passes through an unheated space or when a chimney is used as a raceway, the pipe must be insulated with 1/2-in. thick Armaflex-type insulation.

⚠ CAUTION

When the combustion-air pipe is installed above a suspended ceiling, the pipe must be insulated with 1/2-in. Armaflex-type insulation. The combustion-air pipe should also be insulated when it passes through a warm, humid space.

→ A. Removal of Existing Furnaces From Common Vent Systems

1. These steps shall be follow with each appliance remaining connected to the common vent system placed in

operation, while the other appliances remaining connected to the common vent system are not in operation.

2. Seal any unused openings in the common vent system.
3. Visually inspect the vent system for proper size and horizontal pitch, and determine there is no blockage or restriction, leakage, corrosion, and other deficiencies which could cause an unsafe condition.
4. Insofar as practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common vent system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common vent system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
5. Follow the lighting instructions and place the appliance in operation. Adjust the thermostat so appliance will operate continuously.
6. Test for flue gas spillage at the draffhood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, etc.
7. After it has been determined that each appliance remaining connected to the common vent system properly vents when tested as above, return doors, windows, exhaust fans, fireplace dampers, any other gas-burning appliances to their previous condition of use.
8. If improper venting is observed during any of the above tests, the common vent system must be corrected. The vent system or vent connectors may need to be resized. For any other appliances when resizing vent systems or vent connectors, the system or connector must be sized to approach the minimum size as determined using the appropriate table found in Appendix G of the National Fuel Gas Code.

B. Combustion Air and Vent Piping

⚠ WARNING

Solvent cements are combustible. Keep away from heat, sparks, and open flame. Use only in well ventilated areas. Avoid breathing of the vapor and contact with the skin or eyes. A failure to adhere to this warning can cause a fire, explosion, physical injury, or death.

⚠ WARNING

All combustion-air and vent pipes must be airtight and watertight. The pipes must also terminate exactly as shown in Figs. 2 through 4. A failure to adhere to this warning can cause property damage, physical injury, or death.

- The furnace is shipped from the factory assembled for right-hand vent pipe connection. When left-hand vent connection is desired, loosen the outlet elbow clamp at the inducer housing. Remove the vent drain tube from the collector box. Remove the elbow, rotate it to the left, and reinstall elbow. Be sure the elbow clamp is properly positioned and tight. Reposition vent drain so as to point toward the front of the furnace and reconnect it to collector box. Remove the plastic plug from the left-hand casing side panel and install it in the right-hand casing side panel.

→ Table 4—Maximum Allowable Pipe Length (In Ft)

Altitude (ft above sea level)	Furnace Size	Pipe Size	Number of 90-Degree Elbows				
			1	2	3	4	5
0 to 2000	040-GG	1-1/2	20	15	10	10	5
		2	35	35	35	35	35
	060-GG	1-1/2	10	5	5	—	—
		2-1/2	35	30	20	15	10
2001 to 3000	080-JG	2-1/2	35	35	35	35	30
		3	—	—	—	—	35
	100-LG	2-1/2	15	10	5	—	—
		3	35	35	35	35	35
3001 to 4000	040-GG	1-1/2	17	12	7	6	—
		2	31	30	30	29	29
	060-GG	1-1/2	8	—	—	—	—
		2-1/2	31	25	16	11	6
4001 to 5000	080-JG	2-1/2	31	30	30	29	24
		3	—	—	—	—	29
	100-LG	2-1/2	13	7	—	—	—
		3	31	30	30	29	29
5001 to 6000	040-GG	1-1/2	15	10	—	—	—
		2	28	27	26	25	24
	060-GG	1-1/2	6	—	—	—	—
		2-1/2	28	22	13	8	—
6001 to 7000	080-JG	2-1/2	28	27	26	25	19
		3	—	—	—	—	24
	100-LG	2-1/2	11	5	—	—	—
		3	28	27	26	25	24
7001 to 8000	040-GG	1-1/2	13	9	—	—	—
		2	26	25	24	23	22
	060-GG	1-1/2	5	—	—	—	—
		2-1/2	26	20	11	7	—
8001 to 9000	080-JG	2-1/2	26	25	24	23	17
		3	—	—	—	—	22
	100-LG	2-1/2	10	—	—	—	—
		3	26	25	24	23	22
9001 to 10,000	040-GG	1-1/2	11	7	—	—	—
		2	24	22	21	19	18
	060-GG	1-1/2	2	—	—	—	—
		2-1/2	24	17	8	19	18
10001 to 11000	080-JG	2-1/2	24	22	21	19	13
		3	—	—	—	—	18
	100-LG	2-1/2	9	—	—	—	—
		3	24	22	21	19	18
11001 to 12000	040-GG	1-1/2	10	6	—	—	—
		2	22	20	19	17	16
	060-GG	1-1/2	2	—	—	—	—
		2-1/2	22	15	7	—	—
12001 to 13000	080-JG	2-1/2	22	20	19	17	11
		3	—	—	—	—	16
	100-LG	2-1/2	8	—	—	—	—
		3	22	20	19	17	16
13001 to 14000	040-GG	1-1/2	8	—	—	—	—
		2	19	17	15	13	11
	060-GG	1-1/2	2	—	—	—	—
		2-1/2	19	12	—	—	—
14001 to 15000	080-JG	2-1/2	19	17	15	13	6
		3	—	—	—	—	11
	100-LG	2-1/2	6	—	—	—	—
		3	19	17	15	13	11
15001 to 16000	040-GG	1-1/2	6	—	—	—	—
		2	17	15	13	11	9
	060-GG	1-1/2	2	—	—	—	—
		2-1/2	17	10	—	—	—
16001 to 17000	080-JG	2-1/2	17	15	13	11	9
		3	—	—	—	—	9
	100-LG	2-1/2	5	—	—	—	—
		3	17	15	13	11	9
17001 to 18000	040-GG	1-1/2	2	—	—	—	—
		2	15	12	10	7	5
	060-GG	1-1/2	2	—	—	—	—
		2-1/2	15	12	10	7	5
18001 to 19000	080-JG	2-1/2	15	12	10	7	—
		3	—	—	—	—	5
	100-LG	2-1/2	3	—	—	—	—
		3	15	12	10	7	5

NOTES:

1. Size both the combustion-air and vent pipe independently, then use the larger diameter for both pipes.
2. Assume two 45-degree elbows equal one 90-degree elbow. Long radius elbows are desirable.
3. Elbows and pipe sections within the furnace casing and supplied in the vent terminal kit should not be included in count.
4. The installer may use one larger pipe size than what is specified above (up to 3-in. diameter maximum).
5. The minimum pipe length is 5-ft for all applications.

CAUTION

To avoid trapping condensate in the vent pipe system, do not assemble any vent pipe below the level of the furnace vent outlet.

NOTE: The unit is shipped with (2) 2-1/2 x 2-1/2-in. neoprene couplings. Optional couplings size 3 x 2-1/2 ins. and 2-1/2 x 2 ins. are available through your Distributor or branch.

→ 1. Determine pipe diameter.

- a. Using Table 4, determine preliminary combustion-air pipe diameter.
- b. Using Table 4, determine vent pipe diameter.
- c. Use largest diameter determined in (a) and (b) above for both pipes.

EXAMPLE: A 060-sized furnace located in Indianapolis, elevation 650 ft above sea level, installed in an application in which the vent pipe requires 1 elbow and 10 ft of pipe and the combustion-air pipe requires 3 elbows and 10 ft of pipe.

Table 4 indicates this application would allow a 1-1/2-in. diameter vent pipe, but require a 2-in. diameter combustion air pipe (1-1/2-in. pipe is good for 10 ft with one elbow, but only 5 ft with three elbows). However, use 2-in. diameter pipe for both the vent and combustion-air pipes since the larger diameter must always be used for both pipes.

If the same installation was in Albuquerque, elevation 5250 ft above sea level, the installation would allow a 2-in. diameter vent pipe but require a 2-1/2-in. diameter combustion-air pipe (at 5001 to 6000 ft elevation, 2-in. pipe is good for 24 ft with one elbow, but only 8 ft with 3 elbows). In this case, use 2-1/2-in. pipe for both the vent and combustion-air pipes.

NOTE: Do not count the elbows to which the terminal bracket attaches or any elbow between the bracket and open end of the pipe. See shaded area in Figs. 2 through 4. Likewise, do not count elbows or pipe sections inside of furnace casing.

2. Attach PVC pipe, provided with furnace, to vent outlet elbow and clamp. Be sure clamp is tight.
3. Attach neoprene coupling to end to PVC pipe outside of furnace casing.
4. Working from furnace to outside, cut pipe to required length(s).
5. Deburr inside and outside of pipe.
6. Chamfer outside edge of pipe for better distribution of primer and cement.
7. Clean and dry all surfaces to be joined.
8. Check "dry fit" of pipe and mark insertion depth on pipe.

NOTE: It is recommended that all pipes be cut, prepared, and preassembled before permanently cementing any joint.

9. After pipes have been cut and preassembled, apply generous layer of cement primer to pipe fitting socket and end of pipe to insertion mark. Quickly apply approved cement to end of pipe and fitting socket (over primer). Apply cement in light, uniform coat on inside of socket to prevent buildup of excess cement. Apply second coat.
10. While the cement is still wet, insert pipe into socket with a 1/4-turn twist. Be sure pipe is fully inserted into the fitting socket.
11. Wipe excess cement from joint. A continuous bead of cement will be visible around the perimeter of a properly made joint.

- f. For applications using combustion-air pipe option indicated by dashed lines in Fig. 2, install 90-degree street ell into 90-degree elbow, making a U-fitting.
- g. Install open end of street ell on combustion-air pipe.
2. Sidewall termination when combustion-air and vent pipes exit through sidewall 12 ins. or more above highest anticipated snow level and grade. See Fig. 3.
 - a. Loosely install elbow and bracket assembly on combustion-air and vent pipes.
 - b. Remove and disassemble elbow and bracket assembly.
 - c. Install elbows as shown in Fig. 3 using same procedures for cementing as described in Combustion-Air and Vent Piping.
 - d. Install bracket as shown in Fig. 3.
 - e. Position vent pipe assembly so as to maintain 12-ins. separation between vent pipe outlet and combustion-air inlet. Cement vent pipe in elbow as shown in Fig. 3.
- f. For applications using vent pipe option indicated by dashed lines in Fig. 3, rotate vent elbow 90 degrees from position shown in Fig. 3.
3. Sidewall termination when combustion-air and vent pipes exit through sidewall less than 12 ins. above highest anticipated snow level or grade. See Fig. 4.
 - a. Remove one elbow from bracket assembly.
 - b. Install 90-degree street ell into elbow remaining in bracket, making U-fitting.
 - c. Loosely install coupling on end of vent pipe.
 - d. Loosely install U-fitting and bracket as shown in Fig. 4. Position U-fitting so open end is against structure wall.
 - e. Loosely install vent pipe assembly in coupling as shown in Fig. 4.
 - f. Check required dimensions as shown in Fig. 4.
 - g. Disassemble loose pipe fittings. Clean and cement using same procedures as used for system piping.
 - h. Install bracket as shown in Fig. 4.

V. CONDENSATE DRAIN

The 1/2-in. diameter schedule 40 PVC or CPVC condensate drain pipe fittings must conform to ANSI standards and ASTM D1785 and D2846. The schedule 40 PVC or CPVC cement and primer must conform to ASTM D2564 or F493.

For proper condensate drainage from the furnace, the furnace must be within 1/2 in. of level. That is, the highest corner of the furnace must not be more than 1/2 in. higher than the lowest corner.

When a condensate pump is required, select a pump that is approved for condensing furnace applications. To avoid condensate spillage, select a pump with an overflow switch. Wire the overflow switch in series with the heating contacts of the thermostat.

NOTE: The furnace contains an internal condensate trap; an external trap must not be installed.

1. Determine which side of furnace drain will exit, then cut and preassemble drain piping (not provided) directly to an open drain. Refer to Section IV A, "Combustion-Air and Vent Piping," for instructions on preparing and cementing plastic pipe.
2. Cement elbow on pipe assembly (provided) to condensate trap mounted on cell panel.
3. Using backup wrench, attach first section of drain pipe-to-compression coupling (provided).

4. When using schedule 40 PVC drain pipe, connect adapter (provided) to end of pipe installed in compression fitting.
5. Attach schedule 40 PVC adapter (field-supplied) to threaded factory adapter.
6. Cement remaining pipe joints.

VI. STARTUP, ADJUSTMENT, AND SAFETY CHECK

A. Fill condensate trap with water.

1. Disconnect condensate drain tube from inducer housing drain.
2. Insert funnel into tube and pour one quart of water into tube. This should overflow the trap and flow into an open drain.
3. Reconnect drain tube to inducer housing drain.

B. Ignition System Check

Check to be sure that all connections have been properly made, then proceed as follows:

Start the furnace using the procedure outlined on the operating instructions attached to the furnace; however, when starting the furnace for the first time, perform the following additional steps:

1. If the gas supply was not purged before connecting the furnace, the line will be full of air. It is recommended that the ground joint union be loosened, and the supply line be allowed to purge until the odor of gas is detected. Never purge gas lines into a combustion chamber. Immediately upon detection of a gas odor,

Table 5—Gas Rate Cu Ft/Hr

Seconds for One Revolution	SIZE OF TEST DIAL			Seconds for One Revolution	SIZE OF TEST DIAL		
	1 cu ft	2 cu ft	5 cu ft		1 cu ft	2 cu ft	5 cu ft
10	360	720	1800	50	72	144	360
11	327	655	1636	51	71	141	355
12	300	600	1500	52	69	138	346
13	277	555	1385	53	68	136	340
14	257	514	1286	54	67	133	333
15	240	480	1200	55	65	131	327
16	225	450	1125	56	64	129	321
17	212	424	1059	57	63	126	316
18	200	400	1000	58	62	124	310
19	189	379	947	59	61	122	305
20	180	360	900	60	60	120	300
21	171	343	857	62	58	116	290
22	164	327	818	64	56	112	281
23	157	313	783	66	54	109	273
24	150	300	750	68	53	106	265
25	144	288	720	70	51	103	257
26	138	277	692	72	50	100	250
27	133	267	667	74	48	97	243
28	129	257	643	76	47	95	237
29	124	248	621	78	46	92	231
30	120	240	600	80	45	90	225
31	116	232	581	82	44	88	220
32	113	225	563	84	43	86	214
33	109	218	545	86	42	84	209
34	106	212	529	88	41	82	205
35	103	206	514	90	40	80	200
36	100	200	500	92	39	78	196
37	97	195	486	94	38	76	192
38	95	189	474	96	38	75	188
39	92	185	462	98	37	74	184
40	90	180	450	100	36	72	180
41	88	176	439	102	35	71	178
42	86	172	429	104	35	69	173
43	84	167	419	106	34	68	170
44	82	164	409	108	33	67	167
45	80	160	400	110	33	65	164
46	78	157	391	112	32	64	161
47	76	153	383	116	31	62	155
48	75	150	375	120	30	60	150
49	73	147	367				

retighten the union. Allow 5 minutes to elapse, then start the furnace in accordance with the operating instructions on the furnace.

2. After the pilot lights, the main burners should light in 25 to 75 seconds. If the main burners do not light within the prescribed time period check; the pilot flame, electrical supply to main gas valve, burner cross-over alignment, gas supply pressure, manifold, and orifice alignment.
3. The pilot flame should be soft blue in color and it must provide good impingement on the pilot switching element. The flame should extend above the burner carry-over port to provide proper burner ignition. When the pilot flame requires adjustment:

→ **NOTE:** For ease of adjusting the pilot flame, disconnect terminal No. 1 on the gas valve. This will prevent main burner ignition and allow time to adjust the pilot. Reconnect the power lead after adjustment. Check the flame characteristics after replacing the burner enclosure front.

- a. Locate adjustment screw marked "PILOT ADJ" on top of gas valve.
- b. Remove cap and turn adjustment screw clockwise to decrease pilot gas flow. Turn screw counterclockwise to increase pilot gas flow.
- c. When proper adjustment is obtained, replace screw cap.

→ **C. Gas Input**

1. Determine natural gas orifice size and manifold pressure for correct input by using Table 6. Adjust mani-

fold pressure per step 3. For altitudes higher than 2000 ft, see step 2.

NOTE: Be sure all pressure tubing, combustion-air and vent pipes, and burner enclosure front are in place when checking input.

- a. Obtain average yearly heat value for local gas supply.
- b. Obtain average yearly specific gravity for local gas supply.
- c. Verify the furnace model. Table 6 can only be used for Model 58DX Furnaces.
- d. Check and verify orifice size in furnace. **NEVER ASSUME THE ORIFICE SIZE. ALWAYS CHECK AND VERIFY.**
- e. Find natural gas heat value and specific gravity in Table 6.
- f. Follow heat value line and specific gravity line to point of intersection to find orifice size and manifold pressure settings for proper operation at given natural gas condition.

EXAMPLE:

Heat value 1025 Btu/cu ft

Specific gravity 0.64

Therefore: Orifice No. 43*

*The furnace is shipped with No. 44 orifices. Therefore, in this example all main burner orifices must be changed.

- g. Check input rate by clocking meter as described in step 2.

→ **Table 6—Model 58DX Orifice Size and Manifold Pressure For Correct Input Rate**
(Tabulated data based on altitude up to 2000 ft and 22,000 Btu/h per burner.)

Gas Heat Value (Btu/h/cu ft)	Specific Gravity of Natural Gas																	
	0.56		0.58		0.60		0.62		0.64		0.66		0.68		0.70		0.72	
	Orf No.	Mnflld Press	Orf No.	Mnflld Press	Orf No.	Mnflld Press	Orf No.	Mnflld Press	Orf No.	Mnflld Press	Orf No.	Mnflld Press	Orf No.	Mnflld Press	Orf No.	Mnflld Press	Orf No.	Mnflld Press
860	41	3.2	41	3.3	41	3.4	41	3.5	41	3.7	41	3.8	39	3.4	38	3.2	38	3.3
	42	3.6	42	3.7	42	3.8	40	3.3	39	3.2	39	3.3	40	3.6	39	3.5	39	3.6
	—	—	—	—	40	3.2	—	—	40	3.4	40	3.5	—	—	40	3.7	40	3.8
875	42	3.4	41	3.2	41	3.3	41	3.4	41	3.5	41	3.6	41	3.8	39	3.3	38	3.2
	—	—	42	3.6	42	3.7	42	3.8	40	3.3	39	3.2	39	3.3	40	3.6	39	3.4
	—	—	—	—	—	—	40	3.2	—	—	40	3.4	40	3.5	—	—	40	3.7
890	42	3.3	42	3.4	41	3.2	41	3.3	41	3.4	41	3.5	41	3.6	41	3.7	41	3.8
	—	—	—	—	42	3.6	42	3.7	42	3.8	40	3.2	40	3.3	39	3.2	39	3.3
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	40	3.4	40	3.5
905	42	3.2	42	3.3	42	3.4	41	3.2	41	3.3	41	3.4	41	3.5	41	3.6	41	3.7
	—	—	—	—	—	—	42	3.6	42	3.7	42	3.8	40	3.2	40	3.3	39	3.2
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	40	3.4
920	43	3.8	42	3.2	42	3.3	42	3.4	41	3.2	41	3.3	41	3.4	41	3.5	41	3.6
	—	—	—	—	—	—	—	—	42	3.5	42	3.7	42	3.8	40	3.2	40	3.3
935	43	3.7	43	3.8	42	3.2	42	3.3	42	3.4	41	3.2	41	3.3	41	3.4	41	3.5
	—	—	—	—	—	—	—	—	—	—	42	3.5	42	3.7	42	3.8	40	3.2
950	43	3.6	43	3.7	43	3.8	42	3.2	42	3.3	42	3.4	41	3.2	41	3.3	41	3.4
	—	—	—	—	—	—	—	—	—	—	—	—	42	3.5	42	3.6	42	3.7
965	43	3.4	43	3.6	43	3.7	43	3.8	42	3.2	42	3.3	42	3.4	41	3.2	41	3.3
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	42	3.5	42	3.6
980	44	3.8	42	3.5	43	3.6	43	3.7	43	3.8	42	3.2	42	3.3	42	3.4	41	3.2
	43	3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	42	3.5
995	44	3.7	44	3.8	43	3.5	43	3.6	43	3.7	43	3.8	42	3.2	42	3.3	42	3.4
	43	3.2	43	3.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1010	44	3.6	44	3.7	44	3.8	43	3.5	43	3.6	43	3.7	43	3.8	42	3.2	42	3.3
	—	—	43	3.3	43	3.4	—	—	—	—	—	—	—	—	—	—	—	—
1025	44	3.5	44	3.6	44	3.7	43	3.4	43	3.5	43	3.6	43	3.7	43	3.8	43	3.2
	—	—	43	3.2	43	3.3	—	—	—	—	—	—	—	—	—	—	—	—
1040	44	3.4	44	3.5	44	3.6	44	3.7	43	3.4	43	3.5	43	3.6	43	3.7	43	3.8
	—	—	—	—	43	3.2	43	3.3	—	—	—	—	—	—	—	—	—	—
1055	44	3.3	44	3.4	44	3.5	44	3.6	44	3.8	43	3.4	43	3.5	43	3.6	43	3.7
	—	—	—	—	—	—	43	3.2	43	3.3	—	—	—	—	—	—	—	—
1070	44	3.2	44	3.3	44	3.4	44	3.5	44	3.7	44	3.8	43	3.4	43	3.5	43	3.6
	—	—	—	—	—	—	—	—	43	3.2	43	3.3	—	—	—	—	—	—
1085	45	3.8	44	3.2	44	3.3	44	3.4	44	3.6	44	3.7	44	3.8	43	3.4	43	3.5
	—	—	—	—	—	—	—	—	—	—	43	3.2	43	3.3	—	—	—	—
1100	45	3.7	45	3.8	44	3.2	44	3.4	44	3.5	44	3.6	44	3.7	44	3.8	43	3.4
	—	—	—	—	—	—	—	—	—	—	—	—	43	3.2	43	3.3	—	—

2. Determine natural gas input rate by clocking gas meter and adjusting manifold pressure per step 3.

NOTE: Be sure all pressure tubing, combustion-air and vent pipes, and burner enclosure front are in place when checking gas input.

- a. Turn off all other gas appliances and pilots.
- b. Measure time (in seconds) for gas meter test dial to complete one revolution.
- c. Refer to Table 5 for cubic ft of gas per hour.
- d. Multiply gas rate (cu ft/hr) x heating value (Btuh/cu ft). Obtain heating value from local gas utility.

NOTE: Be sure heating value of gas used for calculations is correct for your altitude. Consult local gas utility for altitude adjustment of gas heating value.

- e. Measured gas input must not exceed gas input on unit rating plate.

NOTE: High altitude—Input ratings are for altitudes up to 2000 ft. Ratings for altitudes over 2000 ft must be 4% less for each 1000 ft above sea level. To obtain the altitude adjusted rating, adjust the manifold pressure and replace the main burner orifices as needed.

EXAMPLE:

Btu heating input = Btu/cu ft times cu ft/hr

Heating value of gas = 1070 Btu/cu ft

Time for one revolution of 2-cu-ft dial = 72 sec

Gas rate = 100 cu ft/hr (from Table 5)

Btu heating input = $100 \times 1070 = 107,000$ Btuh

3. To adjust input rate:

NOTE: Manifold pressure must always be measured with the burner enclosure front removed. The gas meter must always be clocked with the burner enclosure front installed.

- a. Remove burner enclosure front and cap that conceals adjustment screws for gas valve regulator.
- b. Turn adjusting screw either counterclockwise (out) to decrease input rate or clockwise (in) to increase rate. When adjusting input rate, do NOT set manifold pressure less than 3.2 or more than 3.8 ins. wc for natural gas. Make any major adjustments by changing main burner orifices.

NOTE: If orifice hole appears damaged or it is suspected to have been redrilled, check the orifice hole with the correct size numbered drill. Never redrill an orifice. A burr-free and squarely aligned orifice hole is essential for proper flame characteristics.

- c. Replace burner enclosure front and measure adjusted gas input rate using method outlined in step 1.
- d. Replace cap that conceals gas valve regulator adjustment screw.

CAUTION

Be sure burner enclosure front is in place after adjustments have been made.

4. Look through sight glass in burner enclosure and check burner and pilot flame. The main burner flame should be clear blue, almost transparent. The pilot flame should be well defined. See Fig. 5.

D. Temperature Rise

The furnace must not be operated outside the range of temperature rise specified on the unit rating plate. Determine the air temperature rise as follows:

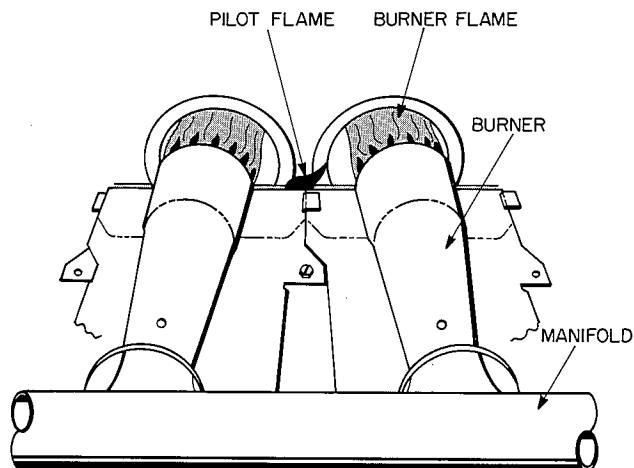


Fig. 5

A84076

1. Place thermometers in return and supply ducts as near furnace as possible. Be sure thermometers do not "see" heating element so that radiant heat does not affect readings. This practice is particularly important with straight-run ducts.
2. When thermometer readings stabilize, subtract return-air temperature from supply-air temperature to determine air temperature rise.
3. Adjust temperature rise by adjusting blower speed. Increase blower speed to reduce temperature rise. Decrease blower speed to increase temperature rise.

E. Thermostat Heat Anticipator Adjustment

The thermostat heat anticipator must be set to match the amp draw of the components in the R-W circuit. Accurate amp draw measurements can be obtained at the thermostat subbase terminals R & W.

Fig. 6 illustrates an easy method of obtaining these measurements. The amp reading should be taken after the blower has started on its heating speed.

F. Safety Check of Limit Control

The control shuts off the combustion gas supply and energizes the circulating-air blower motor if the furnace overheats.

The recommended method of checking this limit control is to gradually block off the return air after the furnace has been operating for a period of at least 5 minutes. As soon as the limit control functions, the return-air opening should be

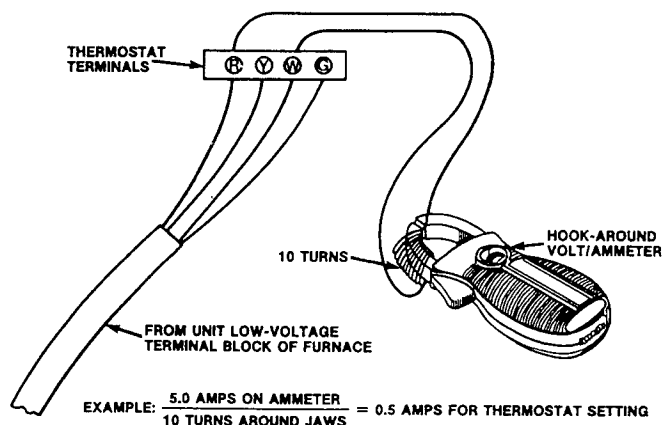


Fig. 6—Amp Draw Check With Ammeter

A80201

unblocked to permit normal air circulation. By using this method to check the limit control, it can be established that the limit is functioning properly and the furnace will "fail-safe" if there is a restricted circulating air supply or motor failure. If the limit control does not function during this test, the cause must be determined and corrected.

→ The manual reset auxiliary limit switch located on the blower housing may or may not open during this test.

G. Safety Check of Flow-Sensing Switch

This control proves operation of the draft inducer.

Check switch operation as follows:

1. Turn off 115-volt power to furnace.
2. Remove control access panel and disconnect lead wires from inducer printed-circuit board.

3. Turn on 115-volt power to furnace.
4. Set thermostat to "call for heat." When the flow-sensing switch is functioning properly, pilot gas flow and sparker operation should not occur. If either gas flow or sparker operation occurs when the inducer motor is disconnected, shut the furnace down immediately. Determine the reason the flow-sensing switch did not function and correct the condition.
5. Turn off 115-volt power to furnace.
6. Reconnect inducer motor leads, reinstall control access panel, turn on 115-volt power supply, and reset thermostat to desired temperature.

Book	1
Tab	6a

PC 101

Catalog No. 515-866

Printed in U.S.A.

Form 58DX-3XA

Pg 10

1-89

Replaces: 58DX-2XA