REZNOR®

Revision: X-TSL (10-23) REV-A

Supersedes: X-TSL (07-23) REV-0

TECHNICAL SPECIFICATIONS FOR MODEL X

GAS-FIRED, INDOOR, COMMERCIAL/INDUSTRIAL, GRAVITY-VENTED DUCT FURNACE

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In keeping with our policy of continuous product improvement, we reserve the right to alter, at any time, the design, construction, dimensions, weights, etc., of equipment information shown here.

TECHNICAL SPECIFICATIONS—CONTINUED

Unit Sizes

These duct furnaces are available in eleven unit sizes based on 75,000–400,000 BTUh input.

Features

- 120V supply
- 80% thermal efficient
- Aluminized-steel burner with SST insert
- Aluminized-steel heat exchanger
- Intermittent spark pilot
- Single-stage combination gas valve (standard)
- Natural gas or propane
- Fan control and high limit safety control
- Horizontal or vertical flue discharge
- Blocked vent safety limit
- Side access for burner and controls
- Designed for field-connection to 24V thermostat for automatic operation

Factory-Installed Options

Option	Description
AA1	Natural gas
AA2	Propane
AB1	Installation elevation of 0–2000 feet
AB2	Installation elevation of 2001–3000 feet
AB3	Installation elevation of 3001–4000 feet
AB4	Installation elevation of 4001–5000 feet
AB5	Installation elevation of 5001–6000 feet
AB6	Installation elevation of 6001–7000 feet
AC1	Aluminized-steel heat exchanger
AC2	409 SST heat exchanger
AD1	Aluminized-steel burner
AD2	409 SST burner
AE1	No burner air shutters
AE2	Burner air shutters (required on propane units)
AF1	Aluminized-steel drip pan/bottom panel
AF2	409 SST drip pan/bottom panel
AGA	US installation rating plate
AG1	Single-stage combination gas valve
AG2	Two-stage combination gas valve
AG3	Two-stage combination gas valve with unit-mounted ductstat
AG8	Electronic modulation with 2:1 turndown ratio and ductstat
AG15	Two-stage combination gas valve with electronic ductstat and remote temperature selector
AG21	Electronic modulation with Maxitrol signal conditioner and gas regulator
AH2	Intermittent spark pilot (not available on propane units)
AH3	Intermittent spark pilot with timed lockout
AK1	115/1/60 voltage
AK2	208/1/60 voltage
AK3	230/1/60 voltage
AK9	460/1/60 voltage
BG3A–BG3Z	Various relay options
BW1	Air flow pressure proving switch
CGA	Canadian installation rating plate and vent cap

Field-Installed Options

Option	Description
AG7	Electronic modulation with room thermostat
AG9	Electronic modulation with 2:1 turndown ratio and remote temperature selector
CE1	Manual shutoff valve, natural gas
CE2	Manual shutoff valve, propane
CL1	Single-stage thermostat
CL9	Electronic modulating room override
CL22	Two-stage thermostat
CL33	Two-stage digital thermostat
CL52	Single-stage digital thermostat
CM1	Locking cover for CL1 thermostat
CM1B	Locking cover for CL22 and CL33 thermostats
CN1A–CN3Z	Various remote switch options
CP2, CP3, CP4	Indoor disconnect switches (US only)
CP5–CP8	Outdoor raintight disconnect switches (US only)
CP41, CP58	Indoor disconnect switch (Canada only)
CP42, CP59	Outdoor raintight disconnect switches (Canada only)
CS1	Condensate drain flange

Technical Data

Parameter	Unit of Measure	Unit Size (MBTUh)										
		75	100	125	140	170	200	225	250	300	350	400
Input heating capacity	BTUh	75,000	100,000	125,000	150,000	175,000	200,000	225,000	250,000	300,000	350,000	400,000
	kW	22.0	29.3	36.6	44.0	51.3	58.6	65.9	73.3	87.9	102.6	117.2
Output heating capacity (80%)	BTUh	60,000	80,000	100,000	120,000	140,000	160,000	180,000	200,000	240,000	280,000	320,000
	kW	17.6	23.4	29.3	35.2	41.0	46.9	52.8	58.6	70.3	82.1	93.8
Air volume with finger-baffles	CFM	610–1105	815–1475	1020–1840	1225–2210	1430–2580	1635–2945	1840–3315	2045–3685	2455–4420	2865–5160	3275–5895
	$meter^3/hr$	1036–1877	1385–2506	1733–3126	2081–3755	2429–4383	2778–5003	3126–5632	3474–6261	4171–7509	4867–8767	5564–10,015
Air volume without finger-baffles*	CFM	735–2765	980–3685	1225–4605	1475–5530	1720–6450	1965–7370	2210–8295	2455–9215	2945–11,060	3440–12,900	3930–14,745
	$meter^3/hr$	1249–4698	1665–6261	2081–7824	2506–9395	2922–10,958	3338–12,521	3755–14,093	4171–15,656	5003–18,790	5844–21,916	6677–25,051
Temperature rise	°F	50–90										
		20–75*										
Gas connection, natural gas	inch	1/2								3/4		
Gas connection, propane		1/2										
Flue diameter (and shape)		5 (round)	6 (round)	7 (oval)	8 (oval)		8 (round)		10 (oval)		12 (oval)	
Full load amps (115V)	amp	0.2										
Unit control amps (24V)		0.3										

*High CFM conversion requires removal of the finger baffles. This conversion shall be done by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction.

Certification

The duct furnaces covered in this manual are design-certified by the Canadian Standards Association to ANSI Z83.8a and CSA 2.6 for use with either natural or propane gas. The type of gas for which the furnace is equipped and the correct firing rate are shown on the rating plate attached to the unit. Electrical characteristics are shown on the unit rating plate.

TECHNICAL SPECIFICATIONS—CONTINUED

Installation Codes

- These units must be installed in accordance with local building codes. In the absence of local codes, in the United States, the unit must be installed in accordance with the *National Fuel Gas Code* (NFPA54/ANSI Z223.1, latest edition). A Canadian installation must be in accordance with the *Installation Code for Gas Burning Appliances and Equipment* (CAN/CGA B149.1). These codes are available from CSA Information Services, 1-800-463-6727. Local authorities having jurisdiction should be consulted before installation is made to verify local codes and installation procedure requirements.
- **Special installations (aircraft hangars/garages):** Installations in aircraft hangars should be in accordance with the *Standard for Aircraft Hangars* (ANSI/NFPA No. 409, latest edition), in public garages in accordance with the *Standard for Parking Structures*, (ANSI/NFPA No. 88A, latest edition), and for repair garages in accordance with the *Standard for Repair Garages* (ANSI/NFPA No. 88B, latest edition). The latest edition of ANSI/NFPA-88 specifies that overhead heaters must be installed at least 8 feet above the floor. In Canada, installations in aircraft hangars should be in accordance with the requirements of the enforcing authorities and in public garages in accordance with CSA B149 codes.

Unit Location

⚠ WARNING ⚠

Avoid installing a furnace in extremely drafty areas. Extreme drafts can shorten the life of the heat exchanger and/or cause safety problems.

- A duct furnace is designed for connection to an inlet and an outlet duct and depends on an external air handler. Location must be in accordance with **Clearances** section.
- There are a variety of factors such as system application, building structure, dimensions, and weight that contribute to selecting the location. Read the installation information in this manual and select a location that complies with the requirements.

Combustion Air Requirements

⚠ WARNING ⚠

The unit is designed to take combustion air from the space in which it is installed and is not designed for connection to an outside combustion air intake duct. Connecting this furnace to an outside combustion air intake duct voids the warranty and could cause hazardous operation.

- Requirements for combustion air and ventilation air depend upon whether the unit is located in a confined or unconfined space. A confined space is defined as a space whose volume is <50 cubic feet per 1,000 BTUh of the installed appliance input rating. An unconfined space is defined as a space whose volume is ≥50 cubic feet per 1,000 BTUh of the installed appliance input rating.
- Sufficient air must enter the equipment location to replace the air exhausted through the vent system. Refer to the installation manual for further information on confined spaces and combustion air requirements.

Hazards of Chlorine

NOTE: Remember, chlorine is heavier than air. This fact should be kept in mind when determining the installation location of heaters and building exhaust systems.

The presence of chlorine vapors in the combustion air of heating equipment presents a potential corrosion hazard. Chlorine, found usually in the form of Freon or degreaser vapors, when exposed to flame will precipitate from the compound and form a solution with any condensation present in the heat exchanger or associated parts. The result is hydrochloric acid, which readily attacks all metals, including 300 grade stainless steel. Care should be taken to separate these vapors from the combustion process. This may be done by wise location of the unit with regard to exhausters or prevailing wind directions.

Venting Requirements

- Safe operation of any gas-fired equipment requires a properly operating vent system, correct provision for combustion air, and regular maintenance and inspection.
- Install the vent in accordance with *Part 7, Venting of Equipment*, of the *National Fuel Gas Code* (ANSI Z223.1, latest edition) or an applicable provision of national, state, or local codes. A Canadian installation must be in accordance with the *Installation Code for Gas Burning Appliances and Equipment* (CSA B149.1) and applicable local codes.
- Refer to the installation manual for further information on venting requirements.

Vent Configuration	Vent Pipe Diameter (Inches)	Vertical Height of Vent (Feet (Meters))					
		6 (1.8)	8 (2.4)	10 (3.0)	15 (4.6)	20 (6.1)	30 (9.1)
		Maximum Horizontal Run (Feet (Meters))					
Double-wall type B connector and double-wall type B vent	5	6 (1.8)	8 (2.4)	10 (3.0)	16 (4.9)	20 (6.1)	20 (6.1)
	6			16 (4.9)		30 (9.1)	40 (12.2)
	7 or 8	6 (1.8)	16 (4.9)	20 (6.1)	30 (9.1)	30 (9.1)	40 (12.2)
	10 or 12						
Single-wall metal pipe	5	2 (0.6)	5 (1.5)	5 (1.5)	5 (1.5)	—	—
	6			10 (3.0)	10 (3.0)	10 (3.0)	
	7	2 (0.6)	10 (3.0)	15 (4.6)	15 (4.6)	15 (4.6)	
	8, 9, 10, or 12				20 (6.1)	20 (6.1)	

Ductwork Requirements

⚠ CAUTION ⚠

- **Joints where ducts attach to furnace must be sealed securely to prevent air leakage into draft hood or burner rack area. Leakage can cause poor combustion, poor performance, and pilot problems and can shorten heat exchanger life.**
- **IMPORTANT: A minimum horizontal duct length of 18 inches (457 mm) is required at the furnace discharge before any vertical rise is made in front of the draft hood relief opening. This is required to prevent interference with the built-in draft hood.**

Refer to the installation manual for further information on ductwork requirements.

Clearances

The unit must be installed so that clearances are provided for combustion air space, for convenient installation and burner control service, and for proper spacing from combustible construction. Clearance to combustibles is defined as the necessary minimum distance from the heater to a surface or object that ensures that a surface temperature does not exceed 90°F above the surrounding ambient temperature. Units must be installed so that clearances are as follows:

Unit Surface	Minimum Clearance (Inches (mm))
Top	6 (152)
Control side	6 (152) + width of furnace*
Side opposite controls	6 (152)
Bottom, to combustibles	3 (76)
Bottom, to noncombustibles	0 (0)
*To have sufficient space to remove the drawer-type burner rack.	

TECHNICAL SPECIFICATIONS—CONTINUED

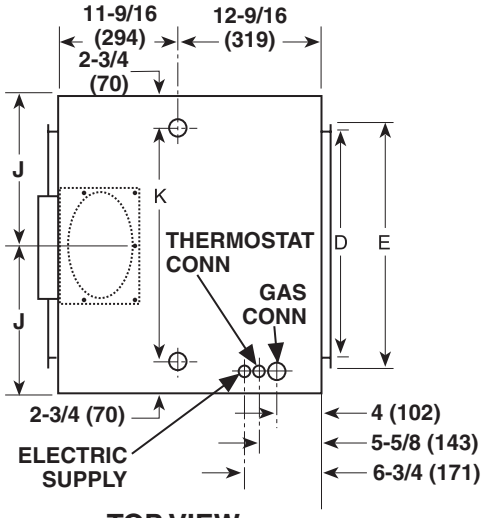
Dimensions

NOTES:

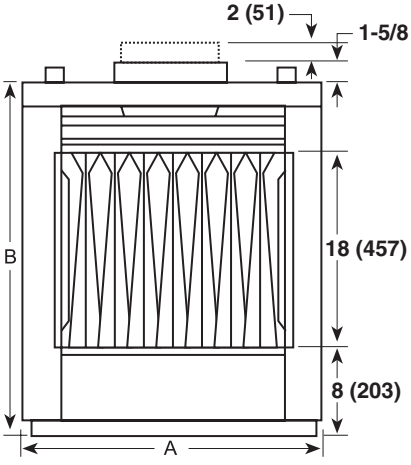
Inches (mm)

Standard airflow may be reversed by changing direction of heat exchanger air baffles.

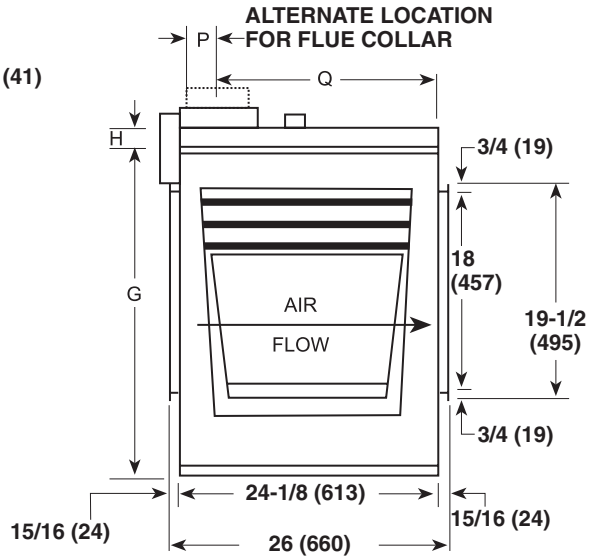
Burner and control access shown left-hand side. Specify right-hand side for opposite access and connections.



TOP VIEW



FRONT VIEW



SIDE VIEW

Dimension (See Graphic Below)	Unit Size (MBTUh)								
	75, 100	125, 140	170	200	225	250	300	350	400
	Inches (mm)								
A	35 (889)				35-3/4 (908)		36 (914)		
B	14-1/4 (362)	17 (432)	19-3/4 (502)	22-1/2 (572)	25-1/4 (641)	28 (711)	33-1/2 (851)	39 (991)	44-1/2 (1130)
C	35-11/16 (906)						38-1/8 (968)		
D	14-5/8 (371)	17-3/8 (441)	20-1/8 (511)	22-7/8 (581)	25-5/8 (651)	28-3/8 (721)	33-7/8 (860)	39-3/8 (1000)	44-7/8 (1140)
E	4-3/8 (111)					7-1/8 (181)	9-7/8 (251)	12-5/8 (321)	15-3/8 (391)
F	4 (102)				5 (127)		6 (152)		
H	5/8 (16)				1-3/8 (35)		1-5/8 (41)		
J	12-1/2 (318)	15-1/4 (387)	18 (457)	20-3/4 (527)	23-1/2 (597)	26-1/4 (667)	31-3/4 (806)	37-1/4 (946)	42-3/4 (1086)
K	7-1/4 (184)						9-9/16 (243)		
L	7-7/16 (189)						7-5/8 (194)		
M	4-5/8 (117)	6 (152)	7-3/8 (187)	8-3/4 (222)	10-1/8 (257)	11-1/2 (292)	13-7/8 (352)	16-5/8 (422)	19-3/8 (492)

Weights

Type	Unit Size (MBTUh)									
	75, 100	125	150	175	200	225	250	300	350	400
	Pounds (kg)									
Unit	150 (68)	163 (74)	182 (83)	186 (84)	224 (102)	231 (105)	276 (125)	286 (130)	320 (145)	355 (161)
Shipping	170 (77)	200 (91)	220 (100)	230 (104)	275 (125)	290 (132)	350 (159)	360 (163)	390 (177)	420 (191)

Duct Furnace Airflow

- The duct furnace must be installed on the positive pressure side of the field-supplied blower.
- The air distribution must be even over the entire heat exchanger. Turning vanes should be employed in elbows or turns in the air inlet to ensure proper air distribution.
- The air throughput must be within the CFM range stated on the heater rating plate.
- If it is determined that the blower CFM is greater than allowed or desirable, refer to the installation manual for determining the correct size of bypass duct required or for instructions on converting the furnace for a higher CFM application.
- To determine temperature rise, the inlet and outlet air temperatures should be measured at points not affected by heat radiating from the heat exchanger. The following table lists the approved temperature rise range with the required CFM and the internal pressure drop for each size of unit.

Temperature Rise	Unit Size (MBTUh)										
	75	100	125	150	175	200	225	250	300	350	400
	CFM/Pressure Drop (IN WC)										
80% Thermal Efficient											
50°F	1105/0.23	1475/0.43	1840/0.50	2210/0.38	2580/0.52	2945/0.42	3315/0.53	3685/0.40	4420/0.58	5160/0.65	5895/0.67
60°F	920/0.15	1225/0.29	1535/0.33	1840/0.26	2150/0.35	2455/0.28	2765/0.36	3070/0.28	3685/0.39	4300/0.44	4915/0.45
70°F	790/0.10	1050/0.21	1315/0.25	1580/0.19	1840/0.26	2105/0.22	2370/0.27	2630/0.23	3160/0.29	3685/0.31	4210/0.32
80°F	690/0.06	920/0.15	1150/0.21	1380/0.15	1610/0.19	1840/0.17	2070/0.22	2300/0.22	2765/0.25	3225/0.25	3685/0.25
90°F	610/0.04	815/0.11	1020/0.18	1225/0.12	1430/0.16	1635/0.14	1840/0.17	2045/0.21	2455/0.22	2865/0.23	3275/0.19
With Finger Baffles Removed											
20°F	2765/0.62	3685/1.08	4605/1.16	5530/0.85	6450/1.19	7370/1.00	8295/1.28	9215/0.90	11,060/1.26	12,900/1.23	14,745/1.23
30°F	1840/0.28	2455/0.5	3070/0.53	3685/0.39	4300/0.54	4915/0.45	5530/0.58	6140/0.41	7370/0.57	8600/0.56	9830/0.56
40°F	1380/0.16	1840/0.28	2300/0.28	2765/0.21	3225/0.29	3685/0.25	4145/0.31	4605/0.22	5530/0.32	6450/0.31	7370/0.31
50°F	1105/0.12	1475/0.16	1840/0.21	2210/0.15	2580/0.18	2945/0.16	3315/0.21	3685/0.15	4420/0.21	5160/0.19	5895/0.19
60°F	920/0.10	1225/0.14	1535/0.15	1840/0.12	2150/0.15	2455/0.12	2765/0.15	3070/0.11	3685/0.15	4300/0.14	4915/0.15
75°F	735/0.10	980/0.12	1225/0.12	1475/0.11	1720/0.12	1965/0.11	2210/0.12	2455/0.08	2945/0.11	3440/0.11	3930/0.11

Gas Supply Pressure

The unit is equipped for a maximum gas supply pressure of 1/2 psi, 3.4 kPa, or 14 IN WC.

NOTES:

Supply pressure higher than 1/2 psi requires the installation of an additional service regulator external to the unit.

PRESSURE TESTING SUPPLY PIPING

- **Test pressures *above* 1/2 psi—disconnect the heater and manual valve from the gas supply line to be tested. Cap or plug the supply line.**
- **Test pressures *below* 1/2 psi—before testing, close the manual valve on the heater.**

Gas Supply Piping

- All piping must be in accordance with requirements outlined in the *National Fuel Gas Code* (ANSI/Z223.1, latest edition) or the *Natural Gas and Propane Installation Code* (CSA B149.1).
- Duct furnaces are orificed for operation with natural gas having a heating value of 1,000 (±50) BTU per cubic foot or with propane gas having a heating value of 2,500 (±100) BTU per cubic foot. Sizing of gas supply lines depends on piping capacity and is based on cubic feet per hour based on a 0.3 IN WC pressure drop, a 0.6 specific gravity for natural gas at 1,000 BTU per cubic feet, and a 1.6 specific gravity for propane at 2,550 BTU per cubic feet. If the gas at the installation does not meet this specification, consult the factory for proper orificing.
- Variables for sizing gas supply lines are listed in the table below. When sizing supply lines, consider the possibility of future expansion and increased requirements. Refer to the *National Fuel Gas Code* for additional information on line sizing.

Length of Pipe (Feet)	Diameter of Pipe (Inches)											
	1/2		3/4		1		1-1/4		1-1/2		2	
	Natural Gas	Propane	Natural Gas	Propane	Natural Gas	Propane	Natural Gas	Propane	Natural Gas	Propane	Natural Gas	Propane
	Cubic Feet per Hour											
20	92	56	190	116	350	214	730	445	1100	671	2100	1281
30	73	45	152	93	285	174	590	360	890	543	1650	1007
40	63	38	130	79	245	149	500	305	760	464	1450	885
50	56	34	115	70	215	131	440	268	670	409	1270	775
60	50	31	105	64	195	119	400	244	610	372	1105	674
70	46	28	96	59	180	110	370	226	560	342	1050	641
80	43	26	90	55	170	104	350	214	530	323	990	604
90	40	24	84	51	160	98	320	195	490	299	930	567
100	38	23	79	48	150	92	305	186	460	281	870	531
125	34	21	72	44	130	79	275	168	410	250	780	476
150	31	19	64	39	120	73	250	153	380	232	710	433
175	28	17	59	36	110	67	225	137	350	214	650	397
200	26	16	55	34	100	61	210	128	320	195	610	372

NOTES

⚠ DANGER ⚠

FIRE OR EXPLOSION HAZARD

- **Failure to follow safety warnings exactly could result in serious injury, death, or property damage.**
- **Improper installation, adjustment, alteration, service, or maintenance can cause serious injury, death, or property damage.**
- **Installation and service must be performed by a qualified installer, service agency, or the gas supplier.**
- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**

WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Leave the building immediately.**
- **Immediately call your gas supplier from a phone remote from the building. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

For more information on Reznor HVAC products:

- **Contact your local Reznor representative at 1-800-695-1901**
- **Refer to the manuals and additional consumer materials found at www.reznorhvac.com**

X-TSL (10-23) REV-A