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MUA-DS-5

Outdoor Gas Heating Units and Duct Furnaces

Packaged Rooftop Unit for Heating, Cooling, Ventilating and Make-Up Air Applications

Features and Benefits

The Trane rooftop line is a packaged air heating and cooling system, suitable for heating, cooling, ventilating and make- up air applications. Unit sizes range from 800 to 14,000 cfm (0.4-6.6 cu. m/s) with ½-15 hp motor capabilities. These rooftops are available with inputs from 100,000 Btu/h to 1,200,000 Btu/h (29.3 to 351.4 kW).

Duct furnaces are AGA and CGA certified for safety and performance with a range of 100,000 Btu/h input to 400,000 Btu/h (29.3 to 117.1 kW) input per duct furnace. Packaged units are also ETL and CSA certified for electrical safety in compliance with UL-1995 Standard for HVAC equipment. The rooftop units can be ordered as individual duct furnaces only, heating with evaporative cooling or packaged heating and cooling systems.

The mechanical configuration is determined by selecting one of the nine standard arrangements. Rooftop arrangements are divided into two classifications — standard and high cfm blower types.

The standard blower unit consists of a blower cabinet that houses the dampers, filters and blower in one cabinet. An optional evaporative cooling unit is available on units up to 800 MBh (234.3 kW). Trane recommends the use of 409 stainless steel whenever an evaporative cooling unit is installed upstream of a duct furnace section(s).

The high cfm blower unit utilizes a separate damper/filter cabinet with a "V" bank filter arrangement, a blower cabinet and up to three duct furnaces (1200 MBh) (351.4 kW). An optional cooling coil cabinet is offered on units up to 800 MBh. Trane recommends the use of 409 stainless steel whenever a cooling coil is used upstream of a furnace section(s). Both standard and high cfm blower arrangements may also include a downturn supply air plenum, outside air and/or return air, intake hood and a roof curb.

All units are completely packaged, rail-mounted, wired, piped, waterproofed and test fired to assure a smooth installation and easy start-up.

Furnace types are divided into two classifications — standard temperature rise and high temperature rise with natural and power vented models. All furnaces have optional left or right hand access. Standard temperature rise units have a lower pressure drop across the heat exchanger allowing higher airflow capabilities and an 80 percent efficiency rating with a temperature rise of 20 to 60 F (11 to 33 C). High temperature rise units are configured for higher temperature rise, and have a higher pressure drop across the furnace section of the unit and a 79 percent efficiency rating with a temperature rise of 60 to 90 F (33 to 50 C). The high temperature rise type furnace is not available in California and only available in a single furnace package. The maximum discharge air temperature for all duct furnaces is 150 F (66 C).

In addition to a versatile offering of mechanical features, this new rooftop unit also offers a wide variety of factory installed control options. Control components are located in the main electrical cabinet. The main electrical cabinet is located out of the air stream as part of the blower transition, between the blower cabinet and the first furnace for both standard and high cfm units. The standard electrical control scheme consists of a solid-state fan time delay, two pre-wired relay sockets which are mounted on the unit's main connection board, a solid-state gas ignition system and room or duct thermostats. The units are also equipped with a blower door safety interlock, a 24 VAC circuit breaker, a high temperature limit switch in each furnace section and a reverse airflow switch located in the blower cabinet as standard equipment.

Gas control options range from single stage to six stages of fire, mechanical or electronic modulation and direct digital control (DDC) interface. Air control options offer a similar range of control features from manual dampers to modulating dampers that may include mixed air, dry bulb, pressure sensing, enthalpy control, DDC interface or ASHRAE cycle control arrangements.

The venting is an integral part of the furnace and must not be altered in the field. The rooftop furnaces are equipped with a vent cap which is designed for gravity venting. Air for combustion enters at the base of the vent through a protective grill, and the design of the vent cap is such that the products of combustion are discharged at the upper section of the cap. This cap is shipped in a separate carton. It should be fastened in position and not be altered in any way.

Gravity Venting

Power Venting

The proximity of the combustion air inlet to products of combustion discharge is designed to provide trouble-free operation under all types of wind conditions.

The power vented unit has a system with the inlet and discharge grill located in the upper section of a split-side panel. This balanced flue design also performs well under virtually all wind conditions.

Features and Benefits

- AGA and CGA Certified Duct Furnaces
- ETL and CSA UL-1995 Certified Packaged Units
- FM (Factory Mutual) Compliant
- Heating Capacities from 100 MBh to 1200 MBh (29.3 kW to 351.4 kW)
- Gravity and Power Vented Furnaces
- 80% Efficient Standard Temperature Rise Furnace - 20 to 60 F (11 to 33 C) per Furnace
- 79% Efficient High Temperature Rise Furnace - 60 to 90 F (33 to 50 C) - single furnace only
- CFM ranges from 800 to 14,000 CFM (0.4 to 6.6 Cu.m/s)
- Motor sizes up to 15 horsepower
- ODP motors with high efficiency, totally enclosed and two-speed options
- Left hand or right hand service access
- Draw-thru coil cabinet with stainless steel drain pan
- Evaporative cooling with standard 8 or optional 12" media (203 or 305 mm)
- Uninsulated or insulated roof curb
- Standard 18-gauge cabinets
- Standard 20-gauge aluminized steel heat exchanger. Optional stainless steel.
- Standard one-inch washable filters
- Standard single stage combination gas valve
- Standard high temperature limit (each furnace)
- Standard blower door safety interlock switch
- Standard reverse airflow safety switch
- Standard 24-volt circuit breaker
- Standard printed circuit main connection board
- Wiring harnesses with stamped wire numbers
- Solid-state automatic pilot ignition control
- Solid-state fan time delay
- Over 40 standard gas and air control packages

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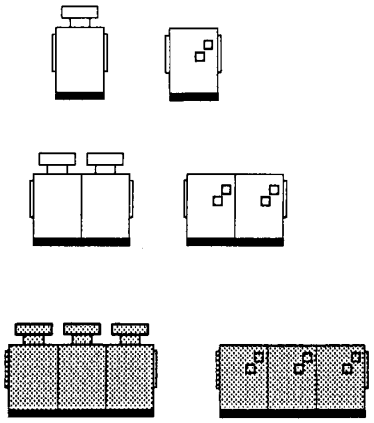
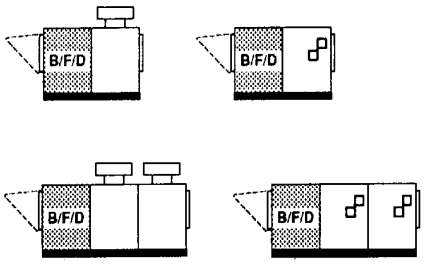
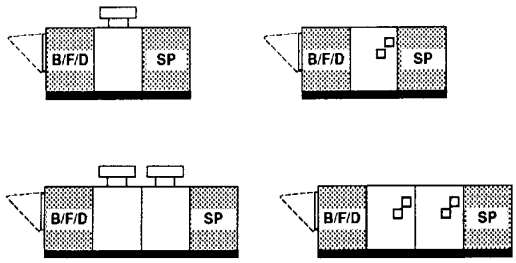
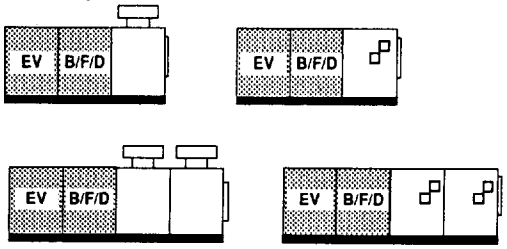
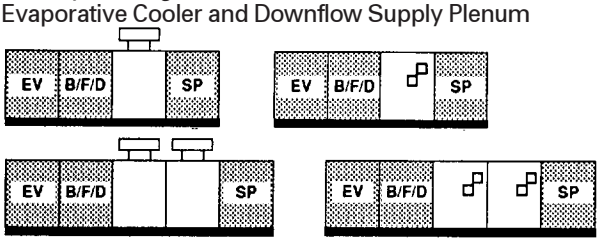
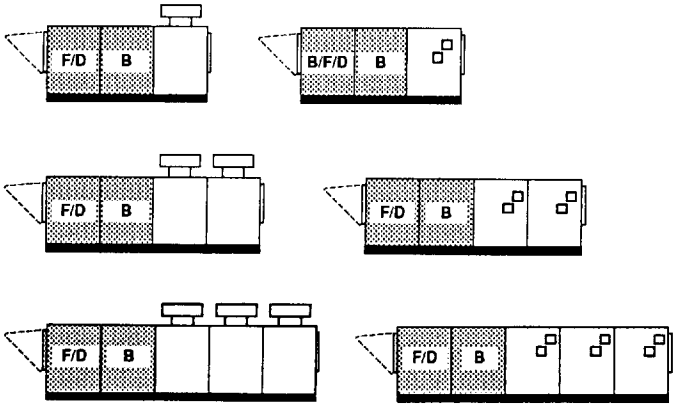
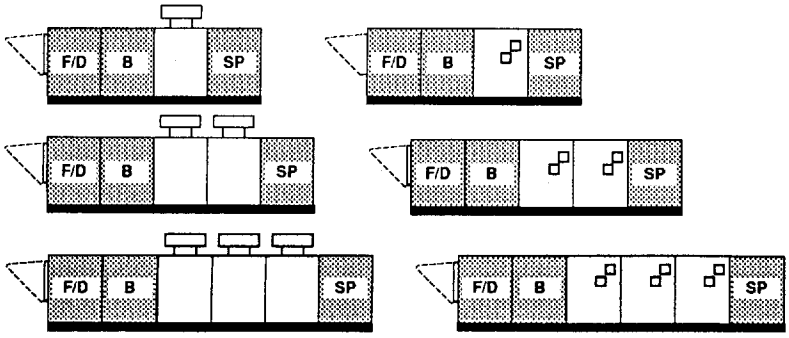
Unit Configurations

Unit Type	Standard Features
Arrangement A Rooftop Duct Furnace 	- Natural or LP (Propane Gas) - Single Stage 24-Volt Gas Valve - Intermittent Pilot Ignition - Orificed for Operation Up To 2000' Above Sea Level - Aluminized Steel Heat Exchanger - Flue Vent Cap (Gravity Vent Only) - 24-Volt High Temperature Safety Circuit - Terminal Block Wiring, Single Point Connection - Quick Opening Access Doors
Arrangement B Rooftop Heating Unit With Standard Blower 	Same as Arrangement A with: - Insulated Blower/Filter/Damper Cabinet - 1" Permanent Filters - Fan Time Delay Relay - Electrical Cabinet Isolated from the Air Stream - 24-Volt Control Circuitry - Low Voltage Circuit Breaker - Blower Door Interlock Switch with Service Override
Arrangement C Rooftop Heating Unit with Standard Blower and Downflow Supply Plenum 	Same as Arrangement B with: - Insulated Supply Plenum

See page 6 for Legend.

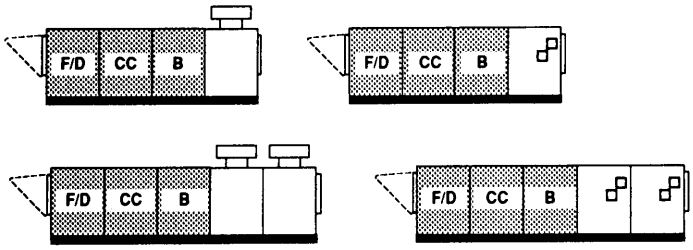
Unit Configurations

Unit Type	Standard Features
Arrangement D Rooftop Heating Unit with Standard Blower and Evaporative Cooler 	Same as Arrangement B with: - Evaporative Cooler - High Efficiency 8“ Media - Self-Cleaning Design - Sealed Pump Motor with Float Valve - 24-Volt Control Circuitry - Heavy-Duty Stainless Steel Water Tank - Easy Access Intake Filter and PVC Distribution Tubes
Arrangement E Rooftop Heating Unit with Standard Blower, Evaporative Cooler and Downflow Supply Plenum 	Same as Arrangement D with: - Downflow Supply Plenum
Arrangement G Rooftop Heating Unit with High Cfm Blower 	- Natural or LP (Propane Gas) - Single-Stage 24 Volt Gas Valve - Intermittent Pilot Ignition - Orificed for Operation up to 2000' above Sea Level - Aluminized Steel Heat Exchanger - Flue Vent Cap (Gravity Vent Only) - 24-Volt High Temperature Safety Circuit - Terminal Block Wiring, Single Point Connection - Quick Opening Access Doors - Permanent Filter - Fan Time Delay Relay - Standard V-bank Filter and Damper Cabinet - Insulated Filter/Damper and Blower Cabinet
Arrangement J Rooftop Heating Unit with High Cfm Blower and Downflow Supply Plenum 	Same as Arrangement G with: - Insulated Supply Plenum

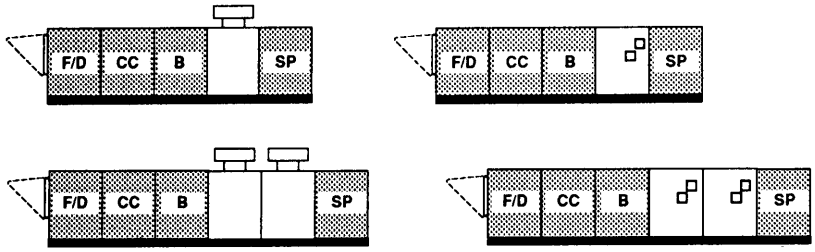
See page 6 for Legend.

Unit Configurations

Unit Type	Standard Features
Arrangement K Rooftop Heating Unit with High Cfm Blower and Coil Cabinet	Same as Arrangement G with: - Coil Section - Mounting for 4 to 6 Row Coils - Stainless Steel Drain Pan with 3/4" Tapped Outlets



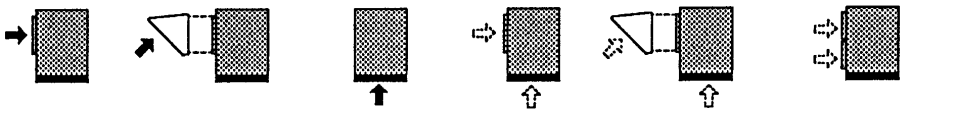
Arrangement L Rooftop Heating Unit with High Cfm Blower, Coil Cabinet and Downflow Supply Plenum	Same as Arrangement K with: - Insulated Supply Plenum



Motors, Air Inlet Configuration/Air Control and Damper Arrangement Must Be Selected for Each Unit

Notes:
1. Gravity vent or power vent models available on all unit sizes.
2. Optional air inlet hood shown in dotted lines.
3. Legend is as follows:
   - B/F/D - Standard Blower/Filter/Damper
   - SP - Supply Plenum
   - EV - Evaporative Cooler
   - F/D - Filter/Damper
   - B - High cfm Blower
   - CC - Coil Cabinet
4. Horizontal outside air over return air. Specify air inlet configuration 4 or 5 and then select miscellaneous option "D" for horizontal return.

Air Inlet Configurations (Digit 18 of the Model Number)



1 **2** **3** **4** **5** **See Note 4 Above**

Model Number Description

G	R	A	A	40	G	D	C	C	0	N	2	B	Q	1	0	2	A	0	+
1	2	3	4	5,6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Digit 1 — Gas Heating Equipment
G = Gas

Digit 2 — Unit Type
F = Rooftop Duct Furnace
R = Rooftop Heating Unit
S = Special Unit Type

Digit 3 — Furnace Type
A = Standard Temp Rise (20-60 F) LH
B = Standard Temp Rise (20-60 F) RH
C = High Temp Rise (60-90 F) LH
D = High Temp Rise (60-90 F) RH
S = Special Furnace Type
Note: LH = Left Hand
RH = Right Hand

Digit 4 — Development Sequence
A = First Generation

Digit 5,6 — Input Capacity
Single Furnace
10 = 100 MBh Input
15 = 150 MBh Input
20 = 200 MBh Input
25 = 250 MBh Input
30 = 300 MBh Input
35 = 350 MBh Input
40 = 400 MBh Input
Double Furnace
50 = 500 MBh Input
60 = 600 MBh Input
70 = 700 MBh Input
80 = 800 MBh Input
Triple Furnace
12 = 1200 MBh Input
SS = Special unit

Digit 7 — Venting Type
G = Gravity Venting
P = Power Venting
S = Special Venting

Digit 8 — Main Power Supply
A = 115/60/1
B = 208/60/1
C = 230/60/1
D = 208/60/3
E = 230/60/3
F = 460/60/3
G = 575/60/3
S = Special Main Power Supply

Digit 9 — Gas Control Option (Intermittent Pilot Ignition)
A = Single-Stage
B = Two-Stage
C = Hydraulic Modulating (60-100)
D = Hydraulic Modulating (75-200)
E = Hydraulic Modulating With Bypass and limit (60-100)
F = Hydraulic Modulating With Bypass (75-200)
G = Electronic Modulating With Room T-Stat
H = Electronic Modulating With Duct T-Stat
J = Electronic Modulating With Duct T-Stat and Override Room Thermostat
K = Electronic Modulating W/External 4-20 mA Input (Furnace 1)
L = Electronic Modulating W/External 4-20 mA Input (All furnaces)
M = Electronic Modulating W/External 0-10 VDC Input (Furnace 1)
N = Electronic Modulating W/External 0-10 VDC Input (All furnaces)
P = Two-Stage Discharge Air Control w/OA Reset.
R = Three-Stage Discharge Air Control w/OA Reset.
T = Four-Stage Discharge Air Control w/OA reset.
U = S-350 2 Stage Modular Electronic Control System
W= S-350 3 Stage Modular Electronic Control System
X = S-350 4 Stage Modular Electronic Control System
Y = S-350 6 Stage Modular Electronic Control System
S = Special Gas Control

Digit 10, 11 — Design Sequence
DO = Design Sequence

Digit 12 — Fuel Type
N = Natural Gas
P = LP (Propane) Gas
L = Natural Gas with 100% Lockout
S = Special Fuel type

Digit 13 — Heat Exchanger Material
1 = Aluminized Steel
2 = #409 Stainless Steel (First Furnace Only)
3 = #409 Stainless Steel (All Furnace Sections)
4 = #321 Stainless Steel (First Furnace Only)
5 = #321 Stainless Steel (All Furnace Sections)
6 = #409 Stainless Steel Package (First Furnace Only)
7 = #409 Stainless Steel Package (All Furnace Sections)
8 = #321 Stainless Steel Package (First Furnace Only)
9 = #321 Stainless Steel Package (All Furnace Sections)
S = Special Heat Exchanger Package

Digit 14 — Rooftop Arrangements
A = Duct Furnace
B = Blower (Standard)
C = Blower (Standard) Plenum
D = Blower (Standard) Evaporative Cooler
E = Blower (Standard) Evaporative Cooler/ Plenum
G = Blower (High CFM) /Plenum
J = Blower (High CFM) /Plenum
K = Blower (High CFM) /Coil Cabinet
L = Blower (High CFM) /Coil Cabinet/ Plenum
S = Special Rooftop Arrangement

Digit 15 — Rooftop Heating Unit Motor Selection
0 = None (Rooftop duct furnace)
A = ½ HP w/contactor
B = ¾ HP w/contactor
C = 1 HP w/contactor
D = 1 ½ HP w/contactor
E = 2 HP w/contactor
F = 3 HP w/contactor
G = 5 HP w/contactor
H = ½ HP w/magnetic starter
J = ¾ HP w/magnetic starter
K = 1 HP w/magnetic starter
L = 1 ½ HP w/magnetic starter
N = 2 HP w/magnetic starter
P = 3 HP w/magnetic starter
Q = 5 HP w/magnetic starter
R = 7 ½ HP w/magnetic starter
T = 10 HP w/magnetic starter
U = 15 HP w/magnetic starter
S = Special Motor

Digit 16 — Motor Speed
0 = No Selection
1 = Single Speed ODP 1800 RPM
2 = Single Speed TEFC 1800 RPM
3 = Single Speed High Efficiency ODP 1800 RPM
4 = Single Speed High Efficiency TEFC 1800 RPM
5 = 2S1W ODP 1800/900 RPM
6 = 2S2W ODP 1800/1200 RPM
S = Special Motor Speed & Starter

Digit 17 — Coil Options
0 = No cooling coil selection
A = DX coil, 4 Row, Single Circuit
B = DX coil, 4 Row, Dual Circuit
C = DX coil, 6 Row, Single Circuit
D = DX coil, 6 Row, Dual Circuit
E = Chilled Water Coil, 4 Row,
G = Chilled Water Coil, 6 Row,
S = Special coil

Model Number Description

Digit 18 — Air Inlet Configuration
0 = None (Rooftop Duct Furnace)
1 = Outside Air (OA) (Horizontal Inlet)
2 = Outside Air W/Air Hood (Horizontal Inlet
3 = Bottom Return Air (RA)
4 = Outside And Return Air (OA/RA)
5 = Outside and Return Air W/Air Hood
S = Special Air inlet configuration

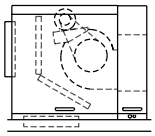
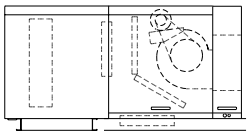
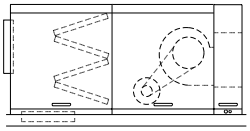
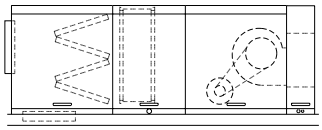
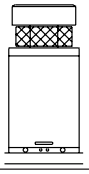
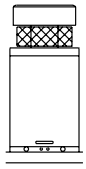
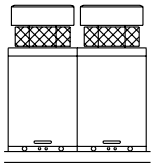
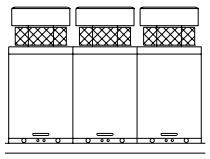
Digit 19 — Air Control and Damper Arrangement
0 = None (Rooftop Duct Furnace)
A = Outside Air 2 pos. Motor/SR
B = Return Air 2 pos. Motor/SR
C = OA/RA 2 pos SR
E = OA/RA Mod Mtr W/Mixed Air Control/ Min Pot/SR
H = OA/RA Mod Mtr W/Mixed Air Control/ SR
K = OA/RA Mod Mtr W/Min Pot/SR
M = OA/RA Mod Mtr W/Dry Bulb/Mixed Air Control/Min Pot/SR
N = OA/RA Mod Mtr W/ Enthalpy Controlled Economizer/SR
P = OA/RA Mod Mtr W/ Space Pressure Controller
R = OA/RA Mod Mtr W/ S-350 P Proportional Mixed Air Control/SR
U = OA/RA Mtr. W/External 0-10 VDC and 4-20 mA Analog Input/SR (External Input)
W= ASHRAE Cycle I (OA/RA 2 pos. w/ warm-up stat/SR
X = ASHRAE Cycle II (OA/RA Mod W/Warm-up Stat/Mixed Air/min pot/SR
Y = ASHRAE Cycle III (OA/RA Mod. W/Warm-up Stat/Mixed Air/SR
Z = Manual Dampers
S = Special Air Control and Damper Arrangement

Digit 20
0 = Non-California Shipment
1 = California Shipment

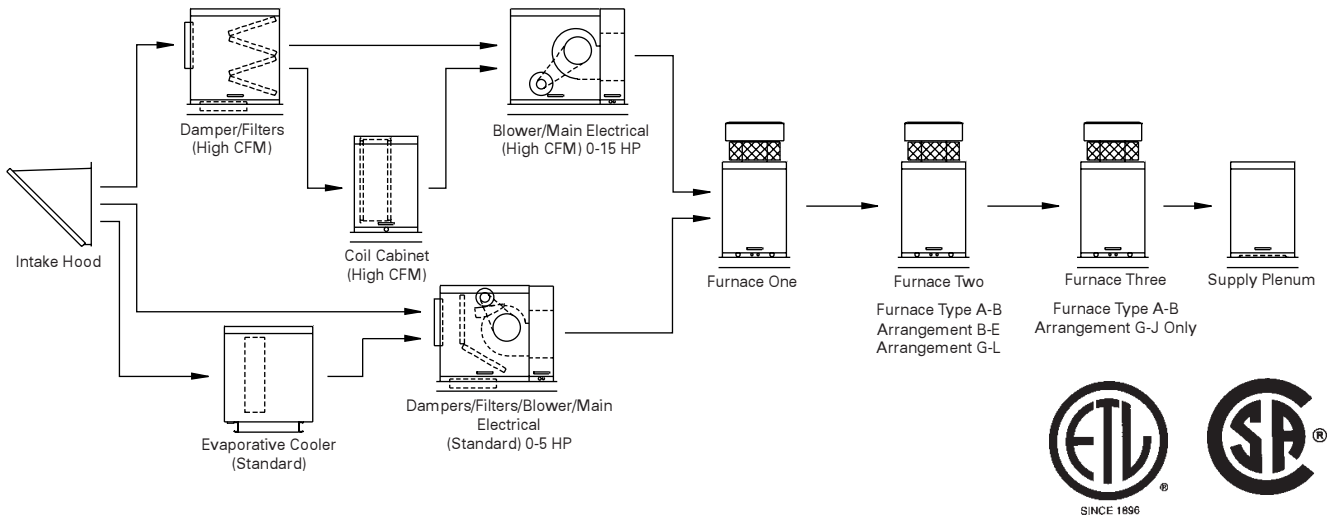
Digit 21 — Miscellaneous Options
A = Orifices For Elevation Above 2000 Feet (Specify Elevation)
B = 12″ Evaporative Media
C = Moisture Eliminators
D = Horizontal Return
E = Continuous Fan Relay
F = Freezestat
G = Fan Time Delay Control (Duct Furnace Only)
H = Return Air Firestat
J = Supply Air Firestat
K = Manual Blower Switch
L = 409 Stainless Steel Furnace Drip Pan
N = Foil Face Insulation
P = Low Leak Dampers
Q = Clogged Filter Switch
R = High/Low Gas Pressure Limit Switches
T = Status Indicator Lamps (Elec Cabinet)
V = Manual Reset High LImit Switch
W= Interlock Relay —24/115V Coil SPDT 10A
X = Interlock Relay —24/115-230V Coil DPDT 10A
Y = Ambient Lockout

General Data

*The maximum CFM for Rooftop Arrangements K and L is 6,300 (3.0 m^3/s). A two-speed motor may be utilized for non-cooling airflow up to 14,000 CFM (6.6 m^3/s).

	Standard Blower Rooftop Arrangements B,C	Standard Blower w/Evap. Rooftop Arrangements D,E	High CFM Blower Rooftop Arrangements G, J	High CFM Blower w/Cooling Rooftop Arrangements K,L*†
				
Furnace Type A,B ΔT20 - 60F 	**Capacity 10-40** 10 - 1,200-3,500 CFM, ½ - 5 HP 15 - 2,000-4,500 CFM, ½ - 5 HP 20 - 2,500-5,500 CFM, ½ - 5 HP 25 - 3,000-5,500 CFM, ¾ - 5 HP 30 - 3,700-7,000 CFM, ¾ - 5 HP 35 - 4,500-8,500 CFM, ¾ - 5 HP 40 - 5,000-8,500 CFM, 1 - 5 HP ESP .1 - 2 in. WC	**Capacity 10-40** 10 -1,200-3,500 CFM, ½ - 5 HP 15 - 2,000-4,500 CFM, ½ - 5 HP 20 - 2,500-5,500 CFM, ½ - 5 HP 25 - 3,000-5,500 CFM, ¾ - 5 HP 30 - 3,700-7,000 CFM, ¾ - 5 HP 35 - 4,500-8,500 CFM, ¾ - 5 HP 40 - 5,000-8,500 CFM, 1 - 5 HP ESP .1 - 2 in. WC	**Capacity 20-40** 20 -2,500-7,400 CFM, ¾ - 10 HP 25 - 3,100-7,500 CFM, ¾ - 10 HP 30 - 3,700-11,00 CFM, ½ - 15 HP 35 - 4,500-13,000 CFM, ¾ - 15 HP 40 - 5,000-14,000 CFM, 1 - 15 HP ESP .1 - 2 in. WC	**Capacity 10-40** 10 -1,200-3,000 CFM, ½ - 5 HP 15 - 2,000-3,000 CFM, ½ - 5 HP 20 - 2,500-4,400 CFM, ¾ - 10 HP 25 - 3,100-4,400 CFM, ¾ - 10 HP 30 - 3,700-5,700 CFM, ½ - 15 HP 35 - 4,500-5,700 CFM, ¾ - 15 HP 40 - 5,000-6,300 CFM, 1 - 15 HP ESP .1 - 2 in. WC
Furnace Type C,D ΔT60 - 90F 	**Capacity 10-40** 10 - 800-1,200 CFM, ½ - 1 ½ HP 15 - 12,000-1,800 CFM, ½ - 2 HP 20 - 1,600-2,400 CFM, ½ - 2 HP 25 - 2,000-3,000 CFM, ½ - 3 HP 30 - 2,400-3,600 CFM, ½ - 5 HP 35 - 2,800-4,200 CFM, ½ - 5 HP 40 - 3,200-4,800 CFM, ½ - 5 HP ESP .1 - 2 in. WC	**Capacity 10-40** 10 - 800-1,200 CFM, ½ - 1 ½ HP 15 - 12,000-1,800 CFM, ½ - 2 HP 20 - 1,600-2,400 CFM, ½ - 2 HP 25 - 2,000-3,000 CFM, ½ - 3 HP 30 - 2,400-3,600 CFM, ½ - 5 HP 35 - 2,800-4,200 CFM, ½ - 5 HP 40 - 3,200-4,800 CFM, ½ - 5 HP ESP .1 - 2 in. WC	**NA**	**Capacity 20-40** 20 - 1,600-2,400 CFM, ½ - 2 HP 25 - 2,000-3,000 CFM, ½ - 2 HP 30 - 2,400-3,600 CFM, ½ - 5 HP 35 - 3,000-4,200 CFM, ½ - 5 HP 40 - 3,300-5,000 CFM, ½ - 5 HP ESP .1 - 2 in. WC
Furnace Type A,B ΔT40 - 120F 	**Capacity 50-80** 50 - 3,000-3,500 CFM, 1 - 5 HP 60 - 3,700-6,500 CFM, 1 - 5 HP 70 - 4,500-8,000 CFM, 1 - 5 HP 80 - 5,000-8,000 CFM, 1 - 5 HP ESP .1 - 2 in. WC	**Capacity 50-80** 50 - 3,000-3,500 CFM, 1 - 5 HP 60 - 3,700-6,500 CFM, 1 - 5 HP 70 - 4,500-8,000 CFM, 1 - 5 HP 80 - 5,000-8,000 CFM, 1 - 5 HP ESP .1 - 2 in. WC	**Capacity 50-80** 50 - 3,100-7,500 CFM, 1 - 10 HP 60 - 3,700-11,000 CFM, ¾ - 15 HP 70 - 4,500-13,000 CFM, 1 - 15 HP 80 - 5,000-13,500 CFM, 1 - 15 HP ESP .1 - 2 in. WC	**Capacity 50-80** 50 - 3,000-4,400 CFM, 1 - 10 HP 60 - 3,700-5,700 CFM, ¾ - 15 HP 70 - 4,500-5,700 CFM, 1 - 15 HP 80 - 5,000-6,300 CFM, 1 - 15 HP ESP .1 - 2 in. WC
Furnace Type A,B ΔT60 - 180F 	**NA**	**NA**	**Capacity 12** 12 - 5,500-13,000 CFM, 1 ½ - 15 HP ESP .1 - 2 in. WC	**NA**

†These minimum and maximum CFM's shown are for Arrangements K and L in the cooling mode. See Performance Data for heating mode specifications.



General Data

Table G-1 — Filter Data

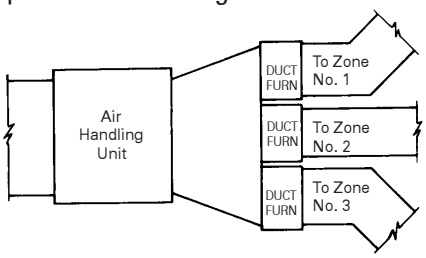
Rooftop Arrangement	Unit Size			
	10,15	20,25,50	30,35,60,70	40,80,12
B-E	(4)16 x 20	(4)20 x 20	(4)16 x 20 (2)20 x 20	(6)20 x 20
G-L	(8)16 x 20	(8)20 x 20	(8)16 x 20 (4)20 x 20	(12)20 x 20

Table G-2 — Metric Conversion Table

Unless otherwise specified, the following conversions may be used for calculating SI unit measurements:	
1 cubic foot= 0.028 m^3	1 inch water column = 0.029 kPa
1 foot = 0.0305 m	1 gallon = 3.785 L
1 inch = 25.4 mm	1,000 Btu/Cu. Ft. = 37.5 MJ/m3
1 psig = 6.894 kPa	1 liter/second = CFM x 0.472
1 pound = 0.453 kg	1 meter/second = FPM ÷ 196.8
1,000 Btu per hour = 0.293 kW	

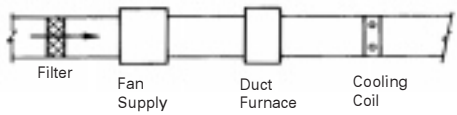
Application Considerations

General
Outdoor duct furnaces are designed for use in ducted applications with a separate air handling device such as a horizontal blower assembly. By utilizing a separate air source, greater application flexibility in airflow delivery can be obtained. Multiple duct furnaces can be used with an air handling unit to provide zone heating.



Note: When installing duct furnaces in parallel or in series, minimum clearance requirements must be considered. This clearance is required for serviceability. Duct furnaces are approved for blow-thru applications only. Right-hand burner drawers are available for parallel applications. Contact your local Trane representative for more information.

When used in conjunction with filters, cooling coils and an air handler, the duct furnace can become part of a built-up heating and cooling system.



Outdoor heating units are designed for make-up air or space heating applications. These weatherproofed units are intended for roof or slab mounting, saving indoor space and offering easy access for service and maintenance. The units are typically used in ducted applications.

Outdoor units cannot be mounted indoors due to the flue configuration.

Gas Heating Value
The majority of gas heating units are installed in applications where natural gas is readily available. In areas where natural gas is not available, Trane units may be ordered directly from the factory for use on LP (propane) gas.

Gas heat content varies by fuel type and location. The standard gross heating value for natural gas is 1,000 Btuh per cubic foot; for propane it is 2,500 Btuh per cubic foot. Significant variations from these standard values should be taken into account in equipment selections. To account for variations in the gross heating value of the fuel, adjust the total heat input required and select the unit on the basis of the adjusted load using the following formula:

$$\text{Adjusted load} = \text{Calculated load} \times \frac{\text{Standard gross heat value (Btuh/cu ft)}}{\text{Actual gross heat value (Btuh/cu ft)}}$$

Low Temperature Rise
Trane recommends against the set-up of a unit which will result in a temperature rise of less than 20 F. With such low temperature rises, the flue gases passing through the heat exchanger are cooled to condensate before reaching the flue outlet. This condensate is corrosive and will result in shortened heat exchanger life.

Air Density
Catalog performance data is based on elevations up to 2,000 feet (610 m) above sea level. Above 2,000 feet (610 m), the unit's heating capacity must be derated four percent for each 1,000 feet above sea level and special orifice selections are required. Table PAF-1 contains correction factors that can be applied to the unit's cataloged heating capacity, fan rpm, and fan bhp to obtain actual values for elevations above 2,000 feet.

Corrosive Atmospheres
Corrosion of heat exchangers and draft diverters have two basic variables — moisture (condensation) and sulphur. These two ingredients form to make sulfuric acid in the combustion process. Condensation occurs commonly in make-up air systems, using large amounts of fresh air, when air temperatures entering the heat exchanger drop to 40 F or below. This reaction can also occur in recirculating systems where some quantity of outside air is introduced upstream of the exchanger. The sulphur will always be present as an integral component of the gas. The resulting concentration of the acid is governed by the amount of sulphur in the gas. This concentration varies from gas to gas and geographically within the same type of gas.

Beyond sulfuric acid corrosion, there is the area of chlorinated or halogenated hydrocarbon vapor corrosion. This type of corrosion occurs when substances are mixed with combustion air that will cause the formation of hydrochloric or hydrofluoric acid when burned. These basic substances are found in degreasers, dry cleaning solvents, glues, cements, paint removers and aerosol propellants. Specific chemicals included in this group are trichloroethylene, perchloroethylene, carbon tetrachloride, methylene chloride, methyl chloroform and refrigerants 11, 12, 21, 22 and 114.

If sufficient PPM content of these corrosives is present, none of the common heat exchanger materials will hold up. The dilemma becomes whether to place the gas heating equipment outside of the area to be conditioned or use equipment in the space which does not burn a fuel such as gas (i.e., electric or hydronic).

Units should not be installed in areas with corrosive or inflammable atmospheres. Locations containing solvents or chlorinated hydrocarbons will produce corrosive acids when coming in contact with burner flames. This reaction will greatly reduce the life of the heat exchanger and may void the warranty. For added protection against heat exchanger corrosion, optional 409 and 321 stainless steel construction is available.

On units using outside air, with entering air temperature below 40 F, condensation of flue gas in the heat exchanger is possible. In these cases, stainless steel heat exchangers are recommended. An optional 409 or 321 stainless steel heat exchanger is recommended whenever there is an evaporative cooler or cooling coil upstream of the furnace section(s).

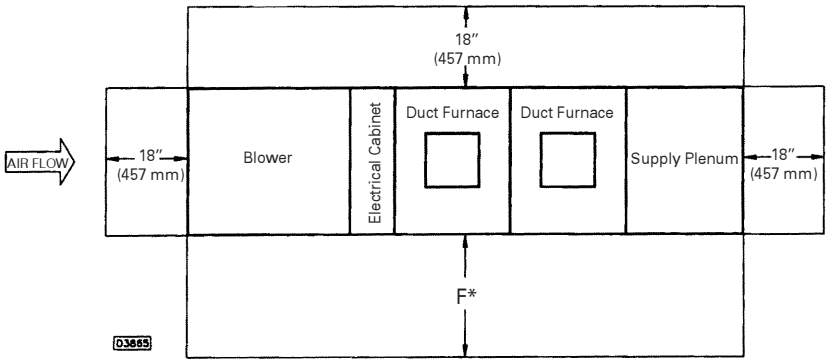
Application Considerations

Careful review of the job application with respect to use, probable contaminants within a conditioned space and the amount of fresh air to be brought in will help to make the proper selection of heat exchanger material. This review will help to eliminate problems before they begin.

Outdoor gas heating products are used in either make-up air or space heating applications (constant volume or variable air volume). These two basic applications are discussed in detail below.

Make-Up Air Applications
Make-up air systems provide outside air for ventilation requirements and replace air removed by an exhaust air system. Typical applications include kitchens, restaurants, manufacturing areas, sports centers, garages and terminals.

Local codes and ordinances frequently specify ventilation requirements for public places and industrial installations. Generally accepted industry practices are given in the ASHRAE Handbook of Fundamentals. Published industrial ventilation codes are usually based on summer ventilation conditions of a work environment and should be reviewed for winter operation. Exhaust requirements should also be examined to establish the year-round make-up air requirement within limitations of codes and regulations. Whenever fresh air will be used and is present at temperatures below 40 F, 409 stainless steel heat exchangers are recommended.



*Refer to Outdoor Duct Furnace Manual for specific clearances.

Space Heating Applications — Constant Volume
Make-up air units can be used to offset a portion of the building heat losses in addition to supplying make-up air. This is accomplished by heating the make-up air beyond the required space temperature. The additional heat supplied above room temperature can satisfy a portion of the space heating requirement. The additional capacity (Btuh) available for heating can be calculated with the following equation:

Space Heating Capacity =

1.085 x SCFM Make-up Air x (Max ΔT - (T_{room} - $T_{O.A.}$))

Outdoor units using 100 percent return air or a combination of return and outside air are more efficient in providing space heat than make-up air units using 100 percent outside air at a colder temperature.

Space Heating Applications — Variable Air Volume
Dual duct VAV systems have one duct to distribute cold air to those spaces that need cooling and another to distribute warm air to those spaces that need heating. When separate fans are used to handle the two duct systems, the ductwork can be arranged to allow simultaneous use of airside economizers and plenum heat of lights. The cooling unit uses return air or cold outside air in order to save compressor energy. The heating unit uses only plenum heated return air. This return air contains the rejected heat from the lights in the building and when recovered through the heating unit, can lower gas heating costs.

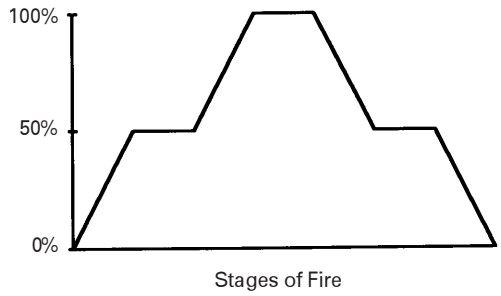
In this mode, the dual duct VAV is not unlike water source heat pumps or three deck multizone air handlers, but also has the added savings of variable air volume.

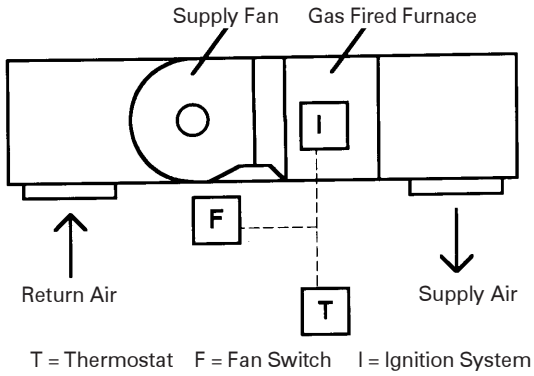
Result — dual duct VAV is an efficient system capable of using economizers and heat recovery devices. Occupant comfort is enhanced because heating and cooling are always available to the perimeter zones.

Application Considerations

General System Types

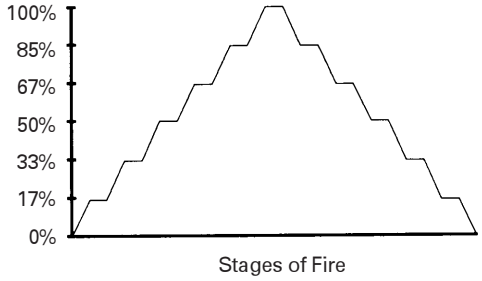
Single-Zone Staged Systems

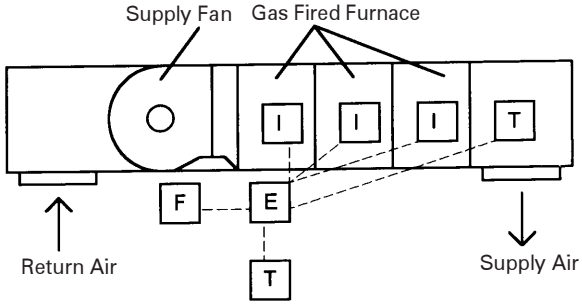




T = Thermostat F = Fan Switch I = Ignition System

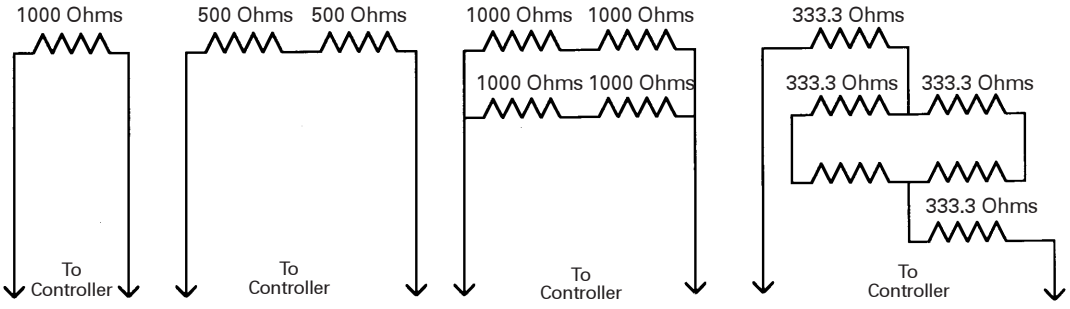
Single-zone staged systems can use multistage thermostats or ductstats for control of heating and cooling as well as multi-stage electronic controls. Systems need to be sized with respect to the heated space. Typical staged single-zone heating is achieved with a two-stage thermostat, delivering 50 percent of the units rated input at low fire and 100 percent at high fire. The thermostat is set to the desired space temperature with a differential setting for high and low fire. A fan time delay relay provides fan control with a post warm-up delay period preventing discomfort in the space.





T = Temperature Sensor F = Fan Switch
I = Ignition System E = Electronic Control

Electronic controls generally provide more stages of control with a higher degree of precision in temperature sensing and actuation of stages. A six-stage system equipped with an electronic control system can deliver 16 percent of a units input at stage 1 (low fire), 33 percent at stage 2, 50 percent at stage 3, 66 percent at stage 4, 84 percent at stage 5 and 100 percent at stage 6 (high fire).

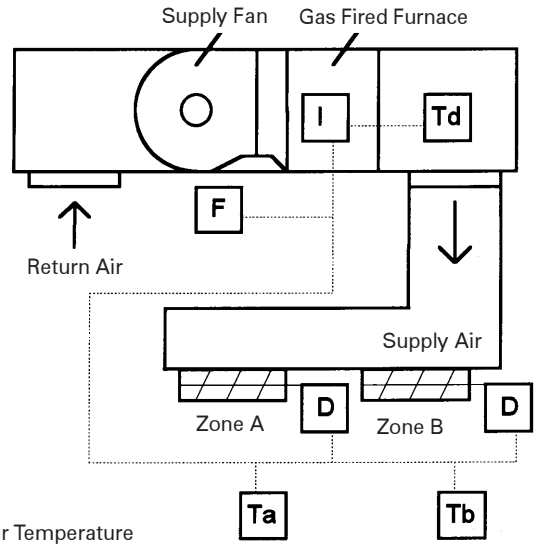


Large areas may incur hot and cold spots due to thermostat location, this can be overcome with electronic controls by incorporating within the space a scheme of temperature averaging, by locating a number of series or series/paralleled temperature sensors such as thermisters, rtds or prtd type sensors, an average temperature within the space can be transmitted to the control system.

Application Considerations

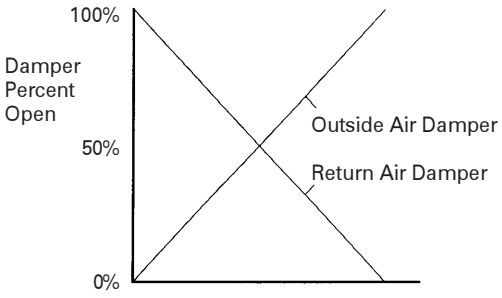
Multizone Staged Systems

Multizone staged systems act on the same basic principals as a single-zone staged system where as each stage is engaged with respect to demand. With multizone systems a thermostat or zone sensor is used for each zone. The system must be sized to maintain comfort levels for all zones. Zone dampers are used for efficient operation of multizone systems. Upon a call for heat from either zone the system will fire at low fire, upon a call from both zones the system will go to high fire. The zone dampers shall open and close upon a call for heat from their respective zone sensors. Typically a discharge air thermostat or sensor is used to maintain supply air temperature in multizone systems.

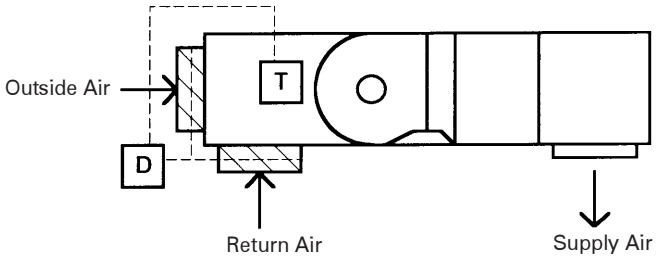


Td = Discharge Air Temperature
Ta/b = Temperature Sensor Zone A/B
F = Fan Switch
I = Ignition System
D = Damper Actuator

Two Zone System



Interlocked Outside and Return Air Dampers



T = Temperature Sensor
D = Damper Actuator

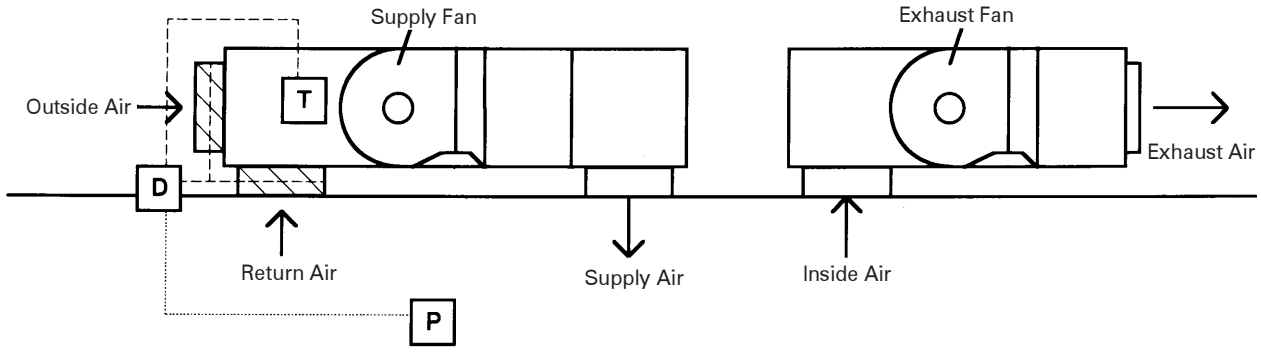
Outside and Return Air Damper Arrangement

Outside and Return Air Damper Control

Outside and return air damper control may be included in a staged single or multizone system. Interlocked outside and return air dampers with proportional actuator control, either electronic or electromechanical can maintain a minimum outside air setting and a mixed air setting. Damper control may also include enthalpy or pressure control.

Application Considerations

Make-Up Air Systems



T = Temperature Sensor
D = Damper Actuator
P = Pressure Sensor

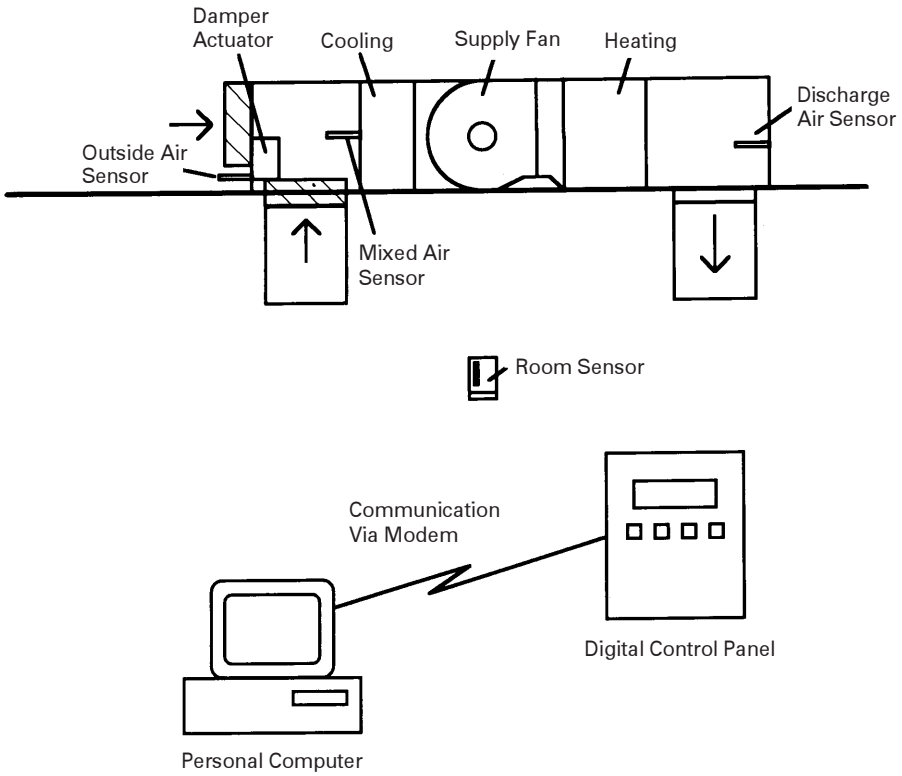
Rooftop Make-Up Air Unit with a Rooftop Exhaust Unit
Outside air is introduced in order to replace or make up for exhausted air due to commercial or industrial processes that require exhausted air within a space. The make up air is heated to a comfortable level relieving any additional load on the space heating system. Make-up air systems may also be configured to supplement space heating by increasing the discharge air temperature beyond the required temperature for the space. This additional heat above space temperature can offset a portion of the buildings heat losses. The additional heating capacity (Btuh) can be calculated as:

Space Heating Capacity =
$\frac{1.085 \times SCFM\ Make\text{-}Up\ Air \times}{(Max\ \Delta T - (T_{ROOM} - T_{O.A.}))}$.

Typical applications for make up air may include restaurants, kitchens, public arenas, airport and bus terminals, parking and maintenance garages, manufacturing and process areas. Make-up air and exhaust units may be matched in size and electrically interlocked with 100 percent outside air introduced when the exhaust fan is engaged. The make-up air system may also incorporate outside and return air and modulate the mixture based upon building pressure typically maintaining a slightly positive pressure within the space in order to reduce infiltration. The mixed air arrangement is generally the more efficient method due to the tempering of the outside air, however some applications may require 100 percent outside air due to poor return air quality. The use of 409 or 321 stainless steel heat exchangers is recommended whenever outside air is used.

Application Considerations

Direct Digital Control (DDC) Systems



Basic DDC Control System with Heating/Cooling Rooftop Unit

The basic direct digital control (DDC) system uses a microprocessor based controller and software to perform system and building control functions. The controller receives input from sensors mounted within the system. Based upon input data, the controller outputs a programmed response to the system's actuators (gas valves, fan motors and damper motors). Inputs may consist of temperature, pressure or flow and can be analog or digital signals. Output can also be analog or digital; analog output signals are generally 4-20 mA or 0-10 VDC and digital outputs a relay actuation.

The control may be located in the unit or in the building. A personal computer (PC) and software may be provided for remote communication. Temperature setpoints, night setback, time limited cycling, safety interlock input and system override functions may be setup at the controller or by PC interface via modem or direct connection. The controller may store in memory a number of previous cycles of operation with date, time, sensed temperatures, rate of fire and duration-of-cycle information available for down loading to a PC for report generation and printout. With digital control, energy use can be easily optimized for economical operation while maintaining comfort levels with a higher degree of accuracy.

Unit Placement
Refer to the applicable Trane Installation, Operation and Maintenance literature for specific installation instructions. Installations must conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1.

Outdoor units are designed and certified for outdoor use only. They may be located on the roof or at any convenient location outside the building to be heated. When locating units on the roof, make certain that it is capable of carrying the additional load of this equipment.

Units are mounted on skids and are suitable for curb or slab mounting. It is recommended that the unit's skids be mounted either on solid planking or steel channels, but not on a soft tar roof where the skids could sink and reduce the clearance between the bottom of the unit and the roof.

Application Considerations

Venting
The venting is an integral part of the furnace and must not be altered in the field. The rooftop furnaces are equipped with a vent cap which is designed for gravity venting. Air for combustion enters at the base of the vent through a protective grill, and the design of the vent cap is such that the products of combustion are discharged at the upper section of the cap. This cap is shipped in a separate carton. It should be fastened in position and not be altered in any way.

The proximity of the combustion air inlet to products of combustion discharge is designed to provide trouble-free operation under all types of wind conditions.

The power vented unit has a system with the inlet and discharge grill located in the upper section of a split-side panel. This balanced flue design also performs well under virtually all wind conditions.

FM and IRI Requirements
IRI, which stands for Industrial Risk Insurers, and FM, which stands for Factory Mutual, are both basically insurance companies which insure commercial/industrial firms against a variety of losses. Both publish requirements which must be met by certain equipment operating in the facilities they are preparing to insure.

Listed below is our interpretation of the requirements of both insurers pertaining to heating units only to the extent of features/controls required by IRI and/or FM. There are a number of additional requirements which pertain to electrical service, details of installation, etc., and we urge you to obtain copies of the publications pertaining to these details if you are involved in a job where IRI or FM adherence has been indicated. The requirements detailed herein are our interpretations of the latest publications in our possession and we must disclaim any responsibility for errors due to our interpretation and/or lack of any updated revision of these standards. Our intent is to provide you with an understanding of the application of these standards and how we believe our indirect-fired gas heating equipment applies.

IRI Requirements
1
All input sizes require 100 percent shutoff. This requires that any natural gas unit, equipped with intermittent pilot ignition, must employ a "lock-out" type ignition system which will shut off pilot gas if the pilot fails to light at any time. This system is required by AGA on LP gas units as standard equipment. However, for natural gas units, you will need to specify fuel type "L" Natural Gas with 100 percent lockout.
2
All units require AGA certification or UL "listed" controls. Our units are AGA certified and meet this requirement.
3
Models with inputs of 150,000 to 400,000 Btuh (43.9-117.1 kW) require "mechanical exhaust" and a "safety interlock." For our units this means a power vented unit.

FM Requirements
1
All units must be AGA certified or UL listed. Our units are AGA certified.
2
The high limit control must be in a circuit, the voltage of which does not exceed 120 VAC. All of our high limits would meet this requirement.

The specific requirement for an "IRI or FM gas train," while it applies to direct and indirect-fired gas heating equipment as well as oil-fired, comes into play only with units having an input in excess of 400,000 Btuh (117.1 kW). This may be one of the reasons why the majority of gas heating equipment manufacturers (indirect-fired) limit their largest individual furnace to 400,000 Btuh (117.1 kW).

Minimum/Maximum Gas Inlet Pressures
Gas valves are suitable to a maximum inlet pressure of 0.5 psi (14 inches water column) on natural gas. If the main gas supply pressure is greater than 14 inches WC (3.5 kPa), a step down pressure regulator must be field installed ahead of the gas valve. Minimum inlet pressure for natural gas units is 6 ½ inches W.C (1.6 kPa).

For LP (propane) gas, the minimum inlet pressure is 11 ½ inches WC (2.9 kPa) and the maximum inlet pressure is 14.0 inches WC (3.5 kPa).

Application Considerations

High Pressure Regulators — Natural Gas Only

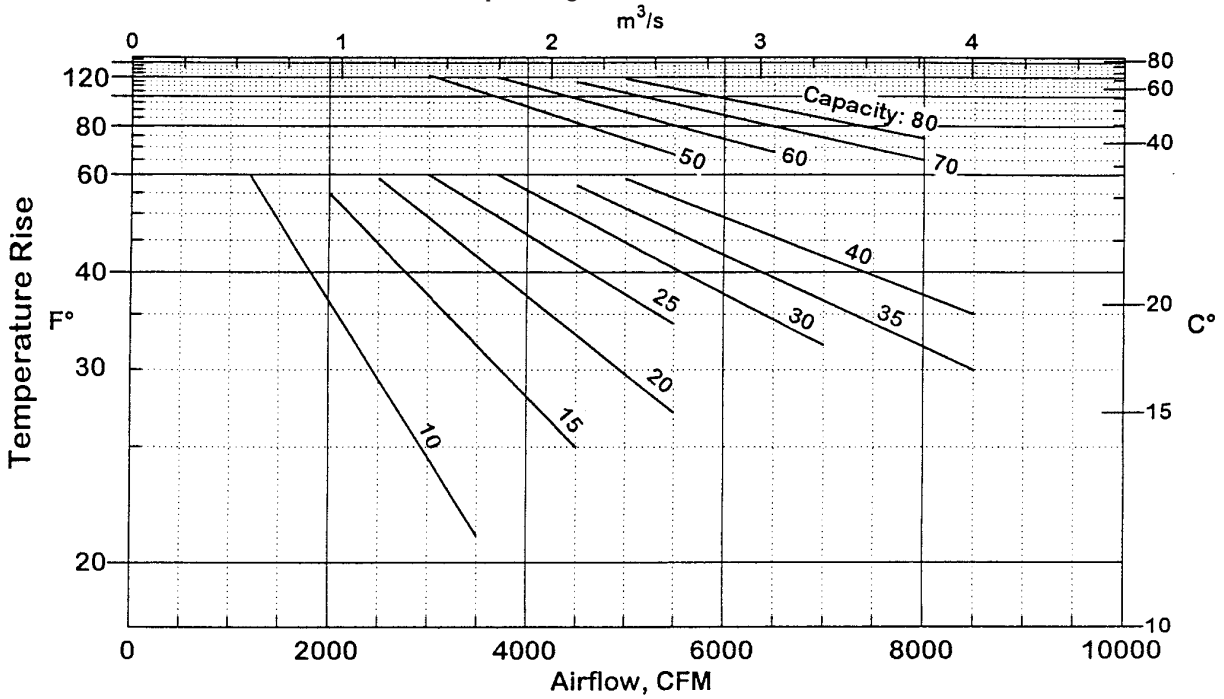
The Trane gas heating products contained in this catalog are designed to operate at a pressure of 3.5-inch WC (0.9 kPa) (water column) when firing on natural gas. This is the "manifold" pressure or that which is present at the burner orifices. All five and six-function valves provide a built-in pressure regulator which is capable of reducing "supply" pressures from a maximum of 14-inch WC (3.5 kPa) (½ psi) down to 3.5-inch WC (0.9 kPa) on the leaving side of the valve. The valve typically "drops" about 1 ½-inch so the minimum supply pressure is 5-inch WC.

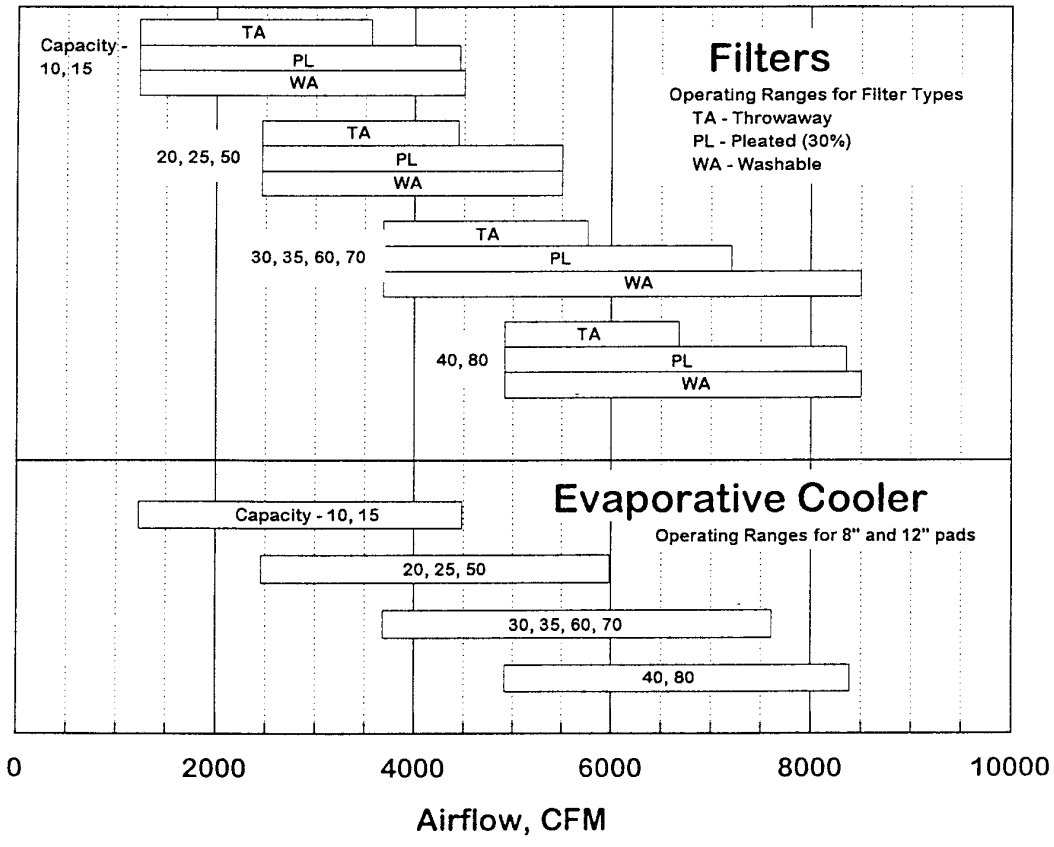
Whenever supply pressures exceed 14-inch WC (3.5 kPa), a high pressure regulator should be selected. We supply an Equimeter regulator which is fitted with pressure springs and capacity orificing to meet the requirements of each specific job. In order to select the proper spring/orifice combination, we need to know what the supply pressure is on that particular job and the input size of the unit being ordered. More than one unit can be run from one regulator; however, we recommend that each unit have its own regulator.

We require that the "job" supply pressure be included on all jobs requiring high pressure regulators along with the unit size. The table that follows displays the regulator's range as it pertains to inlet pressure and MBh. NA requires the customer to contact a local utility or an industrial supply house.

These devices are **not available** from Trane for LP gas. LP accessories must be secured from the gas supplier or industrial supply house.

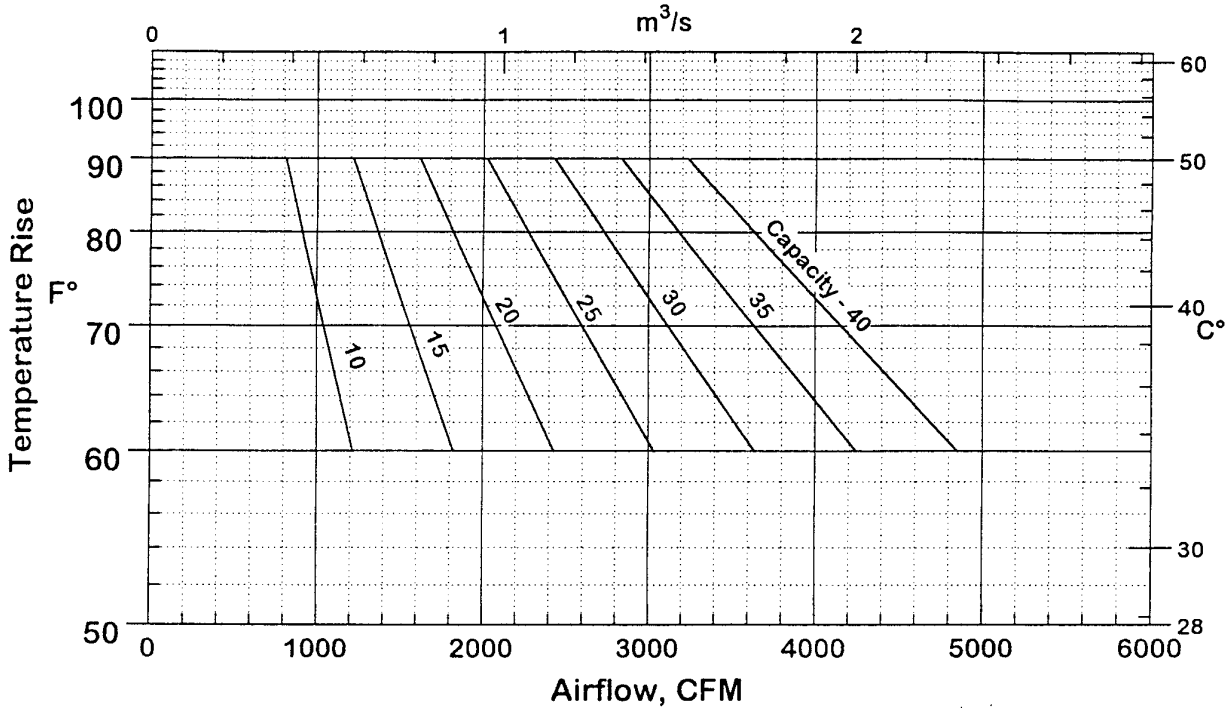
Quick Sizer Chart 1
Furnace Type (A, B) Standard Temperature Rise
Rooftop Arrangement (B, C, D, E)

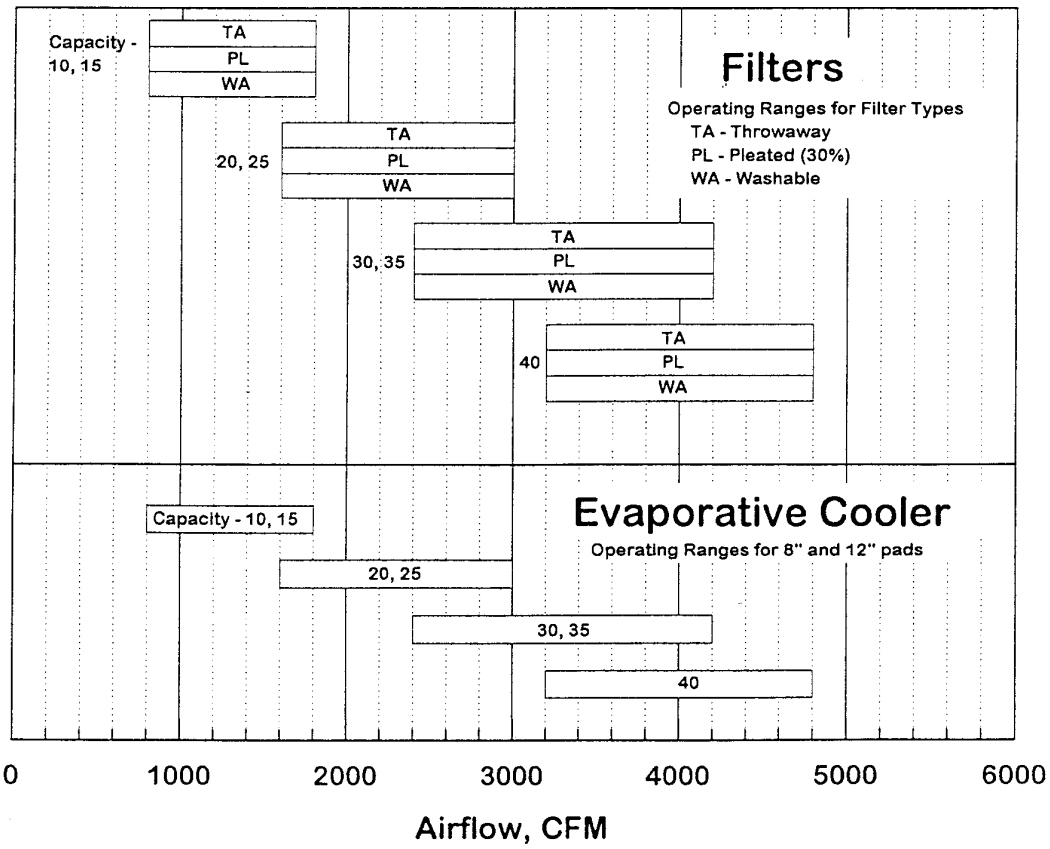




Selection Procedure

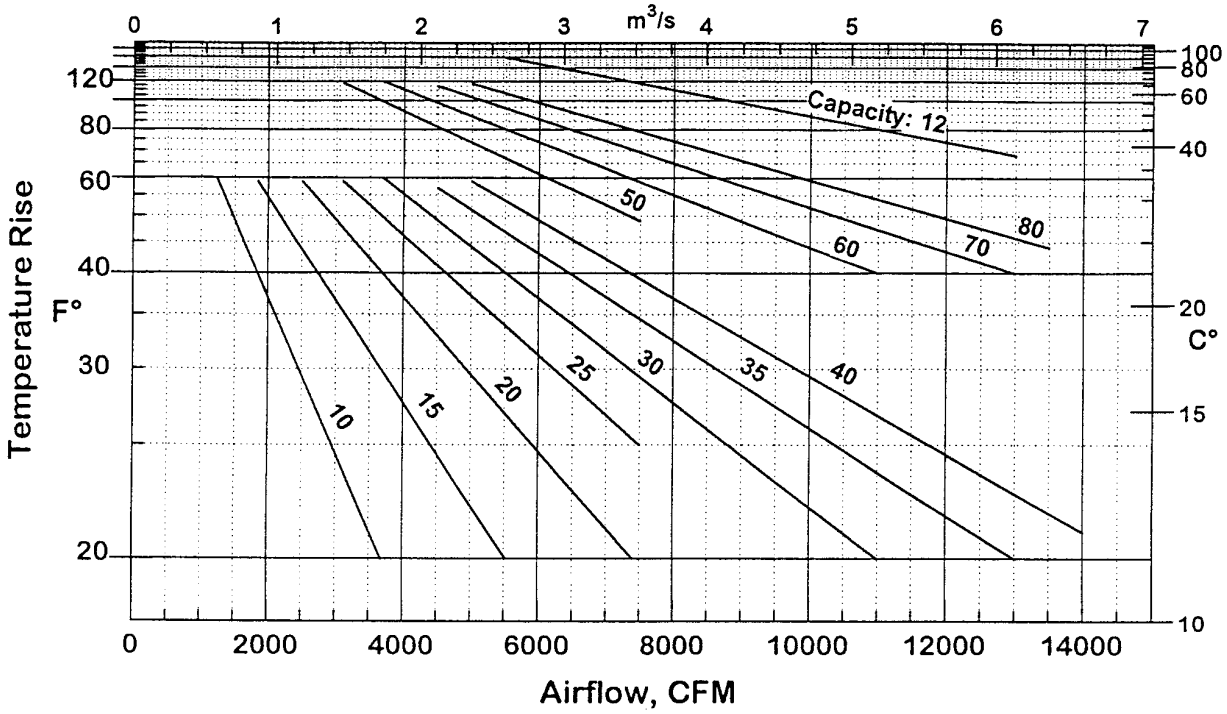
Quick Sizer Chart 2
Furnace Type (C, D) High Temperature Rise
Rooftop Arrangement (B, C, D, E)

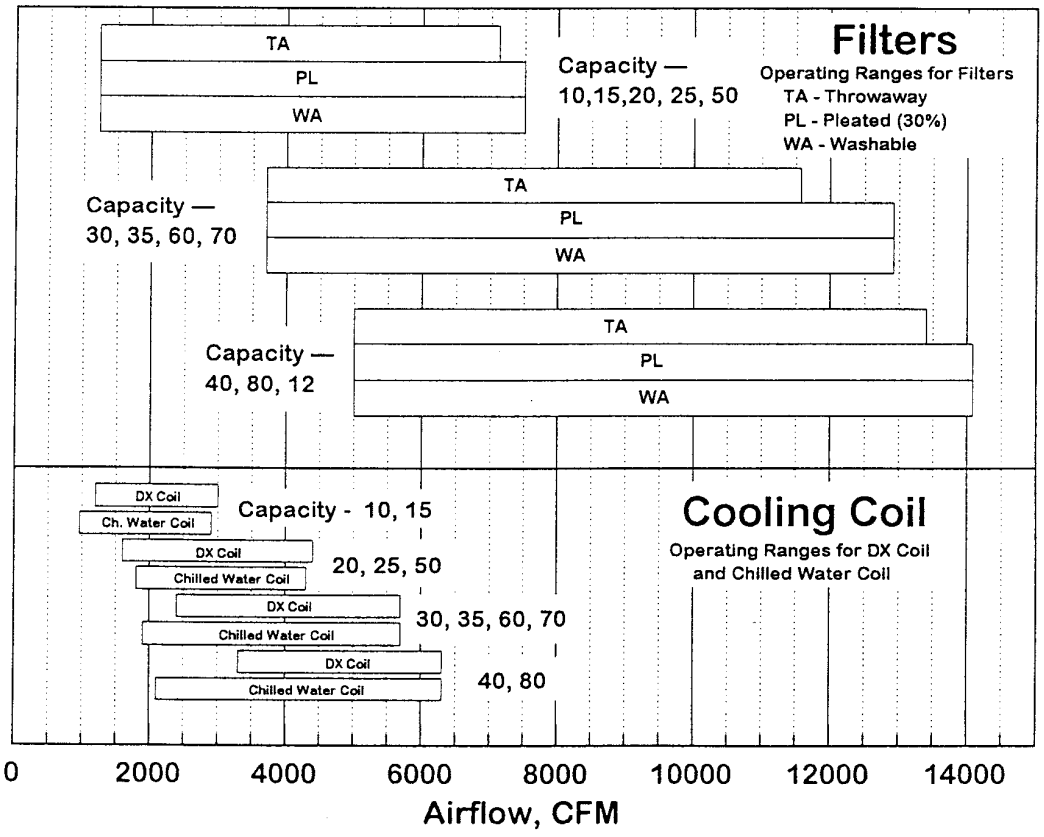




Selection Procedure

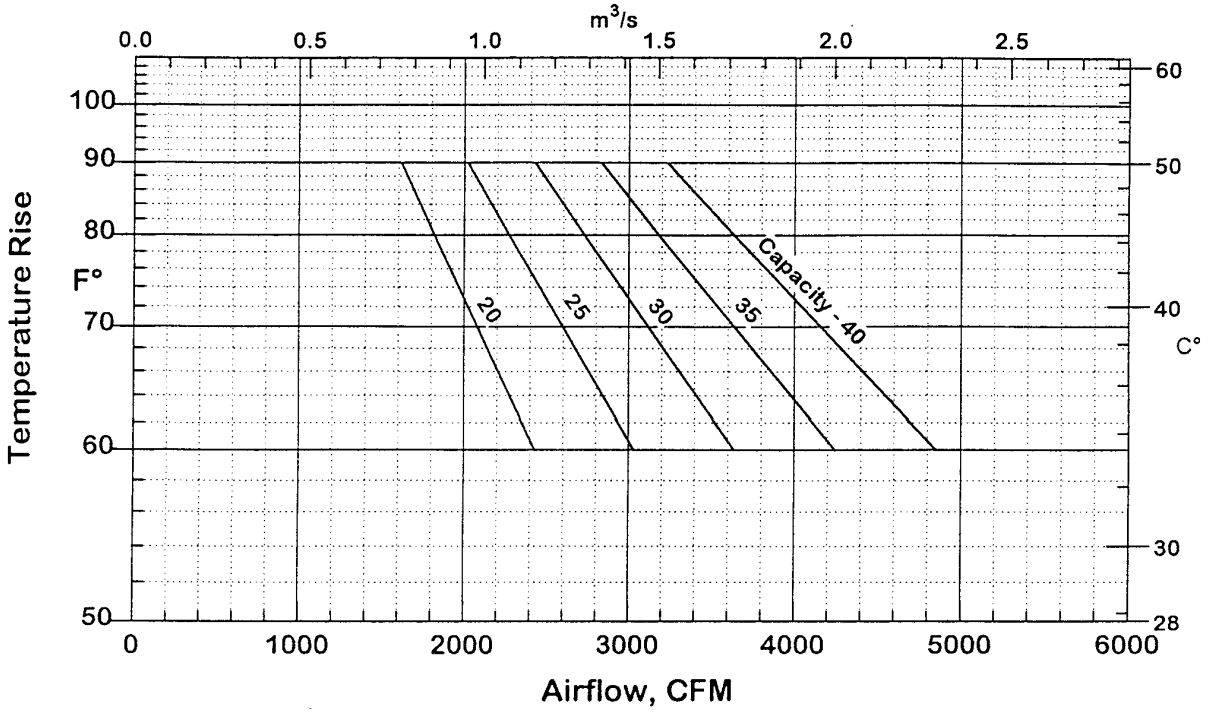
Quick Sizer Chart 3
Furnace Type (A, B) Low Temperature Rise
Rooftop Arrangement (G, J, K, L)

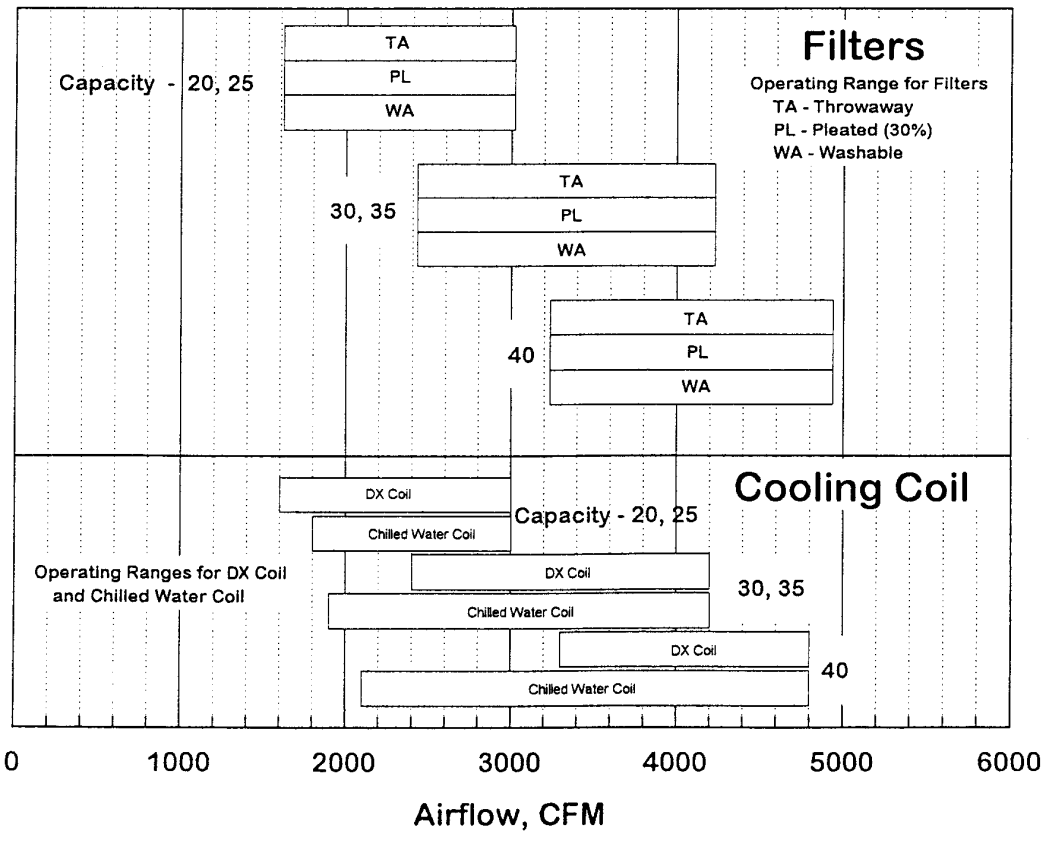




Selection Procedure

Quick Sizer Chart 4
Furnace Type (C, D) High Temperature Rise
Rooftop Arrangement (G, J, K, L)





Selection Procedure

Step 1
To properly select a unit, two of the three following items must be known: temperature rise (TR) required, cubic feet per minute of air delivery (cfm) required and output (Btu/h out) required. From any two of these items the third item can be determined, as well as the input (Btu/h In) required by using the following:

TR = BTU/H Out ÷ (1.085 x CFM)

CFM = BTU/H ÷ (1.085 x TR)

BTU/H Out = (CFM x 1.085) x TR

BTU/H In = BTU/H Out ÷ Efficiency
.80 or .79

(The value 1.085 represents a constant.)

With any two of the three required values, match these requirements to a unit with the nearest input (Btu/h), temperature rise (TR) and airflow (cfm) capabilities keeping in mind that:

BTU/H Out = BTU/H In x Efficiency

Refer to the "Packaged Rooftop Arrangement Reference," page 9, to match a capacity range (Btu/h), air delivery (cfm) and temperature rise (TR) with a rooftop arrangement.

The top portion of Quick Sizer Charts 1, 2, 3 and 4 allows the use of temperature rise and cfm to determine capacity, or temperature rise and capacity to determine cfm, or capacity and cfm to determine temperature rise. Follow the top chart down to the corresponding filter and cooling range for the selection.

Step 2
Once capacity, temperature rise and cfm have been determined, go to the accessory pressure losses table for the arrangement and calculate pressure losses for unit accessories. Add the losses for filters, plenums, dampers, rainhood with screen or moisture eliminators, evaporative cooler or cooling coil and losses due to ductwork to determine the total esp.

Step 3A — 2000 ft. Altitude and Below
Refer to the performance table for the selection and determine rpm and bhp for the total external static pressure (esp). Go to the table row that most closely matches unit capacity, temperature rise and cfm, follow the row out to the column that equals the total esp for rpm and bhp values.

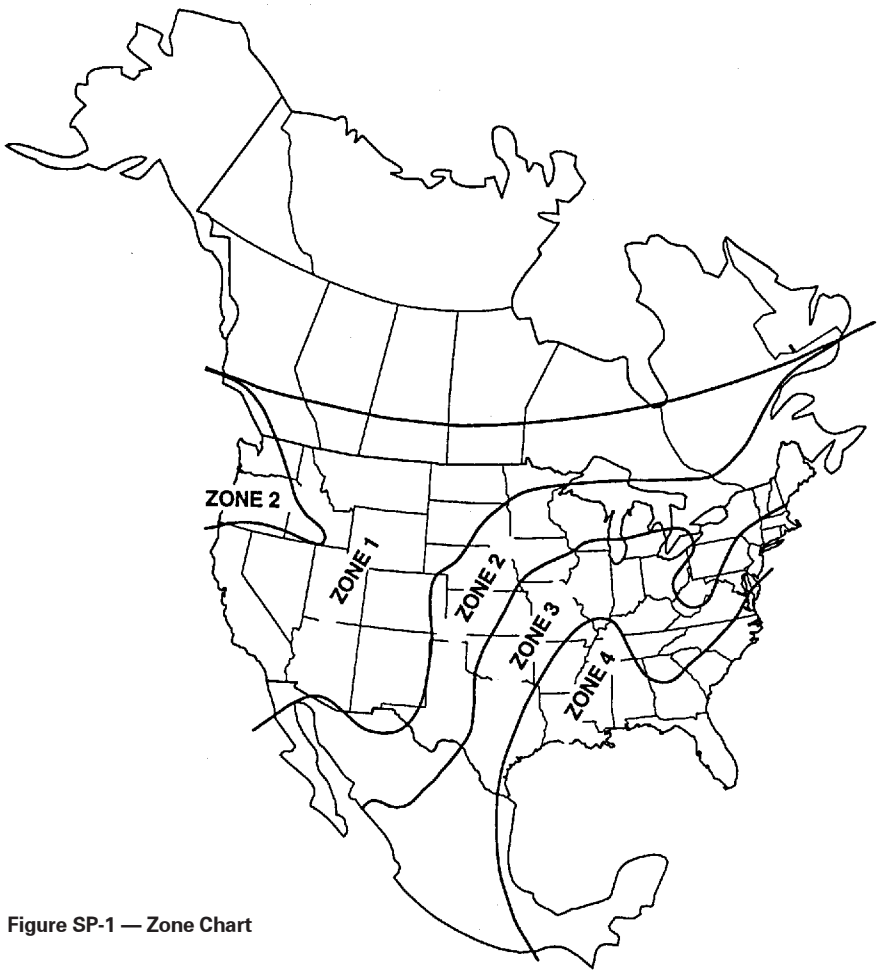


Figure SP-1 — Zone Chart

Step 3B — Above 2000 ft. Altitude
To correct for altitude, go to Table PAF-1, Correction Factors for Altitude. From this table, determine the correction factor from temperature and altitude for the system.
Correct the esp from ductwork to actual esp for altitude, then add sp from accessories as shown below. Refer to the performance table for the selected unit. Go to the row that most closely matches unit capacity, temperature rise and cfm, and follow the row out to the column that equals the corrected actual esp for rpm and bhp values. The bhp value can now be corrected to actual bhp for altitude as shown below.

Actual ESP = Duct ESP x Factor +
Access. SP

Actual BHP = Cat. BHP ÷ Factor

Corrected BTUH Input =
Catalog BTUH Input ÷ Factor

Corrected BTUH Output =
Corrected BTUH Input x Efficiency

Performance
Evaporative cooling is most commonly used in areas where the relative humidity is low and the dry bulb temperatures are high. However, cooling through evaporation can be used in most areas.

Evaporative cooling is best utilized whenever the wet bulb depression (difference between dry and wet bulb temperature) is a minimum of 15 F.

The efficiency of the evaporative cooler is determined by a variety of factors: geographical location, application, air change requirements, sufficient water supply, airflow and maintenance. In most instances, efficiency is expected to be between 77 percent and 88 percent. Heat gains in the distribution system will affect the final output temperature.

Note: For SI metric conversion, see Table G-2 on page 10.

Selection Procedure

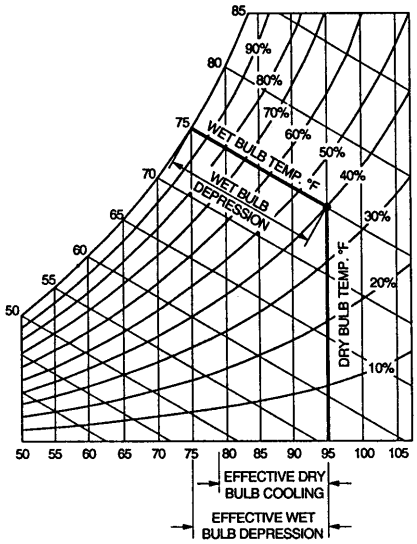


Figure SP-2 — Psychrometrics Chart

Use the psychrometric chart (shown in Figure SP-2) or actual humidity temperature readings to estimate the leaving dry bulb temperature at the outlet of the evaporative cooler.

Example:
Entering Dry Bulb: 95 F
Entering Wet Bulb: 75 F
Wet Bulb Depression (95 F - 75 F) = 20 F
Effective Wet Bulb Depression (20 F x .85) = 17 F
Leaving Dry Bulb Temperature (95 F - 17 F) = 78 F
Leaving Wet Bulb = Entering Wet Bulb = 75 F

Selection Method
The easiest method for selecting an evaporative cooler is to first determine the required number of air changes per minute.

1
Using Figure SP-1, choose the geographical zone in which the unit is to be installed.

2
Determine the internal load within the structure:
Normal Load: structures with normal people loads, and without high internal heat gains.
High Load: Structures with high equipment loads (i.e. factories, laundromats, beauty salons, restaurant kitchens, etc.), and structures with high occupancy (night clubs, arenas, etc.).

3
Determine whether the structure has normal or high heat gains.
Normal Gain: Structures that have insulated roofs or are in shaded areas. Structures that have two or more stories or facing directions with no sun.
High Gain: Structures that have uninsulated roofs, unshaded areas, or rooms that are exposed to sun.

4
Using Table SP-1, determine the required air changes per minute based on zone selection and the type of heat load.

5
Finally, determine the air quantity for the space chosen, by calculating the volume (L x W x H). Multiply this volume by the air changes per minute.

Example:
Structure Dimensions:
25 L x 24 W x 10 H = 6000 Ft^3
Exterior Load Type: Normal
Interior Load Type: Normal
Location: Dallas, Texas — Zone 3
Air Changes Per Minute: 3/4
Evaporative Cooler Requirements:
6000 Ft^3 x 3/4 Air Change/Minute = 4500 CFM Required
See the evaporative cooler performance chart for unit size that would best apply.

Table SP-1 — Air Changes Per Minute

	Zone			
Type Heat Load	1	2	3	4
High Load/High Gain	3/4	1	1 1/3	2
High Load/Normal Gain	1/2	3/4	1	1 1/3
Normal Load/High Gain	1/2	3/4	1	1 1/3
Normal Load/Normal Gain	1/2	1/2	3/4	1

Cooling Coils
Cooling coils are used in air handling systems to cool and dehumidify an air stream for comfort purposes. To reduce the cooling load in buildings, most applications recirculate a large percentage of the air. Usually recirculated air is 75 to 80 percent of the airflow with the remainder being outside fresh air. Some codes require 100 percent outside air, particularly for hospitals and schools. Also many engineers specify higher percentages of outside air to meet the requirements of ASHRAE Standard 62-1989 "Ventilation for Acceptable Indoor Air Quality."

1
In order to select the least expensive coil to meet the specific performance criteria, the following information is required:
- Unit size
- Airflow in SCFM or ACFM and altitude (see "Fan Selection at Altitude")
- Entering air dry bulb and wet bulb temperatures based on ratio of outside to return air.
- Cooling load MBh (1000's Btu/h) or leaving air wet bulb.

2
For chilled water coils, the following additional information is required.
- Fluid type: water, ethylene glycol, propylene glycol and percent of mixture.
- Entering fluid temperature — F
- Leaving fluid temperature — F or rate of flow GPM.

Chilled water catalog tables are based on:
45 F entering water temperature
Entering air temperature of 80 F DB/67 F WB. Data is certified in accordance with ARI Standard 410. For other than these conditions, please consult the factory.

3

For DX (refrigerant) coils the following additional information is required:

- Refrigerant type
- Suction temperature — F
- Liquid temperature — F
- Type of circuiting desired
- Hot gas bypass required?

DX catalog tables are based on:
45 F suction temperature
Entering air temperature of 80 F DB/ 67 F WB
R-22 refrigerant
100 F liquid temperature
Data is certified in accordance with ARI Standard 410. For other than these conditions, please consult the factory.

4

When specifying a coil, one of the most important pieces of information is the airflow in SCFM. As stated in the "Fan Selection at Altitude" section, SCFM means Standard CFM or air at a density of 0.075 lb./cu. ft. A fan must be selected using ACFM or ACTUAL CFM. A cooling coil or heating coil must be selected using SCFM. Up to an altitude of approximately 1,500 feet above sea level, very little error would be introduced in the selection of a cooling coil. For altitudes above 1,500 feet above sea level, the coil must be selected using SCFM. The relationship between ACFM and SCFM is shown by the following equation:

SCFM = ACFM x (Actual Density ÷ 0.075)

The term "0.075 ÷ Actual Density" is referred to as the density correction factor, herein called the "Factor." This factor can be found in Table PAF-1. The previous equation can then be rewritten as:

SCFM = (ACFM ÷ Factor)

Example: A cooling coil must be selected at 5,000 ft. altitude. The unit delivers 10,000 ACFM. What is the SCFM? At 5,000 ft. altitude, the factor from Table PAF-1 is 1.20, therefore:

SCFM = 10,000 ACFM ÷ 1.20 = 8.333 SCFM

5

The entering air temperatures, both wet bulb and dry bulb, must also be considered when selecting a coil. A majority of units usually use recirculated air with a percentage of outside air. The cooling coil must be selected using the mixed air temperature entering the coil.

The following example shows how to calculate the mixed air temperature:

25 percent outside air at 95 F DB/ 75 F WB
75 percent recirculated air at 78 F DB/ 67 F WB

The mixed dry bulb is simply the proportional value between the outside and recirculated dry bulb temperatures.

.25 x 95 + .75 x 78 = 82.3 F

The mixed wet bulb temperatures must be calculated using either the humidity ratio from a psychrometric chart or from Table SP-2, The enthalpy of saturated air at various wet bulb temperatures.

Using Table SP-2, the enthalpy of the outside air at 75 F WB is 38.62 Btu/lb. and the recirculated air at 67 F WB is 31.63 Btu/lb., the mixed enthalpy is:

.25 x 38.62 + .75 x 31.63 = 33.38 Btu/lb.

Using this value in Table SP-2, the interpolated wet bulb temperature is 69.1 F.

So the final mixed temperatures are:

82.3 F DB/69.1 F WB

Table SP-2 — Enthalpy of Saturated Air at Various Wet Bulb Temperatures

Wet Bulb Temp.	BTU per Pound	Wet Bulb Temp.	BTU Per Pound
50	20.38	65	30.05
50.5	20.64	65.5	30.44
51	20.90	66	30.83
51.5	21.17	66.5	31.23
52	21.45	67	31.63
52.5	21.73	67.5	32.03
53	22.01	68	32.44
53.5	22.29	68.5	32.86
54	22.59	69	33.27
54.5	22.88	69.5	33.70
55	23.18	70	34.12
55.5	23.48	70.5	34.55
56	23.79	71	34.99
56.5	24.10	71.5	35.42
57	24.42	72	35.87
57.5	24.74	72.5	36.31
58	25.06	73	36.77
58.5	25.39	73.5	37.22
59	25.73	74	37.68
59.5	26.06	74.5	38.15
60	26.40	75	38.61
60.5	26.75	75.5	39.09
61	27.10	76	39.56
61.5	27.45	76.5	40.04
62	27.81	77	40.53
62.5	28.17	77.5	41.02
63	28.54	78	41.51
63.5	28.91	78.5	42.01
64	29.29	79	42.51
64.5	29.67	79.5	43.02

Performance Adjustment Factors

Table PAF-1 — Correction Factors for Altitude

Temp. F	Altitude (Feet) 0′	500′	1000′	1500′	2000′	2500′	3000′	3500′	4000′	4500′	5000′	5500′	6000′
	Barometric Pressure (In. Hg)												
	39.92	29.38	28.86	28.33	27.82	27.31	26.82	26.32	25.84	25.36	24.9	24.43	29.98
-40	0.79	0.81	0.82	0.84	0.85	0.87	0.88	0.90	0.92	0.93	0.95	0.97	0.99
0	0.87	0.88	0.90	0.92	0.93	0.95	0.97	0.99	1.00	1.02	1.04	1.06	1.08
40	0.94	0.96	0.98	1.00	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.16	1.18
70	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.25
80	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.25	1.27
100	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.25	1.27	1.29	1.32
120	1.90	1.11	1.13	1.16	1.18	1.20	1.22	1.24	1.27	1.29	1.31	1.34	1.37

1. Actual ESP = Duct ESP x Factor ÷ Accs. SP
2. Actual BHP = Cat. BHP ÷ Factor
3. Correct BTUH Input = Catalog BTUH Input ÷ Factor
4. Corrected BTUH Output = Corrected BTUH Input x Efficiency

Performance Data

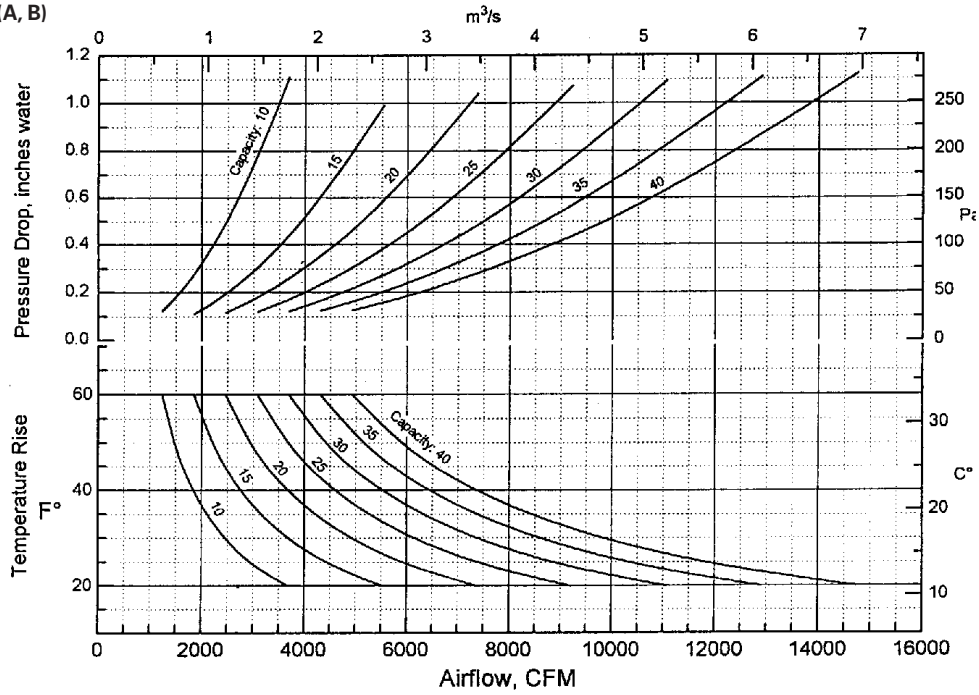
Table PD-1 — Rooftop Gas Duct Furnace Performance Data — Arrangement A

Capacity 10-12 Furnace Type A,B/C,D Rooftop Arrangement "A"	Input Rating BTU/Hr (kW)	Output Rating BTU/Hr (kW)	Eff. %	Temp. Rise Deg. F (Deg. C) Min.	Temp. Rise Deg. F (Deg. C) Max.	CFM (cu. m/s) Min.	CFM (cu. m/s) Max.	Pressure Drop in. of Water (kPa) Min.	Pressure Drop in. of Water (kPa) Max.	Nat. Gas Inlet in.	L.P. Gas Inlet in.
10 A/B	100,000 (29.3)	80,000 (23.4)	80	20 (11)	60 (33)	1,235 (0.583)	3,704 (1.748)	0.15 (0.04)	1.10 (0.27)	1/2	1/2
15 A/B	150,000 (43.9)	120,000 (35.1)	80	20 (11)	60 (33)	1,852 (0.874)	5,556 (2.622)	0.15 (0.04)	1.00 (0.25)	1/2	1/2
20 A/B	200,000 (58.6)	160,000 (46.9)	80	20 (11)	60 (33)	2,469 (1.165)	7,407 (3.496)	0.15 (0.04)	1.05 (0.26)	1/2	1/2
25 A/B	250,000 (73.2)	200,000 (58.6)	80	20 (11)	60 (33)	3,086 (1.457)	9,259 (4.370)	0.15 (0.04)	1.08 (0.27)	3/4	1/2 OR 3/4
30 A/B	300,000 (87.8)	240,000 (70.3)	80	20 (11)	60 (33)	3,704 (1.748)	11,111 (5.244)	0.15 (0.04)	1.10 (0.27)	3/4	1/2 OR 3/4
35 A/B	350,000 (102.5)	280,000 (82.0)	80	20 (11)	60 (33)	4,321 (2.040)	12,963 (6.119)	0.15 (0.04)	1.11 (0.28)	3/4	1/2 OR 3/4
40 A/B	400,000 (117.1)	320,000 (93.7)	80	20 (11)	60 (33)	4,938 (2.331)	14,815 (6.993)	0.15 (0.04)	1.12 (0.28)	3/4	1/2 OR 3/4
50 A/B	500,000 (146.4)	400,000 (117.1)	80	40 (22)	120 (67)	3,086 (1.457)	9,269 (4.375)	0.30 (0.07)	2.16 (0.54)	3/4	1/2 OR 3/4
60 A/B	600,000 (175.7)	480,000 (140.6)	80	40 (22)	120 (67)	3,704 (1.748)	11,111 (5.244)	0.30 (0.07)	2.20 (0.55)	3/4	1/2 OR 3/4
70 A/B	700,000 (205.0)	560,000 (164.0)	80	40 (22)	120 (67)	4,321 (2.040)	12,963 (6.119)	0.30 (0.07)	2.22 (0.55)	3/4	1/2 OR 3/4
80 A/B	800,000 (234.3)	640,000 (187.4)	80	40 (22)	120 (67)	4,938 (2.331)	14,815 (6.993)	0.30 (0.07)	2.24 (0.56)	3/4	1/2 OR 3/4
12 A/B	1,200,000 (351.4)	960,000 (281.1)	80	60 (33)	180 (100)	4,938 (2.331)	14,815 (6.993)	0.45 (0.11)	3.36 (0.84)	3/4	1/2 OR 3/4
10 C/D	100,000 (29.3)	79,000 (23.1)	79	30 (17)	90 (50)	823 (0.388)	2,469 (1.165)	0.10 (0.02)	0.88 (0.22)	1/2	1/2
15 C/D	150,000 (43.9)	118,500 (34.7)	79	30 (17)	90 (50)	1,219 (0.575)	3,657 (1.726)	0.10 (0.02)	0.78 (0.19)	1/2	1/2
20 C/D	200,000 (58.6)	158,000 (46.3)	79	30 (17)	90 (50)	1,626 (0.767)	4,876 (2.301)	0.10 (0.02)	0.81 (0.20)	1/2	1/2
25 C/D	250,000 (73.2)	197,500 (57.8)	79	30 (17)	90 (50)	2,032 (0.959)	6,096 (2.877)	0.10 (0.02)	0.85 (0.21)	3/4	1/2 OR 3/4
30 C/D	300,000 (87.8)	237,000 (69.4)	79	30 (17)	90 (50)	2,438 (1.151)	7,315 (3.453)	0.10 (0.02)	0.86 (0.21)	3/4	1/2 OR 3/4
35 C/D	350,000 (102.5)	276,500 (81.0)	79	30 (17)	90 (50)	2,845 (1.343)	8,534 (4.028)	0.10 (0.02)	0.87 (0.22)	3/4	1/2 OR 3/4
40 C/D	400,000 (117.1)	316,000 (92.5)	79	30 (17)	90 (50)	3,251 (1.534)	9,753 (4.603)	0.10 (0.02)	0.88 (0.22)	3/4	1/2 OR 3/4

Ratings shown are for elevations up to 2000 feet (610 m) above sea level. Above 2000 feet (610 m), input must be derated four percent for each 1000 feet (305 m) above sea level.

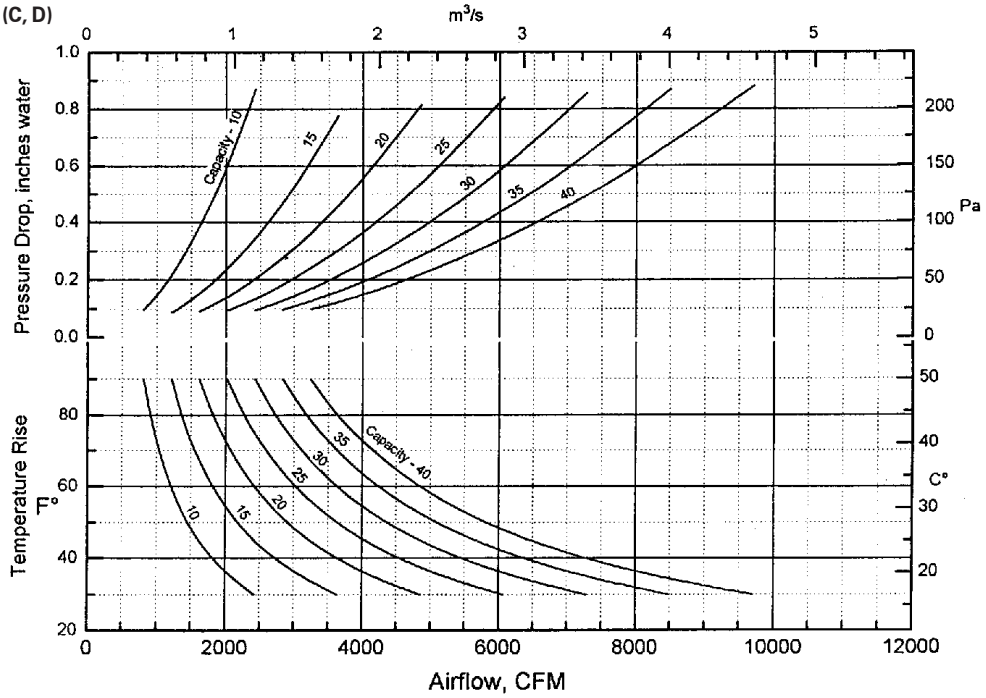
Performance Data

Chart PD-1 — Duct Furnace Performance
Furnace Type — (A, B)



Standard Temperature Rise Duct Furnace Performance
Furnace Type — (A, B)
20-60 F Rise/Furnace
80% Efficiency

Chart PD-2 — Duct Furnace Performance
Furnace Type — (C, D)



High Temperature Rise Duct Furnace Performance
Furnace Type — (C, D)
60-90 F Rise/Furnace
79% Efficiency

Performance Data

Table PD-2 — Rooftop Gas Heating Units Performance Data — Furnace Type (A,B) Standard Temperature Rise — Rooftop Arrangement B,C,D,E

Capacity					TOTAL EXTERNAL STATIC PRESSURE (INCHES OF WATER)																			
Furnace	TR		Input	Output	0.2		0.4		0.6		0.8		1		1.2		1.4		1.6		1.8		2	
Type	(F)	CFM	BTU/H	BTU/H	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	61	1,200	100,000	80,000	575	0.16	705	0.23	825	0.31	940	0.4	1040	0.5	1135	0.6	1220	0.7	1300	0.8	1375	0.91	1440	1.02
	49	1,500			655	0.26	765	0.35	870	0.44	965	0.54	1060	0.64	1150	0.75	1235	0.87	1315	0.99	1390	1.12	1460	1.24
10-A,B	37	2,000			795	0.55	890	0.65	975	0.77	1055	0.88	1130	1	1205	1.12	1280	1.25	1355	1.39	1425	1.54	1490	1.68
	29	2,500			950	1.01	1030	1.12	1105	1.25	1175	1.39	1240	1.54	1305	1.68	1365	1.83	1425	1.98	1485	2.13	1545	2.29
	25	3,000			1110	1.68	1175	1.82	1240	1.95	1305	2.1	1365	2.27	1420	2.44	1475	2.62	1530	2.79	1580	2.97	1635	3.14
	21	3,500			1270	2.59	1330	2.77	1385	2.93	1440	3.08	1495	3.25	1550	3.43	1600	3.63	1650	3.83	1695	4.04	1745	4.25
	55	2,000	150,000	120,000	685	0.44	785	0.54	880	0.63	965	0.75	1045	0.87	1120	0.98	1195	1.11	1270	1.24	1345	1.37	1415	1.52
	44	2,500			805	0.78	890	0.91	970	1.04	1045	1.15	1120	1.28	1190	1.43	1255	1.57	1320	1.72	1380	1.86	1440	2.01
15-A,B	37	3,000			935	1.28	1005	1.44	1075	1.6	1140	1.75	1205	1.88	1270	2.02	1335	2.18	1390	2.35	1450	2.53	1500	2.7
	32	3,500			1065	1.97	1130	2.15	1190	2.33	1250	2.52	1305	2.7	1360	2.87	1420	3.02	1475	3.17	1525	3.35	1580	3.55
	28	4,000			1200	2.88	1255	3.08	1310	3.28	1365	3.49	1415	3.7	1465	3.91	1515	4.12	1565	4.3	1615	4.48	1660	4.65
	25	4,500			1340	4.04	1390	4.26	1435	4.49	1485	4.72	1530	4.95										
	59	2,500	200,000	160,000	555	0.44	650	0.55	740	0.66	820	0.78	895	0.89	965	1.02	1035	1.14	1105	1.28	1170	1.41	1230	1.56
	49	3,000			630	0.71	710	0.83	790	0.96	865	1.1	935	1.23	1000	1.37	1065	1.52	1125	1.66	1180	1.81	1240	1.96
20-A,B	37	4,000			790	1.58	855	1.72	915	1.86	975	2.03	1035	2.21	1090	2.39	1145	2.57	1200	2.76	1250	2.94	1300	3.13
	29	5,000			965	2.98	1010	3.15	1060	3.32	1110	3.5	1160	3.7	1205	3.9	1255	4.12	1300	4.35	1345	4.57	1390	4.8
	27	5,500			1050	3.92	1095	4.11	1135	4.3	1180	4.49	1225	4.7	1270	4.91								
	61	3,000	250,000	200,000	615	0.69	695	0.8	775	0.93	850	1.07	920	1.21	985	1.34	1050	1.49	1110	1.63	1170	1.78	1225	1.93
	53	3,500			690	1.05	760	1.17	830	1.31	900	1.46	965	1.62	1025	1.78	1085	1.94	1140	2.11	1195	2.27	1250	2.44
25-A,B	46	4,000			770	1.53	830	1.66	895	1.81	955	1.97	1015	2.14	1070	2.32	1125	2.51	1180	2.69	1235	2.87	1285	3.06
	41	4,500			855	2.13	905	2.29	960	2.44	1015	2.61	1070	2.79	1125	2.98	1175	3.19	1225	3.39	1275	3.6	1320	3.8
	37	5,000			940	2.88	985	3.05	1030	3.23	1080	3.4	1130	3.59	1180	3.79	1230	4	1275	4.22	1320	4.45	1365	4.68
	34	5,500			1025	3.8	1065	3.98	1110	4.17	1150	4.36	1195	4.56	1240	4.77	1285	4.98						
	60	3,700	300,000	240,000	655	0.73	760	0.91	860	1.11	945	1.32	1030	1.54	1110	1.76	1190	2.01	1270	2.26	1345	2.53	1415	2.81
	55	4,000			690	0.89	790	1.09	885	1.28	970	1.51	1050	1.74	1125	1.98	1200	2.22	1275	2.48	1345	2.76	1415	3.05
30-A,B	44	5,000			815	1.59	895	1.85	975	2.1	1055	2.32	1125	2.58	1195	2.88	1260	3.17	1325	3.46	1385	3.75	1445	4.05
	37	6,000			945	2.6	1015	2.91	1080	3.23	1150	3.53	1215	3.79	1280	4.07	1340	4.39	1400	4.74				
	34	6,500			1010	3.25	1075	3.58	1140	3.92	1200	4.26	1260	4.58	1320	4.86								
	32	7,000			1075	4	1140	4.35	1200	4.71														
	57	4,500	350,000	280,000	535	0.7	640	0.9	730	1.11	815	1.32	890	1.55	970	1.78	1040	2.02	1110	2.28	1175	2.55	1235	2.82
	52	5,000			575	0.91	670	1.13	755	1.36	835	1.59	910	1.83	980	2.08	1050	2.33	1115	2.6	1180	2.88	1240	3.16
35-A,B	43	6,000			650	1.48	735	1.72	810	1.99	880	2.26	950	2.54	1015	2.82	1080	3.1	1140	3.39	1195	3.69	1255	4
	37	7,000			735	2.25	805	2.51	875	2.81	940	3.12	1000	3.44	1060	3.76	1120	4.09	1175	4.41	1230	4.74		
	32	8,000			820	3.27	880	3.56	940	3.87	1000	4.21	1060	4.57	1115	4.94								
	30	8,500			860	3.88	920	4.18	980	4.51	1035	4.86												
	59	5,000	400,000	320,000	560	0.89	655	1.1	745	1.33	825	1.56	900	1.8	970	2.04	1040	2.3	1105	2.56	1170	2.84	1230	3.12
	45	6,500			675	1.78	750	2.03	825	2.3	895	2.6	960	2.9	1025	3.2	1085	3.5	1145	3.8	1200	4.12	1255	4.44
40-A,B	42	7,000			715	2.19	785	2.44	855	2.73	920	3.04	985	3.36	1045	3.68	1105	4	1160	4.33	1215	4.66	1270	4.99
	37	8,000			800	3.18	860	3.46	920	3.76	980	4.09	1040	4.45	1095	4.81								
	35	8,500			840	3.77	895	4.07	955	4.38	1015	4.72												
	123	3,000	500,000	400,000	645	0.73	730	0.85	805	0.99	880	1.12	950	1.26	1015	1.4	1075	1.55	1135	1.69	1195	1.84	1250	1.99
	105	3,500			730	1.12	800	1.25	870	1.39	935	1.55	1000	1.71	1060	1.87	1115	2.03	1175	2.2	1225	2.36	1280	2.53
50-A,B	92	4,000			815	1.63	875	1.77	940	1.92	1000	2.09	1055	2.27	1110	2.46	1165	2.64	1220	2.82	1270	3.01	1320	3.19
	82	4,500			900	2.27	955	2.43	1010	2.59	1065	2.77	1120	2.97	1170	3.17	1220	3.37	1270	3.58	1320	3.78	1365	3.99
	74	5,000			990	3.07	1040	3.25	1085	3.42	1135	3.61	1185	3.81	1235	4.03	1280	4.25	1325	4.47	1370	4.7	1415	4.93
	67	5,500			1080	4.05	1120	4.23	1165	4.43	1210	4.63	1255	4.84										
	120	3,700	600,000	480,000	700	0.82	805	0.99	900	1.2	985	1.42	1065	1.64	1145	1.87	1225	2.12	1305	2.38	1375	2.65	1450	2.94
	111	4,000			740	1	840	1.18	930	1.4	1010	1.63	1090	1.86	1165	2.1	1240	2.36	1310	2.63	1385	2.91	1455	3.2
60-A,B	88	5,000			880	1.79	960	2.05	1035	2.27	1110	2.53	1180	2.82	1250	3.11	1310	3.4	1370	3.69	1430	3.99	1490	4.29
	74	6,000			1025	2.95	1090	3.27	1155	3.57	1220	3.83	1285	4.11	1345	4.43	1405	4.78						
	68	6,500			1095	3.69	1160	4.03	1220	4.37	1280	4.67	1340	4.95										
	115	4,500	700,000	560,000	590	0.8	685	1.01	770	1.22	855	1.43	930	1.66	1005	1.9	1075	2.15	1140	2.41	1205	2.68	1265	2.96
	103	5,000			630	1.04	720	1.27	805	1.5	880	1.74	950	1.98	1020	2.23	1090	2.49	1155	2.76	1215	3.05	1275	3.34
70-A,B	86	6,000			720	1.68	800	1.95	870	2.22	940	2.5	1005	2.78	1070	3.06	1130	3.35	1190	3.65	1245	3.96	1300	4.27
	74	7,000			815	2.55	885	2.85	950	3.17	1010	3.49	1070	3.81	1130	4.13	1185	4.46	1240	4.79				
	65	8,000			910	3.7	970	4.03	1030	4.38	1085	4.75												
	118	5,000	800,000	640,000	605	0.98	695	1.21	780	1.44	860	1.67	935	1.91	1005	2.16	1070	2.42	1135	2.69	1200	2.97	1260	3.26
80-A,B	98	6,000			690	1.59	770	1.84	845	2.12	915	2.39	980	2.67	1045	2.95	1105	3.24	1165	3.53	1225	3.84	1280	4.15
	84	7,000			780	2.41	850	2.7	915	3.01	980	3.33	1040	3.65	1100	3.97	1155	4.29	1210	4.62	1265	4.96		
	74	8,000			870	3.51	930	3.81	990	4.15	1050	4.51	1105	4.87										

Notes:
1. Refer to Accessory Pressure Loss table.
2. Values are based on the "Basic Packaged Unit" which includes pressure drop of the duct furnace(s) and "system effect" of the blower module.
3. Brake horsepower (BHP) includes drive losses.
4. Unit leaving air temperature is limited to 150 F (66 C) and is equal to: Entering Air Temperature + Duct Furnace(s) Temperature Rise.
5. "Total External Pressure" is the sum of the unit's "Internal" accessory pressure loss(es) plus the external static pressure.
6. Ratings shown are for elevations between 0 and 2000 ft. (610 m). For unit installation in the U.S.A. above 2000 ft. (610 m), the unit input must be derated 4% for each 1000 ft. (305 m) above sea level; refer to local codes, or in absence of local codes, refer to the National Fuel Gas Code, ANSI Standard Z223.1-1992 (N.F.P.A. No. 54), or the latest edition.
   For installation in Canada, any references to deration at altitudes in excess of 2000 ft. (610 m) are to be ignored. At altitudes of 2000 to 4500 ft. (610 to 1372 m), the unit must be derated to 90% of the normal rating, and be so marked in accordance with the C.G.A. certification.

Performance Data

Table PD-3 — Rooftop Gas Heating Units Performance Data — Furnace Type C,D — High Temperature Rise — Rooftop Arrangement B,C,D,E

Capacity					TOTAL EXTERNAL STATIC PRESSURE (INCHES OF WATER)																			
Furnace	TR		Input	Output	0.2		0.4		0.6		0.8		1		1.2		1.4		1.6		1.8		2	
Type	(F)	CFM	BTU/H	BTU/H	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	91	800	100,000	79,000	550	.09	710	.15	840	.22	950	.29	1045	.37	1135	.45	1210	.53	1285	.61	1355	.69	1420	.78
	81	900			575	.11	730	.18	855	.25	965	.33	1065	.41	1150	.50	1230	.58	1305	.67	1375	.76	1440	.86
10-C,D	73	1,000			605	.14	745	.21	870	.29	980	.37	1080	.46	1165	.55	1245	.64	1320	.74	1390	.83	1455	.93
	66	1,100			635	.17	770	.25	890	.33	995	.42	1095	.51	1180	.61	1260	.71	1335	.81	1410	.91	1475	1.01
	61	1,200			670	.21	795	.29	910	.38	1015	.47	1110	.57	1195	.67	1280	.77	1355	.88	1425	.99	1490	1.10
	91	1,200	150,000	118,500	580	.16	705	.23	830	.31	940	.40	1045	.50	1135	.60	1220	.70	1300	.80	1375	.91	1445	1.02
15-C,D	78	1,400			630	.23	745	.31	855	.39	960	.49	1055	.59	1150	.70	1235	.81	1315	.93	1385	1.05	1460	1.17
	68	1,600			685	.31	795	.40	890	.50	985	.60	1075	.70	1160	.82	1245	.94	1325	1.07	1400	1.19	1470	1.33
	61	1,800			740	.42	845	.52	935	.62	1020	.73	1100	.84	1180	.96	1260	1.09	1340	1.22	1410	1.36	1480	1.50
	91	1,600	200,000	158,000	500	.19	615	.26	720	.35	815	.44	900	.54	980	.64	1055	.76	1130	.88	1200	1.00	1270	1.13
	81	1,800			530	.24	640	.33	735	.42	830	.51	915	.62	990	.73	1060	.84	1130	.96	1200	1.09	1265	1.23
20-C,D	73	2,000			560	.31	665	.41	755	.50	845	.60	925	.71	1000	.83	1075	.95	1140	1.07	1205	1.20	1265	1.34
	66	2,200			595	.40	695	.50	780	.60	860	.71	940	.82	1015	.94	1085	1.07	1150	1.19	1215	1.33	1270	1.47
	61	2,400			635	.49	725	.60	805	.71	885	.83	955	.95	1030	1.07	1095	1.20	1160	1.34	1225	1.48	1285	1.62
	91	2,000	250,000	197,500	540	.30	645	.39	740	.48	825	.58	910	.69	985	.80	1060	.92	1125	1.05	1190	1.18	1250	1.31
	81	2,250			580	.39	680	.50	765	.60	850	.71	925	.82	1000	.94	1070	1.07	1140	1.20	1200	1.33	1260	1.47
25-C,D	73	2,500			625	.51	715	.63	795	.74	875	.86	945	.98	1015	1.10	1085	1.23	1150	1.37	1210	1.51	1270	1.66
	66	2,750			665	.66	750	.78	830	.90	905	1.03	970	1.16	1035	1.29	1100	1.43	1160	1.57	1225	1.72	1280	1.87
	61	3,000			710	.83	790	.96	865	1.10	935	1.23	1000	1.37	1065	1.51	1125	1.66	1180	1.81	1240	1.96	1295	2.12
	91	2,400	300,000	237,000	585	.33	710	.47	835	.63	945	.81	1045	1.00	1140	1.20	1225	1.41	1305	1.62	1375	1.83	1445	2.05
	81	2,700			625	.43	740	.58	850	.75	960	.94	1055	1.14	1150	1.36	1235	1.58	1315	1.80	1390	2.04	1460	2.27
30-C,D	73	3,000			665	.54	775	.72	875	.90	975	1.09	1070	1.30	1160	1.53	1245	1.76	1325	2.00	1395	2.25	1470	2.50
	66	3,300			705	.69	815	.87	905	1.07	1000	1.27	1085	1.49	1175	1.72	1255	1.97	1335	2.22	1405	2.48	1475	2.75
	61	3,600			750	.86	850	1.05	940	1.26	1025	1.47	1110	1.70	1190	1.94	1270	2.20	1345	2.46	1415	2.74	1485	3.02
	91	2,800	350,000	276,500	485	.30	610	.44	720	.60	815	.77	905	.96	990	1.17	1070	1.40	1145	1.63	1215	1.87	1280	2.12
	82	3,100			510	.37	625	.52	730	.69	825	.87	910	1.07	990	1.28	1070	1.51	1140	1.75	1210	2.00	1280	2.26
35-C,D	75	3,400			535	.46	645	.62	745	.79	840	.98	920	1.19	1000	1.40	1070	1.63	1140	1.88	1210	2.14	1275	2.41
	69	3,700			560	.56	665	.73	760	.91	850	1.11	935	1.32	1010	1.55	1080	1.78	1145	2.03	1210	2.29	1275	2.57
	64	4,000			590	.67	690	.86	780	1.05	865	1.26	945	1.48	1020	1.71	1090	1.95	1155	2.20	1220	2.47	1280	2.75
	61	4,200			605	.76	705	.95	790	1.15	875	1.36	950	1.59	1025	1.82	1095	2.07	1160	2.33	1225	2.60	1285	2.88
	91	3,200	400,000	316,000	500	.38	620	.53	725	.70	820	.88	905	1.08	985	1.29	1060	1.52	1130	1.76	1205	2.01	1270	2.28
	81	3,600			535	.50	645	.66	740	.84	830	1.04	915	1.24	995	1.46	1065	1.69	1135	1.94	1200	2.20	1265	2.47
40-C,D	73	4,000			570	.64	670	.82	760	1.01	845	1.22	930	1.43	1005	1.66	1075	1.90	1145	2.15	1205	2.42	1265	2.69
	66	4,400			605	.80	700	1.01	785	1.21	865	1.43	945	1.66	1020	1.90	1090	2.15	1155	2.41	1215	2.68	1275	2.96
	61	4,800			640	1.00	730	1.22	815	1.44	890	1.67	960	1.91	1035	2.16	1100	2.42	1165	2.69	1230	2.97	1285	3.26

Notes:
1. Refer to Accessory Pressure Loss table.
2. Values are based on the "Basic Packaged Unit" which includes pressure drop of the duct furnace(s) and "system effect" of the blower module.
3. Brake horsepower (BHP) includes drive losses.
4. Unit leaving air temperature is limited to 150 F (66 C) and is equal to: Entering Air Temperature + Duct Furnace(s) Temperature Rise.
5. "Total External Pressure" is the sum of the unit's "Internal" accessory pressure loss(es) plus the external static pressure.
6. Ratings shown are for elevations between 0 and 2000 ft. (610 m). For unit installation in the U.S.A. above 2000 ft. (610 m), the unit input must be derated 4% for each 1000 ft. (305 m) above sea level; refer to local codes, or in absence of local codes, refer to the National Fuel Gas Code, ANSI Standard Z223.1-1992 (N.F.P.A. No. 54), or the latest edition.
   For installation in Canada, any references to deration at altitudes in excess of 2000 ft. (610 m) are to be ignored. At altitudes of 2000 to 4500 ft. (610 to 1372 m), the unit must be derated to 90% of the normal rating, and be so marked in accordance with the C.G.A. certification.

Performance Data

Table PD-4 — Rooftop Gas Heating Units Accessory Pressure Loss Data — Rooftop Arrangements B,C,D,E

		Pressure Loss (Inches of Water)										
		Rainhood With		Filters					Supply Air	Evaporative Media		Return or Outside Air
				Throwaway	Washable		Pleated					
Capacity	CFM	Screen	Mstr.Elim.	2″	1″	2″	1″	2″	Plenum	8″	12″	Damper
	800	<.01	.01	.03	<.01	<.01	.03	.01	.02	.01	.02	.01
	900	.01	.01	.03	<.01	<.01	.03	.02	.02	.02	.02	.02
	1,100	.02	.02	.04	<.01	<.01	.04	.02	.03	.02	.04	.03
10	1,200	.02	.02	.05	<.01	<.01	.05	.03	.04	.03	.04	.03
	1,500	.03	.04	.06	.01	.02	.07	.04	.06	.04	.07	.05
	2,000	.05	.07	.09	.02	.03	.12	.07	.10	.08	.12	.09
	2,500	.08	.11	.12	.03	.04	.17	.10	.15	.12	.18	.13
	3,000	.11	.15	.16	.04	.06	.23	.14	.22	.17	.26	.19
	3,500	.16	.21	.19	.06	.08	.30	.18	.29	.24	.35	.25
	1,200	.02	.02	.05	<.01	<.01	.05	.03	.03	.03	.04	.03
	1,400	.03	.03	.06	<.01	.01	.06	.03	.03	.04	.06	.04
	1,600	.03	.04	.07	.01	.02	.08	.04	.04	.05	.07	.06
	1,800	.04	.05	.08	.02	.02	.10	.05	.06	.06	.09	.07
15	2,000	.05	.07	.09	.02	.03	.12	.07	.07	.08	.12	.09
	2,500	.08	.11	.12	.03	.04	.17	.10	.11	.12	.18	.13
	3,000	.11	.15	.16	.04	.06	.23	.14	.15	.17	.26	.19
	3,500	.16	.21	.19	.06	.08	.30	.18	.21	.24	.35	.25
	4,000	.20	.27		.07	.11	.38	.23	.27	N/A	N/A	.33
	4,500	.26	.34		.09	.14			.34	N/A	N/A	.42
	1,600	.02	.02	.05	<.01	.01	.06	.03	.02	.02	.03	.03
	1,800	.02	.03	.06	<.01	.01	.07	.04	.03	.02	.03	.03
	2,000	.02	.03	.07	.01	.02	.08	.04	.03	.03	.04	.04
	2,200	.03	.04	.08	.01	.02	.09	.05	.04	.03	.05	.05
20	2,400	.03	.05	.09	.02	.02	.11	.06	.05	.04	.06	.05
	2,500	.04	.05	.09	.02	.03	.12	.07	.05	.04	.07	.06
	3,000	.05	.07	.12	.03	.04	.16	.09	.07	.06	.10	.08
	4,000	.09	.13	.17	.05	.07	.26	.16	.13	.11	.17	.15
	5,000	.15	.20		.07	.11	.38	.23	.21	.18	.27	.23
	5,500	.18	.25		.09	.13	.44	.28	.25	.22	.32	.28
	2,000	.02	.03	.07	.01	.02	.08	.04	.02	.03	.04	.04
	2,250	.03	.04	.08	.02	.02	.10	.05	.03	.04	.05	.05
	2,500	.04	.05	.09	.02	.03	.12	.07	.04	.04	.07	.06
	2,750	.04	.06	.10	.02	.03	.14	.08	.04	.05	.08	.07
25	3,000	.05	.07	.12	.03	.04	.16	.09	.05	.06	.10	.08
	4,000	.09	.13	.17	.05	.07	.26	.16	.09	.11	.17	.15
	4,500	.12	.16		.06	.09	.31	.19	.12	.15	.22	.19
	5,000	.15	.20		.07	.11	.38	.23	.14	.18	.27	.23
	5,500	.18	.25		.09	.13	.44	.28	.17	.22	.32	.28
	2,400	.02	.03	.06	.01	.01	.07	.04	.02	.03	.04	.03
	2,700	.02	.03	.07	.01	.02	.09	.05	.03	.03	.05	.04
	3,000	.03	.04	.08	.02	.02	.10	.06	.03	.04	.06	.05
	3,300	.04	.05	.09	.02	.03	.12	.07	.04	.05	.07	.06
30	3,600	.04	.06	.10	.02	.03	.14	.08	.05	.06	.09	.07
	4,000	.05	.08	.12	.03	.04	.17	.10	.06	.07	.11	.08
	5,000	.09	.12	.16	.04	.06	.24	.14	.09	.11	.17	.13
	6,000	.12	.17		.06	.09	.33	.20	.13	.16	.24	.19
	6,500	.14	.20		.07	.11	.38	.23	.16	.19	.29	.22
	7,000	.17	.23		.09	.13	.43	.27	.18	.22	.33	.25

Table PD-4 (Continued) — Rooftop Gas Heating Units Accessory Pressure Loss Data — Rooftop Arrangements B,C,D,E

		Pressure Loss (Inches of Water)										
		Rainhood With		Filters					Supply Air	Evaporative Media		Return or Outside Air
				Throwaway	Washable		Pleated					
Capacity	CFM	Screen	Mstr.Elim.	2″	1″	2″	1″	2″	Plenum	8″	12″	Damper
	2,800	.03	.04	.07	.01	.02	.09	.05	.02	.04	.05	.04
	3,100	.03	.05	.08	.02	.02	.11	.06	.03	.04	.07	.05
	3,400	.04	.06	.10	.02	.03	.13	.07	.04	.05	.08	.06
	3,700	.05	.07	.11	.02	.03	.15	.08	.04	.06	.09	.07
35	4,000	.05	.08	.12	.03	.04	.17	.10	.05	.07	.11	.08
	5,000	.09	.12	.16	.04	.06	.24	.14	.08	.11	.17	.13
	6,000	.12	.17		.06	.09	.33	.20	.11	.16	.24	.19
	7,000	.17	.23		.09	.13	.43	.27	.15	.22	.33	.25
	8,000	.22	.31		.11	.16			.19	.29	.44	.33
	9,000	.28	.39						.24	N/A	N/A	.42
	3,200	.03	.04	.07	.01	.02	.09	.05	.02	.04	.06	.04
	3,600	.04	.05	.09	.02	.02	.11	.06	.03	.05	.07	.05
	4,000	.04	.06	.10	.02	.03	.13	.07	.04	.06	.09	.07
	4,400	.05	.07	.11	.03	.04	.15	.09	.05	.07	.11	.08
40	4,800	.06	.09	.13	.03	.04	.18	.10	.05	.09	.13	.10
	5,000	.07	.10	.13	.03	.05	.19	.11	.06	.09	.14	.10
	6,000	.10	.14	.17	.05	.07	.26	.16	.08	.14	.20	.15
	7,000	.13	.19		.07	.09	.33	.21	.11	.18	.27	.20
	8,000	.17	.24		.09	.12	.42	.26	.15	.24	.36	.26
	8,500	.20	.28		.10	.14			.17	.27	.41	.30
	3,000	.05	.07	.12	.03	.04	.16	.09	.05	.06	.10	.08
	3,500	.07	.10	.14	.04	.05	.21	.12	.07	.09	.13	.11
50	4,000	.09	.13	.17	.05	.07	.26	.16	.09	.11	.17	.15
	4,500	.12	.16		.06	.09	.31	.19	.12	.15	.22	.19
	5,000	.15	.20		.07	.11	.38	.23	.14	.18	.27	.23
	5,500	.18	.25		.09	.13	.44	.28	.17	.22	.32	.28
	3,700	.05	.07	.11	.02	.03	.15	.08	.05	.06	.09	.07
	4,000	.05	.08	.12	.03	.04	.17	.10	.06	.07	.11	.08
60	5,000	.09	.12	.16	.04	.06	.24	.14	.09	.11	.17	.13
	6,000	.12	.17		.06	.09	.33	.20	.13	.16	.24	.19
	6,500	.14	.20		.07	.11	.38	.23	.16	.19	.29	.22
	4,500	.07	.10	.14	.04	.05	.20	.12	.06	.09	.14	.11
	5,000	.09	.12	.16	.04	.06	.24	.14	.08	.11	.17	.13
70	6,000	.12	.17		.06	.09	.33	.20	.11	.16	.24	.19
	7,000	.17	.23		.09	.13	.43	.27	.15	.22	.33	.25
	8,000	.22	.31		.11	.16			.19	.29	.44	.33
	5,000	.07	.10	.13	.03	.05	.19	.11	.06	.09	.14	.10
80	6,000	.10	.14	.17	.05	.07	.26	.16	.08	.14	.20	.15
	7,000	.13	.19		.07	.09	.33	.21	.11	.18	.27	.20
	8,000	.17	.24		.09	.12	.42	.26	.15	.24	.36	.26

Performance Data

Table PD-5 — Rooftop Gas Heating Units Performance Data - Furnace Type (A,B) - Standard Temperature Rise - Rooftop Arrangement G,J

Capacity					TOTAL EXTERNAL STATIC PRESSURE (INCHES OF WATER)																			
Furnace	TR		Input	Output	0.2		0.4		0.6		0.8		1		1.2		1.4		1.6		1.8		2	
Type	(F)	CFM	BTU/H	BTU/H	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	59	2,500	200,000	160,000	425	.36	495	.46	565	.55	635	.67	700	.80	760	.93	820	1.07	875	1.21	925	1.35	975	1.50
	49	3,000			490	.59	540	.68	600	.80	660	.92	720	1.05	775	1.19	830	1.35	885	1.51	930	1.67	980	1.84
	37	4,000			630	1.30	660	1.41	700	1.54	740	1.68	785	1.84	830	2.00	875	2.16	920	2.32	965	2.49	1005	2.68
20-A,B	29	5,000			770	2.46	795	2.59	825	2.73	850	2.88	880	3.05	915	3.24	950	3.43	990	3.63	1025	3.83	1065	4.02
	25	6,000			915	4.18	940	4.34	960	4.50	980	4.66	1000	4.84	1025	5.02	1050	5.23	1080	5.44	1110	5.67	1140	5.90
	23	6,500			990	5.27	1010	5.45	1030	5.62	1050	5.80	1070	5.98	1090	6.17	1110	6.37	1135	6.59	1160	6.82	1185	7.06
	21	7,000			1060	6.55	1080	6.74	1100	6.93	1115	7.12	1135	7.31	1155	7.50	1175	7.71	1195	7.93	1215	8.16	1240	8.41
	20	7,400			1120	7.71	1140	7.92	1155	8.12	1175	8.31	1190	8.51	1205	8.71	1225	8.92	1245	9.15	1265	9.38	1285	9.62
	59	3,100	250,000	200,000	495	.62	540	.72	595	.83	655	.95	715	1.08	770	1.22	820	1.37	875	1.54	925	1.71	970	1.87
	46	4,000			620	1.26	650	1.37	685	1.49	725	1.63	770	1.79	815	1.95	860	2.10	905	2.26	950	2.43	990	2.61
25-A,B	37	5,000			755	2.39	785	2.52	810	2.66	835	2.80	865	2.96	895	3.13	930	3.32	970	3.52	1005	3.72	1045	3.92
	31	6,000			895	4.05	920	4.21	945	4.37	965	4.53	985	4.70	1010	4.88	1030	5.07	1060	5.27	1085	5.49	1115	5.72
	26	7,000			1040	6.35	1060	6.55	1080	6.74	1100	6.92	1115	7.11	1135	7.30	1155	7.50	1170	7.70	1195	7.92	1215	8.15
	25	7,500			1110	7.77	1130	7.99	1150	8.19	1165	8.39	1185	8.59	1200	8.79	1215	9.00	1235	9.21	1250	9.43	1270	9.66
	60	3,700	300,000	240,000	415	.47	505	.65	590	.86	665	1.08	740	1.33	815	1.60	885	1.89	950	2.19	1010	2.51	1065	2.82
	55	4,000			430	.56	520	.76	600	.97	675	1.20	745	1.45	815	1.72	880	2.02	945	2.33	1005	2.65	1065	2.99
30-A,B	37	6,000			560	1.51	630	1.79	690	2.08	750	2.38	805	2.69	860	3.01	910	3.34	960	3.68	1010	4.03	1055	4.40
	28	8,000			710	3.29	760	3.64	810	4.01	860	4.40	905	4.79	950	5.19	995	6.00	1035	5.99	1075	6.41	1115	6.83
	22	10,000			860	6.18	900	6.59	945	7.03	985	7.48	1025	7.95	1065	8.44	1100	8.93	1140	9.42	1175	9.92	1210	10.42
	20	11,000			940	8.12	975	8.57	1015	9.04	1050	9.52	1085	10.03	1125	10.55	1160	11.08	1195	11.61	1230	12.16	1260	12.70
	57	4,500	350,000	280,000	405	.58	490	.76	565	.96	640	1.19	705	1.43	765	1.68	825	1.93	880	2.19	930	2.46	975	2.74
	43	6,000			500	1.22	555	1.43	615	1.66	675	1.90	735	2.16	790	2.46	845	2.78	895	3.10	945	3.43	990	3.75
35-A,B	32	8,000			645	2.70	675	2.93	715	3.20	760	3.51	805	3.83	850	4.14	895	4.45	940	4.79	985	5.15	1025	5.55
	26	10,000			790	5.10	815	5.37	840	5.67	870	5.99	905	6.35	940	6.74	980	7.14	1015	7.53	1050	7.92	1085	8.31
	22	12,000			935	8.66	960	8.98	980	9.31	1000	9.66	1025	10.04	1050	10.44	1080	10.87	1110	11.32	1140	11.79	1170	12.27
	20	13,000			1010	10.95	1030	11.29	1050	11.64	1070	12.01	1090	12.39	1115	12.80	1140	13.24	1165	13.71	1190	14.19	1215	14.69
	59	5,000	400,000	320,000	430	.73	500	.92	570	1.12	640	1.35	705	1.61	765	1.88	820	2.15	875	2.43	925	2.71	975	3.00
	49	6,000			495	1.18	545	1.38	605	1.62	665	1.85	725	2.11	780	2.40	835	2.72	885	3.04	935	3.36	985	3.69
40-A,B	37	8,000			630	2.62	665	2.85	700	3.10	745	3.40	790	3.72	835	4.03	880	4.34	925	4.67	970	5.02	1010	5.41
	29	10,000			775	4.96	800	5.23	825	5.51	855	5.82	885	6.16	920	6.54	960	6.93	995	7.33	1030	7.72	1070	8.11
	25	12,000			920	8.42	945	8.74	965	9.07	985	9.40	1010	9.75	1030	10.14	1060	10.55	1085	10.98	1115	11.44	1145	11.92
	21	14,000			1065	13.22	1085	13.60	1105	13.97	1120	14.35	1140	14.73										
	119	3,100	500,000	400,000	515	.66	565	.76	625	.89	680	1.01	740	1.14	790	1.29	845	1.45	895	1.61	945	1.78	990	1.95
	92	4,000			640	1.34	675	1.45	715	1.59	755	1.74	805	1.90	850	2.06	895	2.21	935	2.38	980	2.56	1020	2.76
50-A,B	74	5,000			785	2.54	810	2.67	840	2.82	870	2.98	900	3.16	935	3.35	975	3.55	1010	3.74	1045	3.94	1085	4.13
	61	6,000			935	4.30	955	4.46	975	4.63	1000	4.80	1020	4.98	1045	5.18	1075	5.40	1105	5.62	1135	5.86	1165	6.10
	53	7,000			1080	6.76	1100	6.94	1120	7.13	1135	7.32	1155	7.52	1175	7.73	1195	7.95	1215	8.18	1240	8.42	1265	8.68
	49	7,500			1155	8.28	1175	8.48	1190	8.68	1205	8.88	1225	9.08	1240	9.30	1260	9.52	1280	9.76				
	120	3,700	600,000	480,000	455	.55	545	.74	625	.95	700	1.19	775	1.45	845	1.73	915	2.02	975	2.33	1035	2.65	1090	2.97
	111	4,000			480	.66	560	.86	640	1.09	710	1.33	780	1.59	850	1.87	915	2.18	975	2.50	1035	2.83	1090	3.16
60-A,B	74	6,000			640	1.83	700	2.12	755	2.42	810	2.73	865	3.05	915	3.38	965	3.72	1015	4.08	1065	4.45	1110	4.83
	55	8,000			810	4.00	855	4.38	905	4.78	950	5.17	990	5.57	1035	5.98	1075	6.39	1115	6.81	1155	7.24	1195	7.68
	44	10,000			985	7.49	1025	7.96	1065	8.45	1100	8.94	1140	9.43	1175	9.92	1210	10.42	1245	10.93	1280	11.43	1310	11.95
	40	11,000			1075	9.83	1110	10.35	1145	10.87	1180	11.41	1215	11.95	1250	12.49	1280	13.04	1315	13.58	1345	14.14	1375	14.69
	115	4,500	700,000	560,000	445	.67	525	.85	600	1.07	670	1.31	735	1.55	795	1.80	850	2.06	905	2.32	955	2.60	1000	2.88
	86	6,000			545	1.39	610	1.63	670	1.86	725	2.12	780	2.42	835	2.73	890	3.05	940	3.38	985	3.71	1030	4.04
70-A,B	65	8,000			695	3.06	735	3.35	785	3.66	830	3.98	875	4.29	920	4.61	960	4.96	1005	5.34	1045	5.74	1085	6.16
	52	10,000			850	5.75	880	6.09	915	6.46	950	6.85	990	7.25	1025	7.64	1060	8.03	1095	8.42	1130	8.82	1165	9.23
	43	12,000			1005	9.74	1030	10.13	1060	10.54	1085	10.97	1115	11.43	1145	11.90	1175	12.38	1210	12.86	1240	13.33	1270	13.79
	40	13,000			1085	12.30	1110	12.71	1130	13.14	1155	13.59	1185	14.08	1210	14.57								
	118	5,000	800,000	640,000	460	.82	535	1.01	605	1.22	670	1.47	735	1.74	790	2.01	850	2.28	900	2.56	950	2.85	995	3.14
	98	6,000			525	1.31	585	1.54	645	1.77	705	2.02	760	2.30	815	2.61	870	2.93	920	3.25	965	3.58	1015	3.91
80-A,B	74	8,000			670	2.88	710	3.15	750	3.45	800	3.77	845	4.08	890	4.39	935	4.72	975	5.08	1020	5.47	1060	5.88
	59	10,000			820	5.45	850	5.75	880	6.08	915	6.45	950	6.84	985	7.24	1025	7.63	1060	8.02	1095	8.41	1130	8.81
	49	12,000			975	9.24	995	9.58	1020	9.95	1045	10.35	1075	10.77	1100	11.22	1130	11.69	1165	12.17	1195	12.65	1225	13.12
	44	13,500			1090	13.03	1110	13.41	1130	13.81	1150	14.23	1175	14.68										
	161	5,500	1,200,000	960,000	530	1.16	595	1.38	660	1.61	720	1.87	780	2.17	835	2.46	885	2.76	935	3.06	985	3.37	1030	3.68
	147	6,000			565	1.46	625	1.70	685	1.93	740	2.20	800	2.50	850	2.82	905	3.15	950	3.47	1000	3.80	1045	4.13
	126	7,000			640	2.21	690	2.49	745	2.76	795	3.03	845	3.34	890	3.68	940	4.04	985	4.41	1030	4.79	1070	5.16
12-A,B	111	8,000			715	3.20	760	3.50	805	3.82	850	4.13	895	4.45	940	4.78	980	5.14	1025	5.54	1065	5.95	1105	6.37
	88	10,000			875	6.01	905	6.37	940	6.75	980	7.15	1015	7.55	1050	7.94	1090	8.32	1125	8.72	1160	9.13	1195	9.57
	74	12,000			1035	10.16	1060	10.57	1090	11.01	1120	11.47	1150	11.94	1180	12.42	1210	12.90	1240	13.36	1270	13.83	1300	14.29
	68	13,000			1115	12.81	1140	13.25	1165	13.72	1190	14.20	1220	14.71										

1. Refer to Accessory Pressure Loss table.
2. Values are based on the "Basic Packaged Unit" which includes pressure drop of the duct furnace(s) and "system effect" of the blower module.
3. Brake horsepower (BHP) includes drive losses.
4. Unit leaving air temperature is limited to 150 F (66 C) and is equal to: Entering Air Temperature + Duct Furnace(s) Temperature Rise.
5. "Total External Pressure" is the sum of the unit's "Internal" accessory pressure loss(es) plus the external static pressure.
6. Ratings shown are for elevations between 0 and 2000 ft. (610 m). For unit installation in the U.S.A. above 2000 ft. (610 m), the unit input must be derated 4% for each 1000 ft. (305 m) above sea level; refer to local codes, or in absence of local codes, refer to the National Fuel Gas Code, ANSI Standard Z223.1-1992 (N.F.P.A. No. 54), or the latest edition.
   For installation in Canada, any references to deration at altitudes in excess of 2000 ft. (610 m) are to be ignored. At altitudes of 2000 to 4500 ft. (610 to 1372 m), the unit must be derated to 90% of the normal rating, and be so marked in accordance with the C.G.A. certification.

Performance Data

Table PD-6 — Rooftop Gas Heating Units Performance Data - Furnace Type (A,B) - Standard Temperature Rise - Rooftop Arrangement K,L

Capacity					TOTAL EXTERNAL STATIC PRESSURE (INCHES OF WATER)																			
Furnace	TR		Input	Output	0.2		0.4		0.6		0.8		1		1.2		1.4		1.6		1.8		2	
Type	(F)	CFM	BTU/H	BTU/H	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	61	1,200	100,000	80,000	575	.16	705	.23	825	.31	940	.40	1040	.50	1135	.60	1220	.70	1300	.80	1375	.91	1440	1.02
	49	1,500			655	.26	765	.35	870	.44	965	.54	1060	.64	1150	.75	1235	.87	1315	.99	1390	1.12	1460	1.24
10-A,B	37	2,000			795	.55	890	.65	975	.77	1055	.88	1130	1.00	1205	1.12	1280	1.25	1355	1.39	1425	1.54	1490	1.68
	29	2,500			950	1.01	1030	1.12	1105	1.25	1175	1.39	1240	1.54	1305	1.68	1365	1.83	1425	1.98	1485	2.13	1545	2.29
	25	3,000			1110	1.68	1175	1.82	1240	1.95	1305	2.10	1365	2.27	1420	2.44	1475	2.62	1530	2.79	1580	2.97	1635	3.14
	55	2,000	150,000	120,000	685	.44	785	.54	880	.63	965	.75	1045	.87	1120	.98	1195	1.11	1270	1.24	1345	1.37	1415	1.52
15-A,B	44	2,500			805	.78	890	.91	970	1.04	1045	1.15	1120	1.28	1190	1.43	1255	1.57	1320	1.72	1380	1.86	1440	2.01
	37	3,000			935	1.28	1005	1.44	1075	1.60	1140	1.75	1205	1.88	1270	2.02	1335	2.18	1390	2.35	1450	2.53	1500	2.70
	59	2,500	200,000	160,000	425	.36	495	.46	565	.55	635	.67	700	.80	760	.93	820	1.07	875	1.21	925	1.35	975	1.50
20-A,B	49	3,000			490	.59	540	.68	600	.80	660	.92	720	1.05	775	1.19	830	1.35	885	1.51	930	1.67	980	1.84
	37	4,000			630	1.30	660	1.41	700	1.54	740	1.68	785	1.84	830	2.00	875	2.16	920	2.32	965	2.49	1005	2.68
25-A,B	59	3,100	250,000	200,000	495	.62	540	.72	595	.83	655	.95	715	1.08	770	1.22	820	1.37	875	1.54	925	1.71	970	1.87
	46	4,000			620	1.26	650	1.37	685	1.49	725	1.63	770	1.79	815	1.95	860	2.10	905	2.26	950	2.43	990	2.61
	60	3,700	300,000	240,000	415	.47	505	.65	590	.86	665	1.08	740	1.33	815	1.60	885	1.89	950	2.19	1010	2.51	1065	2.82
30-A,B	55	4,000			430	.56	520	.76	600	.97	675	1.20	745	1.45	815	1.72	880	2.02	945	2.33	1005	2.65	1065	2.99
	37	6,000			560	1.51	630	1.79	690	2.08	750	2.38	805	2.69	860	3.01	910	3.34	960	3.68	1010	4.03	1055	4.40
35-A,B	57	4,500	350,000	280,000	405	.58	490	.76	565	.96	640	1.19	705	1.43	765	1.68	825	1.93	880	2.19	930	2.46	975	2.74
	43	6,000			500	1.22	555	1.43	615	1.66	675	1.90	735	2.16	790	2.46	845	2.78	895	3.10	945	3.43	990	3.75
40-A,B	59	5,000	400,000	320,000	430	.73	500	.92	570	1.12	640	1.35	705	1.61	765	1.88	820	2.15	875	2.43	925	2.71	975	3.00
	49	6,000			495	1.18	545	1.38	605	1.62	665	1.85	725	2.11	780	2.40	835	2.72	885	3.04	935	3.36	985	3.69
50-A,B	119	3,100	500,000	400,000	515	.66	565	.76	625	.89	680	1.01	740	1.14	790	1.29	845	1.45	895	1.61	945	1.78	990	1.95
	92	4,000			640	1.34	675	1.45	715	1.59	755	1.74	805	1.90	850	2.06	895	2.21	935	2.38	980	2.56	1020	2.76
	120	3,700	600,000	480,000	455	.55	545	.74	625	.95	700	1.19	775	1.45	845	1.73	915	2.02	975	2.33	1035	2.65	1090	2.97
60-A,B	111	4,000			480	.66	560	.86	640	1.09	710	1.33	780	1.59	850	1.87	915	2.18	975	2.50	1035	2.83	1090	3.16
	74	6,000			640	1.83	700	2.12	755	2.42	810	2.73	865	3.05	915	3.38	965	3.72	1015	4.08	1065	4.45	1110	4.83
70-A,B	115	4,500	700,000	560,000	445	.67	525	.85	600	1.07	670	1.31	735	1.55	795	1.80	850	2.06	905	2.32	955	2.60	1000	2.88
	86	6,000			545	1.39	610	1.63	670	1.86	725	2.12	780	2.42	835	2.73	890	3.05	940	3.38	985	3.71	1030	4.04
80-A,B	118	5,000	800,000	640,000	460	.82	535	1.01	605	1.22	670	1.47	735	1.74	790	2.01	850	2.28	900	2.56	950	2.85	995	3.14
	98	6,000			525	1.31	585	1.54	645	1.77	705	2.02	760	2.30	815	2.61	870	2.93	920	3.25	965	3.58	1015	3.91

Table PD-7 — Rooftop Gas Heating Units Performance Data - Furnace Type C,D - High Temperature Rise - Rooftop Arrangement K,L

Capacity					TOTAL EXTERNAL STATIC PRESSURE (INCHES OF WATER)																			
Furnace	TR		Input	Output	0.2		0.4		0.6		0.8		1		1.2		1.4		1.6		1.8		2	
Type	(F)	CFM	BTU/H	BTU/H	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	91	1,600	200,000	158,000	380	.16	480	.24	565	.33	645	.42	710	.52	770	.63	830	.74	880	.86	930	.98	980	1.10
	81	1,800			400	.20	495	.29	580	.39	650	.49	720	.59	780	.70	835	.82	890	.94	940	1.07	985	1.20
20-C,D	73	2,000			425	.26	510	.35	590	.45	665	.56	730	.67	790	.79	845	.91	900	1.04	950	1.17	995	1.31
	66	2,200			450	.33	530	.42	605	.53	675	.64	740	.76	800	.89	855	1.02	905	1.15	955	1.28	1000	1.43
	61	2,400			475	.40	550	.50	620	.61	690	.74	750	.87	810	1.00	865	1.13	915	1.27	965	1.41	1010	1.56
	91	2,000	250,000	197,500	405	.24	495	.33	575	.43	650	.54	715	.65	780	.76	835	.89	890	1.01	940	1.14	985	1.28
	81	2,250			435	.32	515	.41	590	.52	660	.64	725	.76	785	.88	845	1.01	895	1.14	945	1.28	995	1.42
25-C,D	73	2,500			465	.42	540	.52	610	.62	675	.75	740	.88	795	1.02	855	1.15	905	1.29	955	1.44	1000	1.58
	66	2,750			500	.53	565	.64	630	.75	695	.87	755	1.02	810	1.16	865	1.31	915	1.46	965	1.62	1010	1.77
	61	3,000			535	.67	595	.79	655	.90	710	1.03	770	1.17	825	1.33	875	1.49	925	1.65	975	1.81	1020	1.98
	91	2,400	300,000	237,000	390	.25	510	.40	615	.60	700	.80	775	1.01	845	1.23	905	1.45	960	1.68	1010	1.92	1055	2.16
	84	2,600			405	.29	515	.45	615	.65	705	.86	780	1.09	850	1.31	910	1.55	965	1.79	1020	2.04	1065	2.29
	78	2,800			420	.33	520	.50	620	.70	710	.92	785	1.16	855	1.40	920	1.65	975	1.91	1025	2.16	1075	2.43
30-C,D	73	3,000			435	.38	530	.56	625	.76	710	.99	790	1.24	860	1.49	925	1.76	980	2.02	1035	2.29	1085	2.57
	68	3,200			450	.44	540	.62	630	.83	715	1.06	790	1.32	865	1.59	930	1.86	985	2.14	1040	2.42	1090	2.71
	64	3,400			465	.51	555	.69	640	.91	720	1.14	795	1.40	865	1.68	930	1.97	990	2.26	1045	2.56	1100	2.86
	61	3,600			480	.58	565	.77	645	.99	725	1.23	800	1.49	870	1.78	935	2.08	995	2.38	1050	2.69	1105	3.00
	85	3,000	350,000	276,500	385	.29	485	.46	575	.62	650	.81	715	1.00	775	1.21	835	1.44	885	1.67	935	1.90	980	2.15
	80	3,200			395	.34	495	.50	580	.68	655	.87	720	1.07	780	1.29	840	1.51	890	1.75	940	2.00	985	2.25
35-C,D	75	3,400			410	.38	505	.56	585	.74	660	.94	725	1.14	785	1.36	840	1.60	895	1.84	945	2.09	990	2.35
	67	3,800			430	.49	520	.68	600	.88	670	1.09	735	1.31	795	1.54	855	1.78	905	2.03	955	2.29	1000	2.57
	64	4,000			445	.55	530	.74	610	.96	680	1.17	745	1.40	805	1.63	860	1.88	910	2.14	960	2.41	1005	2.68
	61	4,200			460	.62	540	.81	615	1.04	685	1.26	750	1.50	810	1.74	865	1.99	915	2.25	965	2.52	1010	2.81
	88	3,300	400,000	316,000	390	.34	485	.51	575	.69	650	.88	715	1.08	775	1.30	835	1.52	885	1.76	935	2.01	985	2.27
	83	3,500			400	.38	495	.56	580	.75	655	.94	720	1.15	780	1.37	835	1.60	890	1.85	940	2.10	985	2.37
40-C,D	73	4,000			430	.52	515	.70	595	.92	665	1.13	730	1.36	790	1.59	850	1.83	900	2.09	950	2.35	995	2.63
	65	4,500			460	.70	540	.88	615	1.11	680	1.35	745	1.60	805	1.85	860	2.10	910	2.37	960	2.65	1005	2.93
	58	5,000			495	.91	565	1.11	635	1.34	700	1.60	760	1.87	820	2.14	875	2.41	925	2.70	975	2.99	1020	3.29

Notes:
1. Refer to Accessory Pressure Loss table.
2. Values are based on the "Basic Packaged Unit" which includes pressure drop of the duct furnace(s) and "system effect" of the blower module.
3. Brake horsepower (BHP) includes drive losses.
4. Unit leaving air temperature is limited to 150 F (66 C) and is equal to: Entering Air Temperature + Duct Furnace(s) Temperature Rise.
5. "Total External Pressure" is the sum of the unit's "Internal" accessory pressure loss(es) plus the external static pressure.
6. Ratings shown are for elevations between 0 and 2000 ft. (610 m). For unit installation in the U.S.A. above 2000 ft. (610 m), the unit input must be derated 4% for each 1000 ft. (305 m) above sea level; refer to local codes, or in absence of local codes, refer to the National Fuel Gas Code, ANSI Standard Z223.1-1992 (N.F.P.A. No. 54), or the latest edition.
   For installation in Canada, any references to deration at altitudes in excess of 2000 ft. (610 m) are to be ignored. At altitudes of 2000 to 4500 ft. (610 to 1372 m), the unit must be derated to 90% of the normal rating, and be so marked in accordance with the C.G.A. certification.

Performance Data

Table PD-8 — Rooftop Gas Heating Units Accessory Pressure Loss Data — Rooftop Arrangement G,J,K,L

		Pressure Loss (Inches of Water)								
		Rainhood		Filters					Supply	Return or Outside
		With		Throwaway	Washable		Pleated		Air	Air
Capacity	CFM	Screen	Mstr.Elim.	2″	1″	2″	1″	2″	Plenum	Damper
	800	<.01	.01	.01	<.01	<.01	<.01	<.01	.02	.01
	900	.01	.02	.01	<.01	<.01	<.01	<.01	.02	.02
	1,100	.02	.02	.02	<.01	<.01	.01	<.01	.03	.03
10*	1,200	.02	.03	.02	<.01	<.01	.02	<.01	.04	.03
	1,500	.03	.04	.02	<.01	<.01	.02	.01	.06	.05
	2,000	.06	.07	.04	<.01	<.01	.04	.02	.10	.09
	2,500	.09	.12	.05	<.01	.01	.05	.03	.15	.13
	3,000	.13	.17	.06	.01	.02	.07	.04	.22	.19
	3,500	.18	.23	.08	.01	.02	.09	.05	.29	.25
	1,200	.02	.03	.02	<.01	<.01	.02	<.01	.03	.03
	1,400	.03	.04	.02	<.01	<.01	.02	<.01	.03	.04
	1,600	.04	.05	.03	<.01	<.01	.03	.01	.04	.06
	1,800	.05	.06	.03	<.01	<.01	.03	.02	.06	.07
15*	2,000	.06	.07	.04	<.01	<.01	.04	.02	.07	.09
	2,500	.09	.12	.05	<.01	.01	.05	.03	.11	.13
	3,000	.13	.17	.06	.01	.02	.07	.04	.15	.19
	3,500	.18	.23	.08	.01	.02	.09	.05	.21	.25
	4,000	.23	.30	.09	.02	.03	.12	.07	.27	.33
	4,500	.29	.38	.11	.02	.03	.14	.08	.34	.42
	1,600	.02	.02	.03	<.01	<.01	.03	.01	.02	.03
	1,800	.02	.03	.03	<.01	<.01	.03	.02	.03	.03
	2,000	.02	.03	.04	<.01	<.01	.04	.02	.03	.04
	2,200	.03	.04	.04	<.01	<.01	.04	.02	.04	.05
	2,400	.03	.05	.05	<.01	<.01	.05	.03	.05	.05
	2,500	.04	.05	.05	<.01	.01	.05	.03	.05	.06
20	3,000	.05	.07	.06	.01	.02	.07	.04	.07	.08
	4,000	.09	.13	.09	.02	.03	.12	.07	.13	.15
	5,000	.15	.20	.12	.03	.04	.17	.10	.21	.23
	6,000	.21	.29	.16	.04	.06	.23	.14	.30	.33
	6,500	.25	.34	.17	.05	.07	.26	.16	.35	.39
	7,000	.29	.40	.19	.06	.08	.30	.18	.40	.45
	7,400	.32	.45	.06	.09	.33	.20	.45	.50	
	2,000	.02	.03	.04	<.01	<.01	.04	.02	.02	.04
	2,250	.03	.04	.04	<.01	<.01	.04	.02	.03	.05
	2,500	.04	.05	.05	<.01	.01	.05	.03	.04	.06
	2,750	.04	.06	.05	<.01	.01	.06	.03	.04	.07
25	3,000	.05	.07	.06	.01	.02	.07	.04	.05	.08
	4,000	.09	.13	.09	.02	.03	.12	.07	.09	.15
	5,000	.15	.20	.12	.03	.04	.17	.10	.14	.23
	6,000	.21	.29	.16	.04	.06	.23	.14	.21	.33
	7,000	.29	.40	.19	.06	.08	.30	.18	.28	.45
	7,500	.33	.46		.07	.09	.34	.21	.32	.52
	2,400	.02	.03	.02	<.01	<.01	.02	.01	.02	.03
	2,600	.02	.03	.03	<.01	<.01	.03	.01	.03	.04
	2,800	.03	.04	.03	<.01	<.01	.03	.01	.03	.04
	3,000	.03	.04	.03	<.01	<.01	.03	.02	.03	.05
	3,200	.03	.05	.03	<.01	<.01	.04	.02	.04	.05
30	3,400	.04	.06	.04	<.01	<.01	.04	.02	.04	.06
	3,600	.04	.06	.04	<.01	<.01	.04	.02	.05	.07
	4,000	.05	.08	.05	<.01	.01	.05	.03	.06	.08
	6,000	.12	.17	.08	.02	.02	.10	.06	.13	.19
	8,000	.22	.31	.12	.03	.04	.17	.10	.24	.33
	10,000	.34	.48	.16	.04	.06	.24	.14	.37	.52
	11,000	.41	.58	.18	.05	.08	.28	.17	.45	.63
	3,000	.03	.04	.03	<.01	<.01	.03	.02	.03	.05
	3,200	.03	.05	.03	<.01	<.01	.04	.02	.03	.05
	3,400	.04	.06	.04	<.01	<.01	.04	.02	.04	.06
	3,600	.04	.06	.04	<.01	<.01	.04	.02	.04	.07
	3,800	.05	.07	.04	<.01	<.01	.05	.03	.04	.08
35	4,000	.05	.08	.05	<.01	.01	.05	.03	.05	.08
	4,500	.07	.10	.05	<.01	.01	.06	.03	.06	.11
	6,000	.12	.17	.08	.02	.02	.10	.06	.11	.19
	8,000	.22	.31	.12	.03	.04	.17	.10	.19	.33
	10,000	.34	.48	.16	.04	.06	.24	.14	.30	.52
	12,000	.49	.69		.06	.09	.33	.20	.43	.75
	13,000	.58	.81		.07	.11	.38	.23	.51	.88

*Available in arrangements K and L only.

Refer to Table for Cooling Coil and Chilled Water Coil Pressure Losses (Arrangement K, L). Include the coil pressure loss with the above data.

Table PD-8 (Continued) — Rooftop Gas Heating Units Accessory Pressure Loss Data — Rooftop Arrangement G,J,K,L

		Pressure Loss (Inches of Water)								
		Rainhood With		Filters					Supply Air	Return or Outside Air
				Throwaway	Washable		Pleated			
Capacity	CFM	Screen	Mstr.Elim.	2″	1″	2″	1″	2″	Plenum	Damper
	3,300	.03	.04	.03	<.01	<.01	.03	.02	.03	.05
	3,500	.03	.05	.03	<.01	<.01	.03	.02	.03	.05
	4,000	.04	.06	.04	<.01	<.01	.04	.02	.04	.07
	4,500	.05	.08	.05	<.01	<.01	.05	.03	.05	.08
40	5,000	.07	.10	.05	<.01	.01	.06	.03	.06	.10
	6,000	.10	.14	.07	.01	.02	.08	.04	.08	.15
	8,000	.17	.24	.10	.02	.03	.13	.07	.15	.26
	10,000	.27	.38	.13	.03	.05	.19	.11	.23	.41
	12,000	.39	.55	.17	.05	.07	.26	.16	.34	.59
	14,000	.53	.75	.07	.09	.33	.21	.46	.80	
	3,100	.06	.08	.06	.01	.02	.08	.04	.06	.09
	4,000	.09	.13	.09	.02	.03	.12	.07	.09	.15
50	5,000	.15	.20	.12	.03	.04	.17	.10	.14	.23
	6,000	.21	.29	.16	.04	.06	.23	.14	.21	.33
	7,000	.29	.40	.19	.06	.08	.30	.18	.28	.45
	7,500	.33	.46		.07	.09	.34	.21	.32	.52
	3,700	.05	.07	.04	<.01	<.01	.05	.02	.05	.07
	4,000	.05	.08	.05	<.01	.01	.05	.03	.06	.08
60	6,000	.12	.17	.08	.02	.02	.10	.06	.13	.19
	8,000	.22	.31	.12	.03	.04	.17	.10	.24	.33
	10,000	.34	.48	.16	.04	.06	.24	.14	.37	.52
	11,000	.41	.58	.18	.05	.08	.28	.17	.45	.63
	4,500	.07	.10	.05	<.01	.01	.06	.03	.06	.11
	6,000	.12	.17	.08	.02	.02	.10	.06	.11	.19
70	8,000	.22	.31	.12	.03	.04	.17	.10	.19	.33
	10,000	.34	.48	.16	.04	.06	.24	.14	.30	.52
	12,000	.49	.69		.06	.09	.33	.20	.43	.75
	13,000	.58	.81		.07	.11	.38	.23	.51	.88
	5,000	.07	.10	.05	<.01	.01	.06	.03	.06	.10
	6,000	.10	.14	.07	.01	.02	.08	.04	.08	.15
80	8,000	.17	.24	.10	.02	.03	.13	.07	.15	.26
	10,000	.27	.38	.13	.03	.05	.19	.11	.23	.41
	12,000	.39	.55	.17	.05	.07	.26	.16	.34	.59
	13,500	.49	.70		.06	.09	.31	.19	.43	.75
	7,400	.15	.21	.09	.02	.03	.11	.06	.13	.22
	8,000	.17	.24	.10	.02	.03	.13	.07	.15	.26
12	10,000	.27	.38	.13	.03	.05	.19	.11	.23	.41
	12,000	.39	.55	.17	.05	.07	.26	.16	.34	.59
	13,000	.46	.65	.19	.06	.08	.30	.18	.40	.69

Note: Refer to Table for Cooling Coil and Chilled Water Coil Pressure Losses. (Rooftop Arrangements K,L). Include the coil pressure loss with the above data.

Performance Data

Table PD-9 — DX Cooling Coil Performance Data (Ref. R-22) — Rooftop Arrangements K, L

				Capacity based on 95 F EDB, 74 F EWB, 45 F Sat. Suction, 100 F Liquid							
				Number of Rows							
				4				6			
Unit Capacity	Air Flow (SCFM)	Face Velocity (FPM)	Fin Spacing (FPF)	Capacity (MBH)	L.A.T. (DB/WB)	A.P.D. In. W.C.	WT. (LBS)	Capacity (MBH)	L.A.T. (DB/WB)	A.P.D. In. W.C.	WT. (LBS)
10,15	1200	240	*96				62				84
			*120				65				89
			144	77.0	55 / 55	0.16	70	87.1	52 / 52	0.23	95
	1500	301	96	75.5	62 / 60	0.20	62				84
			*120	83.8	59 / 58	0.22	65	97.8	55 / 55	0.32	89
			144	90.3	57 / 56	0.23	70	103.8	53 / 53	0.35	95
	2000	401	96	89.5	64 / 62	0.33	62	110.2	59 / 58	0.49	84
			120	100.3	61 / 60	0.35	65	121.6	57 / 56	0.52	89
			144	109.0	59 / 58	0.37	70	130.6	55 / 55	0.55	95
	2500	501	96	100.8	66 / 63	0.46	62	127.7	61 / 60	0.68	84
			120	113.7	63 / 61	0.49	65	142.5	58 / 58	0.73	89
			144	124.5	61 / 60	0.52	70	154.5	56 / 56	0.78	95
	3000	601	96	110.2	68 / 64	0.59	62	142.9	62 / 61	0.88	84
			120	124.9	65 / 63	0.64	65	161.1	59 / 59	0.94	89
			144	139.2	62 / 61	0.66	70	176.0	57 / 57	1.01	95
20,25,50	1600	217	*96	91.1	59 / 58	0.11	84				115
			*120	99.5	56 / 56	0.12	89				122
			144	106.4	54 / 54	0.13	95	120.8	51 / 51	0.20	130
	2000	271	96	105.3	61 / 59	0.17	84	129.3	55 / 55	0.25	115
			120	117.2	58 / 57	0.18	89	138.7	53 / 53	0.27	122
			144	126.6	56 / 55	0.20	95	145.3	52 / 52	0.29	130
	3000	407	96	136.1	64 / 61	0.33	84	171.4	58 / 57	0.50	115
			120	154.4	61 / 59	0.36	89	186.6	56 / 56	0.54	122
			144	169.8	58 / 58	0.38	95	198.1	54 / 54	0.57	130
	4000	542	96	160.0	66 / 63	0.51	84	204.4	61 / 60	0.77	115
			120	184.1	63 / 61	0.55	89	224.8	58 / 58	0.82	122
			144	205.2	61 / 59	0.59	95	243.3	56 / 56	0.87	130
	4400	596	96	168.6	67 / 64	0.58	84	215.7	62 / 60	0.87	115
			120	194.5	64 / 62	0.63	89	238.1	59 / 59	0.94	122
			144	217.7	61 / 60	0.67	95	261.2	57 / 57	1.00	130
30,35,60, 70	2400	246	96	134.9	59 / 58	0.14	105	159.5	55 / 54	0.21	145
			120	148.7	57 / 56	0.15	112	169.1	53 / 53	0.23	155
			144	159.0	55 / 54	0.17	119	176.9	51 / 51	0.24	166
	3000	307	96	156.2	61 / 59	0.21	105	186.3	56 / 56	0.32	145
			120	173.6	58 / 57	0.23	112	201.5	54 / 54	0.34	155
			144	187.2	56 / 56	0.24	119	213.6	52 / 52	0.36	166
	4000	410	96	185.7	64 / 61	0.34	105	228.1	58 / 58	0.51	145
			120	208.6	61 / 59	0.36	112	251.1	56 / 55	0.54	155
			144	227.3	58 / 58	0.39	119	269.5	54 / 54	0.58	166
	5000	512	96	209.8	66 / 62	0.47	105	264.7	60 / 59	0.71	145
			120	237.6	63 / 61	0.51	112	294.9	57 / 57	0.76	155
			144	260.7	60 / 59	0.55	119	319.7	55 / 55	0.81	166
	5700	584	96	224.3	67 / 63	0.57	105	287.5	61 / 60	0.85	145
			120	255.0	64 / 62	0.61	112	322.7	58 / 58	0.91	155
			144	281.8	61 / 60	0.65	119	352.0	56 / 56	0.97	166
40,80	3300	304	96	173.1	61 / 59	0.21	115	207.5	56 / 55	0.31	158
			120	191.6	58 / 57	0.22	122	224.7	54 / 54	0.33	170
			144	205.9	56 / 56	0.24	130	237.6	52 / 52	0.36	182
	4000	369	96	194.3	63 / 60	0.29	115	238.6	57 / 57	0.43	158
			120	216.5	60 / 58	0.31	122	260.6	55 / 55	0.46	170
			144	234.1	58 / 57	0.33	130	277.7	53 / 53	0.49	182
	5000	461	96	219.9	65 / 62	0.40	115	277.9	59 / 58	0.60	158
			120	246.8	62 / 60	0.43	122	306.9	56 / 56	0.65	170
			144	271.9	59 / 58	0.46	130	330.3	54 / 54	0.69	182
	6000	553	96	241.3	66 / 63	0.53	115	312.4	60 / 59	0.79	158
			120	273.5	63 / 61	0.56	122	348.2	58 / 57	0.85	170
			144	307.7	61 / 59	0.60	130	377.9	56 / 55	0.91	182
	6300	581	96	247.1	67 / 63	0.56	115	321.9	61 / 60	0.84	158
			120	281.7	64 / 62	0.60	122	359.7	58 / 57	0.91	170
			144	317.7	61 / 60	0.64	130	391.3	56 / 56	0.97	182

Conversions:
2119 SCFM = 1 m/s
196.8 FPM = 1 m/s
3.412 MBH = 1 kW
(F-32) 5/9 = C
1 In. W.C. = 248.8 Pa
1 LB. = 0.453 kg

Notes:
1.) Data certified in accordance with ARI Standard 410.
2.) Capacity based on 95 F EDB, 74 F EWB, 45 F Sat. Suction, 100 F Liquid.
3.) Weight listed is the total weight of the dry coil.
4.) Coils denoted by an asterisk (*) require special pricing; consult product marketing for special coil requirements and pricing.

Performance Data

Table PD-10 — DX Cooling Coil Performance Data (Ref. R-22) — Rooftop Arrangements K, L

				Capacity based on 80 F EDB, 67 F EWB, 45 F Sat. Suction, 100 F Liquid							
				Number of Rows							
				4				6			
Unit Capacity	Air Flow (SCFM)	Face Velocity (FPM)	Fin Spacing (FPF)	Capacity (MBH)	L.A.T. (DB/WB)	A.P.D. In. W.C.	WT. (LBS)	Capacity (MBH)	L.A.T. (DB/WB)	A.P.D. In. W.C.	WT. (LBS)
10,15	1200	240	*96				62				84
			*120				65				89
			*144				70				95
	1500	301	*96				62				84
			*120				65				89
			*144	58.6	55 / 54	0.23	70				95
	2000	401	96	57.4	60 / 58	0.33	62	68.7	57 / 56	0.48	84
			120	64.9	58 / 57	0.35	65	80.4	54 / 54	0.52	89
			144	71.3	56 / 56	0.37	70	84.8	53 / 53	0.55	95
	2500	501	96	64.9	61 / 59	0.46	62	79.5	58 / 57	0.67	84
			120	74.1	59 / 58	0.49	65	89.9	56 / 56	0.71	89
			144	82.0	57 / 57	0.52	70	97.4	55 / 54	0.76	95
	3000	601	96	71.3	62 / 60	0.59	62	89.8	59 / 58	0.87	84
			120	82.0	60 / 59	0.63	65	101.2	57 / 56	0.93	89
			144	91.3	58 / 57	0.67	70	111.1	55 / 55	1.00	95
20,25,50	1600	217	*96				84				115
			*120				89				122
			*144				95	79.8	50 / 50	0.19	130
	2000	271	*96				84				115
			*120				89				122
			144	82.2	54 / 54	0.20	95	97.7	51 / 51	0.29	130
	3000	407	96	88.2	59 / 58	0.33	84	112.0	56 / 55	0.50	115
			120	97.7	58 / 57	0.36	89	123.1	54 / 54	0.53	122
			144	107.5	56 / 56	0.38	95	131.8	53 / 53	0.57	130
	4000	542	96	101.3	61 / 59	0.51	84	134.3	57 / 56	0.77	115
			120	116.3	59 / 58	0.54	89	149.4	55 / 55	0.82	122
			144	130.5	57 / 57	0.58	95	161.7	54 / 54	0.87	130
	4400	596	96	105.6	62 / 60	0.58	84	142.1	58 / 57	0.87	115
			120	123.1	60 / 58	0.62	89	158.7	56 / 55	0.94	122
			144	138.6	58 / 57	0.66	95	172.3	55 / 54	1.00	130
30,35,60, 70	2400	246	*96				105				145
			*120				112				155
			144	103.8	53 / 53	0.16	119	119.4	50 / 50	0.25	166
	3000	307	*96	100.9	58 / 56	0.21	105				145
			*120	112.9	56 / 55	0.23	112				155
			144	122.5	54 / 54	0.24	119	141.9	51 / 51	0.36	166
	4000	410	96	120.4	59 / 58	0.34	105	151.4	55 / 55	0.51	145
			120	136.3	57 / 56	0.36	112	164.4	54 / 54	0.54	155
			144	149.7	56 / 55	0.39	119	174.3	53 / 53	0.58	166
	5000	512	96	136.6	60 / 59	0.47	105	172.9	57 / 56	0.71	145
			120	155.9	58 / 57	0.51	112	188.8	55 / 55	0.76	155
			144	172.9	57 / 56	0.54	119	204.6	54 / 54	0.80	166
	5700	584	96	146.4	61 / 59	0.57	105	185.7	58 / 57	0.85	145
			120	168.0	59 / 58	0.61	112	205.5	56 / 55	0.90	155
			144	187.2	57 / 57	0.65	119	225.4	54 / 54	0.96	166
40,80	3300	304	*96	113.2	57 / 56	0.21	115				158
			*120	126.2	55 / 55	0.22	122				170
			144	136.5	54 / 54	0.24	130	155.2	51 / 51	0.36	182
	4000	369	96	127.4	58 / 57	0.29	115	156.7	55 / 54	0.43	158
			120	143.1	56 / 56	0.31	122	168.7	53 / 53	0.46	170
			144	155.9	55 / 54	0.33	130	179.8	52 / 52	0.48	182
	5000	461	96	144.9	60 / 58	0.40	115	179.0	56 / 56	0.60	158
			120	164.1	58 / 57	0.43	122	197.6	55 / 54	0.64	170
			144	180.2	56 / 55	0.46	130	213.9	53 / 53	0.68	182
	6000	553	96	159.7	61 / 59	0.53	115	199.4	57 / 56	0.79	158
			120	182.0	59 / 58	0.57	122	224.5	55 / 55	0.84	170
			144	201.1	57 / 56	0.61	130	245.1	54 / 54	0.90	182
	6300	581	96	163.8	61 / 59	0.56	115	205.6	58 / 57	0.84	158
			120	186.9	59 / 58	0.61	122	232.1	56 / 55	0.90	170
			144	206.9	57 / 57	0.65	130	253.9	54 / 54	0.96	182

Conversions:
2119 SCFM = 1 m/s
196.8 FPM = 1 m/s
3.412 MBH = 1 kW
(F-32) 5/9 = C
1 In. W.C. = 248.8 Pa
1 LB. = 0.453 kg

Notes:
1.) Data certified in accordance with ARI Standard 410.
2.) Capacity based on 80 F EDB, 67 F EWB, 45 F Sat. Suction, 100 F Liquid.
3.) Weight listed is the total weight of the dry coil.
4.) Coils denoted by an asterisk (*) require special pricing; consult product marketing for special coil requirements and pricing.

Performance Data

Table PD-11 — Standard Conditions and Specifications — Refrigerant DX Coil

CONDITIONS		
Elevation	0 Ft.	
Entering Air Temperature DB:	80 F	95
Entering Air Temperature WB:	67 F	74
Suction Temperature:	45 F	45
Liquid Temperature:	100 F	100
Fouling Factor:	0 HR x FT^2 x F/BTU	
SPECIFICATIONS		
Coil Type:	FD — Staggered Tube Pattern	
Tube Size:	½" O.D. x 0.016" TWT Copper	
Row Sizes:	4,6	
Fin Type:	DE	Optional DH
Fin Size:	0.0055" Aluminum	
Fin Spacing:	Standard — 96, 120, 144 Fins/Ft. Optional — 72 thru 180 Fins/Ft.	
Circuiting:	Standard — Single Optional — Dual: a) Intertwined b) Face-Split	
Turbulators:	No	

DIMENSIONAL DATA LISTING		
Unit Size	Finned Width	Fixed Finned Length
10, 15	30.00	23.00
20, 25, 50	30.00	34.00
30, 35, 60, 70	30.00	45.00
40, 80	30.00	50.00

Note:
1. Above specification is for standard coil with standard fin spacing. Specify fin spacing and dual circuiting.
2. Special coils — contact Product Marketing.
3. Every order requires a coil selection.

Performance Data

Table PD-12 — Chilled Water Coil Performance Data — Rooftop Arrangements K, L

				Capacity based on 95 F EDB, 74 F EWB, 45 EWT, 70 GPM							
				Number of Rows							
				4				6			
Unit Capacity	Air Flow (SCFM)	Face Velocity (FPM)	Fin Spacing (FPF)	Capacity (MBH)	L.A.T. (DB/WB)	A.P.D. In. W.C.	WT. (LBS)	Capacity (MBH)	L.A.T. (DB/WB)	A.P.D. In. W.C.	WT. (LBS)
10,15	960	200	96	63.4	56 / 54	0.08	62	74.1	50 / 50	0.12	84
			120	68.4	53 / 52	0.09	65	77.7	49 / 49	0.14	89
			144	72.1	51 / 51	0.11	70	80.0	48 / 47	0.16	95
	1600	334	96	89.0	60 / 58	0.18	62	109.1	54 / 53	0.28	84
			120	97.3	58 / 56	0.22	65	116.4	52 / 52	0.32	89
			144	103.8	55 / 55	0.24	70	121.8	51 / 50	0.37	95
	2900	605	96	120.6	66 / 63	0.47	62	156.0	60 / 59	0.70	84
			120	134.4	64 / 61	0.52	65	170.7	58 / 57	0.78	89
			144	145.0	61 / 60	0.60	70	181.6	56 / 56	0.90	95
20,25,50	1800	254	96	109.8	58 / 56	0.12	84	131.2	52 / 52	0.18	115
			120	119.0	55 / 54	0.14	89	138.6	50 / 50	0.21	122
			144	126.3	53 / 53	0.16	95	143.9	49 / 49	0.24	130
	3000	424	96	148.1	63 / 60	0.27	84	185.5	57 / 56	0.40	115
			120	163.0	60 / 58	0.31	89	199.9	55 / 54	0.46	122
			144	174.9	58 / 57	0.35	95	210.8	53 / 53	0.52	130
	4300	607	96	175.1	67 / 63	0.47	84	226.1	61 / 59	0.70	115
			120	195.3	64 / 61	0.52	89	247.5	58 / 57	0.78	122
			144	210.8	62 / 60	0.60	95	263.2	56 / 56	0.90	130
30,35,60, 70	1900	203	96	123.5	56 / 55	0.08	105	144.6	51 / 50	0.12	145
			120	133.2	54 / 53	0.09	112	151.8	49 / 49	0.14	155
			144	140.5	52 / 51	0.11	119	156.7	48 / 48	0.17	166
	3200	341	96	172.1	61 / 59	0.19	105	211.2	55 / 54	0.29	145
			120	188.1	58 / 57	0.22	112	225.7	53 / 53	0.34	155
			144	200.8	56 / 55	0.25	119	236.7	51 / 51	0.38	166
	4500	480	96	205.0	65 / 61	0.33	105	258.8	59 / 57	0.49	145
			120	226.7	62 / 60	0.37	112	281.0	56 / 56	0.55	155
			144	243.8	60 / 58	0.42	119	297.4	55 / 54	0.63	166
	5700	608	96	227.8	67 / 63	0.46	105	292.9	61 / 59	0.69	145
			120	253.7	64 / 62	0.52	112	320.4	59 / 58	0.78	155
			144	273.7	62 / 61	0.59	119	340.8	57 / 57	0.89	166
40,80	2100	202	96	136.2	56 / 55	0.08	115	159.5	51 / 51	0.12	158
			120	146.9	54 / 53	0.09	122	167.5	49 / 49	0.14	170
			144	155.0	52 / 51	0.11	130	172.9	48 / 48	0.16	182
	3500	336	96	188.4	61 / 59	0.19	115	230.8	55 / 54	0.28	158
			120	205.7	58 / 57	0.22	122	246.5	53 / 53	0.33	170
			144	219.6	56 / 55	0.25	130	258.6	51 / 51	0.37	182
	4900	470	96	223.8	64 / 61	0.32	115	281.9	59 / 57	0.47	158
			120	247.4	62 / 60	0.36	122	305.8	56 / 56	0.54	170
			144	265.9	60 / 58	0.41	130	323.6	55 / 54	0.61	182
	6300	605	96	250.4	67 / 63	0.46	115	321.3	61 / 60	0.68	158
			120	278.8	64 / 62	0.51	122	351.4	59 / 58	0.77	170
			144	300.7	62 / 61	0.59	130	373.6	57 / 57	0.89	182

Conversions:
2119 SCFM = 1 m/s
196.8 FPM = 1 m/s
3.412 MBH = 1 kW
(F-32) 5/9 = C
1 In. W.C. = 248.8 Pa
1 LB. = 0.453 kg

Notes:
1.) Data certified in accordance with ARI Standard 410.
2.) Capacity based on 95 F EDB, 74 F EWB, 45 F EWT, 70 GPM.
3.) Weight listed is the total weight of the dry coil.
4.) Contact product marketing for special coil requirements.

Performance Data

Table PD-13 — Chilled Water Coil Performance Data — Rooftop Arrangements K, L

				Capacity based on 80 F EDB, 67 F EWB, 45 EWT, 70 GPM							
				Number of Rows							
				4				6			
Unit Capacity	Air Flow (SCFM)	Face Velocity (FPM)	Fin Spacing (FPF)	Capacity (MBH)	L.A.T. (DB/WB)	A.P.D. In. W.C.	WT. (LBS)	Capacity (MBH)	L.A.T. (DB/WB)	A.P.D. In. W.C.	WT. (LBS)
10,15	960	200	96	44.6	53 / 52	0.08	62	52.0	49 / 49	0.12	84
			120	48.1	51 / 50	0.09	65	54.5	48 / 47	0.14	89
			144	50.6	49 / 49	0.11	70	56.1	47 / 47	0.16	95
	1600	334	96	62.8	56 / 54	0.18	62	76.9	52 / 51	0.28	84
			120	68.7	54 / 53	0.22	65	82.0	50 / 50	0.32	89
			144	73.3	52 / 52	0.24	70	85.7	49 / 49	0.37	95
	2900	605	96	85.6	60 / 58	0.47	62	110.5	56 / 55	0.70	84
			120	95.3	58 / 57	0.53	65	120.7	54 / 53	0.79	89
			144	102.7	57 / 56	0.60	70	128.2	53 / 52	0.90	95
20,25,50	1800	254	96	77.4	54 / 53	0.12	84	92.3	50 / 50	0.18	115
			120	83.9	52 / 52	0.14	89	97.5	49 / 49	0.21	122
			144	89.0	51 / 50	0.16	95	101.2	48 / 48	0.24	130
	3000	424	96	104.9	58 / 56	0.27	84	131.0	53 / 53	0.40	115
			120	115.5	56 / 55	0.31	89	141.2	52 / 51	0.47	122
			144	123.7	54 / 54	0.35	95	148.6	51 / 50	0.53	130
	4300	607	96	124.5	60 / 58	0.47	84	160.1	56 / 55	0.70	115
			120	138.4	58 / 57	0.53	89	174.9	54 / 54	0.79	122
			144	149.2	57 / 56	0.60	95	185.9	53 / 53	0.90	130
30,35,60, 70	1900	203	96	86.9	53 / 52	0.08	105	101.6	49 / 49	0.12	145
			120	93.7	51 / 50	0.09	112	106.6	48 / 48	0.14	155
			144	98.8	50 / 49	0.11	119	110.0	47 / 47	0.17	166
	3200	341	96	121.7	56 / 55	0.19	105	149.1	52 / 52	0.29	145
			120	133.0	54 / 53	0.22	112	159.3	51 / 50	0.34	155
			144	141.9	53 / 52	0.25	119	166.8	49 / 49	0.38	166
	4500	480	96	145.5	59 / 57	0.33	105	183.3	55 / 54	0.49	145
			120	160.6	57 / 56	0.37	112	198.5	53 / 53	0.56	155
			144	172.5	55 / 55	0.42	119	209.9	52 / 52	0.63	166
	5700	608	96	161.7	61 / 58	0.47	105	207.3	56 / 55	0.70	145
			120	179.8	59 / 57	0.53	112	226.6	55 / 54	0.79	155
			144	193.8	57 / 56	0.60	119	240.7	53 / 53	0.90	166
40,80	2100	202	96	95.9	53 / 52	0.08	115	112.1	49 / 49	0.12	158
			120	103.4	51 / 51	0.09	122	117.7	48 / 48	0.14	170
			144	109.0	50 / 49	0.11	130	121.5	47 / 47	0.16	182
	3500	336	96	133.3	56 / 55	0.19	115	162.9	52 / 52	0.28	158
			120	145.5	54 / 53	0.22	122	174.0	51 / 50	0.33	170
			144	155.2	53 / 52	0.25	130	182.2	49 / 49	0.37	182
	4900	470	96	158.9	59 / 57	0.32	115	199.6	55 / 54	0.47	158
			120	175.2	57 / 56	0.36	122	216.1	53 / 53	0.54	170
			144	188.1	55 / 55	0.41	130	228.4	52 / 52	0.61	182
	6300	605	96	177.7	61 / 58	0.47	115	227.4	56 / 55	0.69	158
			120	197.5	59 / 57	0.52	122	248.5	55 / 54	0.78	170
			144	212.8	57 / 56	0.59	130	263.9	54 / 53	0.89	182

Conversions:
2119 SCFM = 1 m/s
196.8 FPM = 1 m/s
3.412 MBH = 1 kW
(F-32) 5/9 = C
1 In. W.C. = 248.8 Pa
1 LB. = 0.453 kg

Notes:
1.) Data certified in accordance with ARI Standard 410.
2.) Capacity based on 80 F EDB, 67 F EWB, 45 F EWT. 70 GPM.
3.) Weight listed is the total weight of the dry coil.
4.) Contact product marketing for special coil requirements.

Performance Data

Table PD-14 — Standard Conditions and Specifications — Chilled Water Coil

CONDITIONS		
Elevation	0 Ft.	
Entering Air Temperature DB:	80 F	95
Entering Air Temperature WB:	67 F	78
Entering Water Temperature:	45 F	45
Water Flow Rate:	70 GPM	70 GPM
Tube Velocity:	4 Ft./Sec.	
Fouling Factor:	0 HR x FT^2 x F/BTU	
SPECIFICATIONS		
Coil Type:	W — Full Row Serpentine	
Tube Size:	$^5/_8$" O.D. x 0.024" TWT Copper	
Row Sizes:	4,6	
Fin Type:	Prima Flo	
Fin Size:	0.0075" Aluminum	
Fin Spacing:	Standard — 96, 120, 144 Fins/Ft. Optional — 80 thru 168 Fins/Ft.	
Circuiting:	Single Circuit	
Drainable:	Yes	
Turbulators:	No	
DIMENSIONAL DATA LISTING		
Unit Size	Finned Width	Fixed Finned Length
10, 15	30.00	23.00
20, 25, 50	30.00	34.00
30, 35, 60, 70	30.00	45.00
40, 80	30.00	50.00

Note:
1. Above specification is for standard coil with standard fin spacing.
2. Special coils — contact Product Marketing.
3. Every order requires a coil selection.

Table PD-15 — Evaporative Cooling Performance Data and Pressure Drop — Rooftop Arrangements D,E

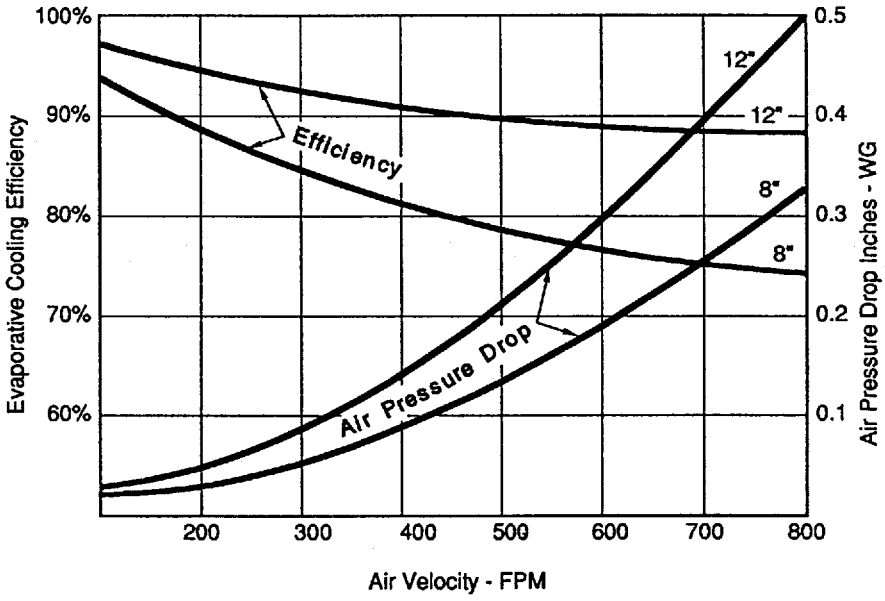
	CFM		Efficiency Range		8" Saturation Efficiency Range		12" Saturation 8" or 12" Deep Media		Pressure Drop in. of Water		"A" Unit	(1) Shipping	(1) Operating
	(cu. m/s)	(cu. m/s)					Face Area	Size	(KPa)	(KPa)	Width	Wt.	Wt.
Unit Size	Min.	Max.	Min.	Max.	Min.	Max.	$Ft.^2$ (m^2)	In. (mm)	Min.	Max.	In. (mm)	lb. (kg)	lb. (kg)
10, 15	800	4,500	78	88	89	92	7.01	31 x 32 9/16	0.03	0.23	32 3/4	137	301
	(0.378)	(2.124)					(0.65)	(787) (827)	(0.01)	(0.06)	(832)	(62)	(136)
20, 25, 50	1,600	5,500	77	88	88	92	9.38	31 x 43 9/16	0.03	0.20	43 3/4	166	386
	(0.755)	(2.596)					(0.87)	(787) (1106)	(0.01)	(0.05)	(1111)	(75)	(175)
30, 35, 60, 70	2,400	8,500	77	86	88	92	11.75	31 x 54 9/16	0.05	0.30	54 3/4	192	468
	(1.133)	(4.012)					(1.09)	(787) (1386)	(0.01)	(0.07)	(1391)	(87)	(212)
40, 80	3,200	8,500	77	86	87	92	12.92	31 x 60	0.07	0.28	60 1/4	206	509
	(1.510)	(4.012)					(1.20)	(787) (1524)	(0.02)	(0.07)	(1530)	(93)	(231)

Note:
1. These weights are for evaporative cooler only.

CELdek® Evaporative Media

The Trane Evaporative Cooler uses high efficiency CELdek® media. CELdek® is made from a special cellulose paper, impregnated with insoluble anti-rot salts and rigidifying saturants. The cross fluted design of the pads induces high-turbulent mixing of air and water for optimum heat and moisture transfer. The Trane evaporative coolers are standard with eight-inch deep media which produce high efficiency and high face velocities, along with a two-inch distribution pad to disperses the water evenly over the pads. We offer an optional 12-inch deep media (see chart at right for efficiencies).

Chart PD-3 — Evaporative Cooler Efficiency/A.P.D. Chart



Electrical Data

Rooftop Gas Heating Units — Motor Electrical Data

Voltage	½ HP	¾ HP	1 HP	1 ½ HP	2 HP	3 HP	5 HP	7 ½ HP	10 HP	15 HP
115/60/1 ODP	7.2	10.9	13.4	18.0	26.0	33.0	NA	NA	NA	NA
208/60/1 ODP	4.3	6.0	6.7	9.3	11.5	16.5	NA	NA	NA	NA
230/60/1 ODP	4.3	5.5	6.7	9.0	13.0	16.5	NA	NA	NA	NA
208/60/3 ODP	2.8	2.6	3.2	4.8	6.2	8.4	12.2	24.0	28.0	44.9
230/60/3 ODP	2.8	2.6	3.2	4.8	6.2	8.4	12.2	21.6	26.6	40.6
460/60/3 ODP	1.4	1.3	1.6	2.4	3.1	4.2	6.1	10.8	13.3	20.3
575/60/3 ODP	1.1	1.4	1.5	1.9	2.5	3.6	5.3	8.6	10.6	15.6
115/60/1 TE	9.0	11.4	13.6	17.6	24.6	34.0	NA	NA	NA	NA
208/60/1 TE	3.9	4.5	6.8	8.0	12.3	17.0	NA	NA	NA	NA
230/60/1 TE	4.5	5.7	6.8	8.8	12.3	17.0	NA	NA	NA	NA
208/60/3 TE	2.1	2.8	3.4	4.8	6.4	9.4	14.0	21.8	28.7	42.6
230/60/3 TE	2.2	2.8	3.6	4.9	6.4	9.2	13.0	20.4	26.4	28.4
460/60/3 TE	1.1	1.4	1.8	2.4	3.2	4.6	6.5	10.2	13.2	19.2
575/60/3 TE	0.9	1.3	1.7	1.9	2.6	3.6	5.1	7.6	9.6	14.4
115/60/1 HEODP	5.2	6.4	9.2	12.5	16.4	NA	NA	NA	NA	NA
208/60/1 HEODP	2.8	4.2	NA	NA	NA	NA	NA	NA	NA	NA
230/60/1 HEODP	2.6	5.2	4.6	6.3	8.2	NA	NA	NA	NA	NA
208/60/3 HEODP	1.8	2.5	3.6	5.0	6.7	9.2	14.7	22.1	29.0	40.0
230/60/3 HEODP	1.6	2.3	2.8	3.8	5.4	8.0	12.8	19.2	25.2	36.0
460/60/3 HEODP	0.8	1.2	1.4	1.9	2.7	4.0	6.4	9.6	25.2	18.0
575/60/3 HEODP	NA	NA	1.1	1.8	2.3	3.2	5.2	7.7	10.1	14.5
115/60/1 HETE	5.5	7.6	9.2	14.0	19.2	NA	NA	NA	NA	NA
208/60/1 HETE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
230/60/1 HETE	2.8	3.8	4.6	7.0	9.6	NA	NA	NA	NA	NA
208/60/3 HETE	NA	NA	3.2	4.6	6.2	8.8	14.7	21.4	29.0	41.2
230/60/3 HETE	4.6	6.3	3.0	4.2	5.8	8.0	12.0	18.8	25.2	37.0
460/60/3 HETE	2.3	3.2	1.5	2..1	2.9	4.0	6.0	9.4	12.6	18.5
575/60/3 HETE	NA	NA	1.1	1.8	2.4	3.2	4.8	7.5	10.2	14.9
208/60/3 2S1W	NA	NA	3.0/1.0	4.4/1.8	6.2/3.0	9.0/3.4	15.0/6.0	21.0/7.5	29.0/9.6	NA
230/60/3 2S1W	NA	NA	3.0/1.0	4.4/1.8	5.9/2.9	8.0/3.3	14.0/6.2	19.5/7.5	25.0/9.3	NA
460/60/3 2S1W	NA	NA	1.5/0.5	2.2/1.9	3.1/1.3	3.8/1.6	6.8/2.8	10.0/4.0	12.0/4.3	18.0/6.0
575/60/3 2S1W	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
115/60/1 2S2W	9.2/6.0	9.2/4.6	11.9/6.9	NA	NA	NA	NA	NA	NA	NA
208/60/1 2S2W	NA	5.0/2.5	6.3/3.0	NA	NA	NA	NA	NA	NA	NA
230/60/1 2S2W	4.6/3.0	4.6/2.3	6.0/3.6	NA	NA	NA	NA	NA	NA	NA
208/60/3 2S2W	2.4/1.6	3.0/1.9	3.4/2.0	5.0/2.6	6.5/3.5	9.3/4.9	NA	20.0/11.0	27.0/14.0	NA
230/60/3 2S2W	2.1/1.4	2.7/1.7	3.2/2.0	4.8/2.9	6.3/3.5	8.5/4.6	NA	19.0/10.0	25.0/12.5	NA
460/60/3 2S2W	1.1/0.7	1.3/0.9	1.5/1.0	2.3/1.3	3.0/1.7	4.6/2.7	NA	9.7/5.5	12.2/7.0	NA
575/60/3 2S2W	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

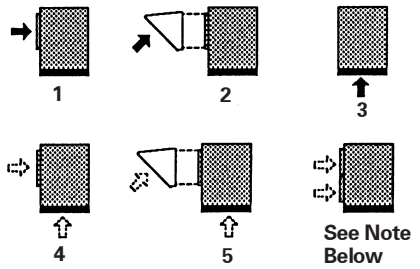
Notes:
1. ODP = Open Drip-proof
2. TE = Totally enclosed
3. HEODP = High Efficiency Open Drip-proof
4. HETE = High Efficiency Totally Enclosed
5. 2S1W = Two Speed One Winding
6. 2S2W = Two Speed Two Winding
7. NA = Not Available

FLA based on NEC Ratings

Pilot Control
Intermittent pilot ignition is standard on all outdoor units. Intermittent pilot ignition contains a solid-state ignition control system that ignites the pilot by spark for each cycle of operation. When the pilot flame is proven, the main burner valve opens to allow gas flow to the burners. Both the pilot and burners are extinguished during the off cycle. Energy savings will be realized using this system as the pilot is extinguished in the off cycle.

Air Inlet Configuration
The air inlet configuration defines the entering air opening for the rooftop gas heating units. This selection does not include dampers and must match the required opening for the air control and damper arrangement. A horizontal return air feature is offered on air inlet configurations 3 and 4.

Air Inlet Configuration



Note: Horizontal outside air over return air. Specify air inlet configuration 4 or 5 and then select miscellaneous option "D" for horizontal return.

Damper Options
Dampers shall be of the opposed blade type, constructed of galvanized steel with neoprene nylon bushings, blades to be mechanically interlocked.

Optional low leak dampers shall be of the opposed blade type, construction of galvanized steel with neoprene nylon bushings and vinyl blade edge seals, blades to be mechanically interlocked.

Outside Air or Return Air Two-Position Motor/Spring Return
Units with outside air or return air only shall be provided with damper, two-position spring return damper motor and controls. The motor shall power the damper full open when the unit is on and full closed when the unit is off.
Outside Air/Return Air
Two-Position Spring Return
Two-position spring return motor with interlocked outside and return air dampers shall be provided. The motor shall power either the outside air damper full open and the return air damper full closed or the outside air damper full closed and the return air damper full open in response to an outside air temperature sensor. When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

Outside Air/Return Air Modulating Motor W/Mixed Air Control/Minimum Position Potentiometer/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

Outside Air/Return Air Modulating Motor W/Mixed Air Temperature Control/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

Outside Air/Return Air Modulating Motor W/Minimum Position Potentiometer/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall position the outside and return air dampers in response to a manually set potentiometer. The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

Outside Air/Return Air Modulating Motor W/Dry Bulb/ Mixed Air Temperature Control and Minimum Position Potentiometer/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller and dry bulb thermostat located in the mixed air stream. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position. The spring return feature drives the outside air damper full open and the return air damper full closed when the unit is off.

Outside Air/Return Air Modulating Motor W/Enthalpy Controlled Economizer/Spring Return
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to an enthalpy controlled economizer. When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

Controls

Outside Air/Return Air Modulating Motor W/Space Pressure Controller
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a pressure sensor located in the building. Non-spring return.

Outside Air/Return Air Modulating Motor W/S-350P Proportional Mixed Air Control/Spring Return
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a solid-state mixed air sensor and S-350 proportional controller. When the unit is off the motor will drive the outside air damper full closed and the return air damper full open.

Outside Air/Return Air Modulating Motor W/External 4-20 mA or 0-10 VDC Analog Input/Spring Return
Modulating motor interlocked with outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a 4-10 mA or 0-10 VDC signal supplied by an external DDC controller. The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is shut down.

ASHRAE Cycle I - Outside/Return Air Two Position W/Warm-Up Stat/Spring Return
Two position spring return motor with interlocked outside and return air dampers shall be provided. The motor shall power the outside air damper full open after a warm up period determined by a minimum supply air temperature sensor when the unit is on, and full closed when the unit is off.

ASHRAE Cycle II - Outside Air/Return Air Modulating Motor W/Warm-Up Stat/Mixed Air Temperature Controller/Minimum Position Potentiometer/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream after a warm up period determined by a minimum supply air temperature sensor. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position. When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

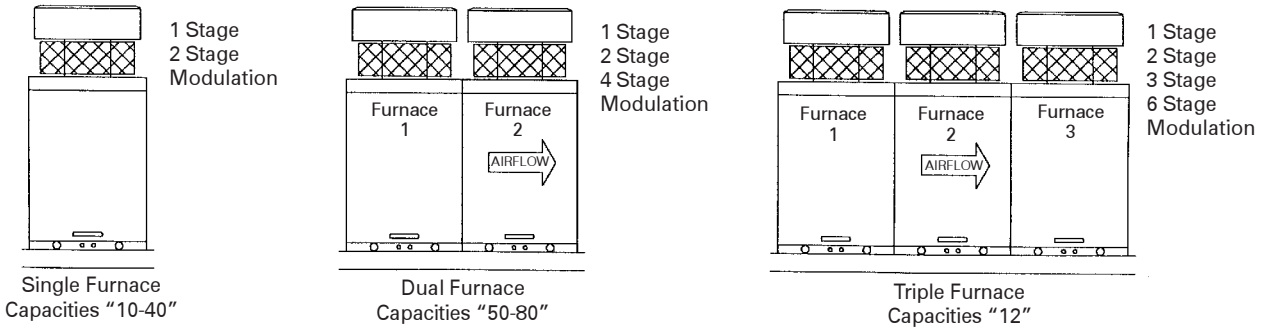
ASHRAE CYCLE III - Outside Air/ Return Air Modulating Motor W/ Warm-Up Thermostat/Mixed Air Temperature Controller/Spring Return
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream after a warm up period determined by a minimum supply air temperature sensor. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position. When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

Manual Dampers
Units with outside air and return air shall be provided with manually set outside and return air dampers.

Controls

Gas Controls

Gas Control Reference



Single-Stage Control
Outdoor gas heating units are provided with an automatic single-stage gas valve as standard. This valve is an on/off type control, typically activated by a low voltage single-stage thermostat (thermostat not included).

Two-Stage Gas Valve
Provides two stages of heat. Ignition is at low fire (one half of the unit's full rated input). Requires the use of an optional two-stage thermostat.

Hydraulic Modulating Gas Valve
Provides modulated heat output. Ignition is at low fire (one half of the unit's full rated input), and a discharge air temperature sensing bulb located in the air stream shall modulate the gas input from 40 percent to 100 percent rated input. Provided with an automatic electric valve in series with the hydraulic valve which cycles the unit in response to an optional low voltage single-stage thermostat.

Hydraulic Modulating Gas Valve with Bypass
Provides modulated heat output. Ignition is at low fire (one half of the unit's full rated input), and a discharge temperature sensing bulb located in the air stream shall modulate the gas input from 40 percent to 100 percent rated input. Provided with an automatic electric valve in series with the hydraulic valve which cycles the unit. An additional electric valve in parallel bypasses the hydraulic modulating valve, overriding the discharge temperature sensing bulb, allowing full fire. Requires the use of an optional thermostat to control the electric valve.

Electronic Modulating — Room or Duct Stat Control
Provides modulated heat output. An automatic valve in series with the modulating valve shall be provided to cycle the unit. Ignition is at full fire (100 percent input), and modulates the gas input from 100 percent to 40 percent rated input.

Available for use with a room thermostat or duct thermostat with remote setpoint adjustment. Duct thermostat available with optional override room thermostat which causes the unit to go to full fire when the room temperature falls below the override room thermostat's setpoint.

Electronic Modulating — 4-20 mA/ 0-10 VDC Input
Provides modulated heat output. Ignition is at full fire (100 percent input), and modulates the gas input from 100 percent to 40 percent rated input. The modulating gas valve shall operate in response to a 4-20 mA or a 0-10 VDC input from an external DDC control. When "furnace one only" is specified on double and triple furnaces, additional furnace sections will have single-stage on-off control.

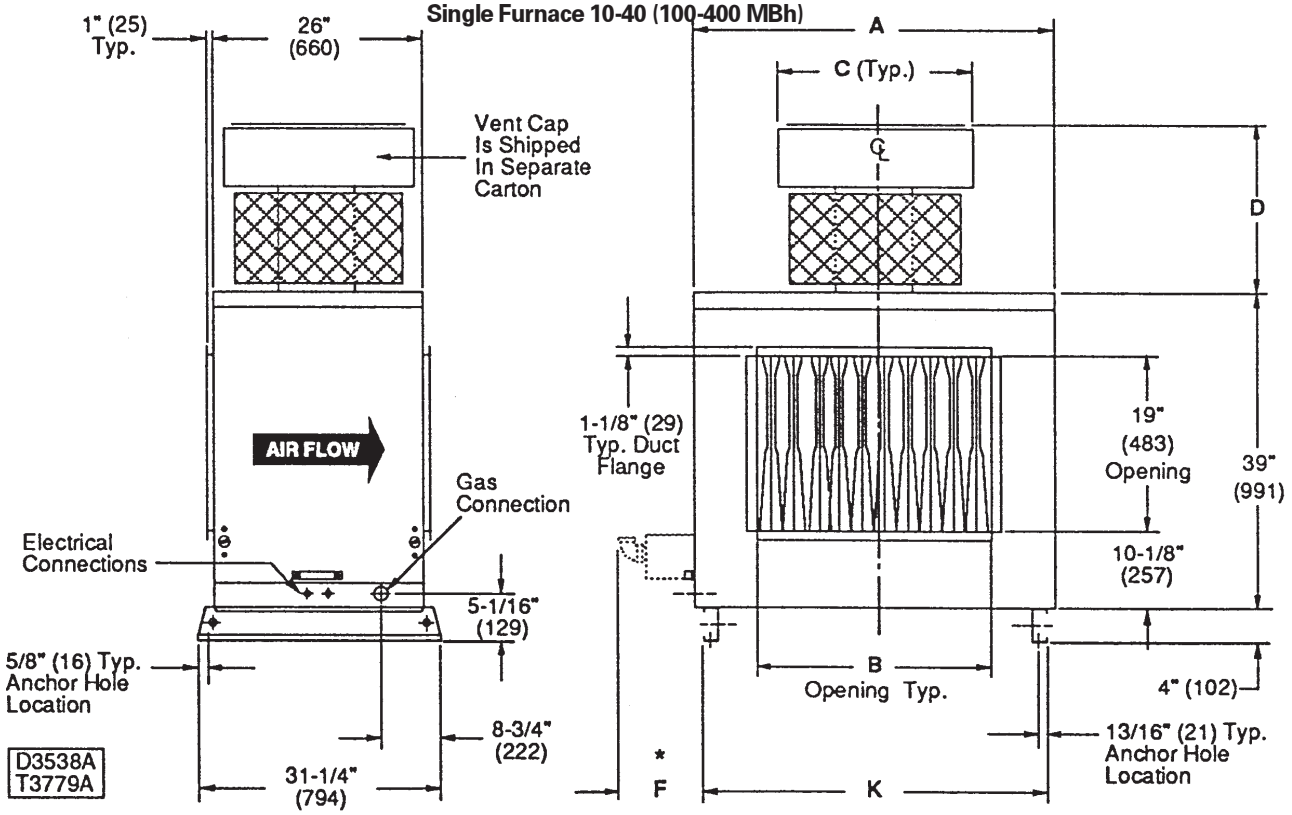
Discharge Air Control with Outside Air Reset
Unit provided with factory-mounted discharge air controller, discharge air sensor, outdoor air reset, summer/winter thermostat and velocity pressure switch. The outdoor air reset range is from 10 F to 60 F. Full reset occurs at 10 F outside air temperature. There is a straight line relationship between outside air temperature and reset. Therefore, at 60 F outside air temperature, no reset will occur. The amount of reset is adjustable from 20 F to 50 F.

Discharge air controller provides two-minute delay between successive on and off stages. A summer/winter thermostat locks out heating when outside air temperature is above 55 F. The velocity pressure switch is provided for protection against high temperatures at low airflows. Available in two-stage (half of the unit's full rated input-single furnace units only), three-stage (33 percent of the unit's full rated input) and four-stage (25 percent of the unit's full rated input). Three and four-stage available on double and triple furnace units only.

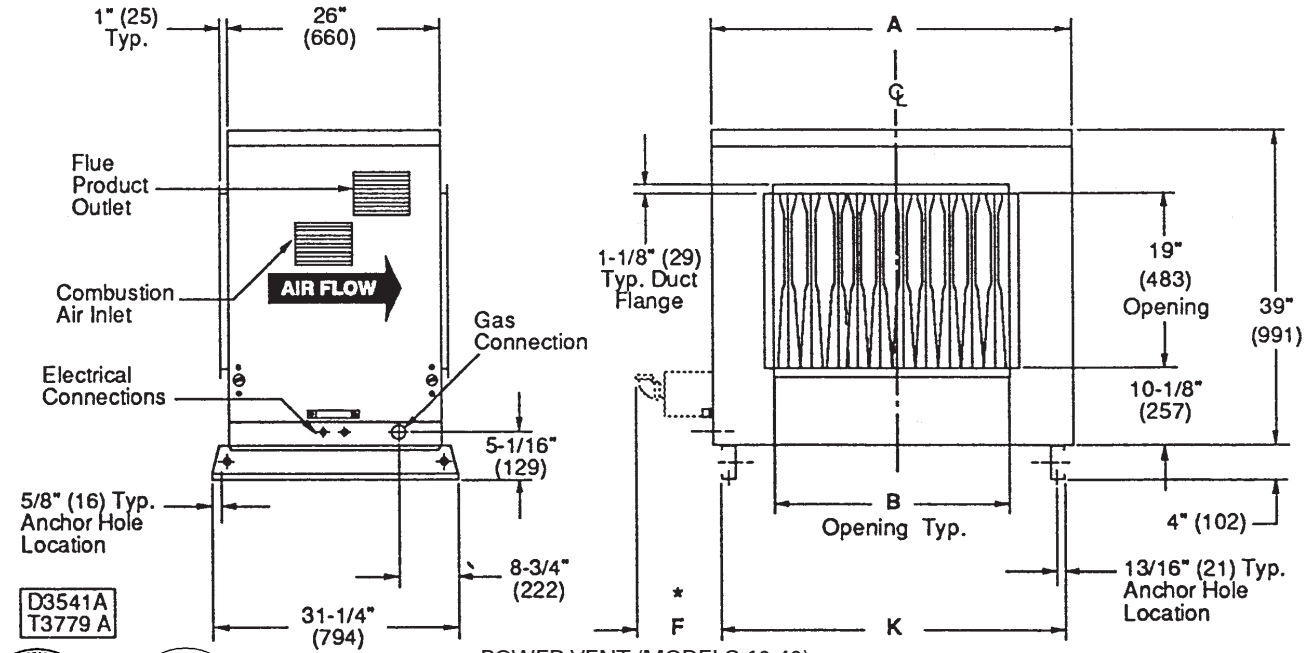
S-350 Modular Electronic Control System
Basic system utilizes a controller module with discharge air sensor, setpoint and one-stage output, a stage module with differential setpoint and one-stage output and a display module with LCD display for temperature readout. The system stages the unit's rate of fire based upon sensed discharge air temperature, setpoint setting and differential setting between stages. Provided as a two-stage (all furnaces), three and four-stage (double and triple furnaces only) and six-stage (triple furnace only).

Dimensional Data

Rooftop Gas Duct Furnace — Arrangement A
Single Furnace 10-40 (100-400 MBh)



NATURAL VENT (MODELS 10-40)
(Left Hand Service Access Shown)



POWER VENT (MODELS 10-40)
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Rooftop Gas Duct Furnace — Arrangement A

				D				Gas Inlet	
Capacity	A	B	C	AGA	CGA	*F	K	NAT	LP
10	32 7/8 (835)	15 9/16 (395)	12 (305)	11 (279)	20 11/16 (525)	19 3/8 (492)	30 3/16 (767)	1/2	1/2
15	32 7/8 (835)	18 5/16 (465)	21 1/2 (546)	16 (406)	25 3/16 (640)	23 1/2 (597)	30 3/16 (767)	1/2	1/2
20	43 7/8 (1114)	23 13/16 (605)	23 1/2 (597)	16 (406)	25 3/16 (640)	26 1/4 (667)	41 3/16 (1046)	1/2	1/2
25	43 7/8 (1114)	29 5/16 (745)	23 1/2 (597)	16 (406)	25 3/16 (640)	34 1/2 (876)	41 3/16 (1046)	3/4	1/2 OR 3/4
30	54 7/8 (1394)	34 13/16 (884)	26 (660)	17 1/2 (445)	26 11/16 (678)	37 1/4 (946)	52 3/16 (1326)	3/4	1/2 OR 3/4
35	54 7/8 (1394)	40 5/16 (1024)	26 (660)	17 1/2 (445)	26 11/16 (678)	45 1/2 (1156)	52 3/16 (1326)	3/4	1/2 OR 3/4
40	60 3/8 (1534)	45 13/16 (1164)	26 (660)	17 1/2 (445)	26 11/16 (678)	51 (1295)	57 11/16 (1465)	3/4	1/2 OR 3/4

NOTE:
DIMENSIONS ARE IN INCHES (DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS).
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).

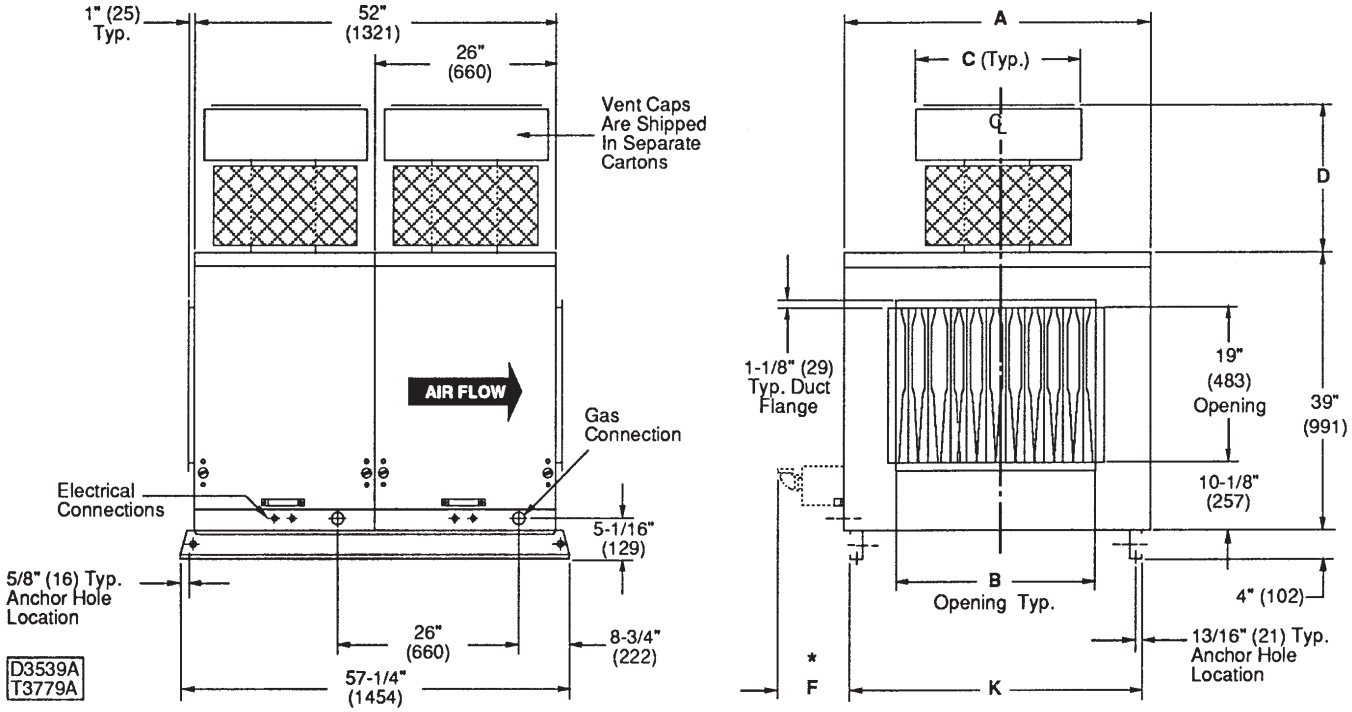
Gravity Vent Model

Power Vent Model

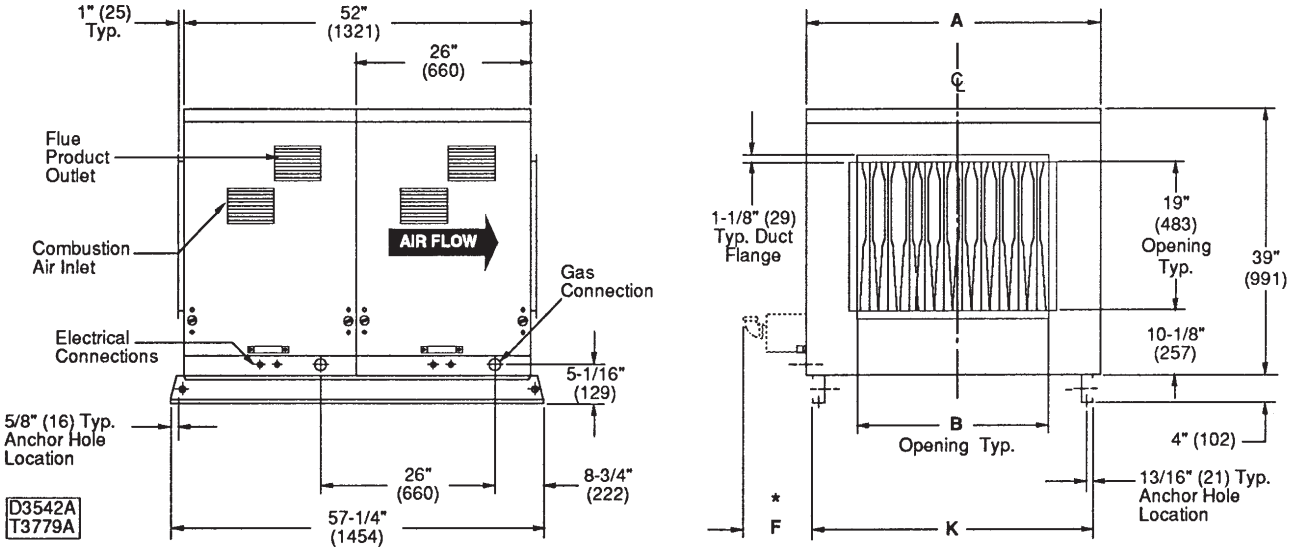
Dimensional Data

Rooftop Gas Duct Furnace — Arrangement A
Double Furnace 50-80 (500-800 MBh)

Standard (40-120°) Temperature Rise Furnace



NATURAL VENT (MODELS 50-80)
(Left Hand Service Access Shown)



POWER VENT (MODELS 50-80)
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Rooftop Gas Duct Furnace — Arrangement A

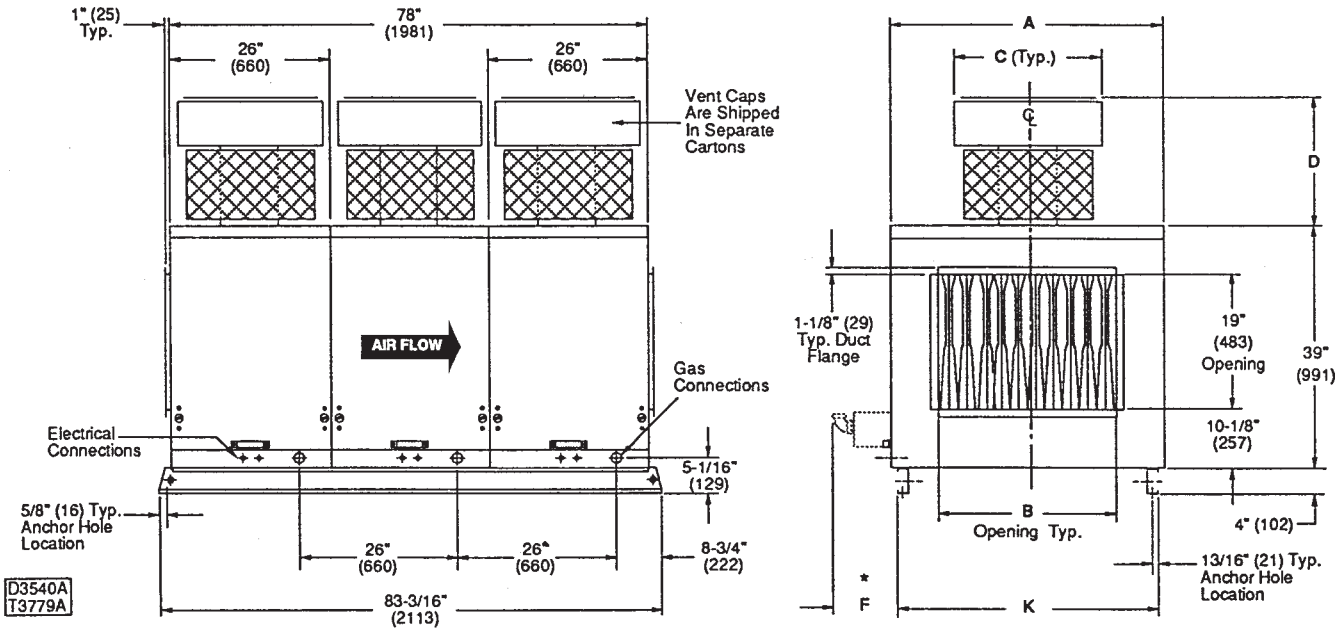
				D				Gas Inlet	
Capacity	A	B	C	AGA	CGA	*F	K	NAT	LP
50	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	41 3/16	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1046)		
60	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	52 3/16	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1326)		
70	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	52 3/16	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1326)		
80	60 3/8	45 13/16	26	17 1/2	26 11/16	51	57 11/16	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1465)		

NOTE:
DIMENSIONS ARE IN INCHES (DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS).
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).

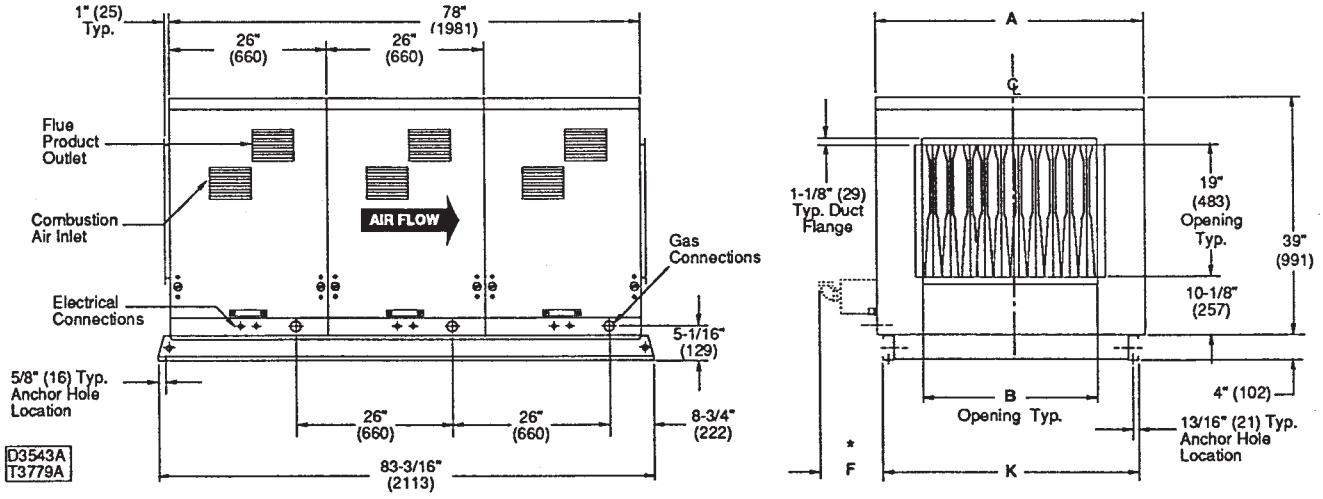
Dimensional Data

Rooftop Gas Duct Furnace — Arrangement A
Triple Furnace 12 (1200 MBh)

Standard (40-120°) Temperature Rise Furnace



NATURAL VENT (MODEL 12)
(Left Hand Service Access Shown)



POWER VENT (MODEL 12)
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

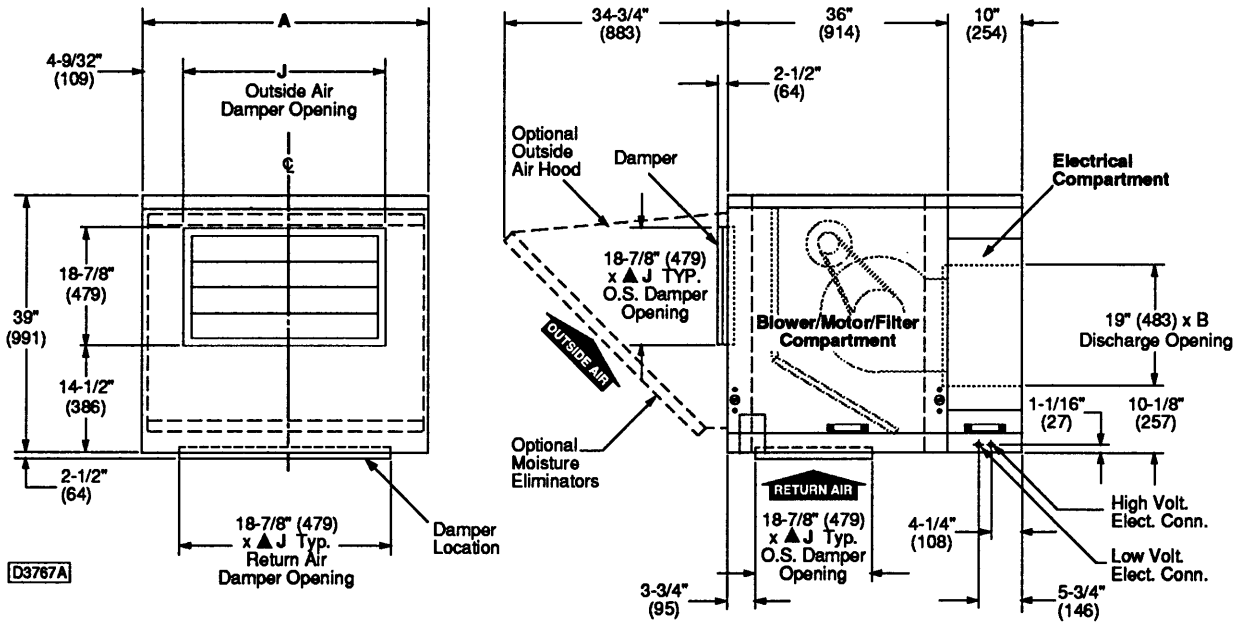
Unit Dimensional Data — Rooftop Gas Duct Furnace — Arrangement A

				D				Gas Inlet	
Capacity	A	B	C	AGA	CGA	*F	K	NAT	LP
12	60 3/8 (1534)	45 13/16 (1164)	26 (660)	17 1/2 (445)	26 11/16 (678)	51 (1295)	57 11/16 (1465)	3/4	1/2 OR 3/4

NOTE:
DIMENSIONS ARE IN INCHES (DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS).
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).

Dimensional Data

Standard Blower Module for Arrangements B, C, D, E
Unit Sizes 10-80 (100-800 MBh)



Model	A	B	J
10/15	32 7/8″ (835)	15 9/16″ (395)	24″ (610)
20/25/50	43 7/8″ (1114)	23 13/16″ (605)	35″ (889)
30/35 60/70	54 7/8″ (1394)	34 13/16″ (884)	46″ (1168)
40/80	60 3/4″ (1534)	45 13/16″ (1164)	51 1/2″ (1308)

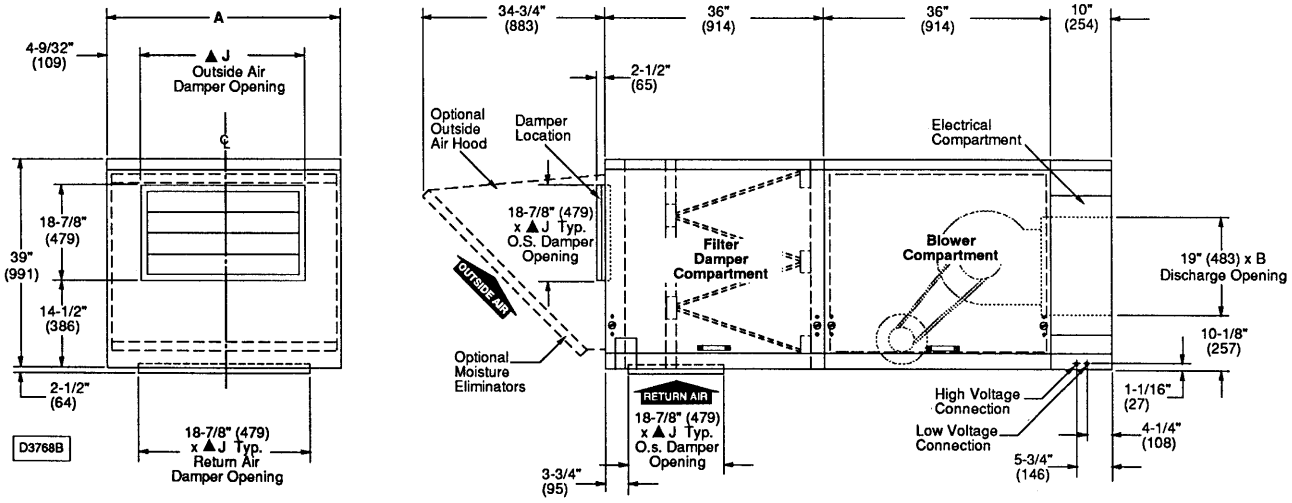
STANDARD BLOWER MODULE
Unit Sizes 10-80
(Left Hand Service Access Shown)

Note: The dimensions shown do not include base skid rail.

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Detail Drawing
High CFM Blower Module for Arrangements G, J
Unit Sizes 10-12 (100-1200 MBh)
100 and 150 MBh Units Not Available on Arrangements G and J



Model	A	B	ΔJ
10/15*	32 7/8″ (835)	15 9/16″ (395)	24″ (610)
20/25/50	43 7/8″ (1114)	23 13/16″ (605)	35″ (889)
30/35 60/70	54 7/8″ (1394)	34 13/16″ (884)	46″ (1168)
40/80/12	60 3/8″ (1534)	45 13/16″ (1164)	51 1/2″ (1308)

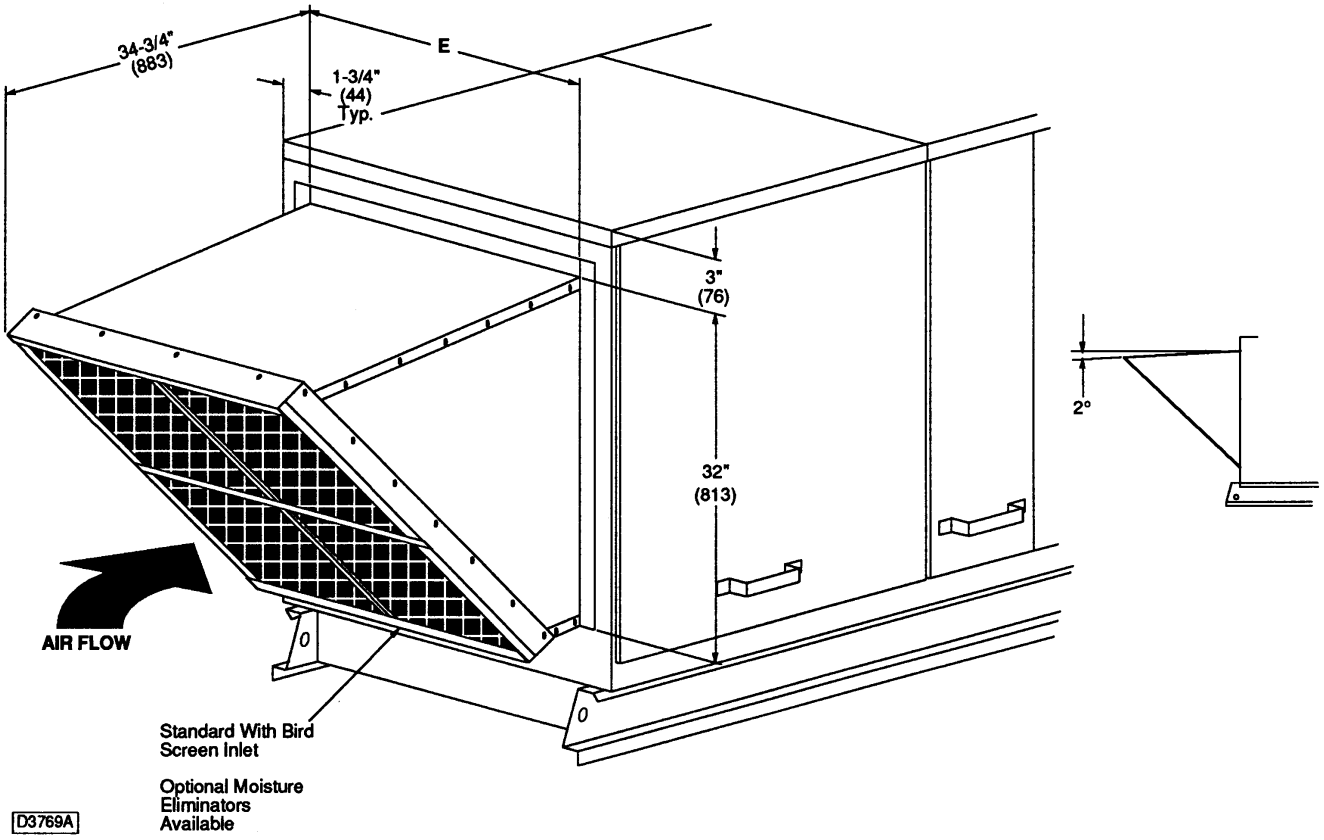
HIGH CFM BLOWER MODULE
*For Cooling Arrangements Only
(Left Hand Service Access Shown)

Note: The dimensions shown do not include base skid rail.

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Air Intake Hood
Arrangements B, C, D, E, G, J, K, L
Unit Sizes 10-12 (100-1200 MBh)

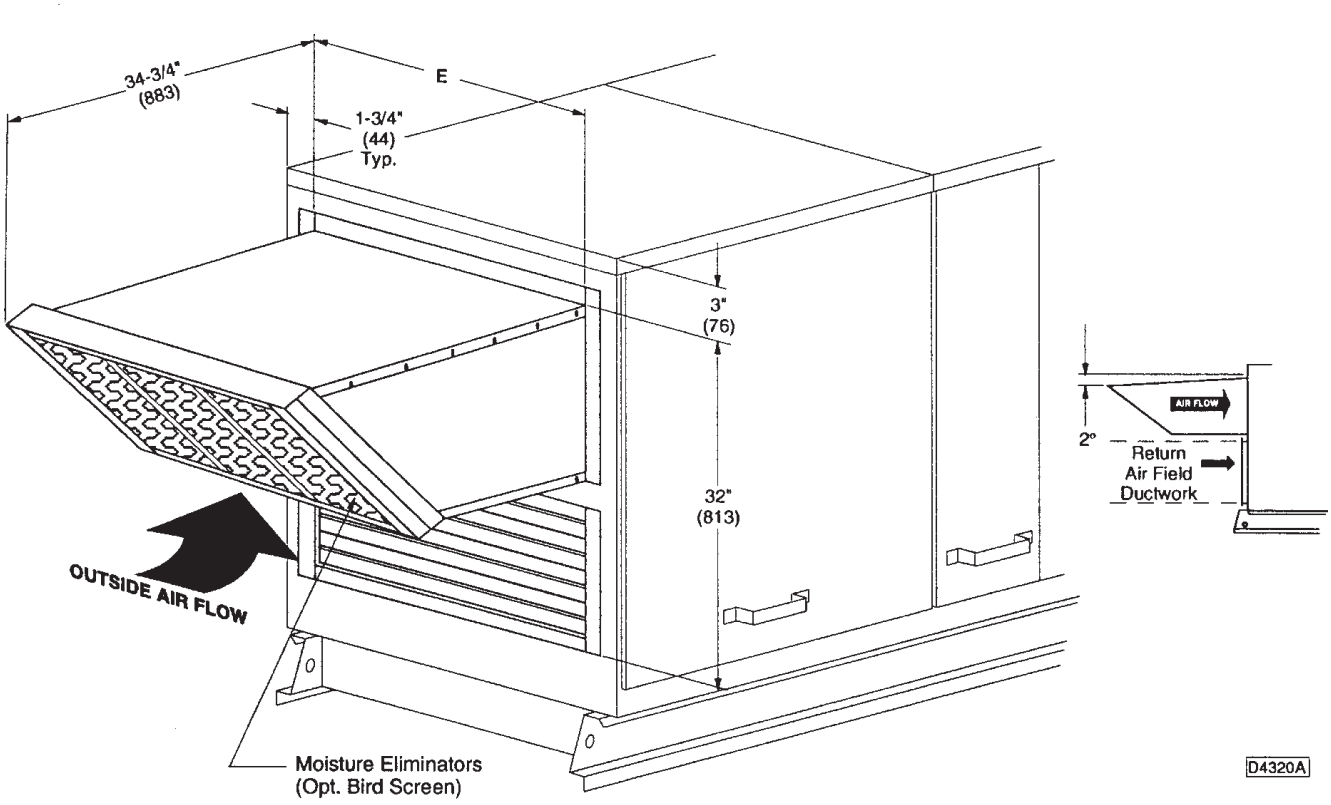


Model	E Dimension
10/15	29 3/8" (746)
20/25/50	40 3/8" (1025)
30/35 60/70	51 3/8" (1305)
40/80/12	56 7/8" (1445)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Over/Under Air Intake with Hood
Arrangements B, C, D, E, G, J, K, L
Unit Sizes 10-12 (100-1200 MBh)

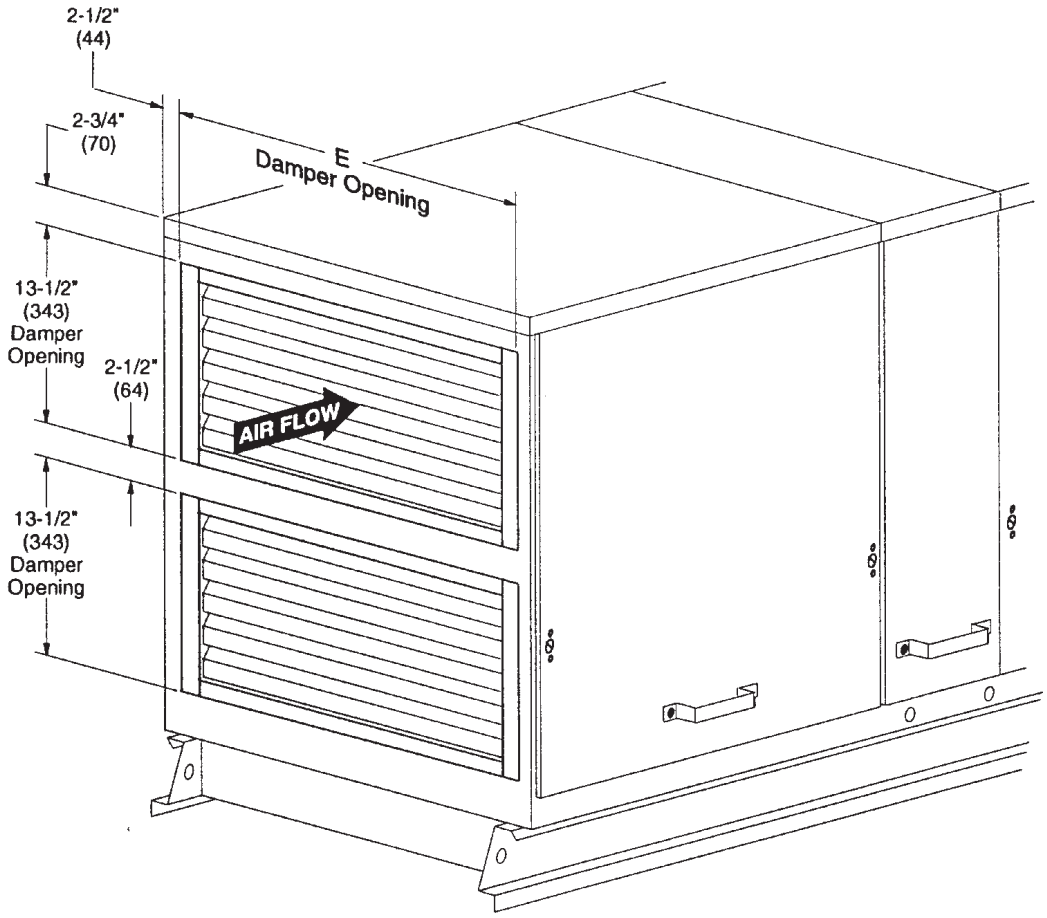


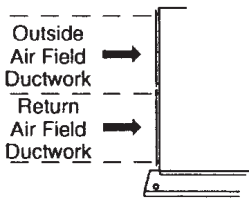
Model	E Dimension
10/15	29 3/8" (746)
20/25/50	40 3/8" (1025)
30/35 60/70	51 3/8" (1305)
40/80/12	56 7/8" (1445)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Over/Under Air Intake without Hood
Arrangements B, C, D, E, G, J, K, L
Unit Sizes 10-12 (100-1200 MBh)





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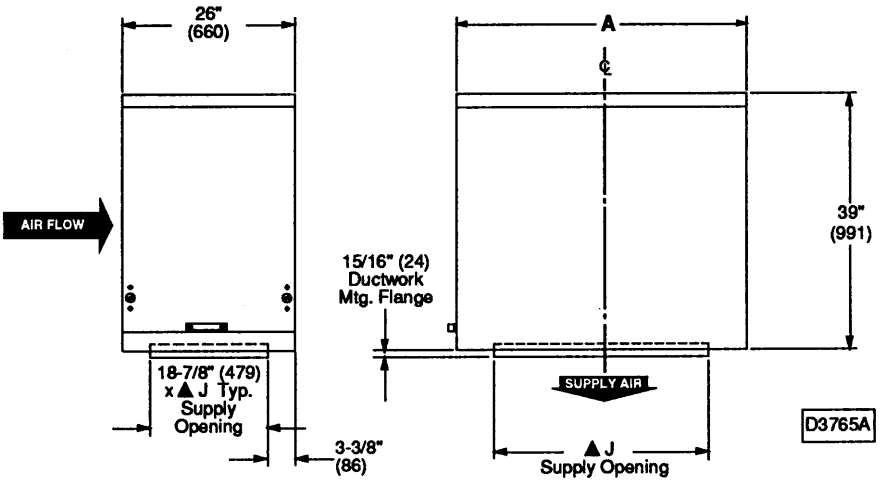
Model	E Dimension
10/15	27 3/4" (705)
20/25/50	38 3/4" (984)
30/35 60/70	49 3/4" (1264)
40/80/12	55 1/4" (1403)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Supply Plenum Module
Arrangements C, E, J, L
Unit Sizes 10-12 (100-1200 MBh)



Note: The dimensions shown do not include base skid rail.

Model	A	J
10/15	32 7/8″ (835)	24″ (610)
20/25/50	43 7/8″ (1114)	35″ (889)
30/35 60/70	54 7/8″ (1394)	46″ (1168)
40/80/12	60 3/8″ (1534)	51″ (1295)

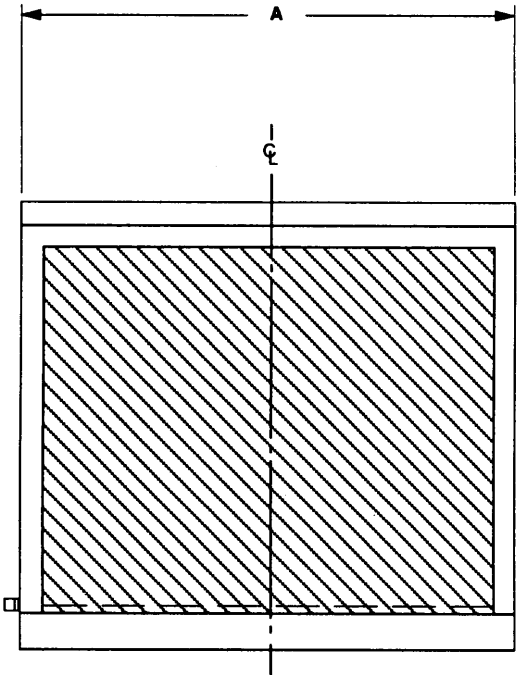
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

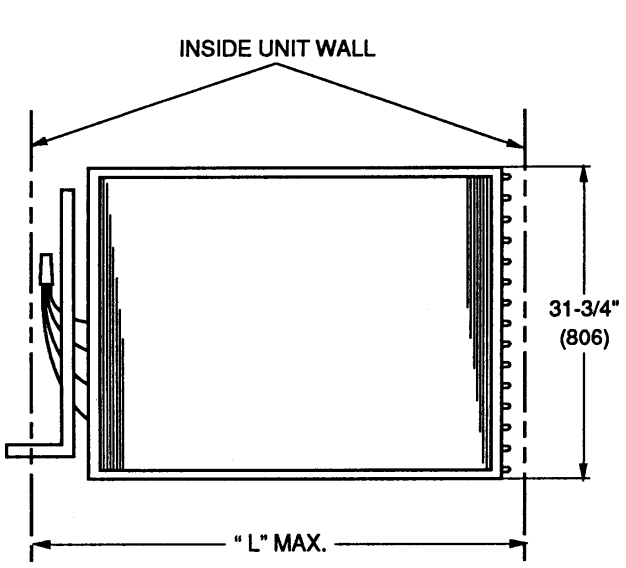
Dimensional Data

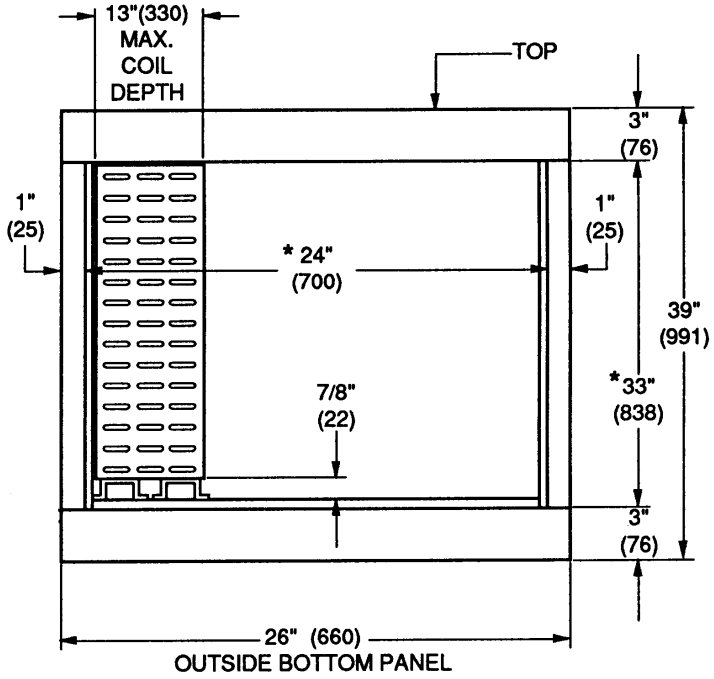
Coil Module
Arrangements K, L
Unit Sizes 10-80 (100-800 MBh)

Model	A
10/15	32 7/8" (835)
20/25/50	43 7/8" (1114)
30/35 60/70	54 7/8" (1394)
40/80	60 3/8" (1534)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.







Side Opening of Cooling Module

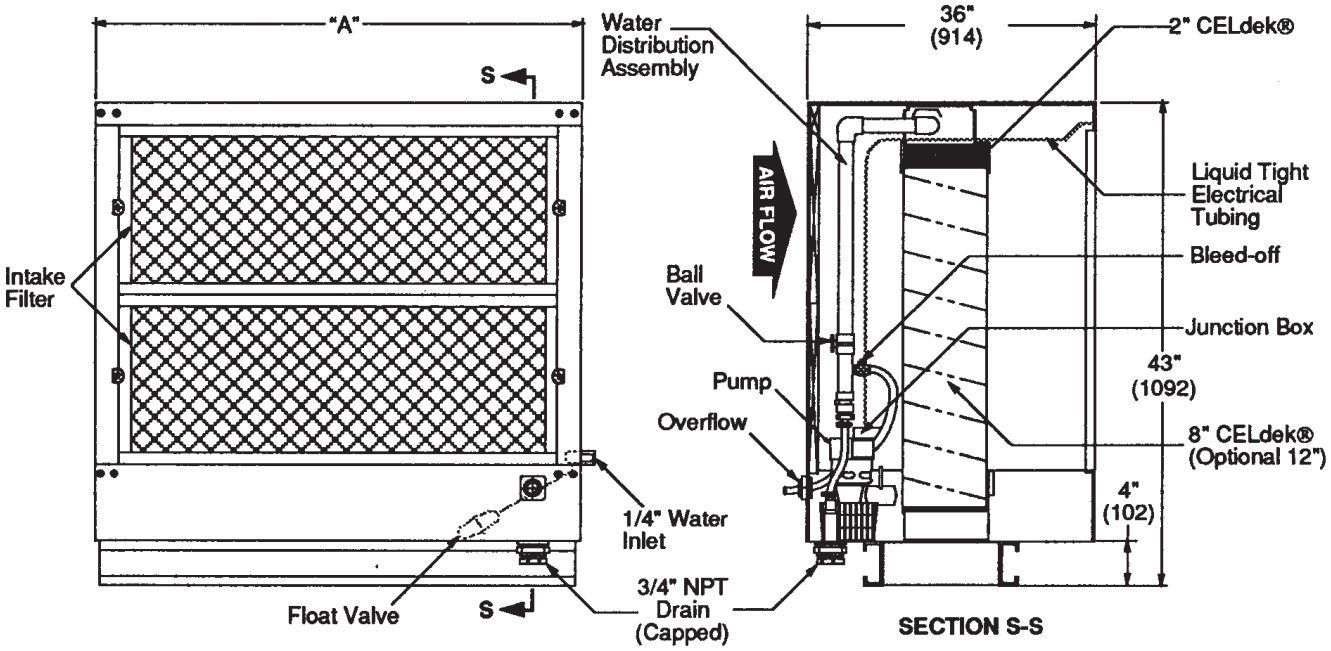
Maximum Coil Dimensions

Unit Size	"L" Inside Max. Cabinet Opening
10/15	32 1/4" (794)
20/25/50	42 1/4" (1073)
30/35/60/70	53 1/4" (1353)
40/80	58 3/4" (1492)

- The coil section drain pan connection is 3/4 inch NPT pipe thread. It is a female fitting that just protrudes outside of the unit base rail. It is located on the service side of the unit.
- The drain pan is constructed of stainless steel, including the fitting. It is sloped towards the center of the pan and level across the width of the unit.
- P-trap required external to the unit provided by others.

Dimensional Data

Evaporative Cooler Module
Arrangements D, E
Unit Sizes 10-80 (100-800 MBh)



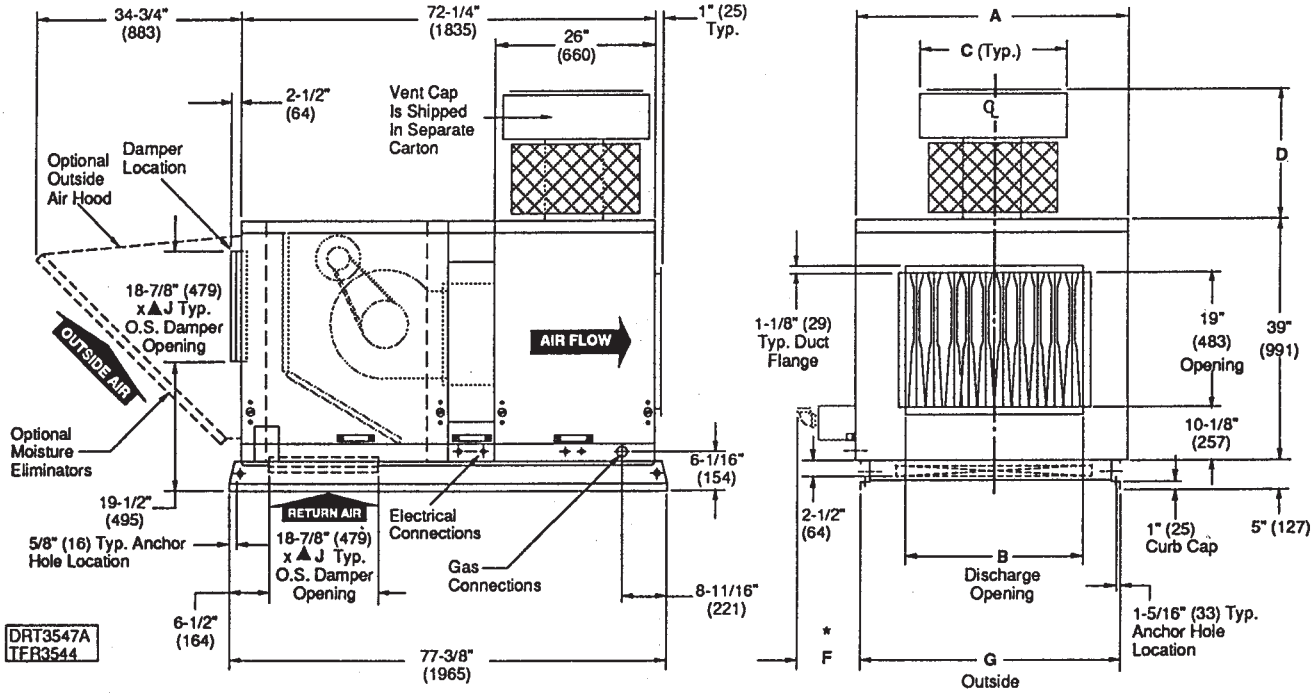
EVAPORATIVE COOLER MODULE
Models 10/80

Model	A
10/15	32 7/8" (835)
20/25/50	43 7/8" (1114)
30/35 60/70	54 7/8" (1394)
40/80	60 3/8" (1534)

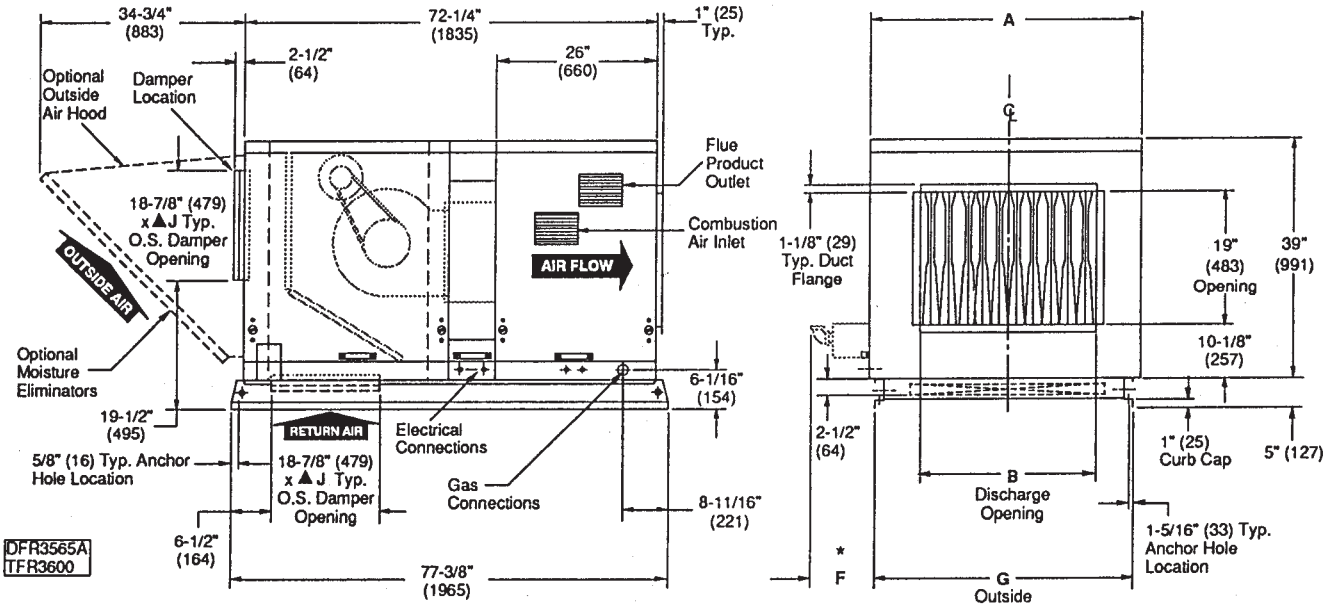
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Rooftop Heating Unit with Standard Blower — Arrangement B
Models GRAA, GRBA, GRCA, GRDA
10, 15, 20, 25, 30, 35, 40 (100-400 MBh) Single Furnace
Standard (20-60 F) and High (60-90 F) Temperature Rise Furnace



ARRANGEMENT "B"
MODELS 10-40
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "B"
MODELS 10-40
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement B 10-40 (100-400 MBh)

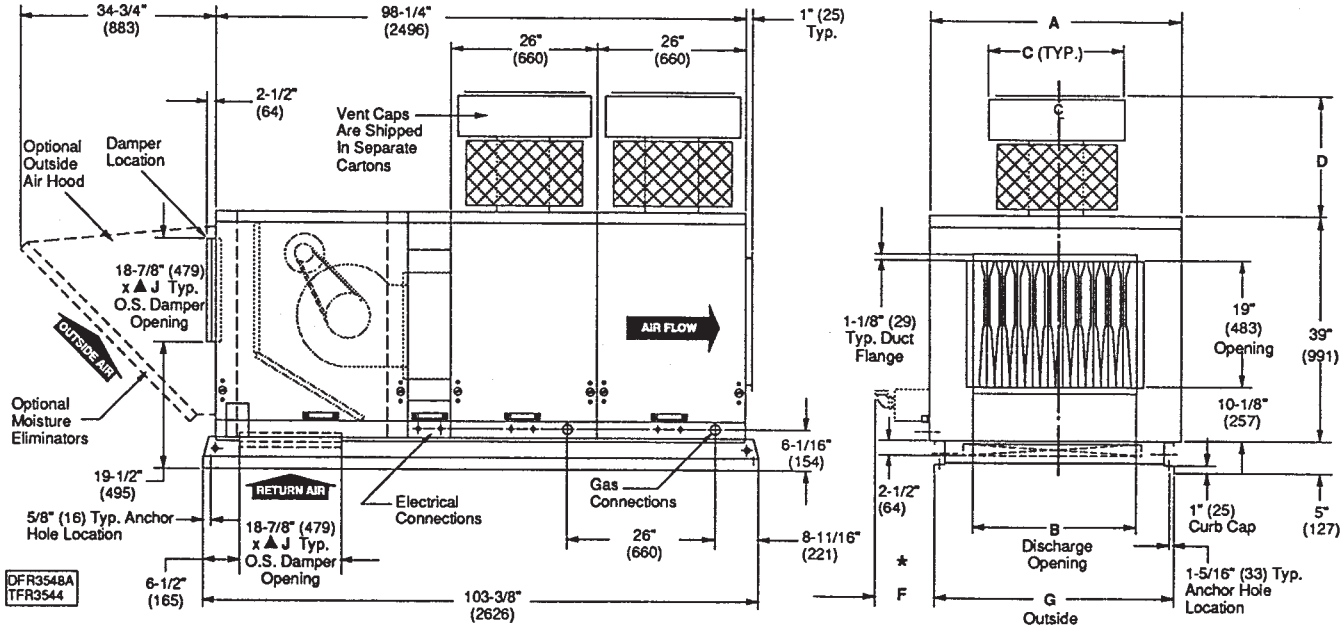
				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
10	32 7/8	15 9/16	12	11	20 11/16	19 3/8	31 1/16	24	1/2	1/2
	(835)	(395)	(305)	(279)	(525)	(492)	(789)	(610)		
15	32 7/8	18 5/16	21 1/2	16	25 3/16	23 1/2	31 1/16	24	1/2	1/2
	(835)	(465)	(546)	(406)	(640)	(597)	(789)	(610)		
20	43 7/8	23 13/16	23 1/2	16	25 3/16	26 1/4	42 1/16	35	1/2	1/2
	(1114)	(605)	(597)	(406)	(640)	(667)	(1068)	(889)		
25	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
30	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
35	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
40	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.

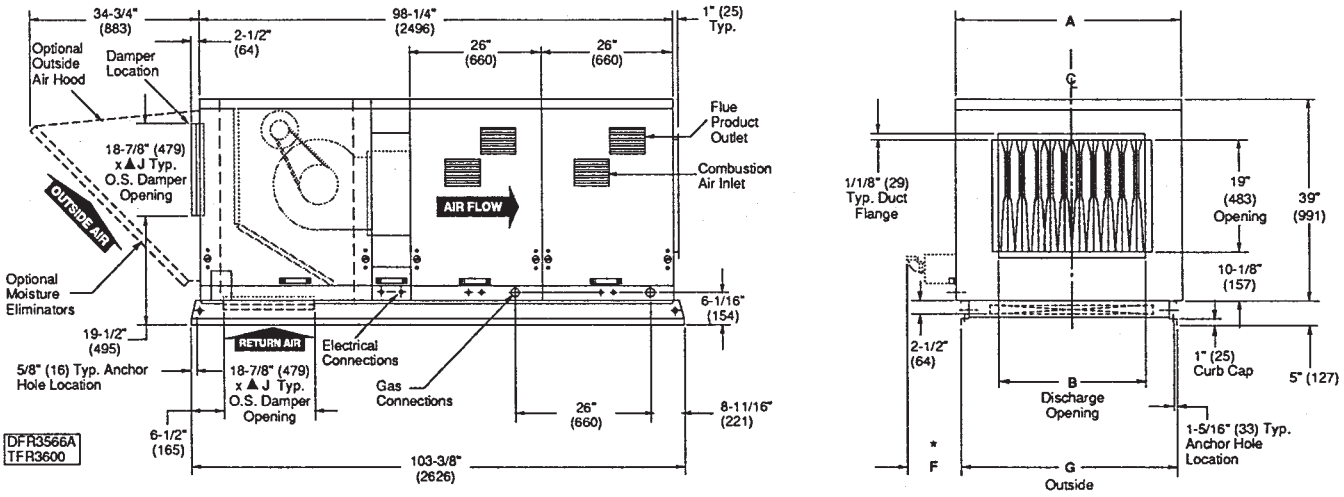
Power Vented Model

Dimensional Data

Rooftop Heating Unit with Standard Blower — Arrangement B
Models GRAA, GRBA — 50, 60, 70, 80 (500-800 MBh)
Double Furnace
Standard (40-120 F) Temperature Rise Furnace



ARRANGEMENT "B"
MODELS 50-80
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "B"
MODELS 50-80
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement B — 50-80 (500-800 MBh)

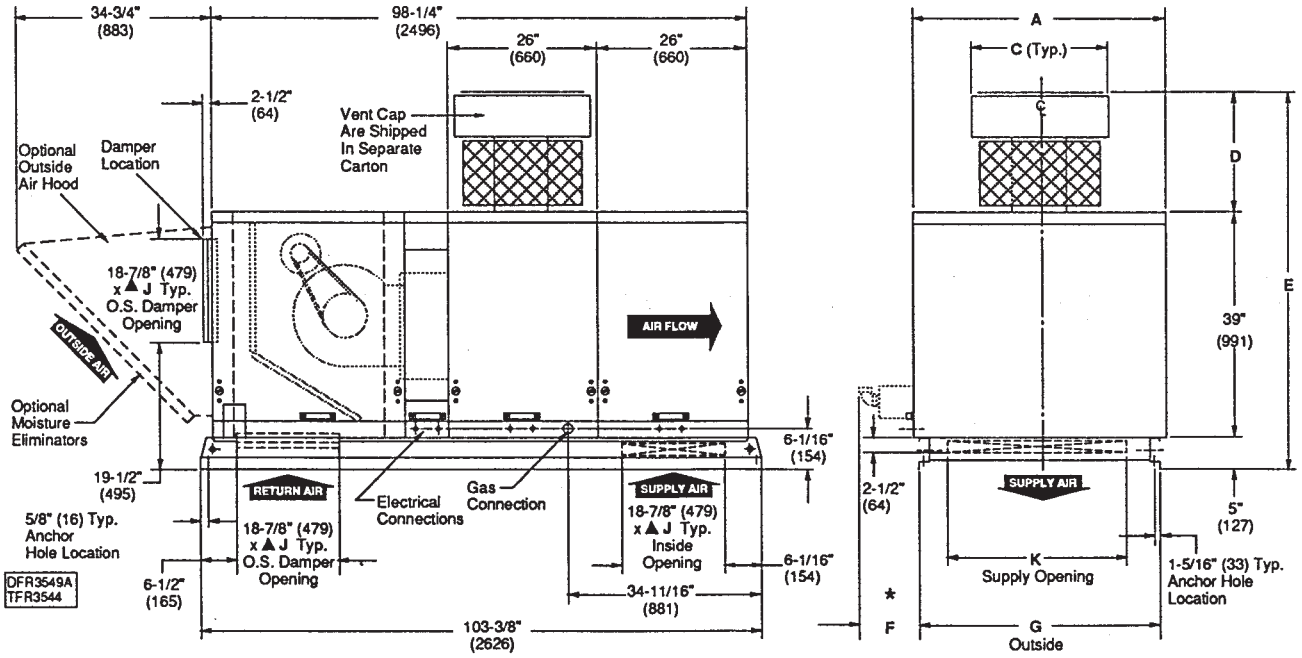
				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
50	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
60	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
70	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
80	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.

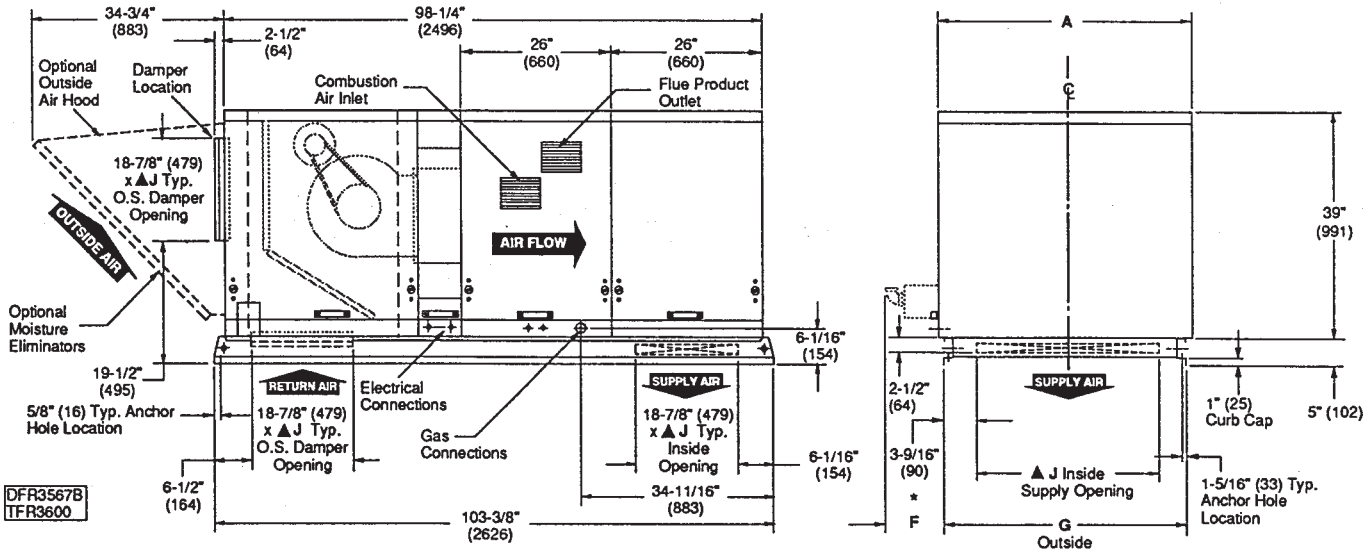
Gravity Vent Model

Dimensional Data

Rooftop Heating Unit with Standard Blower and Downflow Supply Plenum — Arrangement C
Models GRAA, GRBA, GRCA, GRDA — 10, 15, 20, 25, 30, 35, 40 (100-400 MBh)
Single Furnace
Standard (20-60 F) and high (60-90 F) Temperature Rise Furnace



ARRANGEMENT "C"
MODELS 10-40
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "C"
MODELS 10-40
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement C — 10-40 (100-400 MBh)

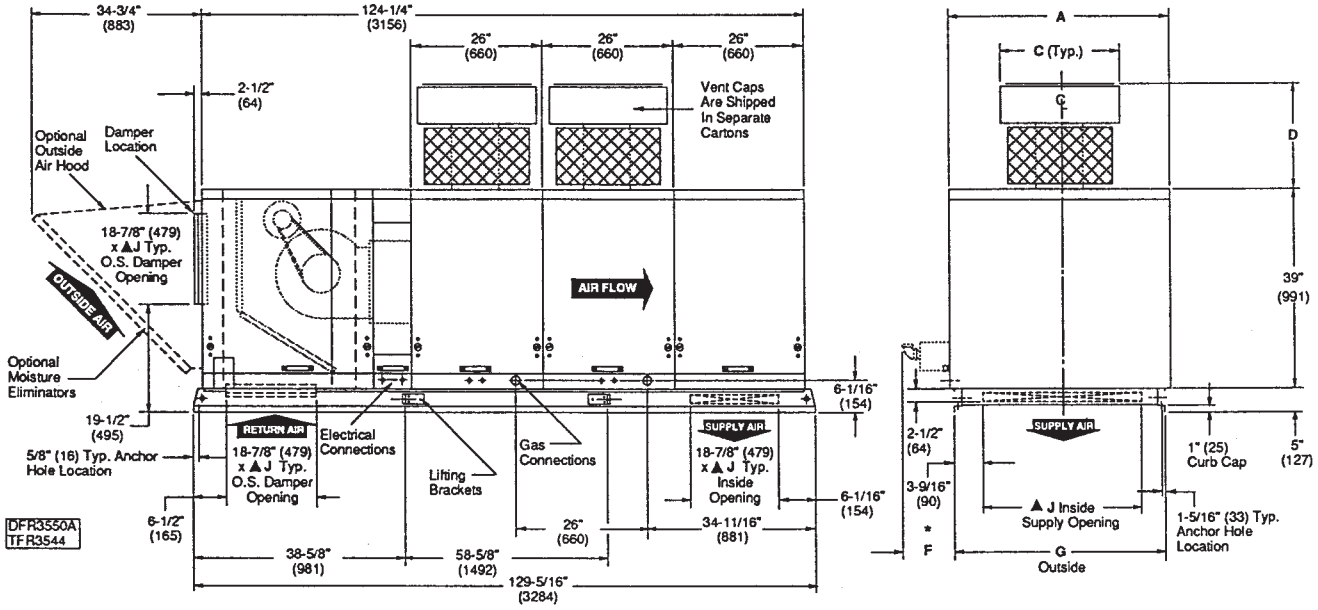
CAPACITY	A	B	C	A.G.A. D	C.G.A. D	*F	G	J	GAS INLET NAT	GAS INLET LP
10	32 7/8 (835)	15 9/16 (395)	12 (305)	11 (279)	20 11/16 (525)	19 3/8 (492)	31 1/16 (789)	24 (610)	1/2	1/2
15	32 7/8 (835)	18 5/16 (465)	21 1/2 (546)	16 (406)	25 3/16 (640)	23 1/2 (597)	31 1/16 (789)	24 (610)	1/2	1/2
20	43 7/8 (1114)	23 13/16 (605)	23 1/2 (597)	16 (406)	25 3/16 (640)	26 1/4 (667)	42 1/16 (1068)	35 (889)	1/2	1/2
25	43 7/8 (1114)	29 5/16 (745)	23 1/2 (597)	16 (406)	25 3/16 (640)	34 1/2 (876)	42 1/16 (1068)	35 (889)	3/4	1/2 OR 3/4
30	54 7/8 (1394)	34 13/16 (884)	26 (660)	17 1/2 (445)	26 11/16 (678)	37 1/4 (946)	53 1/16 (1348)	46 (1168)	3/4	1/2 OR 3/4
35	54 7/8 (1394)	40 5/16 (1024)	26 (660)	17 1/2 (445)	26 11/16 (678)	45 1/2 (1156)	53 1/16 (1348)	46 (1168)	3/4	1/2 OR 3/4
40	60 3/8 (1534)	45 13/16 (1164)	26 (660)	17 1/2 (445)	26 11/16 (678)	51 (1295)	58 9/16 (1487)	51 1/2 (1308)	3/4	1/2 OR 3/4

NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.
"J" DIMENSION IS AN INSIDE DIMENSION FOR SUPPLY AIR (WITHOUT DAMPER).

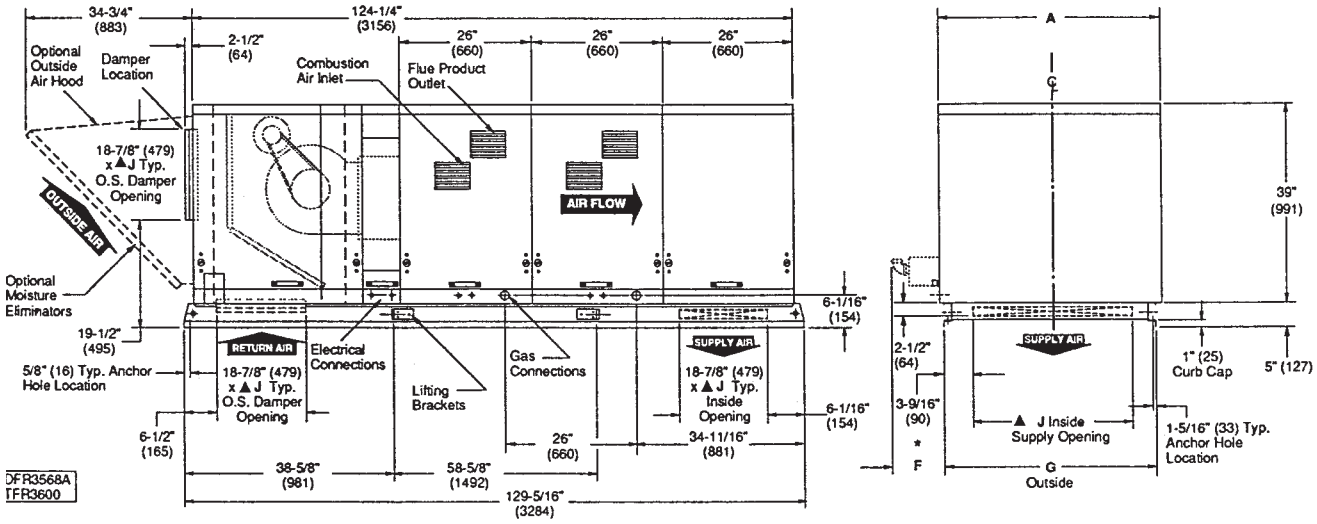
Power Vent Model

Dimensional Data

Rooftop Heating Unit with Standard Blower and Downflow Supply Plenum — Arrangement C
Models GRAA, GRBA — 50, 60, 70, 80 (500-800 MBh)
Double Furnace
Standard (40-120 F) Temperature Rise Furnace



ARRANGEMENT "C"
MODELS 50-80
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "C"
MODELS 50-80
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

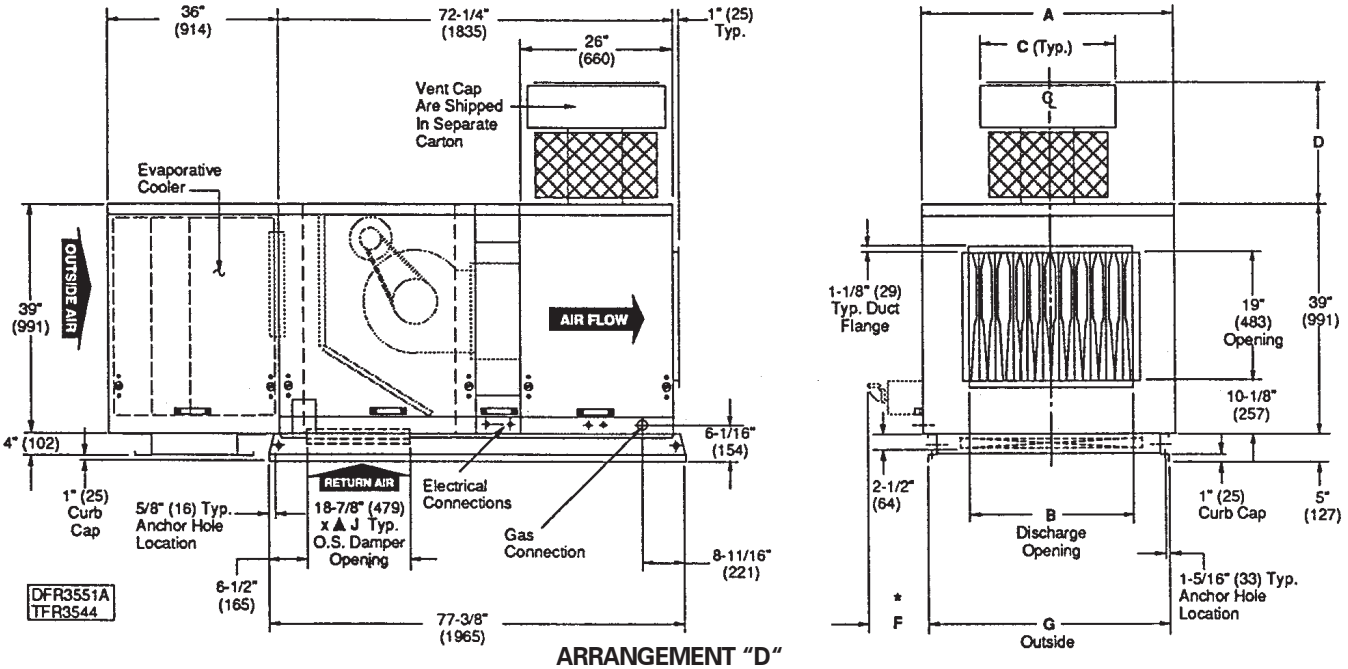
Unit Dimensional Data — Arrangement C — 50-80 (500-800 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
50	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
60	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
70	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
80	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

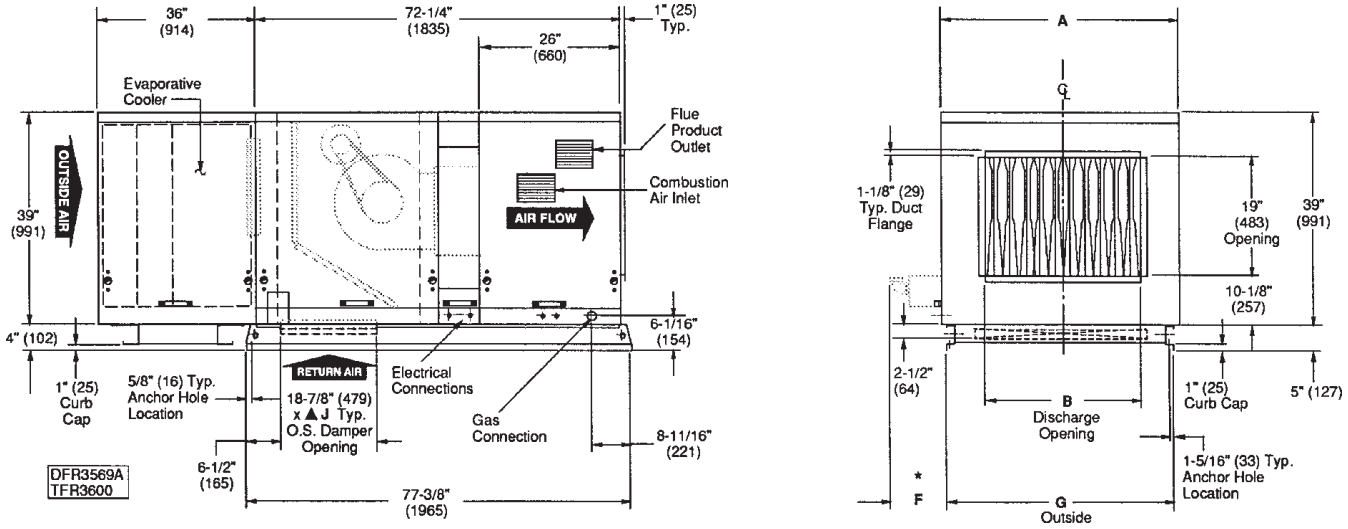
NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.
"J" DIMENSION IS AN INSIDE DIMENSION FOR SUPPLY AIR (WITHOUT DAMPER).

Dimensional Data

Rooftop Heating Unit with Standard Blower and Evaporative Cooler — Arrangement D
Models GRAA, GRBA, GRCA, GRDA — 10, 15, 20, 25, 30, 35, 40 (100-400 MBh)
Single Furnace
Standard (20-60 F) and High (60-90 F) Temperature Rise Furnace



ARRANGEMENT "D"
MODELS 10-40
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "D"
MODELS 10-40
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

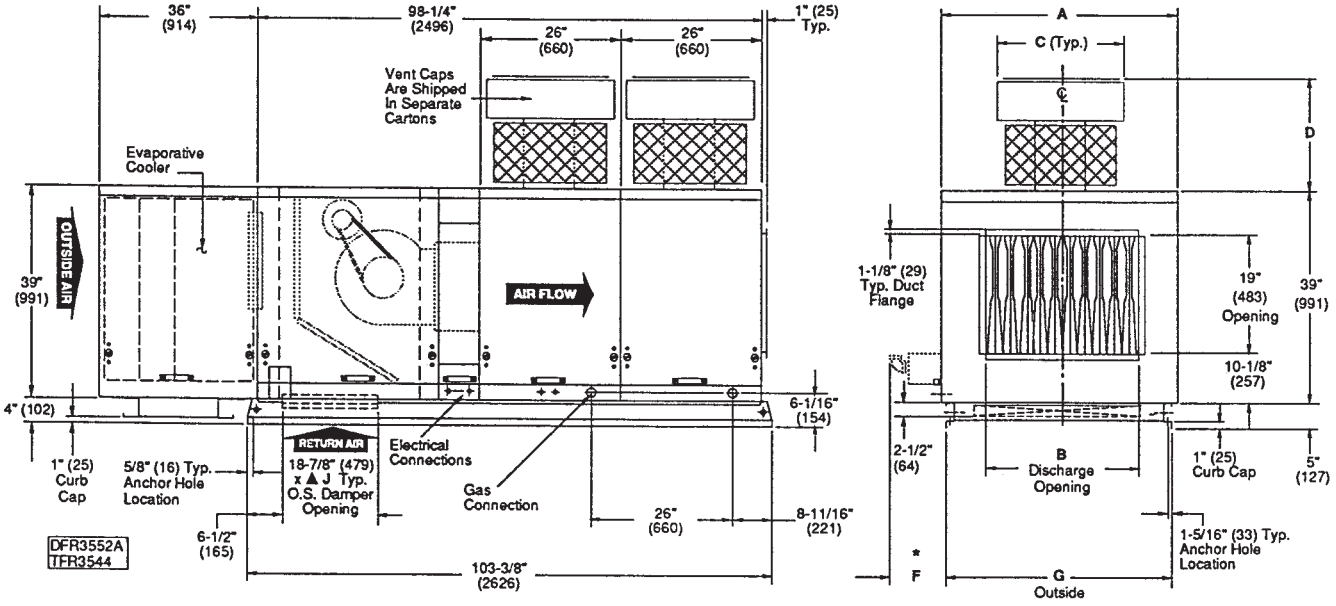
Unit Dimensional Data — Arrangement D — 10-40 (100-400 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
10	32 7/8	15 9/16	12	11	20 11/16	19 3/8	31 1/16	24	1/2	1/2
	(835)	(395)	(305)	(279)	(525)	(492)	(789)	(610)		
15	32 7/8	18 5/16	21 1/2	16	25 3/16	23 1/2	31 1/16	24	1/2	1/2
	(835)	(465)	(546)	(406)	(640)	(597)	(789)	(610)		
20	43 7/8	23 13/16	23 1/2	16	25 3/16	26 1/4	42 1/16	35	1/2	1/2
	(1114)	(605)	(597)	(406)	(640)	(667)	(1068)	(889)		
25	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
30	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
35	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
40	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

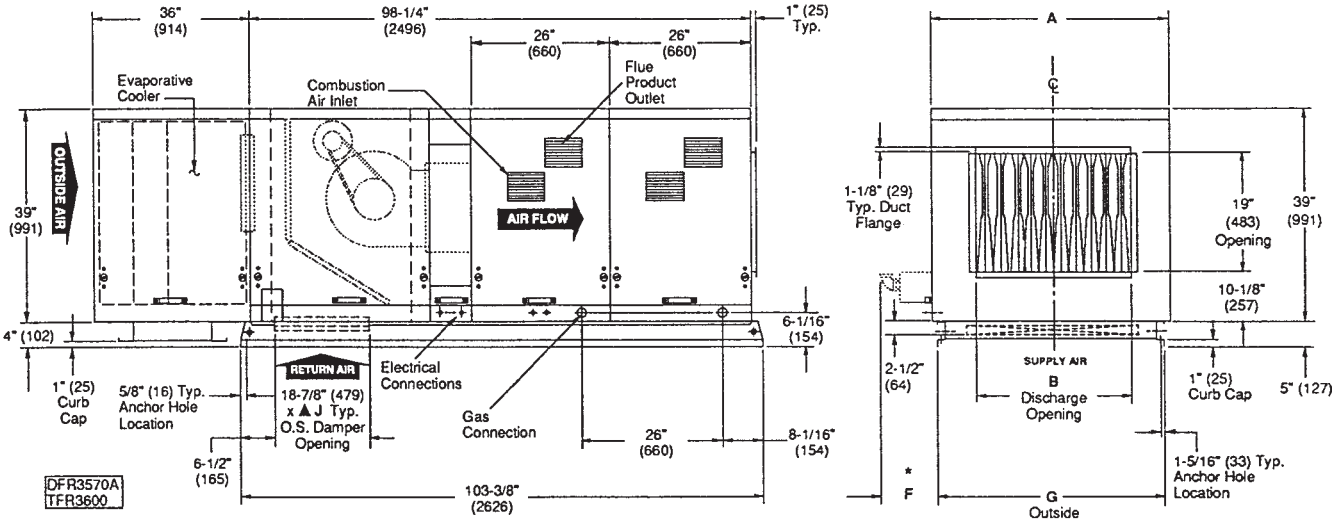
NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.

Dimensional Data

Rooftop Heating Unit with Standard Blower and Evaporative Cooler — Arrangement D
Models GRAA, GRBA — 50, 60, 70, 80 (500-800 MBh)
Double Furnace
Standard (40-120 F) Temperature Rise Furnace



ARRANGEMENT "D"
MODELS 50-80
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "D"
MODELS 50-80
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement D — 50-80 (500-800 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
50	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
60	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
70	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
80	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
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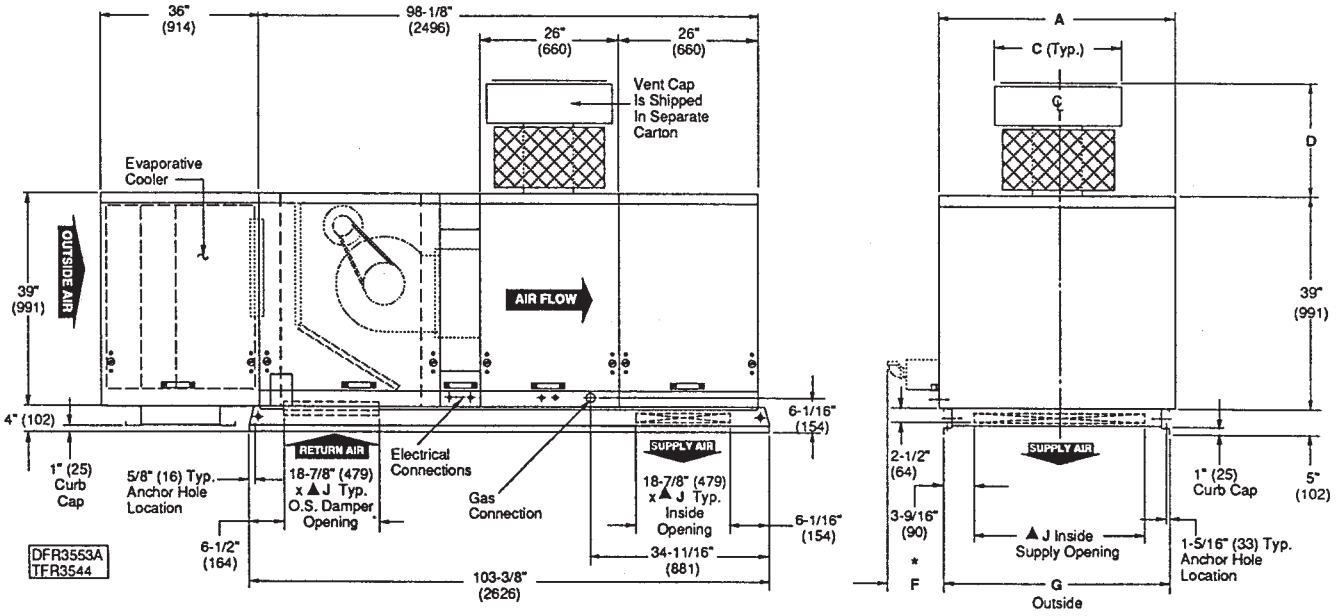
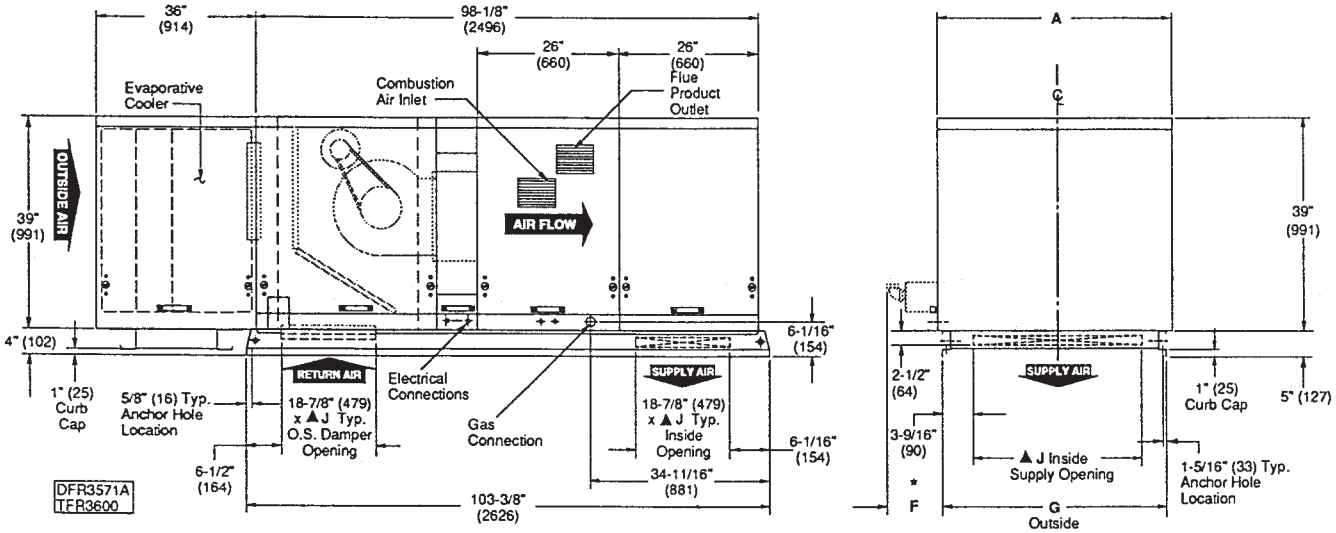
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.

Dimensional Data

Rooftop Heating Unit with Standard Blower, Evaporative Cooler and Downflow Supply Plenum — Arrangement E
Models GRAA, GRBA, GRCA, GRDA — 10, 15, 20, 25, 30, 35, 40 (100-400 MBh)
Single Furnace — Standard (20-60 F) and High (60-90 F) Temperature Rise Furnace



ARRANGEMENT "E"
MODELS 10-40
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "E"
MODELS 10-40
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement E — 10-40 (100-400 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
10	32 7/8	15 9/16	12	11	20 11/16	19 3/8	31 1/16	24	1/2	1/2
	(835)	(395)	(305)	(279)	(525)	(492)	(789)	(610)		
15	32 7/8	18 5/16	21 1/2	16	25 3/16	23 1/2	31 1/16	24	1/2	1/2
	(835)	(465)	(546)	(406)	(640)	(597)	(789)	(610)		
20	43 7/8	23 13/16	23 1/2	16	25 3/16	26 1/4	42 1/16	35	1/2	1/2
	(1114)	(605)	(597)	(406)	(640)	(667)	(1068)	(889)		
25	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
30	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
35	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
40	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
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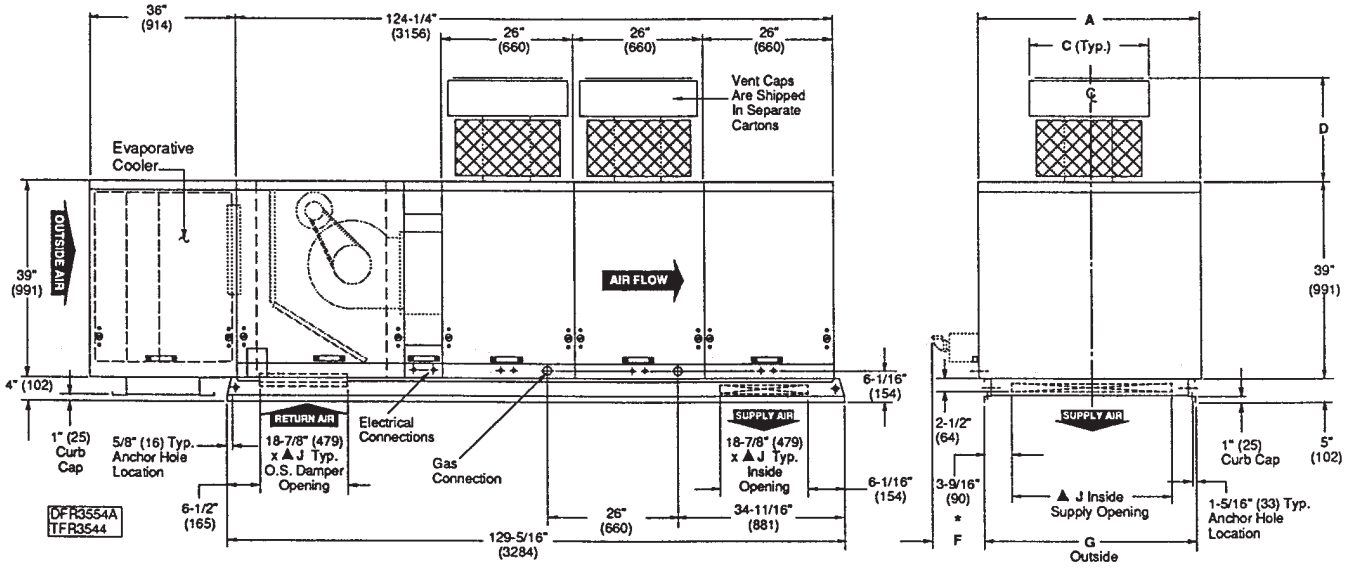
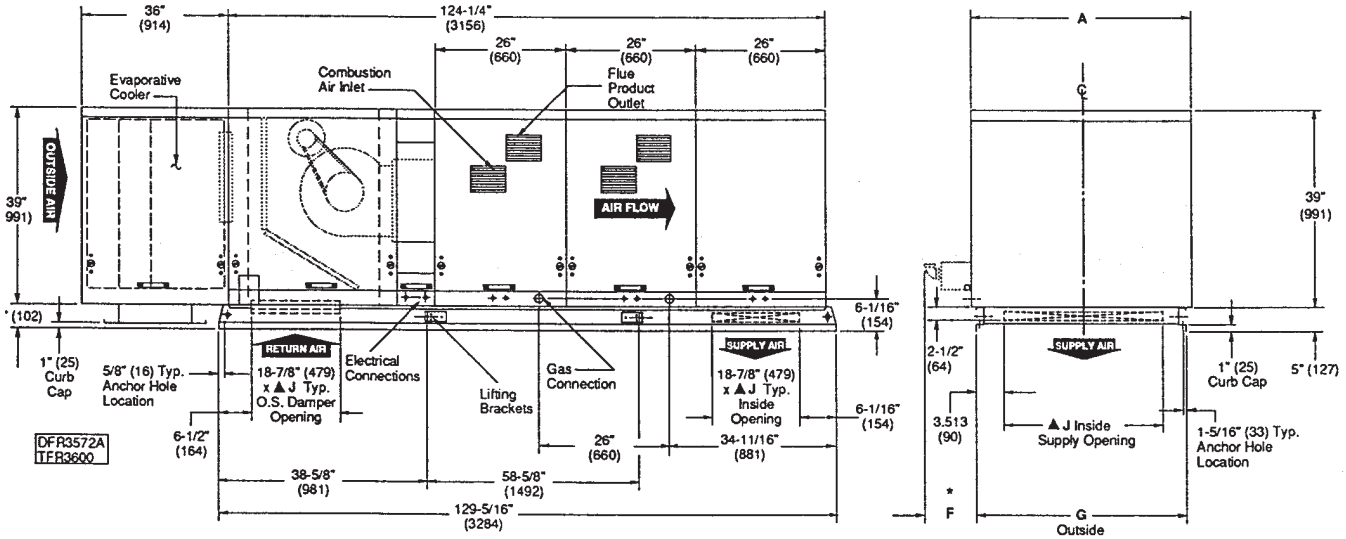
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.
"J" DIMENSION IS AN INSIDE DIMENSION FOR SUPPLY AIR (WITHOUT DAMPER).

Dimensional Data

Rooftop Heating Unit with Standard Blower, Evaporative Cooler and Downflow Supply Plenum — Arrangement E
Models GRAA, GRBA — 50, 60, 70, 80 (500-800 MBh)
Double Furnace — Standard (40-120 F) Temperature Rise Furnace



ARRANGEMENT "E"
MODELS 50-80
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "E"
MODELS 50-80
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

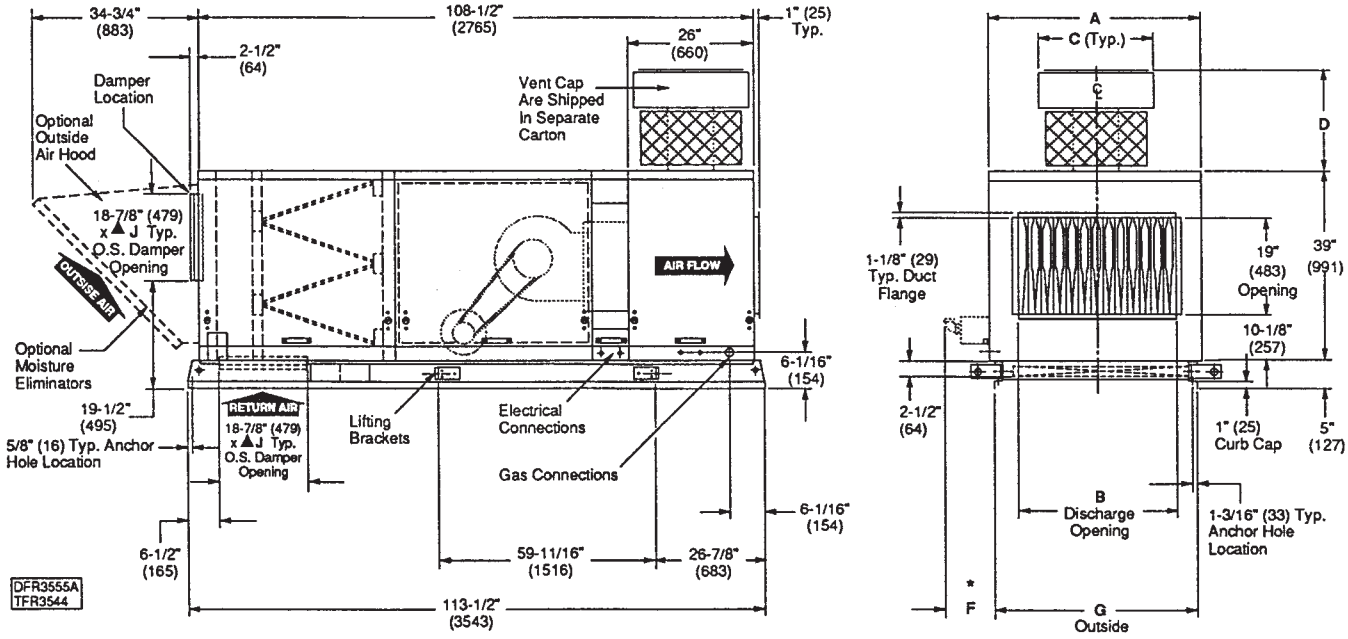
Unit Dimensional Data — Arrangement E — 50-80 (500-800 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
50	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
60	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
70	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
80	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

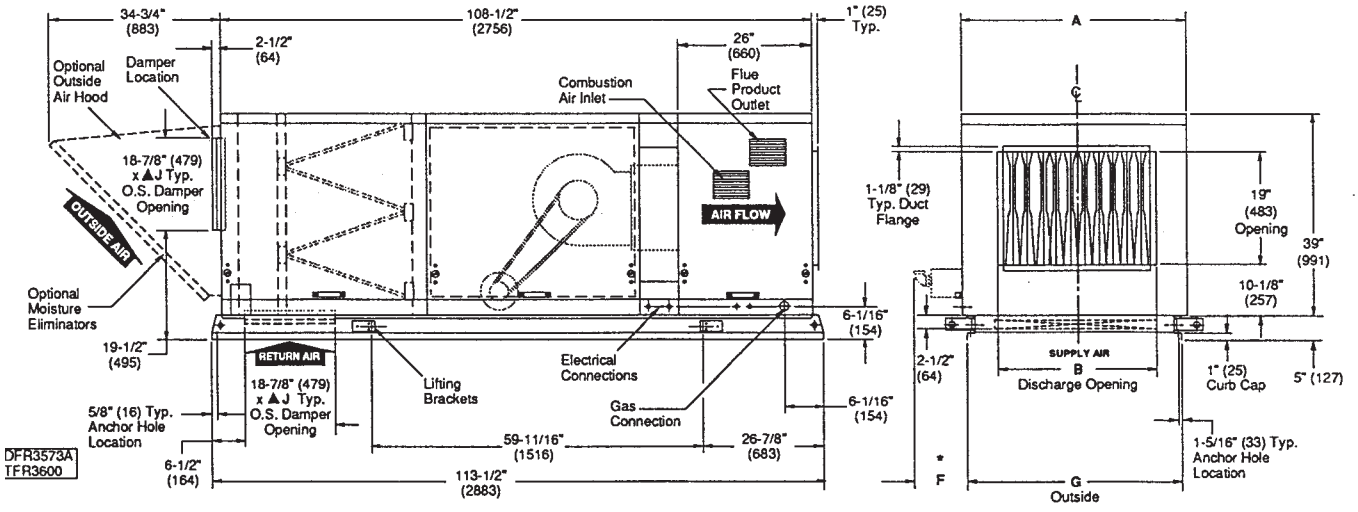
NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.
"J" DIMENSION IS AN INSIDE DIMENSION FOR SUPPLY AIR (WITHOUT DAMPER).

Dimensional Data

Rooftop Heating Unit with High Cfm Blower — Arrangement G
Models GRAA, GRBA — 20, 25, 30, 35, 40 (200-400 MBh)
Single Furnace
Standard (20-60 F) Temperature Rise Furnace



ARRANGEMENT "G"
MODELS 20-40
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "G"
MODELS 20-40
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

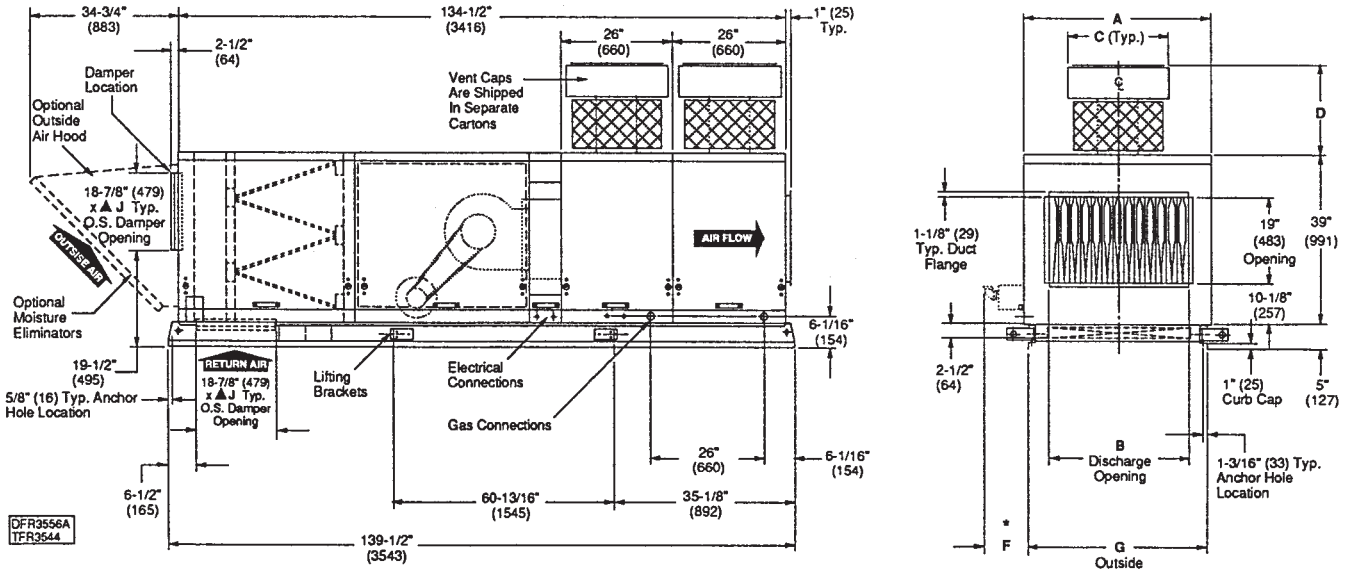
Unit Dimensional Data — Arrangement G — 20-40 (200-400 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
20	43 7/8	23 13/16	23 1/2	16	25 3/16	26 1/4	42 1/16	35	1/2	1/2
	(1114)	(605)	(597)	(406)	(640)	(667)	(1068)	(889)		
25	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
30	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
35	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
40	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

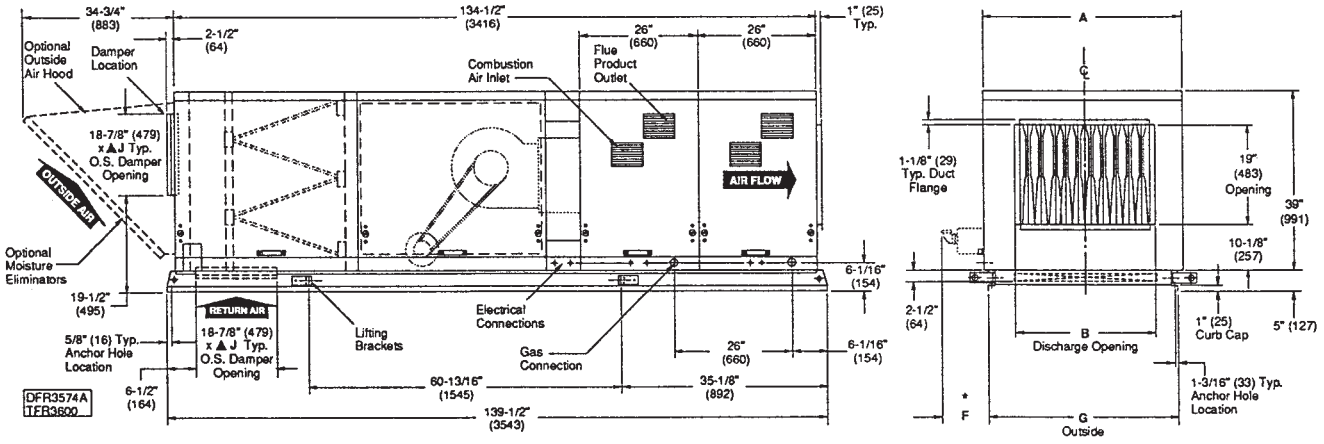
NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.

Dimensional Data

Rooftop Heating Unit with High Cfm Blower — Arrangement G
Models GRAA, GRBA — 50, 60, 70, 80 (500-800 MBh)
Double Furnace
Standard (40-120 F) Temperature Rise Furnace



ARRANGEMENT "G"
MODELS 50-80
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "G"
MODELS 50-80
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement G — 50-80 (500-800 MBh)

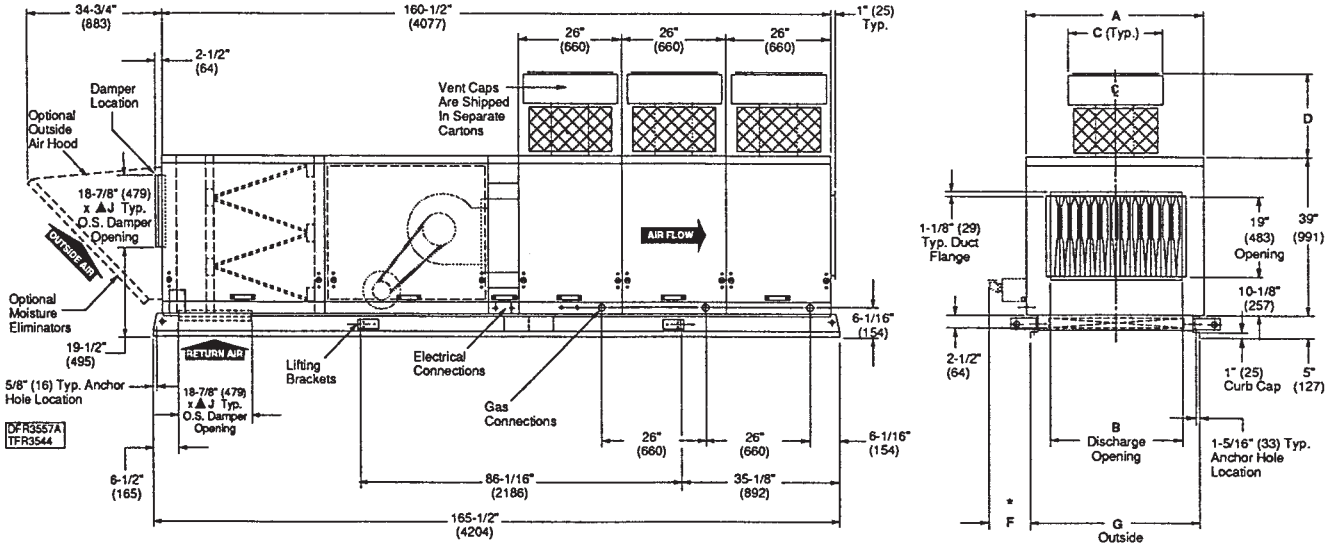
CAPACITY	A	B	C	A.G.A. D	C.G.A. D	*F	G	J	GAS INLET NAT	GAS INLET LP
50	43 7/8 (1114)	29 5/16 (745)	23 1/2 (597)	16 (406)	25 3/16 (640)	34 1/2 (876)	42 1/16 (1068)	35 (889)	3/4	1/2 OR 3/4
60	54 7/8 (1394)	34 13/16 (884)	26 (660)	17 1/2 (445)	26 11/16 (678)	37 1/4 (946)	53 1/16 (1348)	46 (1168)	3/4	1/2 OR 3/4
70	54 7/8 (1394)	40 5/16 (1024)	26 (660)	17 1/2 (445)	26 11/16 (678)	45 1/2 (1156)	53 1/16 (1348)	46 (1168)	3/4	1/2 OR 3/4
80	60 3/8 (1534)	45 13/16 (1164)	26 (660)	17 1/2 (445)	26 11/16 (678)	51 (1295)	58 9/16 (1487)	51 1/2 (1308)	3/4	1/2 OR 3/4

NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.

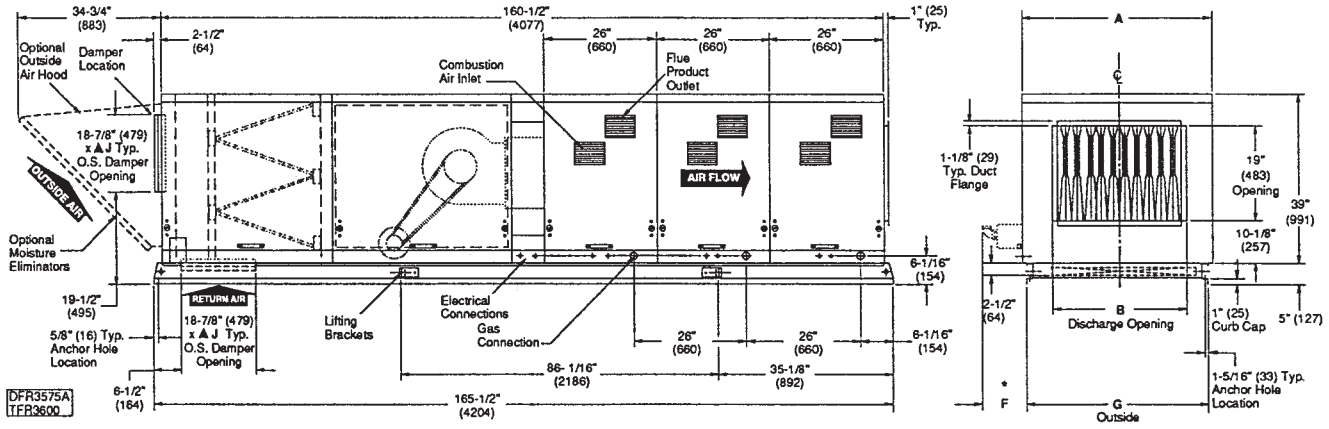
Power Vent Model

Dimensional Data

Rooftop Heating Unit with High Cfm Blower — Arrangement G
Models GRAA, GRBA — 12 (1200 MBh)
Triple Furnace
Standard (60-180 F) Temperature Rise Furnace



ARRANGEMENT "G"
MODEL 12
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "G"
MODEL 12
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

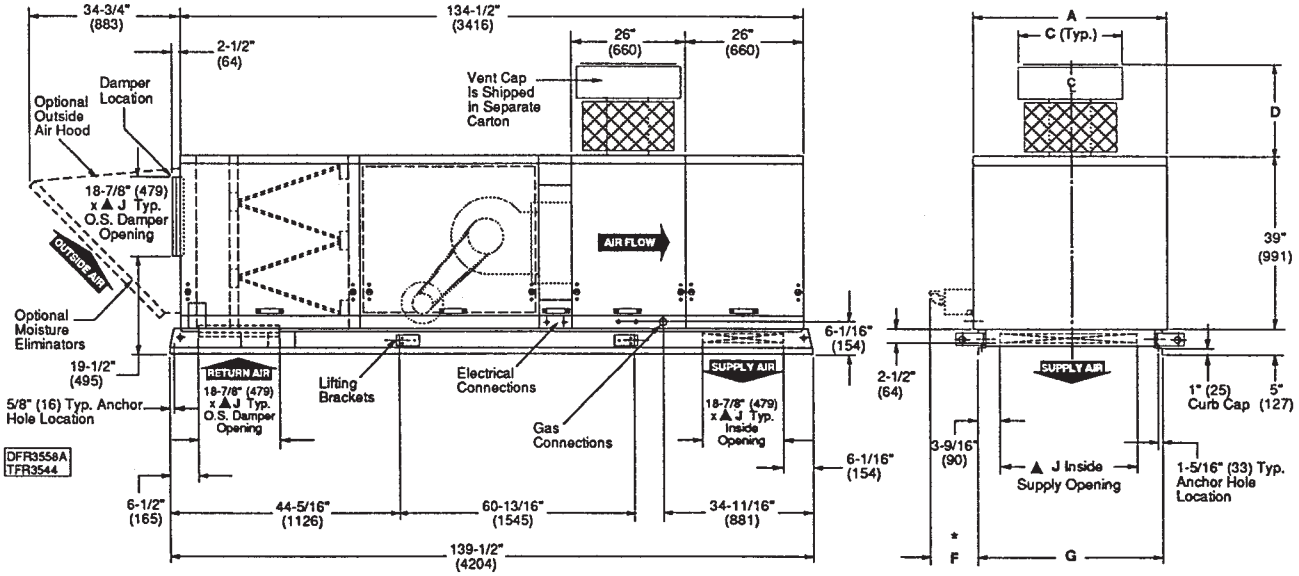
Unit Dimensional Data — Arrangement G — 12 (1200 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
12	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

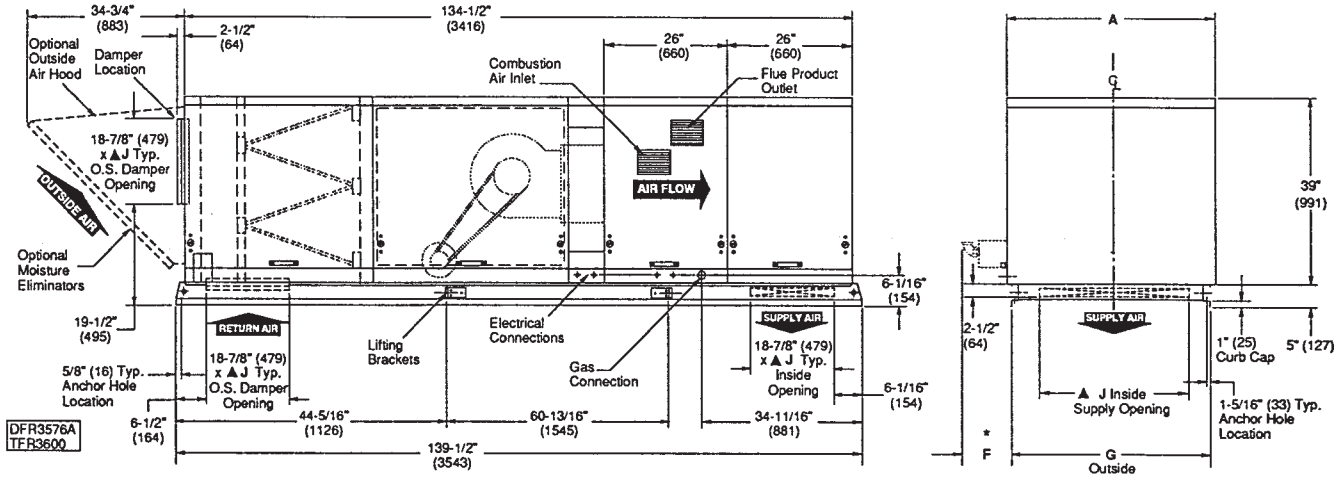
NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
*"F" DIMENSION IS THE RECOMMENDED CLEARANCE TO SERVICE THE BURNER DRAWER(S).
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR RETURN AIR DAMPERS.

Dimensional Data

Rooftop Heating Unit with High Cfm Blower and Downflow Supply Plenum — Arrangement J
Models GRAA, GRBA — 20, 25, 30, 35, 40 (200-400 MBh)
Single Furnace
Standard (20-60 F) Temperature Rise Furnace



ARRANGEMENT "J"
MODEL 20-40
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "J"
MODEL 20-40
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement J — 20-40 (200-400 MBh)

CAPACITY	A	B	C	A.G.A. D	C.G.A. D	*F	G	J	GAS INLET NAT	GAS INLET LP
20	43 7/8 (1114)	23 13/16 (605)	23 1/2 (597)	16 (406)	25 3/16 (640)	26 1/4 (667)	42 1/16 (1068)	35 (889)	1/2	1/2
25	43 7/8 (1114)	29 5/16 (745)	23 1/2 (597)	16 (406)	25 3/16 (640)	34 1/2 (876)	42 1/16 (1068)	35 (889)	3/4	1/2 OR 3/4
30	54 7/8 (1394)	34 13/16 (884)	26 (660)	17 1/2 (445)	26 11/16 (678)	37 1/4 (946)	53 1/16 (1348)	46 (1168)	3/4	1/2 OR 3/4
35	54 7/8 (1394)	40 5/16 (1024)	26 (660)	17 1/2 (445)	26 11/16 (678)	45 1/2 (1156)	53 1/16 (1348)	46 (1168)	3/4	1/2 OR 3/4
40	60 3/8 (1534)	45 13/16 (1164)	26 (660)	17 1/2 (445)	26 11/16 (678)	51 (1295)	58 9/16 (1487)	51 1/2 (1308)	3/4	1/2 OR 3/4

NOTE:
DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
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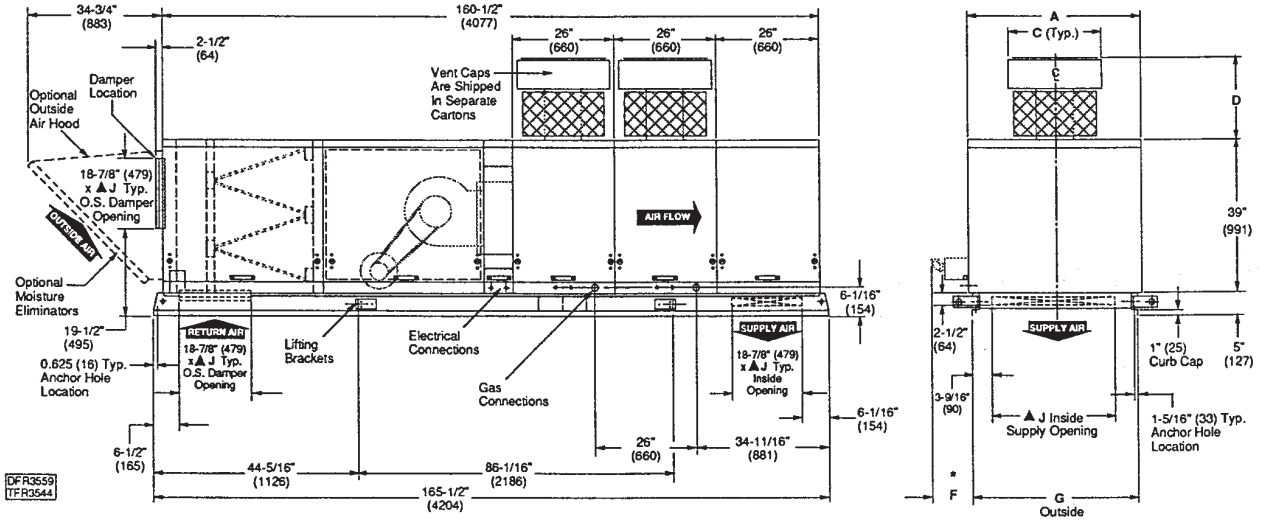
"J" DIMENSION IS AN OUTSIDE DIMENSION FOR OUTSIDE OR RETURN AIR DAMPERS.
"J" DIMENSION IS AN INSIDE DIMENSION FOR SUPPLY AIR (WITHOUT DAMPER).

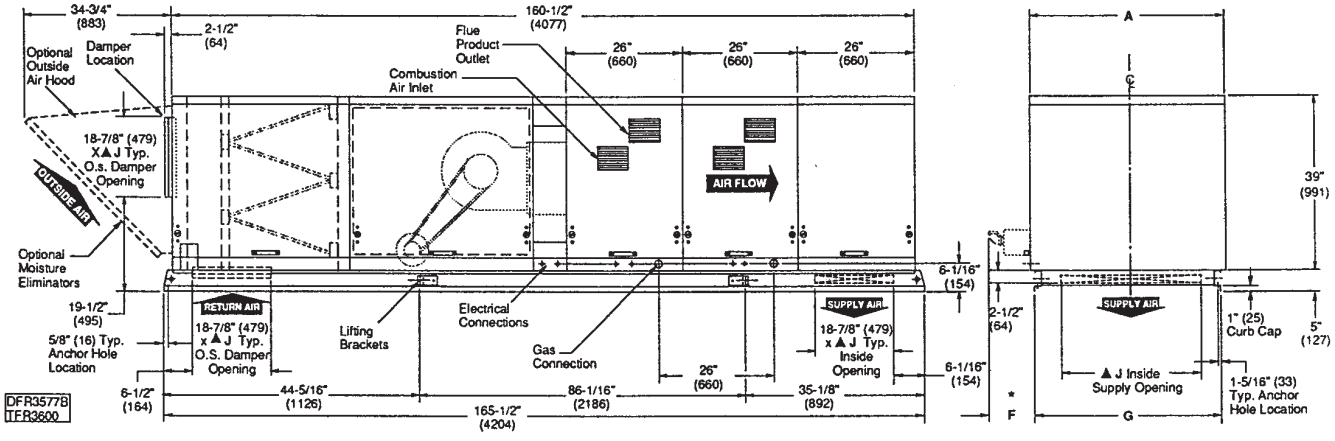
Gravity Vent Model

Dimensional Data

Rooftop Heating Unit with High Cfm Blower and Downflow Supply Plenum — Arrangement J
Models GRAA, GRBA — 50, 60, 70, 80 (500-800 MBh)
Double Furnace
Standard (40-120 F) Temperature Rise Furnace



ARRANGEMENT "J"
MODELS 50-80
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "J"
MODELS 50-80
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement J — 50-80 (500-800 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
50	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
60	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
70	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
80	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

NOTE:
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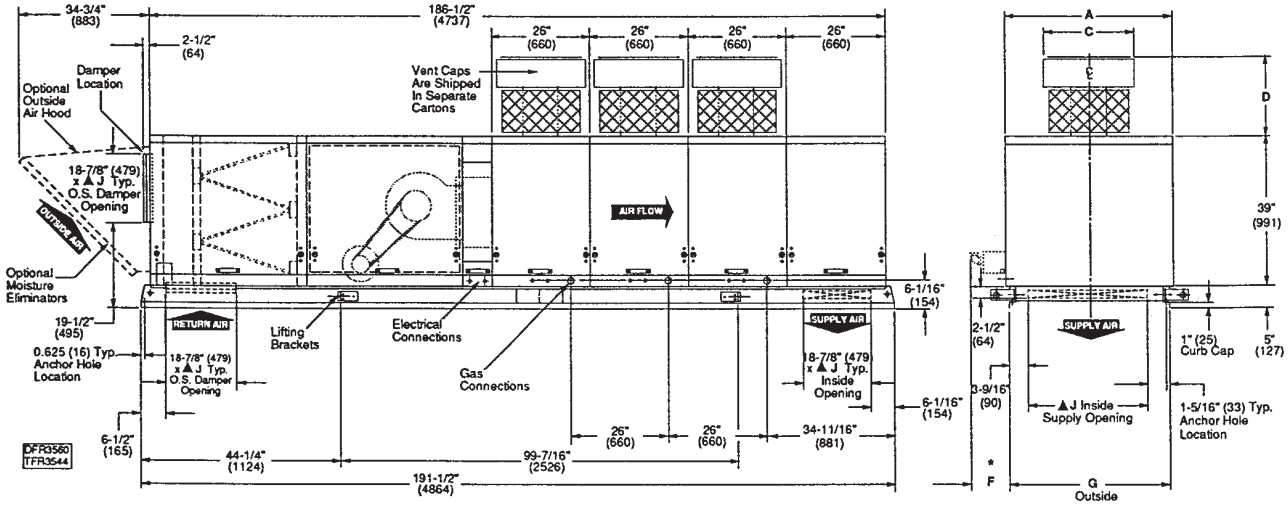
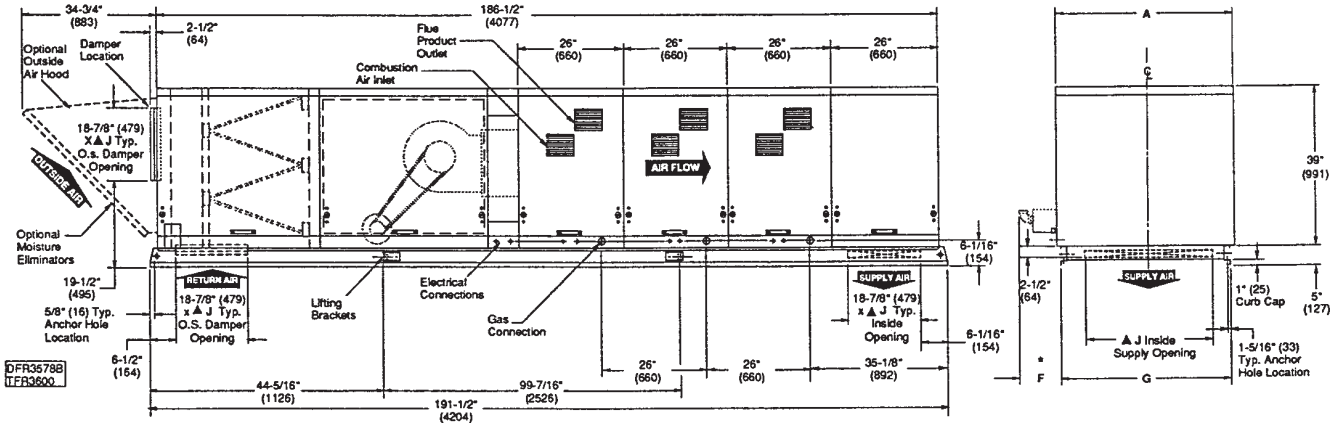
"J" DIMENSION IS AN INSIDE DIMENSION FOR SUPPLY AIR (WITHOUT DAMPER).

Dimensional Data

Rooftop Heating Unit with High Cfm Blower and Downflow Supply Plenum — Arrangement J
Models GRAA, GRBA — 12 (1200 MBh)
Triple Furnace
Standard (60-180 F) Temperature Rise Furnace



ARRANGEMENT "J"
MODEL 12
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "J"
MODEL 12
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement J — 12 (1200 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
12	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

NOTE:
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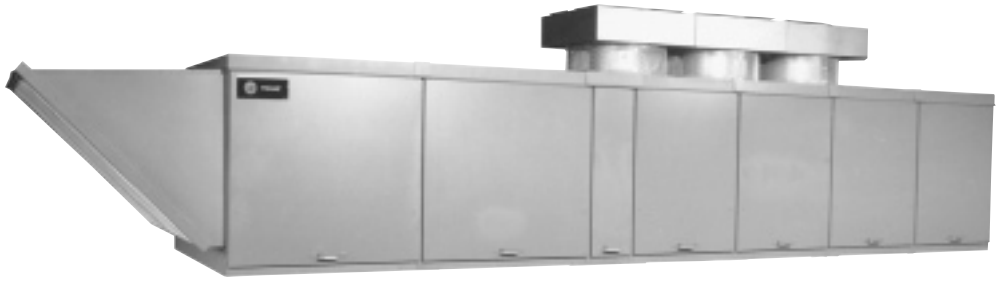
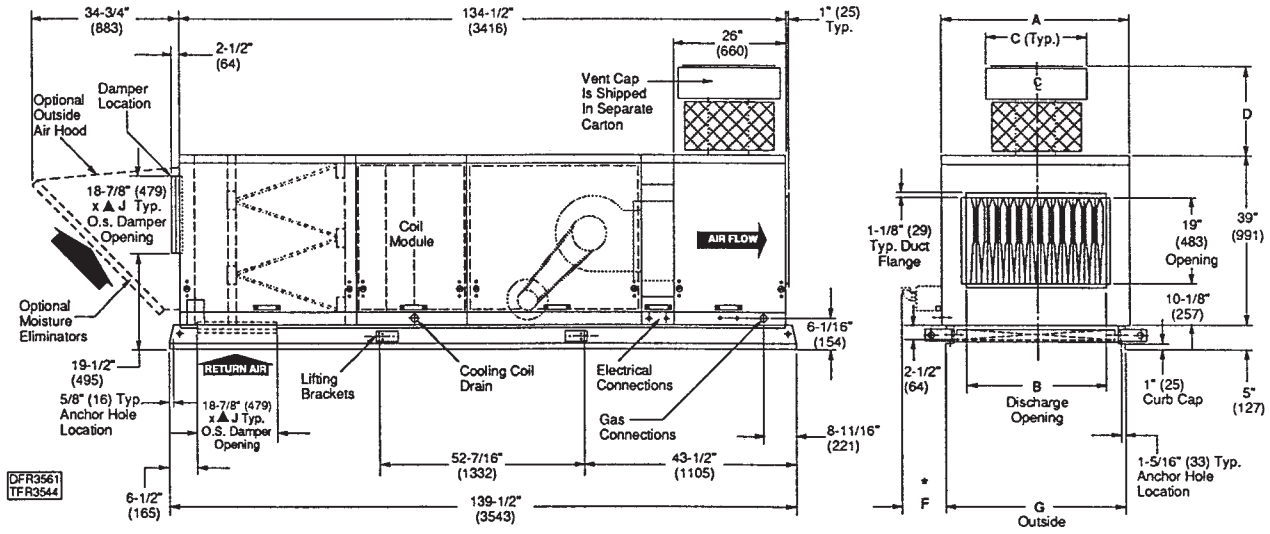
"J" DIMENSION IS AN INSIDE DIMENSION FOR SUPPLY AIR (WITHOUT DAMPER).



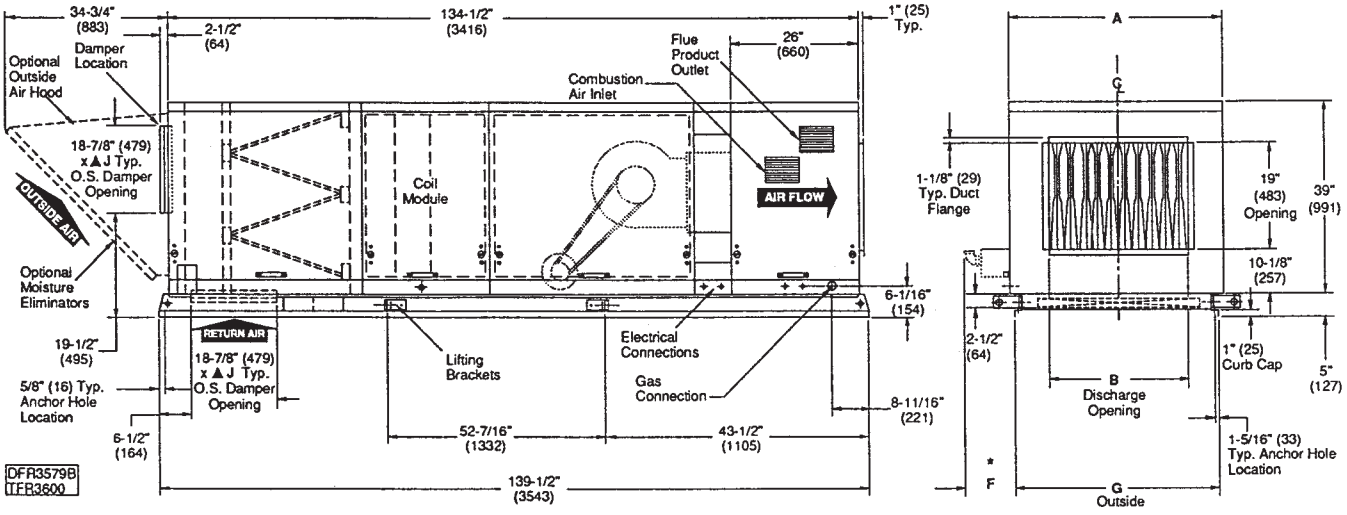
Gravity Vent Model

Dimensional Data

Rooftop Heating Unit with High Cfm Blower and Coil Cabinet — Arrangement K
Models GRAA, GRBA, GRCA, GRDA — Single Furnace
10, 15, 20, 25, 30, 35, 40 (100-400 MBh) — Std. (20-60 F) Temperature Rise Furnace
20, 25, 30, 35, 40 (200-400 MBh) — High (60-90 F) Temperature Rise Furnace



ARRANGEMENT "K"
MODELS 10-40
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "K"
MODELS 10-40
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement K — 10-40

CAPACITY	A	B	C	A.G.A. D	C.G.A. D	*F	G	J	GAS INLET NAT	GAS INLET LP
10	32 7/8 (835)	15 9/16 (395)	12 (305)	11 (279)	20 11/16 (525)	19 3/8 (492)	31 1/16 (789)	24 (610)	1/2	1/2
15	32 7/8 (835)	18 5/16 (465)	21 1/2 (546)	16 (406)	25 3/16 (640)	23 1/2 (597)	31 1/16 (789)	24 (610)	1/2	1/2
20	43 7/8 (1114)	23 13/16 (605)	23 1/2 (597)	16 (406)	25 3/16 (640)	26 1/4 (667)	42 1/16 (1068)	35 (889)	1/2	1/2
25	43 7/8 (1114)	29 5/16 (745)	23 1/2 (597)	16 (406)	25 3/16 (640)	34 1/2 (876)	42 1/16 (1068)	35 (889)	3/4	1/2 OR 3/4
30	54 7/8 (1394)	34 13/16 (884)	26 (660)	17 1/2 (445)	26 11/16 (678)	37 1/4 (946)	53 1/16 (1348)	46 (1168)	3/4	1/2 OR 3/4
35	54 7/8 (1394)	40 5/16 (1024)	26 (660)	17 1/2 (445)	26 11/16 (678)	45 1/2 (1156)	53 1/16 (1348)	46 (1168)	3/4	1/2 OR 3/4
40	60 3/8 (1534)	45 13/16 (1164)	26 (660)	17 1/2 (445)	26 11/16 (678)	51 (1295)	58 9/16 (1487)	51 1/2 (1308)	3/4	1/2 OR 3/4

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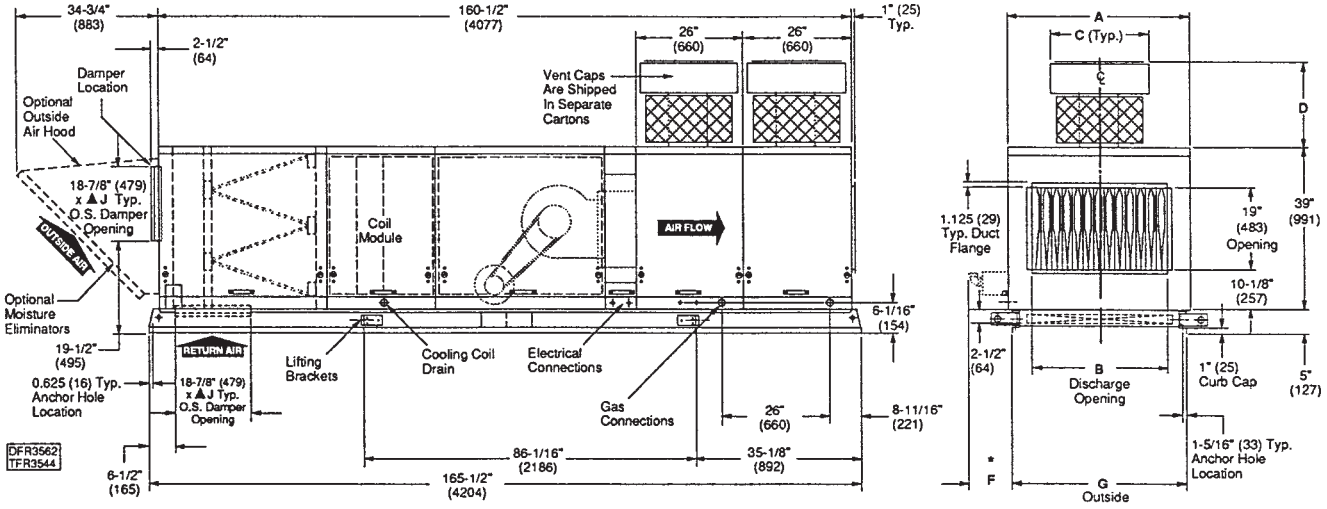
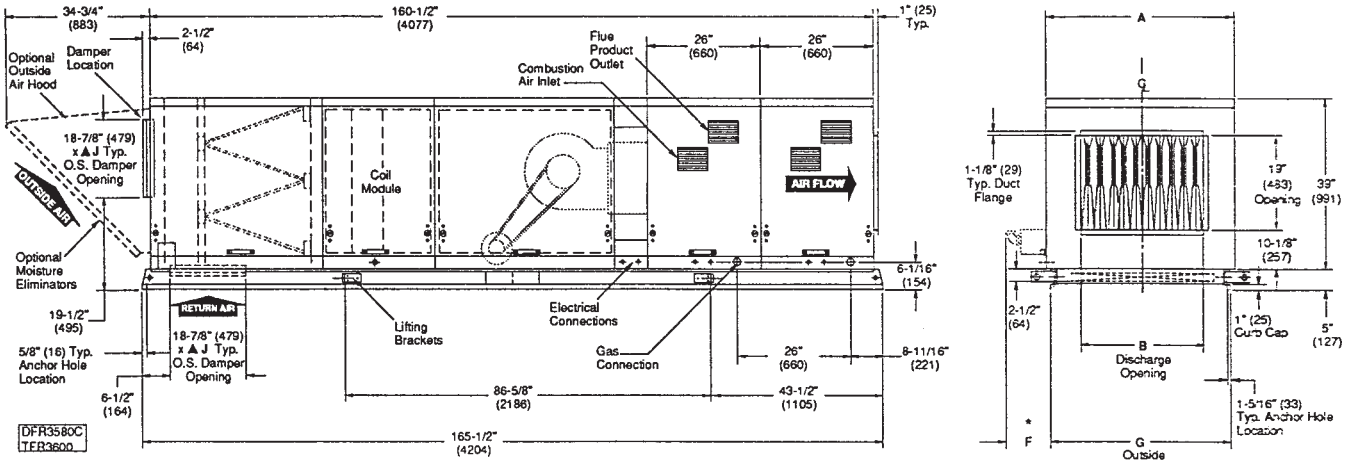
Dimensional Data

Rooftop Heating Unit with High Cfm Blower and Coil Cabinet — Arrangement K
Models GRAA, GRBA — 50, 60, 70, 80 (500-800 MBh)
Double Furnace
Standard (40-120 F) Temperature Rise Furnace



ARRANGEMENT "K"
MODELS 50-80
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "K"
MODELS 50-80
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement K — 50-80 (500-800 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
50	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
60	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
70	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
80	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

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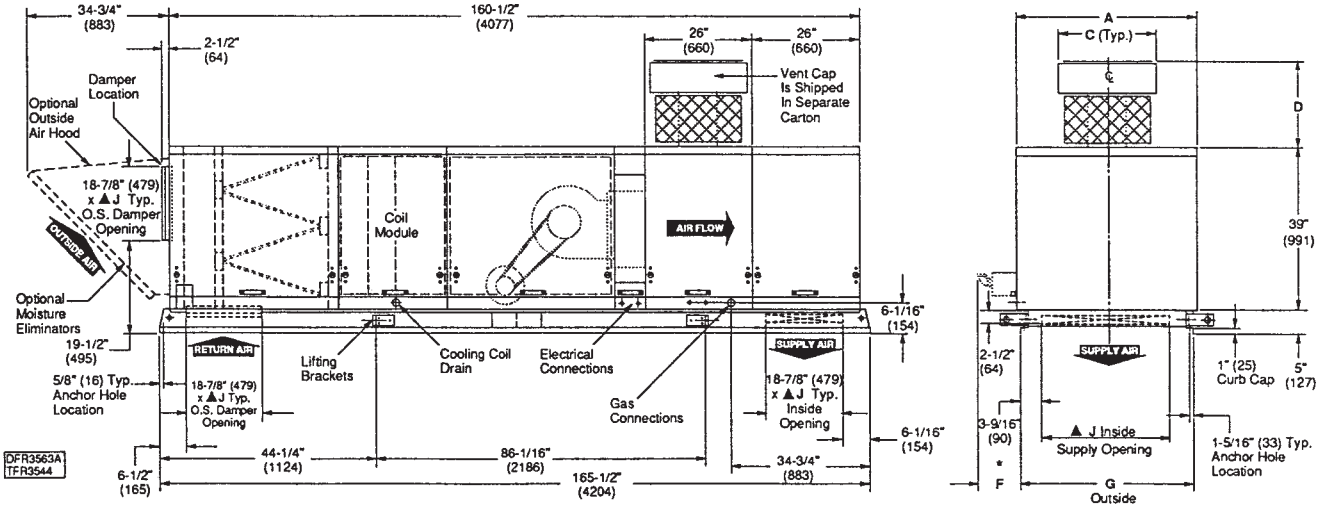
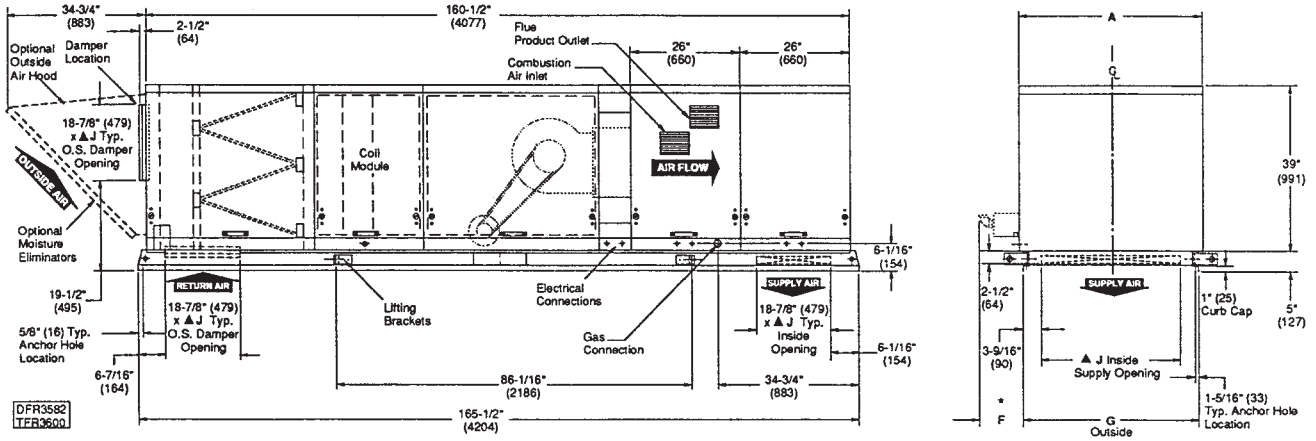
Dimensional Data

Rooftop Heating Unit with High Cfm Blower, Coil Cabinet and Downflow Supply Plenum — Arrangement L
Models GRAA, GRBA, GRCA, GRDA — Single Furnace
10, 15, 20, 25, 30, 35, 40 (100-400 MBh) — Std. (20-60 F) Temperature Rise Furnace
20, 25, 30, 35, 40 (200-400 MBh) — High (60-90 F) Temperature Rise Furnace



ARRANGEMENT "L"
MODELS 10-40
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "L"
MODELS 10-40
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement L — 10-40 (100-400 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
10	32 7/8	15 9/16	12	11	20 11/16	19 3/8	31 1/16	24	1/2	1/2
	(835)	(395)	(305)	(279)	(525)	(492)	(789)	(610)		
15	32 7/8	18 5/16	21 1/2	16	25 3/16	23 1/2	31 1/16	24	1/2	1/2
	(835)	(465)	(546)	(406)	(640)	(597)	(789)	(610)		
20	43 7/8	23 13/16	23 1/2	16	25 3/16	26 1/4	42 1/16	35	1/2	1/2
	(1114)	(605)	(597)	(406)	(640)	(667)	(1068)	(889)		
25	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
30	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
35	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
40	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

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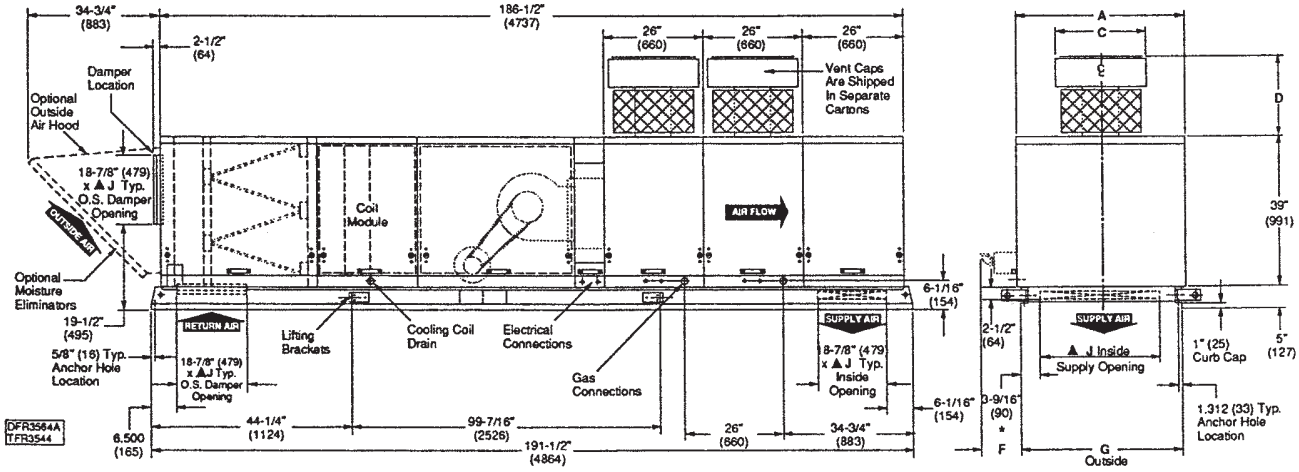
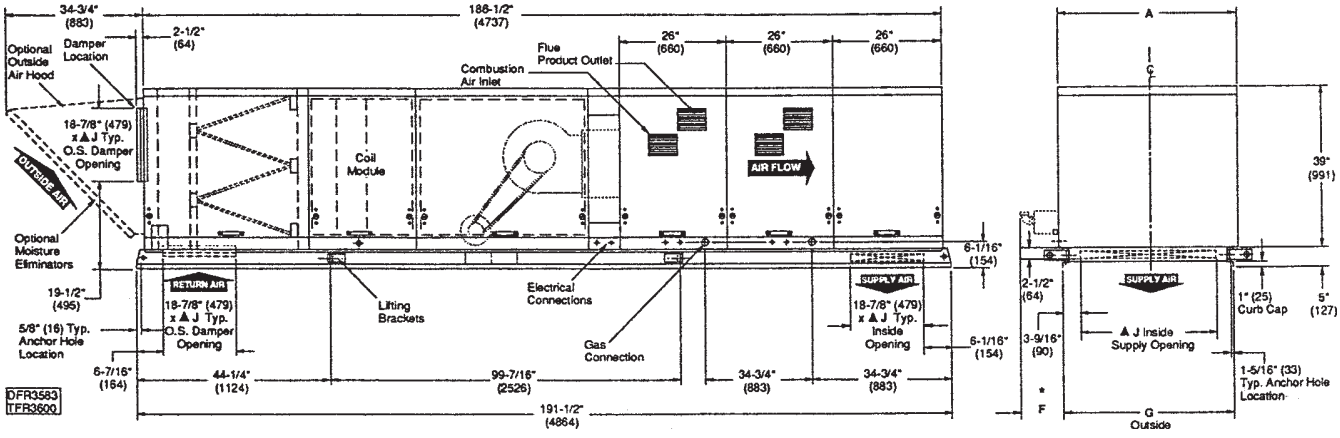
Dimensional Data

Rooftop Heating Unit with High Cfm Blower, Coil Cabinet and Downflow Supply Plenum — Arrangement L
Models GRAA, GRBA — 50, 60, 70, 80 (500-800 MBh)
Double Furnace — Standard (40-120 F) Temperature Rise Furnace



ARRANGEMENT "L"
MODELS 50-80
NATURAL VENT
(Left Hand Service Access Shown)



ARRANGEMENT "L"
MODELS 50-80
POWER VENT
(Left Hand Service Access Shown)

DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

Unit Dimensional Data — Arrangement L — 50-80 (500-800 MBh)

				A.G.A.	C.G.A.				GAS INLET	
CAPACITY	A	B	C	D	D	*F	G	J	NAT	LP
50	43 7/8	29 5/16	23 1/2	16	25 3/16	34 1/2	42 1/16	35	3/4	1/2 OR 3/4
	(1114)	(745)	(597)	(406)	(640)	(876)	(1068)	(889)		
60	54 7/8	34 13/16	26	17 1/2	26 11/16	37 1/4	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(884)	(660)	(445)	(678)	(946)	(1348)	(1168)		
70	54 7/8	40 5/16	26	17 1/2	26 11/16	45 1/2	53 1/16	46	3/4	1/2 OR 3/4
	(1394)	(1024)	(660)	(445)	(678)	(1156)	(1348)	(1168)		
80	60 3/8	45 13/16	26	17 1/2	26 11/16	51	58 9/16	51 1/2	3/4	1/2 OR 3/4
	(1534)	(1164)	(660)	(445)	(678)	(1295)	(1487)	(1308)		

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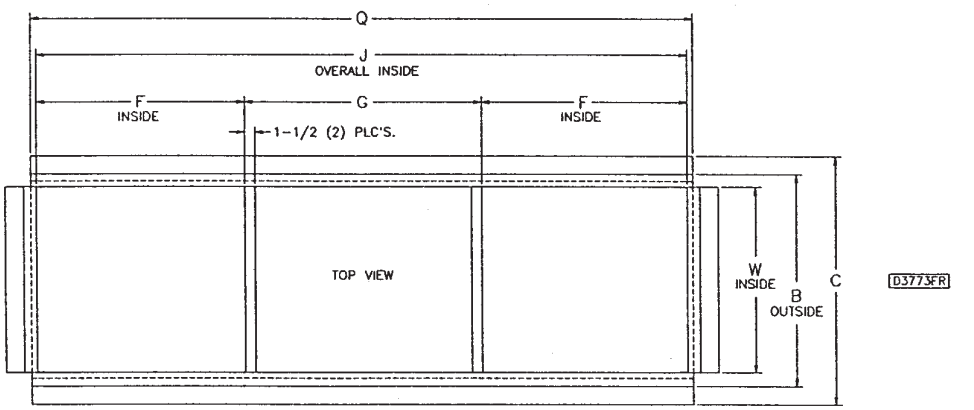
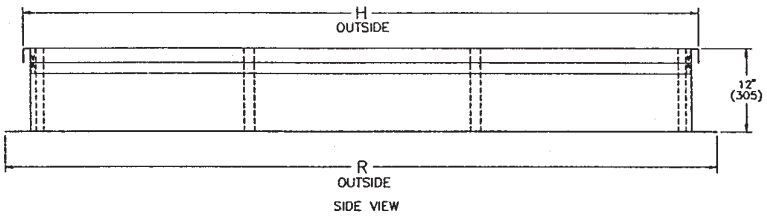
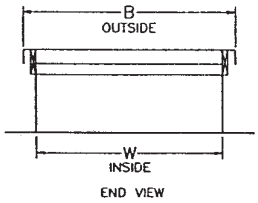
"J" DIMENSION IS AN INSIDE DIMENSION FOR SUPPLY AIR (WITHOUT DAMPER).

Dimensional Data

Rooftop Gas Heating Unit — Arrangements B-L
Roof Curb
10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 12



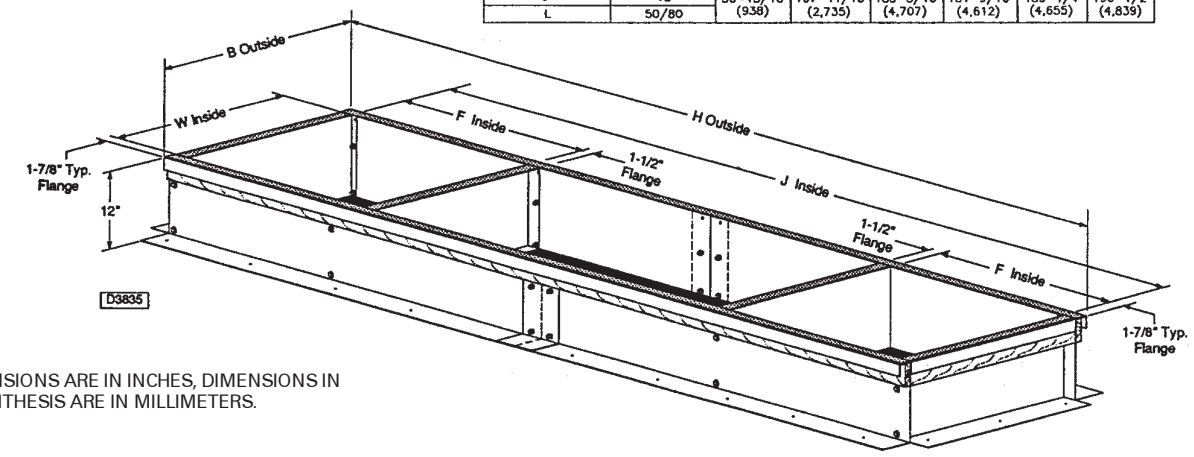




ROOFTOP ARRANGEMENT	CAPACITY	W	B	C
ALL	10/15	26-7/16 (671)	30-3/16 (767)	35-7/16 (900)
	20/25/50	37-7/16 (951)	41-3/16 (1,046)	46-7/16 (1,179)
	30/35/60/70	48-7/16 (1,230)	52-3/16 (1,325)	57-7/16 (1,459)
	40/80/12	53-15/16 (1,370)	57-11/16 (1,465)	62-15/16 (1,599)

Notes:
1. Roof curbs ship knocked down for full assembly.
2. Arrangement D & E require a separate platform for the evaporative cooler. See separate submittal for dimensional information on the platform.

ROOFTOP ARRANGEMENT	CAPACITY	F	G	H	J	Q	R
B & D	10/40	29-5/8 (752)	8-1/8 (206)	71-1/8 (1,806)	67-3/8 (1,711)	69" (1,753)	76-3/8 (1,940)
B & D	50/80		34-1/8 (867)	97-1/8 (2,467)	93-3/8 (2,371)	95" (2,413)	102-3/8 (2,600)
C & E	10/40						
G	50/80	37-1/8 (943)	55-1/4 (1,403)	133-1/4 (3,385)	129-1/2 (3,289)	131-1/8 (3,331)	138-1/2 (3,518)
J	20/40						
K	10/40						
G	20/40	37-3/16 (944)	29-3/16 (741)	107-5/16 (2,726)	103-9/16 (2,631)	105-3/16 (2,672)	112-9/16 (2,859)
C & E	50/80	30-1/8 (765)	59" (1,499)	123" (3,124)	119-1/4 (3,029)	120-7/8 (3,070)	128-1/4 (3,257)
G	12	37-5/16 (948)	80-15/16 (2,056)	159-5/16 (4,046)	155-9/16 (3,951)	157-1/4 (3,994)	164-1/2 (4,178)
J & K	50/80						
L	10/40						
J	12	36-15/16 (938)	107-11/16 (2,735)	185-5/16 (4,707)	181-9/16 (4,612)	183-1/4 (4,655)	190-1/2 (4,839)
L	50/80						

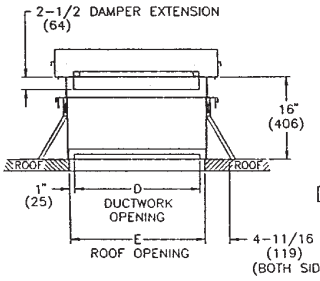


DIMENSIONS ARE IN INCHES, DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

Dimensional Data

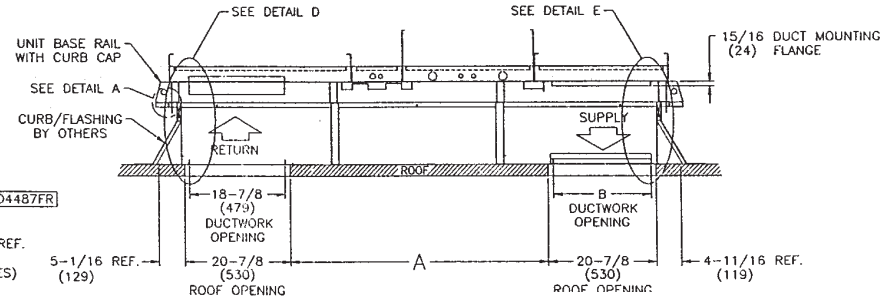
Roof Opening

Section Y-Y

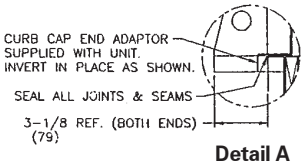


Model	D	E
10,15	24" (610)	26" (660)
20,25,50	35" (889)	37" (940)
30,35,60,70	46" (1168)	48" (1219)
40,80,12	51 1/2" (1308)	53 1/2" (1359)

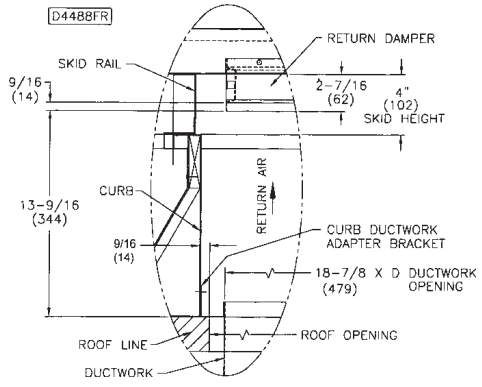
Section X-X



Arrg.	Cap.	B
C&E	10/40	18 7/8 (479)
C&E	50/80	19 3/8 (492)
J	12	18 7/8
L	50/80	(479)
G	50/80	19 1/8
J	20/40	(486)
K	10/40	
G	12	19 1/4
J&K	50/80	(489)
L	10/40	



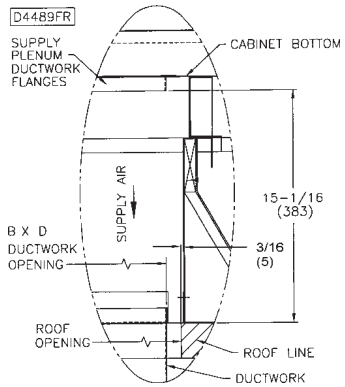
Detail A



Detail D

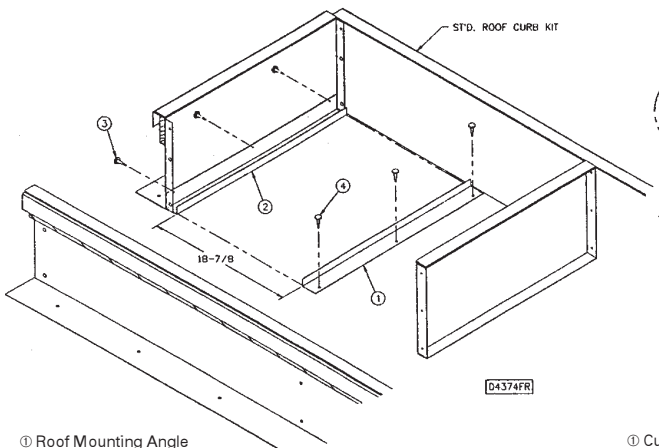
Capacity (CA)	Item #3 K Req'd
10/15	3
20/25/50	4
30/35/60/70	4
40/80/12	5

Capacity	D	Item #4 K Req'd
10/15	24	12
20/25/50	35	14
30/35/60/70	46	14
40/80/12	51 1/2	16



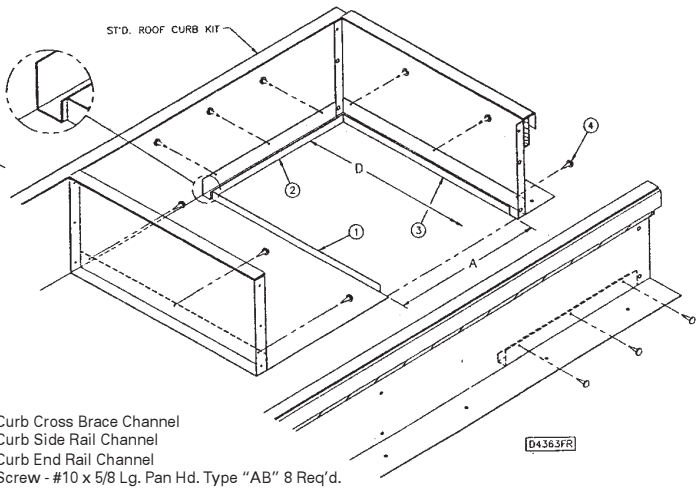
Detail E

Arrg. Cap.	A
C&E 10-40	18 7/8 (479)
C&E 50-80	19 3/8 (492)
J 12, L 50-80	18 7/8 (479)
G 50-80, J 20-40, K 10-40	19 1/8 (486)
G 12, J&K 50-80, L 10-40	19 1/4 (489)



① Roof Mounting Angle
② Curb End Rail Channel
③ Screw - #10 x 5/8 Lg. Pan Hd. Type "AB" K Req'd.
④ Fasteners by Others

Blower/Filter/Damper or Filter/Damper Area

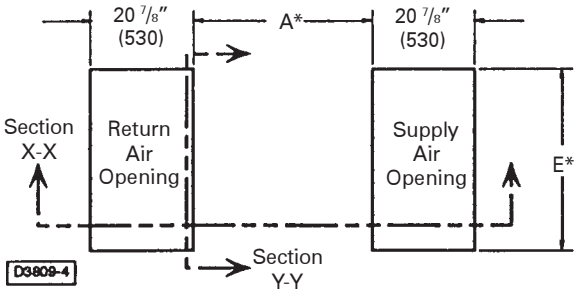


① Curb Cross Brace Channel
② Curb Side Rail Channel
③ Curb End Rail Channel
④ Screw - #10 x 5/8 Lg. Pan Hd. Type "AB" 8 Req'd.

Supply Plenum Area

Dimensional Data

Curb Specifications



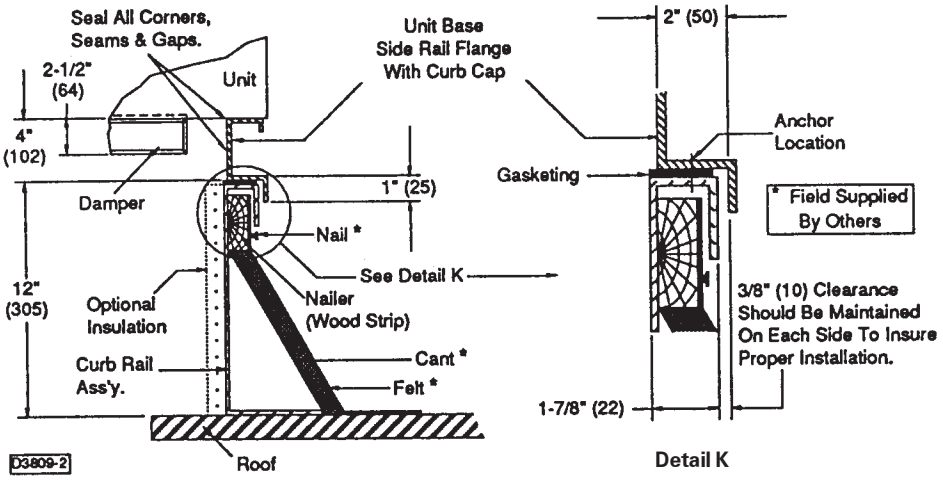
Capacity	Dimension E*
10/15	26" (660)
20/25/50	37" (940)
30/35/60/70	48" (1219)
40/80/12	53 1/2" (1359

*All dimensions shown have been calculated to include a one (1) inch clearance around return and supply ducts.

See preceding page for Sections X-X and Y-Y.

** ROOFTOP ARRANGEMENT	FURNACE	CAPACITY [CA]	UNIT SPECIFICATIONS (REFERENCES) BLOWER ST'D.	BLOWER HIGH CFM	COIL	SUPPLY PLENUM	DIMENSION "A"
C, E	SINGLE	10 - 40	√			√	50 7/8" (1292)
J	SINGLE	20 - 40		√		√	87 1/16" (2211)
L	SINGLE	10 - 40		√	√	√	113" (2871)
C, E	DUAL	50 - 80	√			√	76 7/8" (1952)
J	DUAL	50 - 80		√		√	113" (2871)
L	DUAL	50 - 80		√	√	√	139" (3531)
J	TRI	12		√		√	139" (3531)

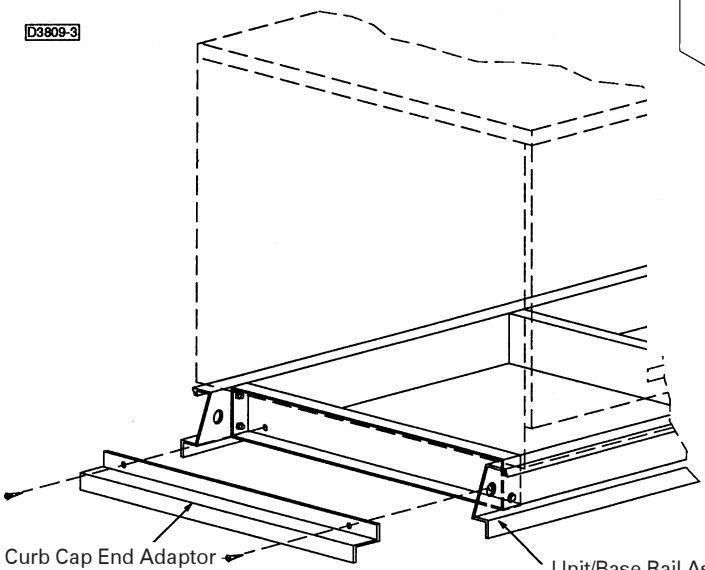
**ROOFTOP ARRANGEMENTS (RA) B, D, G & K ARE WITHOUT A SUPPLY PLENUM; USE THE SAME RETURN AIR DIMENSIONS FOR THESE UNITS ROOFTOP OPENINGS. REFER TO UNIT SUBMITTALS FOR MORE DETAILS.



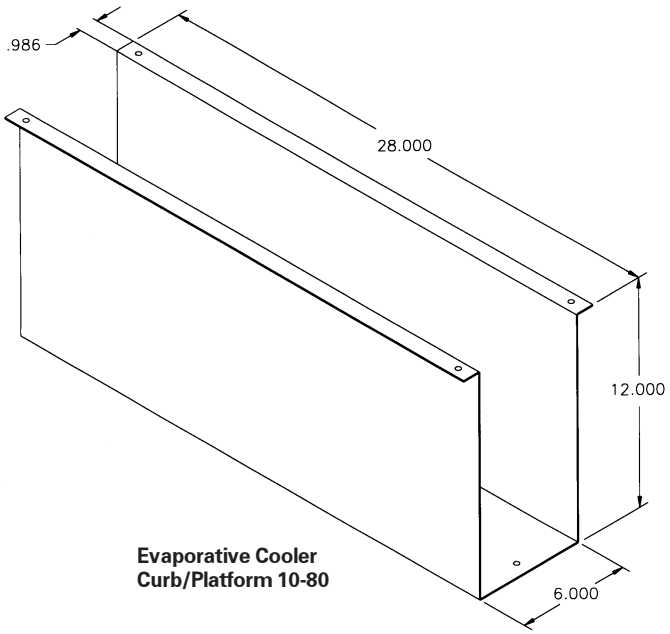
Section Curb Side Rail

Dimensional Data

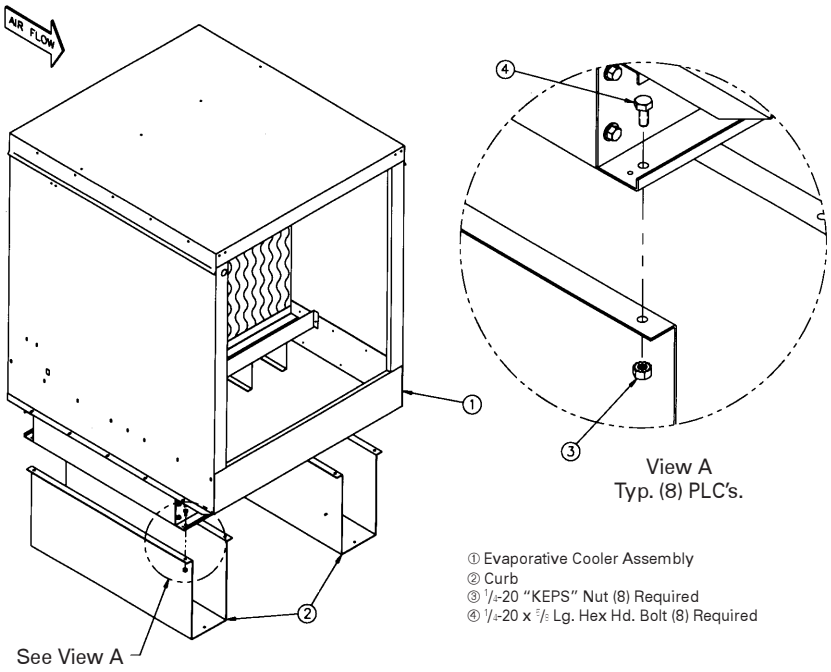
Rooftop Gas Heating Units — Arrangements D, E
Evaporative Cooler — Platform
10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80



Unit/Curb End Rail Assembly



Evaporative Cooler Curb/Platform 10-80



Evaporative Cooler Curb/Platform Mounting Assembly

Weights

Table W-1 — Gravity Vented Unit and Option Weight Data (Pounds)

	A		B		C		D		E		G		J		K		L		Outside
Arrangement	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Air Hood
10	199	218	537	638	651	776	674	805	788	943	NA	NA	NA	NA	775	930	880	1059	43
15	226	245	566	667	679	804	702	833	815	970	NA	NA	NA	NA	801	956	905	1084	43
20	281	302	689	798	819	953	855	995	984	1149	848	988	968	1133	950	1115	1070	1260	51
25	306	327	716	825	844	978	882	1022	1010	1175	898	1038	1023	1188	1000	1165	1125	1315	51
30	362	384	843	959	988	1131	1035	1184	1181	1356	1066	1215	1209	1384	1176	1351	1319	1520	59
35	387	409	889	1005	1033	1176	1081	1230	1225	1400	1110	1259	1252	1427	1220	1395	1362	1563	59
40	423	455	950	1070	1101	1248	1156	1309	1307	1487	1183	1336	1333	1513	1302	1482	1452	1658	63
50	614	711	1035	1169	1155	1314	1201	1366	1321	1511	1209	1374	1329	1519	1311	1501	1439	1654	51
60	727	831	1219	1362	1356	1525	1411	1586	1548	1749	1434	1609	1571	1772	1544	1745	1689	1916	59
70	777	881	1289	1432	1425	1594	1482	1657	1618	1819	1503	1678	1638	1839	1613	1814	1756	1983	59
80	850	958	1386	1533	1530	1704	1592	1772	1736	1942	1612	1792	1755	1961	1730	1936	1874	2107	63
12	1264	1399	NA	NA	NA	NA	NA	NA	NA	NA	2040	2246	2192	2425	NA	NA	NA	NA	63

Note:
1. Weights do not include motors or coils.

Table W-2 — Power Vented Unit and Option Weight Data (Pounds)

	A		B		C		D		E		G		J		K		L		Outside
Arrangement	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Net	Ship	Air Hood
10	197	216	536	637	650	775	672	803	786	941	NA	NA	NA	NA	774	929	879	1058	43
15	221	240	561	662	673	798	697	828	810	965	NA	NA	NA	NA	799	954	903	1082	43
20	268	289	676	785	806	940	842	982	972	1137	832	972	956	1121	938	1103	1063	1253	51
25	293	314	703	812	831	965	869	1009	997	1162	881	1021	1010	1175	984	1149	1112	1302	51
30	340	362	821	937	966	1109	1014	1163	1159	1334	1037	1186	1188	1363	1146	1321	1298	1499	59
35	365	387	867	983	1011	1154	1060	1209	1203	1378	1089	1238	1230	1405	1199	1374	1340	1541	59
40	401	433	928	1048	1079	1226	1134	1287	1286	1466	1161	1314	1311	1491	1280	1460	1430	1636	63
50	589	686	1010	1144	1130	1289	1175	1340	1296	1486	1184	1349	1304	1494	1286	1476	1414	1629	51
60	684	788	1175	1318	1312	1481	1368	1543	1505	1706	1390	1565	1527	1728	1500	1701	1645	1872	59
70	784	838	1246	1389	1382	1551	1438	1613	1574	1775	1459	1634	1595	1796	1569	1770	1713	1940	59
80	806	914	1343	1490	1487	1661	1549	1729	1693	1899	1568	1748	1712	1918	1687	1893	1838	2071	63
12	1198	1333	NA	NA	NA	NA	NA	NA	NA	NA	1975	2181	2127	2360	NA	NA	NA	NA	63

Note:
1. Weights do not include motors or coils.

Table W-3 — Roof Curb Weights

Arrangement	10	15	20	25	30	35	40	50	60	70	80	12
B	115	115	133	133	151	151	161	168	186	186	196	
C	150	150	168	168	186	186	196	197	217	217	227	
D	115	115	133	133	151	151	161	168	186	186	196	
E	150	150	168	168	186	186	196	197	217	217	227	
G			179	179	197	197	207	210	228	228	238	381
J			210	210	228	228	238	338	366	366	381	418
K	192	192	210	210	228	228	238	338	366	366	381	
L	310	310	338	338	366	366	381	375	403	403	418	

Metric Conversion — 1 lb. = 0.453 kg

Weights

Table W-4 — Motor Weights

Voltage	½ HP	¾ HP	1 HP	1 ½ HP	2 HP	3 HP	5 HP	7 ½ HP	10 HP	15 HP
115/60/1 ODP	20	25	25	40	42	80	NA	NA	NA	NA
208/60/1 ODP	21	27	25	40	66	80	NA	NA	NA	NA
230/60/1 ODP	21	25	25	40	42	80	NA	NA	NA	NA
208/60/3 ODP	20	24	31	29	35	47	49	99	118	152
230/60/3 ODP	20	24	31	29	35	47	49	99	118	150
460/60/3 ODP	20	24	31	29	35	47	49	99	118	150
575/60/3 ODP	20	20	27	31	37	56	73	105	116	150
115/60/1 TE	26	30	34	41	65	74	NA	NA	NA	NA
208/60/1 TE	27	36	39	48	65	74	NA	NA	NA	NA
230/60/1 TE	26	30	34	41	65	74	NA	NA	NA	NA
208/60/3 TE	18	23	28	32	36	55	65	90	123	295
230/60/3 TE	18	23	28	32	36	55	65	90	123	295
460/60/3 TE	18	23	28	32	36	55	65	90	123	295
575/60/3 TE	21	21	26	36	40	90	92	161	199	284
115/60/1 HEODP	32	33	38	58	72	NA	NA	NA	NA	NA
208/60/1 HEODP	32	30	NA	NA	NA	NA	NA	NA	NA	NA
230/60/1 HEODP	32	33	38	58	72	NA	NA	NA	NA	NA
208/60/3 HEODP	22	25	40	44	44	83	89	139	141	213
230/60/3 HEODP	24	26	40	43	44	80	91	137	138	238
460/60/3 HEODP	24	26	40	43	44	80	91	137	138	238
575/60/3 HEODP	NA	NA	41	44	45	90	100	170	141	215
115/60/1 HETE	28	37	38	41	53	NA	NA	NA	NA	NA
208/60/1 HETE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
230/60/1 HETE	28	37	38	41	53	NA	NA	NA	NA	NA
208/60/3 HETE	NA	NA	39	34	48	71	78	107	124	225
230/60/3 HETE	32	52	39	34	48	94	110	158	166	294
460/60/3 HETE	32	52	39	34	48	94	110	158	166	294
575/60/3 HETE	NA	NA	44	69	88	76	80	132	140	260
208/60/3 2S1W	NA	NA	34	38	48	66	81	125	143	NA
230/60/3 2S1W	NA	NA	34	38	48	66	81	125	143	NA
460/60/3 2S1W	NA	NA	34	38	41	58	94	125	136	218
575/60/3 2S1W	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
115/60/1 2S2W	23	30	37	NA	NA	NA	NA	NA	NA	NA
208/60/1 2S2W	NA	29	36	NA	NA	NA	NA	NA	NA	NA
230/60/1 2S2W	23	29	36	NA	NA	NA	NA	NA	NA	NA
208/60/3 2S2W	27	32	44	47	67	84	NA	221	192	NA
230/60/3 2S2W	26	32	44	47	67	84	NA	221	192	NA
460/60/3 2S2W	26	33	40	44	55	67	NA	214	230	NA
575/60/3 2S2W	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
1. ODP = Open Drip-proof
2. TE = Totally enclosed
3. HEODP = High Efficiency Open Drip-proof
4. HETE = High Efficiency Totally Enclosed
5. 2S1W = Two Speed One Winding
6. 2S2W = Two Speed Two Winding
7. NA = Not Available

FLA based on NEC Ratings

Table W-5 — Evaporative Cooler Weight

Unit Size	Shipping Wt. lb	Operating Wt. lb
10, 15	137	301
20, 25, 50	166	386
30, 35, 60, 70	192	468
40, 80	206	509

Metric Conversion — 1 lb. = 0.453 kg

Single-Stage Room Thermostat
(Order No. 134-0207-01)
- Low Voltage (24V)
- 40 F to 90 F Range
- Fan Auto-On Switch
- System Heat-Off-Cool Switch

Two-Stage Room Thermostat
(Order No. 134-0207-04)
- Low Voltage (24V)
- 40 F to 90 F Range
- Fan Auto-On Switch
- System Off-Heat-Auto-Cool Switch
- 5 5/8″ W x 3 1/2″ H x 2 1/8″ D

Single-Stage Room Thermostat with Summer/Winter Switch
(Order No. 134-0207-02)
- Low Voltage (24V)
- 55 to 95 F Range
- Fan Auto-On Switch
- 3 1/2″ W x 4 1/5″ H x 1 3/8″ D

T7300 Programmable Room Thermostat
(Order No. 134-0207-05)
- Provides seven-day programmability for two stages of heating and two stages of cooling
- Heat-Off-Cool-Auto system switching four time periods per day for occupied and unoccupied modes with three-hour override of unoccupied mode.
- Automatic heat-cool changeover and battery backup.
- 8″ W x 4″ H x 1 5/8″ D

Universal Guard
(Order No. 134-0207-07)
- Clear Plastic
- Ring Base
- Tumbler Lock and Two Keys
- Cover: 6 7/8″ W x 5 5/8″ H x 3″ D
- Base: 6 9/16″ W x 5 1/2″ H x 3/8″ D

Single-Stage Duct Thermostat
(Order No. 134-0207-03)
- Low Voltage (24V)
- 55 to 175 F Range
- 5′ Capillary
- 2″ W x 5 5/8″ H x 2 7/16″ D

Two-Stage Duct Thermostat
(Order No. 134-0207-06)
- Low Voltage (24V)
- 55 to 175 F Range
- 5′ Capillary
- 2″ W x 5 5/8″ H x 2 7/16″ D

Remote Control Station
(Order No. 134-0201-01)
- Wall mounted
- Six LED status lamps
- System on/off, fan auto/on, heat auto/off, cool auto/off, auxiliary on/off switching and modulating damper potentiometer mounting.
- Plug-in terminal block wiring and wall mounting bracket.
- 6 1/4″ W x 3 3/4″ H x 1 1/2″ D

Seven-Day Timeclock
(Order No. 134-0201-02)
- Single pole double throw (SPDT) relay output at setpoint time
- Maximum of six setpoints per day
- 7 3/4″ H x 5″ W x 3 7/16″ D

24-Hour Timeclock
(Order No. 134-0201-03)
- Single pole double throw (SPDT) relay output at setpoint time.
- Maximum 12 setpoints per day.
- 7 3/4″ H x 5″ W x 3 7/16″ D

Controls

Electronic Modulating Room Thermostat
(Included with Gas Control)
- Low voltage (24 V)
- 60-85 F range
- Natural gas only
- Room thermostat:
  4 1/2″ H x 2 1/2″ W x 1 1/2″ D

Electronic Modulating Duct Thermostat
(Included with Gas Control)
- Low voltage (24 V)
- 55-90 F range
- Sensor: 10-inch probe
- Remote temperature selector:
  4 1/4″ W x 4 1/4″ H x 1 7/8″ D
- Duct thermostat:
  4 1/4″ W x 4 1/4″ H x 1 5/8″ D
- Natural gas only

Electronic Modulating Duct Thermostat with Room Override
- Line voltage (115 V) roomstat
- 50-90 F range
- 2 7/8″ W x 4 9/16″ H x 1 1/4″ D
- Low voltage (24 V) Ductstat
- 55-90 F range
- Sensor: 10-inch probe
- Remote temperature selector:
  4 1/4″ W x 4 1/4″ H x 1 5/8″ D
- Duct thermostat:
  4 1/4″ W x 4 1/4″ H x 1 5/8″ D
- Natural gas only

Options

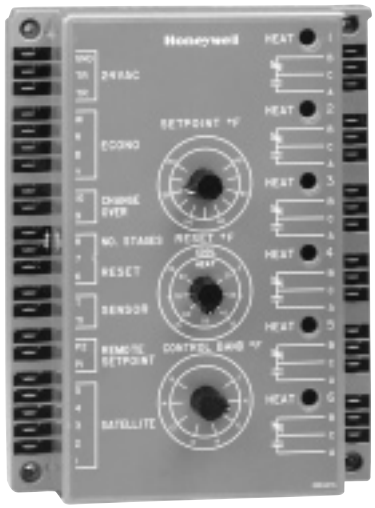
Controls

Electronic Modulating
4-20 mA or 0-10 VDC Input

- A200 signal conditioner
- Control replaces amplifier in duct or room control package

Discharge Air Control with Outside Air Reset

- Available in two, three and four-stage control. Shown below is the discharge air controller.



Roof Curbs

Roof Curbs

Roof curbs are available for all Trane single, double and triple furnace outdoor units. All curbs are shipped knocked down for field assembly.

Curbs are normally available on a short lead time basis so they may be on the jobsite well in advance of the units. Curbs are 12 inches high, factoring in the four-inch unit base rail, overall height to the bottom of the rooftop unit is actually 16 inches. Roof curbs can be supplied with one-inch fiberglass insulation.

Features Summary

Trane rooftop gas heating units have the following design features:

- All units have AGA and CGA certified duct furnaces.
- ETL and CSA UL-1995 certified packaged units.
- All units fabricated from aluminized steel. The heat exchanger uses 20-gauge tubes and 18-gauge header sections.
- Units are complete, wired, tested and rail-mounted packages with blower drives preset.
- Units are available with left hand or right hand gas control configuration. This flexibility helps to meet special application requirements.
- Draw-thru coil cabinet arrangements with stainless steel drain pan.
- Evaporative cooling arrangement with standard 8 or optional 12-inch media (203 or 305 mm).

Arrangement A

GENERAL
Units shall be completely factory assembled, piped, wired and test fired. All duct furnaces shall be AGA and CGA certified and conform with the latest ANSI Standards for safe and efficient performance. Units shall be mounted on metal rails with lifting and anchor holes and shall be suitable for slab mounting. Units shall be available for operation on either natural or LP (propane) gas. The firing rate of each furnace will not exceed 400 MBh and shall contain its own heat exchanger, flue collector, venting, burners, safety and ignition controls. All furnaces shall be in compliance with FM (Factory Mutual) requirements.

ELECTRICAL
Standard control relays shall be socket mounted with terminal block connections. All control wiring shall terminate at terminal strips (single point connection) and include an identifying marker corresponding to the wiring diagram. Control wiring shall be harnessed with terminal block connections.

Casing
Casings shall be die-formed, 18-gauge galvanized steel and finished in air-dry enamel. Service and access panels shall be provided through easily removable side access panels with captive fasteners.

Heat Exchanger
Standard heat exchanger construction shall consist of 20-gauge aluminized steel tubes and 18-gauge aluminized steel headers. Standard drip pan construction shall be corrosion resistant aluminized steel.

Flue Collector
Standard flue collector construction shall be corrosion resistant aluminized steel.

Venting System
Natural vent units shall be provided with a vent cap designed for gravity venting. Outside air for combustion enters at the base of the vent cap through a protective grille, and products of combustion are discharged through the upper section of the flue vent cap.

Power vent units shall be provided with a vent fan. Outside air for combustion and products of combustion shall have individual air inlet and discharge grilles located in the upper section of the furnace service panel. An air proving switch shall be installed and disengage gas flow if for any reason the drafter has failed to operate. (Power venting and 100 percent shutoff ignition systems are required for compliance with IRI (Industrial Risk Insurers).

Burners
Burners shall be die-formed, corrosion resistant aluminized steel, with stamped porting and stainless steel port protectors. Port protectors prevent foreign matter from obstructing the burner ports. Burners are individually removable for ease of inspection and servicing. The entire burner assembly is easily removed with its slide-out drawer design. The pilot shall be accessible through an access plate without removing the burner drawer assembly.

Electrical Cabinet
Electrical cabinet shall be isolated from the air stream with a non-removable access panel interior to the outer service panel. There is provision in this cabinet for component mounting, wire routing and high voltage isolation. Control wiring shall be harnessed with terminal block connections.

Controls
Standard units shall be provided with 24-volt combination single-stage automatic gas valves, including main operating valve and pilot safety shutoff, pressure regulator, manual main and pilot shutoff valve, and adjustable pilot valve. Gas valves shall be suitable for NEC Class 2 use for a maximum inlet gas pressure of 0.5 psi (14" WC) on natural gas. All rooftop units shall be provided with a low voltage circuit breaker rated for 150 percent of the units normal 24-volt operating load.

Each duct furnace shall be provided with a 24 V high temperature limit switch and a (redundant) combination gas valve.

All units provided with a solid state ignition control system which ignites the intermittent pilot by spark during each cycle of operation. When pilot flame is proven, main burner valve opens to allow gas flow to the burners. Pilot and burners are extinguished during the off cycle.

Mechanical Specifications

FACTORY INSTALLED OPTIONS

Control Options (Per Furnace)

☐ Two-Stage Gas Valve
Provides two stages of heat. Ignition is at low fire (one half of the unit's full rated input). Requires the use of an optional two-stage thermostat.

☐ Hydraulic Modulating Gas Valve
Provides modulated heat output. Ignition is at low fire (one half of the unit's full rated input), and a discharge air temperature sensing bulb located in the air stream shall modulate the gas input from 40 percent to 100 percent rated input. Provided with an automatic electric valve in series with the hydraulic valve which cycles the unit in response to an optional low voltage single-stage thermostat.

☐ Hydraulic Modulating Gas Valve with Bypass
Provides modulated heat output. Ignition is at low fire (one half of the unit's full rated input), and a discharge temperature sensing bulb located in the air stream shall modulate the gas input from 40 percent to 100 percent rated input. Provided with an automatic electric valve in series with the hydraulic valve which cycles the unit. An additional electric valve in parallel bypasses the hydraulic modulating valve, overriding the discharge temperature sensing bulb, allowing full fire. Requires the use of an optional thermostat to control the electric valve.

☐ Electronic Modulating — Room or Duct Stat Control
Provides modulated heat output. An automatic valve in series with the modulating valve shall be provided to cycle the unit. Ignition is at full fire (100 percent input), and modulates the gas input from 100 percent to 40 percent rated input. Available for use with a room thermostat or duct thermostat with remote setpoint adjustment. Duct thermostat available with optional override room thermostat which causes the unit to go to full fire when the room temperature falls below the override room thermostat's setpoint.

☐ Electronic Modulating — 4-20 mA/0-10 VDC Input
Provides modulated heat output. Ignition is at full fire (100 percent input), and modulates the gas input from 100 percent to 40 percent rated input. The modulating gas valve shall operate in response to a 4-20 mA or a 0-10 VDC input from an external DDC control. When "furnace one only" is specified on double and triple furnaces, additional furnace sections will have single-stage on-off control.

☐ Discharge Air Control with Outside Air Reset
Unit provided with factory-mounted discharge air controller, discharge air sensor, outdoor air reset, summer/winter thermostat and velocity pressure switch. The outdoor air reset range is from 10 F to 60 F. Full reset occurs at 10 F outside air temperature. There is a straight line relationship between outside air temperature and reset. Therefore, at 60 F outside air temperature, no reset will occur. The amount of reset is adjustable from 20 F to 50 F. Discharge air controller provides two minute delay between successive on and off stages. A summer/winter thermostat locks out heating when outside air temperature is above 55 F. The velocity pressure switch is provided for protection against high temperatures at low airflows.

Available in two-stage (half of the unit's full rated input), three-stage (33 percent of the unit's full rated input) and four-stage (25 percent of the unit's full rated input). Three and four-stage available on double and triple furnace units only.

☐ S-350 Modular Electronic Control System
Basic system utilizes a controller module with discharge air sensor, setpoint and one stage output, a stage module with differential setpoint and one stage output and a display module with LCD display for temperature readout. The system stages the units rate of fire based upon sensed discharge air temperature, setpoint setting and differential setting between stages.

Provided as a two-stage (all furnaces), three and four-stage (double and triple furnaces only) and six-stage (triple furnace only).

Heat Exchanger Options

☐ Type 409 Stainless Steel (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 409 stainless steel. Burners and flue collector shall be aluminized steel. 409 stainless steel is recommended when outside air is used for make-up air in areas where outside temperatures are 40 F or below.

☐ Type 409 Stainless Steel Package (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 409 stainless steel. Burners and flue collector shall be 409 stainless steel. 409 stainless steel is recommended where outside air is used for make-up air in areas where outside temperatures are 40 F or below.

☐ Type 321 Stainless Steel (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 321 stainless steel. Burners and flue collector shall be aluminized steel.

☐ Type 321 Stainless Steel Package (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 321 stainless steel. Burners and flue collector shall be 409 stainless steel.

Additional Factory Installed Options

☐ Fan Time Delay
The fan time delay relay minimizes cold blasts of air on start-up. It also allows the fan to operate after burner shutdown (120 second delay off), removing the residual heat from the heat exchanger.

☐ Manual Blower Switch
Manual blower switch shall be factory installed in the electrical cabinet.

Mechanical Specifications

Firestat
If temperature reaches the setpoint, the unit will close all gas valves, return the dampers to their normal position and shut down the blower. Manual reset.

☐ Return Air Mounted (setpoint typically 130 F)

☐ Supply Air Mounted (setpoint typically 150 F)

☐ Orifices for Elevations over 2000 feet

☐ 409 Stainless Steel Furnace Drip Pan
Replaces the standard aluminized steel furnace drip pan.

☐ Airflow Proving Switch

☐ High/Low Gas Pressure Limit Switches
A high pressure and a low pressure interlock switch and shutoff valve shall be provided for each furnace section. High/low gas pressure limits disengage heating upon detecting either high line pressure or low manifold pressure.

☐ Status Indicator Lamps (Electrical Cabinet)
Status indicator lamps shall include power on, blower on and one lamp per stage of heat mounted in the electrical cabinet.

Field Installed Accessories

☐ High Gas Line Pressure Regulator
Reduces main gas line pressure to a minimum of 7 inches WC. Pressure at the jobsite must be specified. The regulator is selected to accommodate that specific pressure.

☐ Remote Control Station
Wall mounted. Provides six LED status lamps with System On/Off, Fan Auto/On, Heat Auto/Off, Cool Auto/Off, Auxiliary On/Off switching and Modulating damper potentiometer mounting. Designed for easy installation with plug-in terminal block wiring and wall mounting bracket. (Auxiliary On/Off may be used with the Evaporative Cooler fill and drain kit.)

☐ Seven-Day Timeclock
Provides single-pole double-throw (SPDT) relay output at setpoint time with maximum six setpoints per day.

☐ 24-Hour Timeclock
Provides single-pole double-throw (SPDT) relay output at setting time with maximum 12 setpoints per day.
Disconnect Switch

☐ 115V Convenience Outlet
GFI (Ground Fault Convenience Outlet) is manual reset with weatherproof enclosure. (Requires separate 115V power source.)

☐ Manual Reset High Limit Switch
The rooftop unit shall be provided with a manual reset high limit switch wired in series to the lead furnace high limit. If the setpoint is reached, the gas valve will close and the blower will continue to run until the sensed temperature is below the setpoint.

THERMOSTATS

☐ Low voltage room thermostat, single stage with fan auto-on-switch and system heat off- cool switch.

☐ Low voltage room thermostat, single stage with fan auto-on switch.

☐ Low voltage room thermostat, two stage with fan auto-on switch and system off-heat-auto-cool switch.

☐ Low voltage programmable room thermostat, two stage with LCD display, fan auto-on switch and system off-heat-auto-cool switch.

☐ Universal tamperproof guard for all room thermostats.

☐ Low voltage duct thermostat, single stage.

☐ Low voltage duct thermostat, two-stage.

☐ Room thermostat, electronic modulating control.

☐ Duct thermostat, electronic modulating control.

☐ Duct thermostat, electronic modulating control with override room thermostat.

Arrangement B, C, D, E

GENERAL
Units shall be completely factory assembled, piped, wired and test fired. All units shall contain duct furnaces that are AGA and CGA certified and conform with the latest ANSI Standards for safe and efficient performance. Units shall be mounted on metal rails with lifting and anchor holes and shall be suitable for slab or curb mounting. Units shall be available for operation on either natural or LP (propane) gas.

The firing rate of each furnace will not exceed 400 MBh and shall contain its own heat exchanger, flue collector, venting, burners, safety and ignition controls. All units shall be ETL or UL certified for electrical safety in compliance with UL 1995 safety standard for heating, ventilating and cooling equipment. All units shall be in compliance with FM (Factory Mutual) requirements.

ELECTRICAL
Standard control relays shall be socket mounted with terminal block connections. All control wiring shall terminate at terminal strips (single point connection) and include an identifying marker corresponding to the wiring diagram. Motor and control wiring shall be harnessed with terminal block connections.

Casing
Casings shall be die-formed, 18-gauge galvanized steel and finished in air-dry enamel. Service and access panels shall be provided through easily removable side access panels with captive fasteners. Fan sections and supply plenums (when provided) shall be insulated with fire resistant, odorless, matte-faced one-inch glass fiber material. Outside air hoods, when provided, ship with a wire mesh inlet screen.

Heat Exchanger
Standard heat exchanger construction shall consist of 20-gauge aluminized steel tubes and 18-gauge aluminized steel headers. Standard drip pan construction shall be corrosion resistant aluminized steel.

Flue Collector
Standard flue collector construction shall be corrosion resistant aluminized steel.

Venting System
Natural vent units shall be provided with a vent cap designed for gravity venting. Outside air for combustion enters at the base of the vent cap through a protective grille, and products of combustion are discharged through the upper section of the flue vent cap.

Power vent units shall be provided with a vent fan. Outside air for combustion and products of combustion shall have individual air inlet and discharge grilles located in the upper section of the furnace service panel. An air proving switch shall be installed and disengage gas flow if for any reason the draftor has failed to operate. Power venting and 100 percent shutoff ignition systems are required for compliance with IRI (Industrial Risk Insurers).

Burners
Burners shall be die-formed, corrosion resistant aluminized steel, with stamped porting and stainless steel port protectors. Port protectors prevent foreign matter from obstructing the burner ports. Burners are individually removable for ease of inspection and servicing. The entire burner assembly is easily removed with its slide-out drawer design. The pilot shall be accessible through an access plate without removing the burner drawer assembly.

Evaporative Cooler (Standard on Arrangement D and E only)
An evaporative cooler with 8-inch media shall be provided. The evaporative cooler shall be of a self cleaning design with a stainless steel water tank, regulated water flow and overflow protection. The cooler shall have a cabinet assembly of heavy-gauge aluminized steel with weatherproof finish, a UL recognized thermally protected sealed recirculating pump motor, two inch distribution pad, and corrosion resistant PVC water distribution tubes.

Fans
Centrifugal fan shall be belt driven, forward curved with double inlet, statically and dynamically balanced. The blower wheel shall be fixed on a keyed shaft, supported with rubber grommet on bearing only, and ball bearing secured. An access interlock switch shall be installed in the blower compartment and will disengage the blower upon removing the service panel. An override shall be incorporated into the interlock switch for serviceability.

Filters
Filter rack shall be constructed of galvanized steel with access through the side service panel. Standard filters are one-inch permanent washable type.

Electrical Cabinet
Electrical cabinet shall be isolated from the air stream with a non-removable access panel interior to the outer service panel. There is provision in this cabinet for component mounting, wire routing and high voltage isolation. Motor and control wiring shall be harnessed with terminal block connections.

Controls
Standard units shall be provided with 24-volt combination single-stage automatic gas valves, including main operating valve and pilot safety shutoff, pressure regulator, manual main and pilot shutoff valve, and adjustable pilot valve. Gas valves shall be suitable for NEC Class 2 use for a maximum inlet gas pressure of 0.5 psi (14" WC) on natural gas. All rooftop units shall be provided with a low voltage circuit breaker rated for 150 percent of the units normal 24-volt operating load.

Each duct furnace shall be provided with a 24-volt high temperature limit switch, a (redundant) combination gas valve and a fan time delay relay. The fan time delay relay minimizes cold blasts of air on start-up. It also allows the fan to operate after burner shutdown, removing residual heat from the heat exchanger. All rooftop furnace units shall contain a reverse airflow interlock switch. The normally closed switch, when activated, shall cause gas valves to close and continue blower operation. All units provided with a solid-state ignition control system which ignites the intermittent pilot by spark during each cycle of operation. When pilot flame is proven, main burner valve opens to allow gas flow to the burners. Pilot and burners are extinguished during the off cycle.

Mechanical Specifications

FACTORY INSTALLED OPTIONS

Control Options (Per Furnace)

☐ Two-Stage Gas Valve
Provides two stages of heat. Ignition is at low fire (one half of the unit's full rated input). Requires the use of an optional two-stage thermostat.

☐ Hydraulic Modulating Gas Valve
Provides modulated heat output. Ignition is at low fire (one half of the unit's full rated input), and a discharge air temperature sensing bulb located in the air stream shall modulate the gas input from 40 percent to 100 percent rated input. Provided with an automatic electric valve in series with the hydraulic valve which cycles the unit in response to an optional low voltage single-stage thermostat.

☐ Hydraulic Modulating Gas Valve with Bypass
Provides modulated heat output. Ignition is at low fire (one-half of the unit's full rated input), and a discharge temperature sensing bulb located in the air stream shall modulate the gas input from 40 percent to 100 percent rated input. Provided with an automatic electric valve in series with the hydraulic valve which cycles the unit. An additional electric valve in parallel bypasses the hydraulic modulating valve, overriding the discharge temperature sensing bulb, allowing full fire. Requires the use of an optional thermostat to control the electric valve.

☐ Electronic Modulating — Room or Duct Stat Control
Provides modulated heat output. An automatic valve in series with the modulating valve shall be provided to cycle the unit. Ignition is at full fire (100 percent input), and modulates the gas input from 100 percent to 40 percent rated input. Available for use with a room thermostat or duct thermostat with remote setpoint adjustment. Duct thermostat available with optional override room thermostat which causes the unit to go to full fire when the room temperature falls below the override room thermostat's setpoint.

☐ Electronic Modulating — 4-20 mA / 0-10 VDC Input
Provides modulated heat output. Ignition is at full fire (100 percent input), and modulates the gas input from 100 percent to 40 percent rated input. The modulating gas valve shall operate in response to a 4-20 mA or a 0-10 VDC input from an external DDC control. When "furnace one only" is specified on double and triple furnaces, additional furnace sections will have single-stage on-off control.

☐ Discharge Air Control with Outside Air Reset
Unit provided with factory-mounted discharge air controller, discharge air sensor, outdoor air reset, summer/winter thermostat and velocity pressure switch. The outdoor air reset range is from 10 F to 60 F. Full reset occurs at 10 F outside air temperature. There is a straight line relationship between outside air temperature and reset. Therefore, at 60 F outside air temperature, no reset will occur. The amount of reset is adjustable from 20 F to 50 F. Discharge air controller provides two minute delay between successive on and off stages. A summer/winter thermostat locks out heating when outside air temperature is above 55 F. The velocity pressure switch is provided for protection against high temperatures at low airflows.

Available in two-stage (half of the unit's full rated input), three-stage (33 percent of the unit's full rated input) and four-stage (25 percent of the unit's full rated input). Three and four-stage available on double and triple furnace units only.

☐ S-350 Modular Electronic Control System
Basic system utilizes a controller module with discharge air sensor, setpoint and one stage output, a stage module with differential setpoint and one-stage output and a display module with LCD display for temperature readout. The system stages the units rate of fire based upon sensed discharge air temperature, setpoint setting and differential setting between stages.

Provided as a two-stage (all furnaces), three and four-stage (double and triple furnaces only) and six-stage (triple furnace only).

Heat Exchanger Options

☐ Type 409 Stainless Steel (one or all furnaces) Heat exchanger tubes and headers shall be 20-gauge type 409 stainless steel. Burners and flue collector shall be aluminized steel. 409 stainless steel is recommended when outside air is used for make-up air in areas where outside temperatures are 40 F or below.

☐ Type 409 Stainless Steel Package (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 409 stainless steel. Burners and flue collector shall be 409 stainless steel. 409 stainless steel is recommended where outside air is used for make-up air in areas where outside temperatures are 40 F or below.

☐ Type 321 Stainless Steel (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 321 stainless steel. Burners and flue collector shall be aluminized steel.

☐ Type 321 Stainless Steel Package (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 321 stainless steel. Burners and flue collector shall be 409 stainless steel.

Motors — General

All motors shall be ball bearing type with resilient base mount. Windings are Class "B", 1800 rpm with service factors of 1/2 - 3/4 hp = 1.25 and 1 - 5 hp = 1.15.

☐ Single-Speed Open Drip-proof 60 HZ/1800 RPM
Single-Phase (with contactor) — Optional 115V, 208V and 230V motors available in 1/2 - 2 hp models.

Three-Phase (with contactor) — Optional 208V, 230V and 460V motors available in 1/2 - 5 hp models.

Single-Phase (with magnetic starter) — Optional 115V,208V and 230V motors available in 1/2 - 3 hp models.

Three-Phase (with magnetic starter) — Optional 208V,230V,460V and 575V motors available in 1/2 - 5 hp models.

Mechanical Specifications

☐ Single-Speed TEFC
60 HZ/1800 RPM
Single-Phase (with contactor) — Optional 115V, 208V and 230V motors available in 1/2 - 1 1/2 hp models.

Single-Phase (with magnetic starter) — Optional 115V, 208V and 230V motors available in 1/2 - 3 hp models.

Three-Phase (with magnetic starter) — Optional 208V,230V,460V and 575V motors available in 1/2 - 5 hp models.

☐ Single Speed High Efficiency ODP
60 HZ/1800 RPM
Single-Phase (with contactor) — Optional 115V and 230V motors available in 1/2 - 1 hp models. Optional 208V motors available in 1/2 - 3/4 hp models.

Single-Phase (with magnetic starter) — Optional 115V and 230V motors available in 1/2 - 2 hp models. Optional 208V motors available in 1/2 - 3/4 hp models.

Three-Phase (with magnetic starter) — Optional 208V,230V and 460V motors available in 1/2 - 5 hp models. Optional 575V motors available in 1 - 5 hp models.

☐ Single-Speed High Efficiency TEFC
60 HZ/1800RPM
Single-Phase (with contactor) — Optional 115V and 230V motors available in 1/2 - 1 1/2 hp models.

Single-Phase (with magnetic starter) — Optional 115V and 230V motors available in 1/2 - 2 hp models.

Three-Phase (with magnetic starter) — Optional 230V and 460V motors available in 1/2 - 5 hp models. Optional 208V and 575V available in 1 - 5 hp models.

☐ Two-Speed/One Winding Motors (THREE PHASE ONLY)
60 HZ/1800/900 RPM
Three Phase (with magnetic starter) — Optional 208V, 230V and 460V motors available in 1 - 5 hp models.

☐ Two-Speed/Two Winding Motors
60 HZ/1800/1200 RPM
Single-Phase (with magnetic starter) — Optional 115V and 230V motors available in 1/2 - 1 hp models. Optional 208V motors available in 3/4 - 1 hp models.

Three-Phase (with magnetic starter) — Optional 208V and 230V motors available in 1/2 - 5 hp models. Optional 460V motors available in 1/2 - 3 hp models.

☐ Manual Blower Switch
Manual blower switch shall be factory installed in the electrical cabinet.

Damper Options
Dampers shall be of the opposed blade type, constructed of galvanized steel with neoprene nylon bushings, blades to be mechanically interlocked.

Optional low leak dampers shall be of the opposed blade type, construction of galvanized steel with neoprene nylon bushings and vinyl blade edge seals, blades to be mechanically interlocked.

☐ Outside Air or Return Air/ Two-Position Motor/ Spring Return
Units with outside air or return air only shall be provided with damper, two position spring return damper motor and controls. The motor shall power the damper full open when the unit is on and full closed when the unit is off.

☐ OA/RA Two-Position Spring Return
Two position spring return motor with interlocked outside and return air dampers shall be provided. The motor shall power either the outside air damper full open and the return air damper full closed or the outside air damper full closed and the return air damper full open in response to an outside air temperature sensor (includes an outside air thermostat that makes on a rise in temperature and drives the damper open). When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

☐ OA/RA Modulating Motor W/Mixed Air Control/Min. Pot/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

☐ OA/RA Modulating Motor W/Mixed Air Control/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

☐ OA/RA Modulating Motor W/Min Pot/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall position the outside and return air dampers in response to a manually set potentiometer.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

☐ OA/RA Modulating Motor W/Dry Bulb/Mixed Air Control/Min Pot/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller and dry bulb thermostat located in the mixed air stream. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position.

The spring return feature drives the outside air damper full open and the return air damper full closed when the unit is off.

☐ OA/RA Modulating Motor W/ Enthalpy Controlled Economizer/SR
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to an enthalpy controlled economizer. When the unit is off the motor will drive the outside air damper full closed and the return air damper full open.

Mechanical Specifications

☐ OA/RA Modulating Motor with Space Pressure Controller
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a pressure sensor located in the building. Non-spring return.

☐ OA/RA Modulating Motor W/S-350P Proportional Mixed Air Control/SR
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a solid-state mixed air sensor and S-350 Proportional controller. When the unit is off the motor will drive the outside air damper full closed and the return air damper full open.

☐ OA/RA Mtr. W/External 4-20 mA or 0-10VDC Analog lnput/Spring Return
Modulating motor interlocked with outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a 4-10 mA or 0-10VDC signal supplied by an external DDC controller.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is shut down.

☐ ASHRAE Cycle I - OA/RA 2 pos w/ warm-up stat/SR
Two position spring return motor with interlocked outside and return air dampers shall be provided. The motor shall power the outside air damper full open after a warm up period determined by a minimum supply air temperature sensor when the unit is on, and full closed when the unit is off.

☐ ASHRAE Cycle II - OA/RA Mod W/ Warm-up Stat/Mixed Air/Min Pot/ Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream after a warm up period determined by a minimum supply air temperature sensor. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position. When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

☐ ASHRAE Cycle III - OA/RA Mod. W/ Warm-up Stat/Mixed Air/SR
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream after a warm up period determined by a minimum supply air temperature sensor. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position. When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

☐ Manual Dampers
Units with outside air and return air shall be provided with manually set outside and return air dampers.

Additional Factory Installation Options
Firestat
If temperature reaches the setpoint, the unit will close all gas valves, return the dampers to their normal position and shut down the blower. Manual reset.

☐ Return Air Mounted (setpoint typically 130 F) Standard on Arrangement B-E. Utilized on these arrangements as a reverse airflow switch.

☐ Supply Air Mounted (setpoint typically 150 F)

☐ Freezestat
Rooftop unit shall be provided with a freezestat (0-100 F) with the sensing bulb located in the discharge air stream. Wired as an interlock to prevent cold air discharge.

☐ Orifices for Elevations over 2000 feet

☐ 12" Evaporative Media
12" media shall be provided for the evaporative cooler.

☐ 409 Stainless Steel Furnace Drip Pan
Replaces the standard aluminized steel furnace drip pan.

☐ Foil Face Insulation
Fan section and supply plenum (when provided) shall be insulated with one-inch foil face insulation. Conforms with ASHRAE Standard 62-1989.

☐ Clogged Filter Switch
A clogged filter pressure switch with adjustable operating range and normally open switch shall be installed to sense increased suction pressure by the blower due to filter obstruction. Provision for remote indication shall be provided by terminal block connection points. Includes a status lamp mounted in the electrical cabinet.

☐ Moisture Eliminators
Provided in place of an inlet screen on the outside air hood. Includes a pressure switch.

☐ Horizontal Return
Unit shall be supplied with the return air opening at or under the outside air opening location depending on the Air Inlet Configuration.

Mechanical Specifications

☐ Continuous Fan Relay — 24V Coil DPDT 10A
Relay provided with 24 volt coil and double pole double throw 10 amp contacts. Plugs into the main connection PC board in the electrical cabinet. Included as standard on Arrangement D and E . May also be utilized as an exhaust fan interlock.

☐ Interlock Relay — 24/115V Coil SPDT 10A
Relay has a selectable coil voltage of 24 or 115 volts and single pole double throw 10 amp contacts with LED on indicator lamp. Relay is utilized as an auxiliary relay.

☐ Interlock Relay — 24/115-230V Coil DPDT 10A
Relay has a selectable coil voltage of 24, 115 or 230 volts and double pole double throw 10 amp contacts. Utilized as an auxiliary relay for general purpose duty.

☐ High/Low Gas Pressure Limit Switches
A high pressure and a low pressure interlock switch and shutoff valve shall be provided for each furnace section. High/low gas pressure limits disengage heating upon detecting either high line pressure or low manifold pressure.

☐ Status Indicator Lamps (Electrical Cabinet)
Status indicator lamps shall include power on, blower on and one lamp per stage of heat mounted in the electrical cabinet.

☐ Ambient Lockout

☐ Airflow Proving Switch

Field Installed Accessories

☐ High Gas Line Pressure Regulator
Reduces main gas line pressure to a minimum of 7-inches WC. Pressure at the jobsite must be specified. The regulator is selected to accommodate that specific pressure.

☐ Manual Reset High Limit Switch
The rooftop unit shall be provided with a manual reset high limit switch wired in series to the lead furnace high limit. If the setpoint is reached, the gas valve will close and the blower will continue to run until the sensed temperature is below the setpoint.

☐ Remote Control Station
Wall mounted. Provides six LED status lamps with System On/Off, Fan Auto/On, Heat Auto/Off, Cool Auto/Off, Auxiliary On/Off switching and Modulating damper potentiometer mounting. Designed for easy installation with plug-in terminal block wiring and wall mounting bracket. (Auxiliary On/Off may be used with the Evaporative Cooler fill and drain kit.)

☐ Seven-Day Timeclock
Provides single pole double throw (SPDT) relay output at setpoint time with maximum six setpoints per day.

☐ 24-Hour Timeclock
Provides single pole double throw (SPDT) relay output at setting time with maximum 12 setpoints per day.

☐ Disconnect Switch

☐ 115 V Convenience Outlet
GFI (Ground Fault Convenience Outlet) is manual reset with weatherproof enclosure (requires separate 115V power source)

☐ Roof Mounting Curb
Roof curb shall be shipped unassembled with hardware package and gasket attached. Curb and rail shall total 16-inches high and supplied with a cross-member which allows the isolation of the return and supply air streams (when supplied). Roof curbs can be supplied with one-inch fiberglass insulation.

☐ Evaporative Cooler Platform
Provides mounting support for evaporative cooler only.

☐ Fill and Drain Kit
Includes three-way valve and relay for automatic fill and drain for the evaporative coolers. Optional freezestat provides automatic shutoff and drain upon meeting outside air setpoint.

☐ Optional Filters (One-inch permanent standard)
Two-inch Permanent
Two-inch Throwaway
One-inch 30 percent Pleated Media
Two-inch 30 percent Pleated Media

THERMOSTATS

☐ Low voltage room thermostat, single stage with fan auto-on-switch and system heat-off cool switch

☐ Low voltage room thermostat, single stage with fan auto-on switch

☐ Low voltage room thermostat, two-stage with fan auto-on switch and system off-heat-auto-cool switch

☐ Low voltage programmable room thermostat, two-stage with LCD display, fan auto-on switch and system off-heat-auto-cool switch.

☐ Universal tamperproof guard for all room thermostats

☐ Low voltage duct thermostat, single-stage

☐ Low voltage duct thermostat, two-stage

☐ Room thermostat, electronic modulating control

☐ Duct thermostat, electronic modulating control

☐ Duct thermostat, electronic modulating control with override room thermostat

Arrangement G, J, K, L

GENERAL
Units shall be completely factory assembled, piped, wired and test fired. All units shall contain duct furnaces that are AGA and CGA certified and conform with the latest ANSI Standards for safe and efficient performance. Units shall be mounted on metal rails with lifting and anchor holes and shall be suitable for slab or curb mounting. Units shall be available for operation on either natural or LP (propane) gas.

The firing rate of each furnace will not exceed 400 MBh and shall contain its own heat exchanger, flue collector, venting, burners, safety and ignition controls. All units shall be ETL or UL certified for electrical safety in compliance with UL 1995 safety standard for heating, ventilating and cooling equipment. All units shall be in compliance with FM (Factory Mutual) requirements.

ELECTRICAL
Standard control relays shall be socket mounted with terminal block connections. All control wiring shall terminate at terminal strips (single point connection) and include an identifying marker corresponding to the wiring diagram. Motor and control wiring shall be harnessed with terminal block connections.

Casing
Casings shall be die-formed, 18-gauge galvanized steel and finished in air-dry enamel. Service and access panels shall be provided through easily removable side access panels with captive fasteners. Fan sections and supply plenums (when provided) shall be insulated with fire resistant, odorless, matte-faced one-inch glass fiber material. Outside air hoods, when provided, ship with a wire mesh inlet screen.

Heat Exchanger
Standard heat exchanger construction shall consist of 20-gauge aluminized steel tubes and 18-gauge aluminized steel headers. Standard drip pan construction shall be corrosion resistant aluminized steel.

Flue Collector
Standard flue collector construction shall be corrosion resistant aluminized steel.

Venting System
Natural vent units shall be provided with a vent cap designed for gravity venting. Outside air for combustion enters at the base of the vent cap through a protective grille, and products of combustion are discharged through the upper section of the flue vent cap.

Power vent units shall be provided with a vent fan. Outside air for combustion and products of combustion shall have individual air inlet and discharge grilles located in the upper section of the furnace service panel. An air proving switch shall be installed and disengage gas flow if for any reason the draftor has failed to operate. Power venting and 100 percent shutoff ignition systems are required for compliance with IRI (Industrial Risk Insurers).

Burners
Burners shall be die-formed, corrosion resistant aluminized steel, with stamped porting and stainless steel port protectors. Port protectors prevent foreign matter from obstructing the burner ports. Burners are individually removable for ease of inspection and servicing. The entire burner assembly is easily removed with its slide-out drawer design. The pilot shall be accessible through an access plate without removing the burner drawer assembly.

Coil Section (Standard on Arrangement K and L only)
A coil section, constructed of galvanized steel, shall be provided with the unit. This section shall be insulated with fire resistant, odorless, matte-faced one-inch glass fiber material.

Fans
Centrifugal fan shall be belt driven, forward curved with double inlet, statically and dynamically balanced. The blower wheel shall be fixed on a keyed shaft, supported with rubber grommet on bearing only and ball bearing secured. 7 ½ through 15 hp motors do not have the rubber grommets and are equipped with a pillow block bearing assembly on the drive side. An access interlock switch shall be installed in the blower compartment and will disengage the blower upon removing the service panel. An override shall be incorporated into the access interlock switch for serviceability.

Filters
Filter rack shall be of v-bank design for minimal pressure drop and be constructed of galvanized steel with access through the side service panel. Standard filters are one-inch permanent washable type.

Electrical Cabinet
Electrical cabinet shall be isolated from the air stream with a non-removable access panel interior to the outer service panel. There is provision in this cabinet for component mounting, wire routing and high voltage isolation. Motor and control wiring shall be harnessed with terminal block connections.

Controls
Standard units shall be provided with 24-volt combination single-stage automatic gas valves, including main operating valve and pilot safety shutoff, pressure regulator, manual main and pilot shutoff valve, and adjustable pilot valve. Gas valves shall be suitable for NEC Class 2 use for a maximum inlet gas pressure of 0.5 psi (14" WC) on natural gas. All rooftop units shall be provided with a low voltage circuit breaker rated for 150 percent of the units normal 24-volt operating load.

Each duct furnace shall be provided with a 24-volt high temperature limit switch, a (redundant) combination gas valve and a fan time delay relay. The fan time delay relay minimizes cold blasts of air on start-up. It also allows the fan to operate after burner shutdown, removing residual heat from the heat exchanger. All rooftop furnace units shall contain a reverse airflow interlock switch. The normally closed switch, when activated, shall cause gas valves to close and continue blower operation. All units provided with a solid state ignition control system which ignites the intermittent pilot by spark during each cycle of operation. When pilot flame is proven, main burner valve opens to allow gas flow to the burners. Pilot and burners are extinguished during the off cycle.

Mechanical Specifications

FACTORY INSTALLED OPTIONS

Control Options (Per Furnace)

☐ Two-Stage Gas Valve
Provides two stages of heat. Ignition is at low fire (one half of the unit's full rated input). Requires the use of an optional two-stage thermostat.

☐ Hydraulic Modulating Gas Valve
Provides modulated heat output. Ignition is at low fire (one-half of the unit's full rated input), and a discharge air temperature sensing bulb located in the air stream shall modulate the gas input from 40 percent to 100 percent rated input. Provided with an automatic electric valve in series with the hydraulic valve which cycles the unit in response to an optional low voltage single-stage thermostat.

☐ Hydraulic Modulating Gas Valve with Bypass
Provides modulated heat output. Ignition is at low fire (one-half of the unit's full rated input), and a discharge temperature sensing bulb located in the air stream shall modulate the gas input from 40 percent to 100 percent rated input. Provided with an automatic electric valve in series with the hydraulic valve which cycles the unit. An additional electric valve in parallel bypasses the hydraulic modulating valve, overriding the discharge temperature sensing bulb, allowing full fire. Requires the use of an optional thermostat to control the electric valve.

☐ Electronic Modulating — Room or Duct Stat Control
Provides modulated heat output. An automatic valve in series with the modulating valve shall be provided to cycle the unit. Ignition is at full fire (100 percent input), and modulates the gas input from 100 percent to 40 percent rated input. Available for use with a room thermostat or duct thermostat with remote setpoint adjustment. Duct thermostat available with optional override room thermostat which causes the unit to go to full fire when the room temperature falls below the override room thermostat's setpoint.

☐ Electronic Modulating — 4-20 mA/ 0-10 VDC Input
Provides modulated heat output. Ignition is at full fire (100 percent input), and modulates the gas input from 100 percent to 40 percent rated input.

The modulating gas valve shall operate in response to a 4-20 mA or a 0-10 VDC input from an external DDC control.

When "furnace one only" is specified on double and triple furnaces, additional furnace sections will have single-stage on-off control.

☐ VAV Control
Unit provided with factory-mounted discharge air controller, discharge air sensor, outdoor air reset, summer/ winter thermostat and velocity pressure switch. The outdoor air reset range is from 10 F to 60 F. Full reset occurs at 10 F outside air temperature. There is a straight line relationship between outside air temperature and reset. Therefore, at 60 F outside air temperature, no reset will occur. The amount of reset is adjustable from 20 F to 50 F. Discharge air controller provides two-minute delay between successive on and off stages. A summer/winter thermostat locks out heating when outside air temperature is above 55 F. The velocity pressure switch is provided for protection against high temperatures at low airflows.

Available in two-stage (half of the unit's full rated input), three-stage (33 percent of the unit's full rated input) and four-stage (25 percent of the unit's full rated input). Three and four-stage available on double and triple furnace units only.

☐ S-350 Modular Electronic Control System
Basic system utilizes a controller module with discharge air sensor, setpoint and one-stage output, a stage module with differential setpoint and one-stage output and a display module with LCD display for temperature readout. The system stages the units rate of fire based upon sensed discharge air temperature, setpoint setting and differential setting between stages.

Provided as a two-stage (all furnaces), three and four-stage (double and triple furnaces only) and six-stage (triple furnace only).

Heat Exchanger Options

☐ Type 409 Stainless Steel (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 409 stainless steel. Burners and flue collector shall be aluminized steel. 409 stainless steel is recommended when outside air is used for make-up air in areas where outside temperatures are 40 F or below.

☐ Type 409 Stainless Steel Package (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 409 stainless steel. Burners and flue collector shall be 409 stainless steel. 409 stainless steel is recommended where outside air is used for make-up air in areas where outside temperatures are 40 F or below.

☐ Type 321 Stainless Steel (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 321 stainless steel. Burners and flue collector shall be aluminized steel.

☐ Type 321 Stainless Steel Package (one or all furnaces)
Heat exchanger tubes and headers shall be 20-gauge type 321 stainless steel. Burners and flue collector shall be 409 stainless steel.

Mechanical Specifications

Motors — General
All motors shall be ball bearing type with resilient base mount and NEMA frame sizes from 48 to 256T. Windings are Class "B", 1800 rpm with service factors of 1/2 - 3/4 hp = 1.25 and 1 - 15 hp = 1.15.

☐ Single-Speed Open Drip-proof
60 HZ/1800 RPM
Single-Phase (with contactor) — Optional 115V, 208V and 230V motors available in 1/2 - 2 hp models.

Three-Phase (with contactor) — Optional 208V, 230V and 460V motors available in 1/2 - 5 hp models.

Single-Phase (with magnetic starter) — Optional 115V, 208V and 230V motors available in 1/2 - 3 hp models.

Three-Phase (with magnetic starter) — Optional 208V, 230V, 460V and 575V motors available in 1/2-15 hp models.

☐ Single-Speed TEFC
60HZ/1800 RPM
Single-Phase (with contactor) — Optional 115V, 208V and 230V motors available in 1/2 - 1 1/2 hp models.

Single-Phase (with magnetic starter) — Optional 115V, 208V and 230V motors available in 1/2 - 3 hp models.

Three-Phase (with magnetic starter) — Optional 208V, 230V, 460V and 575V motors available in 1/2 - 15 hp models.

☐ Single-Speed High Efficiency ODP
60 HZ/1800 RPM
Single-Phase (with contactor) — Optional 115V and 230V motors available in 1/2 - 1 hp models. Optional 208V motors available in 1/2 - 3/4 hp models.

Single-Phase (with magnetic starter) — Optional 115V and 230V motors available in 1/2 - 2 hp models. Optional 208V motors available in 1/2 - 3/4 hp models.

Three-Phase (with magnetic starter) — Optional 208V,230V and 460V motors available in 1/2 - 15 hp models. Optional 575V motors available in 1 - 15 hp models.

☐ Single-Speed High Efficiency TEFC
60 HZ/1800RPM
Single-Phase (with contactor) — Optional 115V and 230V motors available in 1/2 - 1 1/2 hp models.

Single-Phase (with magnetic starter) — Optional 115V and 230V motors available in 1/2 - 2 hp models.

Three-Phase (with magnetic starter) — Optional 230V and 460V motors available in 1/2 - 15 hp models. Optional 208V and 575V available in 1 - 15 hp models.

☐ Two-Speed/One Winding Motors (Three-Phase Only)
60 HZ/1800/900 RPM
Three-Phase (with magnetic starter) — Optional 208V, 230V and 460V motors available in 1 - 15 hp models.

☐ Two-Speed/Two Winding Motors
60 HZ/1800/1200 RPM
Single-Phase (with magnetic starter) — Optional 115V and 230V motors available in 1/2 - 1 hp models. Optional 208V motors available in 3/4 - 1 hp models.

Three-Phase (with magnetic starter) — Optional 208V and 230V motors available in 1/2 - 15 hp models. Optional 460V motors available in 1/2 - 3 hp and 7 1/2 - 10 hp models. Optional 575V motors available in 7 1/2 - 10 hp models.

☐ Manual Blower Switch
Manual blower switch shall be factory installed in the electrical cabinet.

☐ DX or Chilled Water Cooling Coils
A direct expansion (DX) or chilled water coil certified by ARI shall be provided with the unit.

Damper Options
Dampers shall be of the opposed blade type, constructed of galvanized steel with neoprene nylon bushings, blades to be mechanically interlocked. Optional low leak dampers shall be of the opposed blade type, construction of galvanized steel with neoprene nylon bushings and vinyl blade edge seals, blades to be mechanically interlocked.

☐ Outside Air or Return Air/ Two-Position Motor/ SR — Units with outside air or return air only shall be provided with damper, two-position spring return damper motor and controls. The motor shall power the damper full open when the unit is on and full closed when the unit is off.

☐ OA/RA Two-Position SR
Two position spring return motor with interlocked outside and return air dampers shall be provided. The motor shall power either the outside air damper full open and the return air damper full closed or the outside air damper full closed and the return air damper full open in response to an outside air temperature sensor (Includes an outside air thermostat that makes on a rise in temperature and drives the damper open). When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

☐ OA/RA Mod Mtr. W/Mixed Air Control/Min. Pot/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

☐ OA/RA Mod Mtr. W/Mixed Air Control/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

☐ OA/RA Mod Mtr W/Min Pot/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall position the outside and return air dampers in response to a manually set potentiometer.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is off.

☐ OA/RA Mod Mtr W/Dry Bulb/Mixed Air Control/Min Pot/Spring Return
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller and dry bulb thermostat located in the mixed air stream. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position.

The spring return feature drives the outside air damper full open and the return air damper full closed when the unit is off.

☐ OA/RA Mod Mtr W/Enthalpy Controlled Economizer/SR
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to an enthalpy controlled economizer. When the unit is off the motor will drive the outside air damper full closed and the return air damper full open.

☐ OA/RA Mod Mtr W/ Space Pressure Controller
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a pressure sensor located in the building. Non-spring return.

☐ OA/RA Mod Mtr W/S-350P Proportional Mixed Air Control/SR
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a solid-state mixed air sensor and S-350 proportional controller. When the unit is off the motor will drive the outside air damper full closed and the return air damper full open.

☐ OA/RA Mtr. W/External 4-20 mA or 0-10VDC Analog Input/Spring Return
Modulating motor interlocked with outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a 4-10 mA or 0-10VDC signal supplied by an external DDC controller.

The spring return feature drives the outside air damper full closed and the return air damper full open when the unit is shut down.

☐ ASHRAE Cycle I (OA/RA Two-Position w/warm-up stat/SR)
Two-position spring return motor with interlocked outside and return air dampers shall be provided. The motor shall power the outside air damper full open after a warm up period determined by a minimum supply air temperature sensor when the unit is on, and full closed when the unit is off.

☐ ASHRAE Cycle II (OA/RA Mod W/ Warm-up Stat/Mixed Air/Min Pot/ Spring Return)
Modulating motor with interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream after a warm-up period determined by a minimum supply air temperature sensor. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position. When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

☐ ASHRAE Cycle III (OA/RA Mod. W/ Warm-up Stat/Mixed Air/SR
Modulating motor with spring return and interlocked outside and return air dampers shall be provided. The motor shall modulate the position of the outside and return air dampers in response to a thermostatic controller located in the mixed air stream after a warm-up period determined by a minimum supply air temperature sensor. Units shall also be provided with a minimum position potentiometer for minimum outside air damper position. When the unit is off, the motor will drive the outside air damper full closed and the return air damper full open.

☐ Manual Dampers
Units with outside air and return air shall be provided with manually set outside and return air dampers.

Additional Factory Installed Options
Firestat
If temperature reaches the setpoint, the unit will close all gas valves, return the dampers to their normal position and shut down the blower. Manual reset.

☐ Return Air Mounted (setpoint typically 130 F) Standard on Arrangement G-L. Utilized on these arrangements as a reverse airflow switch.

☐ Supply Air Mounted (setpoint typically 150 F)

☐ Freezestat
Rooftop unit shall be provided with a freezestat (0-100 F) with the sensing bulb located in the discharge air stream. Wired as an interlock to prevent cold air discharge.

Orifices for Elevations over 2000 feet

☐ 409 Stainless Steel Furnace Drip Pan
Replaces the standard aluminized steel furnace drip pan.

☐ Foil Face Insulation
Fan section and supply plenum (when provided) shall be insulated with one-inch foil face insulation. Conforms with ASHRAE Standard 62-1989.

☐ Clogged Filter Switch
A clogged filter pressure switch with adjustable operating range and normally open switch shall be installed to sense increased suction pressure by the blower due to filter obstruction. Provision for remote indication shall be provided by terminal block connection points. Includes a status lamp mounted in the electrical cabinet.

☐ Moisture Eliminators
Provided in place of an inlet screen on the outside air hood. Includes a pressure switch.

☐ Horizontal Return
Unit shall be supplied with the return air opening at or under the outside air opening location depending on the Air Inlet Configuration.

☐ Continuous Fan Relay — 24V Coil DPDT 10A
Relay provided with 24-volt coil and double pole double throw 10 amp contacts. Plugs into the main connection PC board in the electrical cabinet. May also be utilized as an exhaust fan interlock.

☐ Interlock Relay — 24/115V Coil SPDT 10A
Relay has a selectable coil voltage of 24 or 115-volts and single pole double throw 10 amp contacts with LED on indicator lamp. Relay is utilized as an auxiliary relay.

☐ Interlock Relay — 24/115-230V Coil DPDT 10A
Relay has a selectable coil voltage of 24, 115 or 230-volts and double pole double throw 10 amp contacts. Utilized as an auxiliary relay for general purpose duty.

☐ High/Low Gas Pressure Limit Switches
A high pressure and a low pressure interlock switch and shutoff valve shall be provided for each furnace section. High/low gas pressure limits disengage heating upon detecting either high line pressure or low manifold pressure.

☐ Status Indicator Lamps (Electrical Cabinet)
Status indicator lamps shall include power on, blower on and one lamp per stage of heat mounted in the electrical cabinet.

☐ Ambient Lockout

☐ Airflow Proving Switch

Field Installed Accessories
☐ Manual Reset High Limit Switch
The rooftop unit shall be provided with a manual reset high limit switch wired in series to the lead furnace high limit. If the setpoint is reached, the gas valve will close and the blower will continue to run until the sensed temperature is below the setpoint.

☐ High Gas Line Pressure Regulator
Reduces main gas line pressure to a minimum of 7-nches WC. Pressure at the jobsite must be specified. The regulator is selected to accommodate that specific pressure.

☐ Remote Control Station
Wall mounted. Provides six LED status lamps with System On/Off, Fan Auto/On, Heat Auto/Off, Cool Auto/Off, Auxiliary On/Off switching and Modulating damper potentiometer mounting. Designed for easy installation with plug-in terminal block wiring and wall mounting bracket. (Auxiliary On/Off may be used with the Evaporative Cooler fill and drain kit.)

☐ Seven-Day Timeclock
Provides single pole double throw (SPDT) relay output at setpoint time with maximum six setpoints per day.

☐ 24-Hour Timeclock
Provides single pole double throw (SPDT) relay output at setting time with maximum 12 setpoints per day.

☐ Disconnect Switch

☐ 115V Convenience Outlet
GFI (Ground Fault Convenience Outlet) is manual reset with weatherproof enclosure (requires separate 115V power source).

☐ Roof Mounting Curb
Roof curb shall be shipped unassembled with hardware package and gasket attached. Curb and rail shall total 16-inches high and supplied with a cross-member which allows the isolation of the return and supply air streams (when supplied).

Roof curb can be supplied with one-inch fiberglass insulation.

☐ Optional Filters (One-inch permanent standard)

Two-inch permanent

Two-inch Throwaway

One-inch 30 percent Pleated Media

Two-inch 30 percent Pleated Media

THERMOSTATS
☐ Low voltage room thermostat, single-stage with fan auto-on-switch and system heat-off cool switch

☐ Low voltage room thermostat, single-stage with fan auto-on switch

☐ Low voltage room thermostat, two-stage with fan auto-on switch and system off-heat-auto-cool switch

☐ Low voltage programmable room thermostat, two stage with LCD display, fan auto-on switch and system off-heat-auto-cool switch.

☐ Universal tamperproof guard for all room thermostats

☐ Low voltage duct thermostat, single-stage

☐ Low voltage duct thermostat, two-stage

☐ Room thermostat, electronic modulating control

☐ Duct thermostat, electronic modulating control

☐ Duct thermostat, electronic modulating control with override room thermostat

Evaporative Cooler

General
An evaporative cooler with 8-inch media shall be provided. The evaporative cooler shall be of a self-cleaning design with a stainless steel water tank, regulated water flow and overflow protection. The cooler shall have a cabinet assembly of heavy-gauge aluminized steel with weatherproof finish, a UL recognized, thermally protected sealed recirculating pump motor, two-inch distribution pad, and corrosion resistant PVC water distribution tubes.

Factory Installed Options
☐ 12" Evaporative Media
12" media shall be provided for the evaporative cooler.

Field Installed Accessories
☐ Evaporative Cooler Platform
Provides mounting support for evaporative cooler only

☐ Fill and Drain Kit
Includes three-way valve and relay and automatic fill and drain for the evaporative cooler.

☐ Freezestat
Freezestat provides automatic shutoff and drain upon meeting outside air setpoint.

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An American Standard Company

Library	**Product Literature**
Product Section	**Air Handling**
Product	**Make-Up Air**
Model	**000**
Literature Type	**Data Sales Catalog**
Sequence	**5**
Date	**January 1998**
File No.	**PL-AH-MUA-000-DS-5-198**
Supersedes	**MUA-DS-5 595**
Ordering No.	**MUA-DS-5**