

AR12-411 ALTERNATIVE REFRIGERANT HEAT PUMP OUTDOOR UNIT

AR12

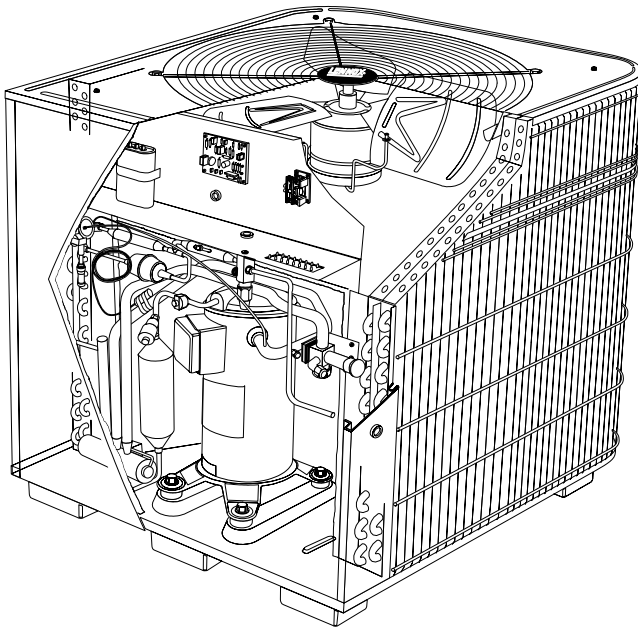
12.10 to 13.00 SEER

Field Trial Units

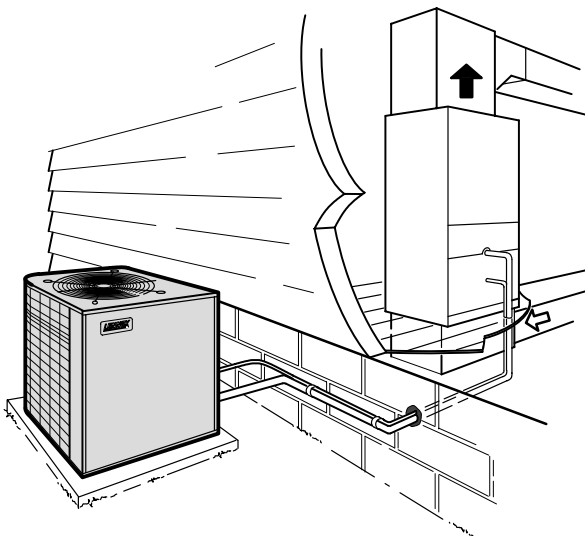
June 1995

***34,800 to 36,200 Btuh (20.4 to 21.2 kW) Cooling Capacity**

***38,000 to 38,500 Btuh (22.3 to 22.6 kW) Heating Capacity**



Typical Application



Application — Energy efficient AR12 outdoor unit is designed for applications with remotely located indoor blower-coil units or indoor add-on coils in FM21 installations. The outdoor unit is equally suited for installation on a slab at grade level or on a rooftop. A variety of matching up-flo, down-flo and horizontal blower powered indoor units, with optional supplemental electric heat, provide selective sizing and installation versatility. For FM21 applications, see bulletin indexed in this tab section. For indoor unit data, see section, Coils-Blower Coil Units. Outdoor units are test operated at the factory to insure proper operation and shipped ready for installation. Installer has only to locate unit and make refrigerant line and electrical connections.

Approvals — Units have been tested with matching indoor units in the Lennox Research Laboratory and rated according to U.S. Department of Energy (DOE) test procedures and in accordance with conditions included in ARI Standard 210/240-89. Field trial units are not certified by ARI and ratings will not appear in ARI directory. In addition, units have been sound rated in the Lennox reverberant sound test room in accordance with conditions included in ARI Standard 270-84. Units and components within are bonded for grounding to meet safety standards for servicing required by U.L., N.E.C. and C.E.C. Units are U.L. listed and C.S.A. certified.

Alternative Refrigerant Equipped — AR12 units are equipped with SUVA 9000 407C refrigerant. Refrigerant is non-ozone depleting and takes the place of conventional HCFC-22 refrigerant.

Equipment Warranty — The compressor has a limited warranty for ten years in residential installations and five years in non-residential installations. All other covered components have a limited warranty for five years. Refer to Lennox Equipment Limited Warranty included with the unit for specific details.

Copeland® Compliant Scroll™ Compressor — High efficiency compressor features durability, steady uniform suction flow, constant discharge flow, high volumetric efficiency, quiet operation and the ability to start under any system load. Use of the scroll compressor eliminates the need for accumulator, crankcase heater, start capacitor and start relay. The compliant scroll type compressor is a simple compression concept design consisting of two involute spiral scrolls matched together to generate a series of crescent-shaped gas pockets between them. During compression, one scroll is stationary while the other is allowed to orbit, not rotate, around the fixed one. As this motion occurs, gas is drawn into the outer pocket sealing off the open passage. As the spiral movement continues, the pockets between the scrolls are slowly pushed to the center of the scrolls while simultaneously being reduced in volume. When the pocket reaches the center, the gas is now at high pressure and is forced out of a port located in the center of the fixed scroll. During compression, several pockets are being compressed simultaneously resulting in a smooth, nearly continuous compression cycle. Continuous flank contact, maintained by centrifugal force, minimizes gas leakage and maximizes efficiency. The scroll compressor is tolerant to the effects of liquid slugging and contaminants. Should this occur, the scrolls separate and allow the liquid or contaminants to be worked to the center and discharged. Low gas pulses during compression minimize operational sound level. Factory installed muffler in discharge line, external to the compressor, provides additional sound reduction. Motor is internally protected from excessive current and temperature. Discharge temperature thermostat protects compressor from high discharge temperature. Compressor is installed in the unit on resilient rubber mounts, assuring vibration free operation.

FEATURES — ELITE™ SERIES

Durable Steel Cabinet — Heavy gauge galvanized steel cabinet is subject to a five station metal wash process. This preparation process results in a perfect bonding surface for the finish coat of baked-on outdoor enamel. The attractive enamel finish gives the cabinet long lasting protection from the weather. Drainage holes are furnished in base section for moisture removal. High density polyethylene base channels raise the unit off of the mounting surface away from damaging moisture. A non-corrosive PVC coated steel wire outdoor coil guard is furnished.

Compressor and Controls Compartment — Separate compressor and controls compartment protects all components from weather conditions and keeps sound transmission at a minimum. Large removable access panel provides complete service access.

Accessible Control Box — Large size and conveniently located in the compressor and controls compartment for easy access. All controls are pre-wired at the factory. A low voltage terminal strip is furnished for ease of field wiring connections.

Powerful Outdoor Fan — Efficient direct drive fan moves large volumes of air uniformly through the entire outdoor coil resulting in high refrigerant cooling capacity. Vertical discharge of air minimizes operating sounds and eliminates hot air damage to lawn and shrubs. Fan motor is totally enclosed for maximum protection from weather, dust and corrosion. A rain shield on the motor provides additional protection from moisture. Fan service access is accomplished by removal of fan guard. Corrosion resistant PVC coated steel wire fan guard is furnished as standard.

Copper Tube Outdoor Coil — Lennox designed and fabricated coil is constructed of precisely spaced ripple-edge aluminum fins machine fitted to seamless copper tubes. Precise coil circuiting gives uniform refrigerant distribution for high efficiency. Extra large wraparound "U" shaped coil configuration provides extra large surface area for excellent heat transfer with minimum air resistance. Fins are equipped with collars that grip tubing for maximum contact area. Inverted coil circuiting prevents ice buildup at coil base in low ambients. Discharge gas enters bottom of coil during defrost and heat of refrigerant flows counter to water drainage resulting in extremely clean and unobstructed fins and tubes. Fin spacing allows rapid and complete water drainage. Flared tubing connections and silver soldering provide tight, leakproof joints. Long life copper tubing is corrosion-resistant and easy to service. Coil is factory tested under high pressure to insure leakproof construction. Entire coil is accessible for cleaning.

Defrost Control — Solid-state defrost control is furnished as standard equipment. It gives a defrost cycle (14 minutes) for every 30, 60 or 90 minutes (adjustable) of compressor "on" time at outdoor temperature below 35°F (2°C). Sensing element mounted on liquid line determines when defrost cycle is required and also when to terminate cycle. Timed-off function prevents compressor short-cycling and also allows time for suction and discharge pressure to equalize, permitting compressor to start in unloaded condition. Automatic reset control provides a five minute time delay between compressor shutoff and start-up. Diagnostic LED's on control furnished as servicing aid.

Refrigerant Line Connections, Electrical Inlets and Service Valves — Liquid and vapor line connections are located inside the unit cabinet and are made with sweat connections. Field wiring inlets are conveniently located for ease of entry. Fully serviceable brass service valves prevent corrosion and provide easy access to refrigerant system. Liquid and vapor valves can be fully shut off, and the liquid valve can be front seated to manage refrigerant charge while servicing the system. Factory installed thermometer well is furnished in the liquid line. In addition, a high capacity drier with internal check valve and strainer are furnished and factory installed in the liquid line.

Reversing Valve — 4-way interchange reversing valve effects a rapid change in direction of refrigerant flow resulting in quick changeover from cooling to heating and vice versa. Valve operates on pressure differential between outdoor unit and indoor unit of the system. Factory installed.

Expansion Valve — Designed and sized specifically for use in heat pump system. Sensing bulb is located on the suction line between reversing valve and compressor thus sensing suction temperature in any cycle. Factory installed and piped.

Service Light Thermostat — Factory installed on the compressor discharge line. Required for operation of conditioned area thermostat with service light.

Ambient Compensating Thermistor — Reduces thermostat droop to improve the operating characteristics of the heat pump system. The thermistor varies the heat anticipator resistance as ambient temperature changes. Factory installed in the discharge air stream.

OPTIONAL ACCESSORIES (Must Be Ordered Extra)

Thermostat (Optional) — Thermostat is not furnished with the unit and must be ordered extra. See Thermostats bulletin in Accessories Section and Lennox Price Book.

Low Ambient Control Kit (Optional) — Units will operate satisfactorily in the cooling mode down to 45°F (7°C) outdoor air temperature without any additional controls. For cases where operation of the unit is required at low ambients, A Low Ambient Control Kit LB-57113BM (**27J00**) can be added in the field, enabling the unit to operate properly down to 30°F (-1°C).

Refrigerant Line Kits (Optional) — Lines are available in several lengths and must be ordered extra. See Refrigerant Line Kit table for selection. The refrigerant lines (vapor and liquid) are shipped refrigeration clean. Lines are cleaned, dried, pressurized and sealed at the factory. Vapor line is fully insulated. L15 line sets are stubbed at both ends. Refrigerant line length should not exceed 50 ft. (15 m) in any installation. If longer length lines are required, contact your Lennox District Service Manager.

Mounting Base (Optional) — Rugged mounting base MB2-L (**69J07**) provides permanent foundation for outdoor unit. High density polyethylene structural material is lightweight, sturdy, sound absorbing and will withstand the rigors of the sun, heat, cold, moisture, oil and refrigerant. Will not mildew or rot. Can be shipped singly or in packages of 6 to a carton. 32" x 34" x 3" (813mm x 864mm x 76mm) shipping weight 15 lbs. (7 kg) each.

Outdoor Thermostat Kit (Optional) — An outdoor thermostat can be used to lock out some of the electric heating elements on indoor units where two stage control is applicable. Outdoor thermostat maintains the heating load on the low power input as long as possible before allowing the full power load to come on the line. Thermostat kit LB-29740BA (**56A87**) and mounting box M-1595 (**31461**) or Φ BM-10260 (**33A09**) must be ordered extra.

SPECIFICATIONS

Model No.			AR12-411
Condenser Coil	Net face area sq. ft. (m ²)	Outer Coil	15.94 (1.48)
		Inner Coil	15.34 (1.43)
	Tube diameter — in. (mm)		3/8 (9.5)
	No. of rows		2
	Fins per inch (m)		18 (709)
Condenser Fan	Diameter in. (mm) — No. of blades		24 (610) — 3
	Motor hp (W)		1/6 (124)
	Cfm (L/s)		3350 (1580)
	Rpm		820
	Watts		210
*Refrigerant furnished (R-407C)			10 lbs. 9 oz. (4.79 kg)
Liquid line conn. o.d. — in. (mm) (sweat)			3/8 (9.5)
Vapor line conn. o.d. — in. (mm) (sweat)			3/4 (19)
Shipping wt. — lbs. (kg) 1 package			236 (107)

*Refrigerant charge sufficient for 20 ft. (6.1 m) length of refrigerant lines.

ELECTRICAL DATA

Model No.			AR12-411
Line voltage data			208/230v 60hz-1ph
Compressor	Rated load amps		16.1
	Power factor		.96
	Locked rotor amps		88
Outdoor Coil Fan Motor	Full load amps		1.1
	Locked rotor amps		2.0
Rec. max. fuse or circuit breaker size (amps)			35
*Minimum circuit ampacity			21.3

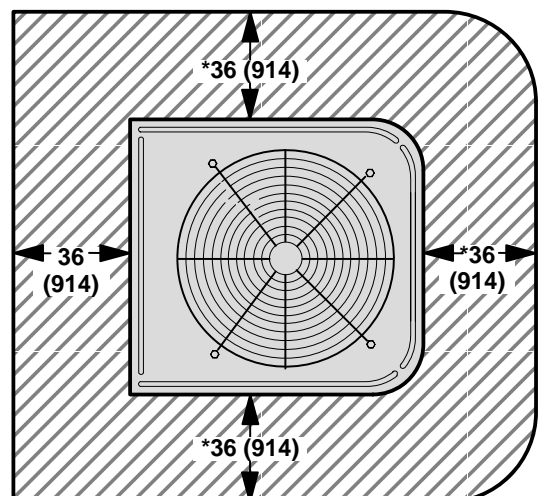
*Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus 10% and minus 5% of line voltage.

REFRIGERANT LINE KITS

Outdoor Unit Model No.	Line Set Model No.	Line Length		Liquid Line (o.d.)		Vapor Line (o.d.)	
		ft.	m	in.	mm	in.	mm
AR12-411	L15-41-20	20	6	3/8	9.5	3/4	19
	L15-41-30	30	9				
	L15-41-40	40	12				
	L15-41-50	50	15				

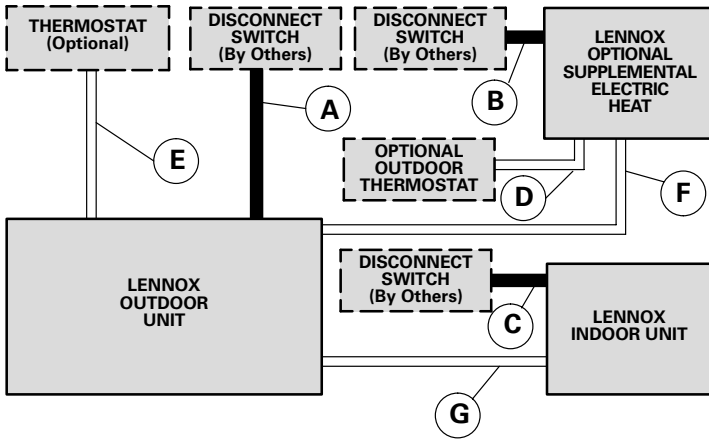
NOTE — Refrigerant line set should not exceed 50 ft. (15m) in any installation.

INSTALLATION CLEARANCES - inches (mm)



NOTE — 48" (1219 mm) clearance required on top of unit.
*NOTE — Two sides of coil may be 12 (305) inches.

FIELD WIRING

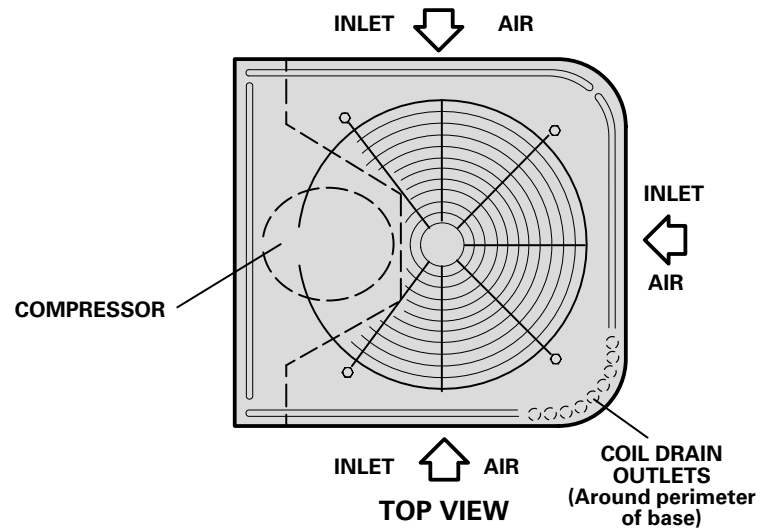


- A – Two Wire Power (see Electrical Data)
- B – Two or Three Wire Power (size to heater capacity)
- C – Two Wire Power (size to indoor coil blower motor)
- D – Two Wire Low Voltage – 18 ga. minimum
- E – Eight Wire Low Voltage – 18 ga. minimum – with Electric Heat
– Ten Wire Low Voltage with Optional Outdoor Thermostat
- F – Four Wire Low Voltage – 18 ga. minimum
- G – Three Wire Low Voltage – 18 ga. minimum

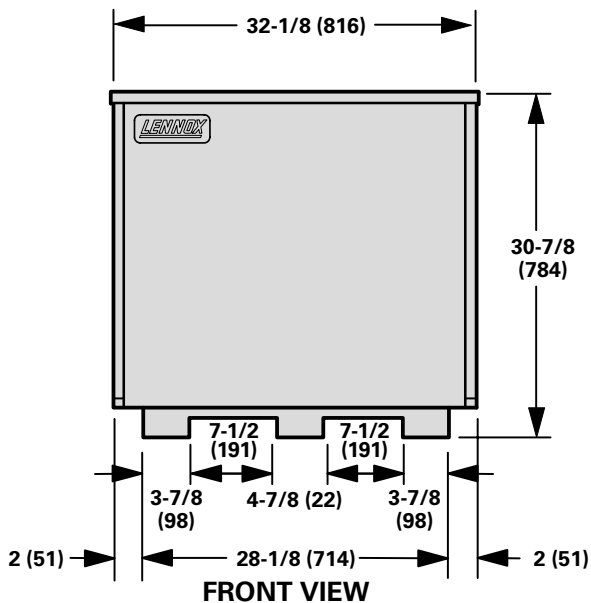
– Field Wiring Not Furnished –

All wiring must conform to NEC or CEC and local electrical codes.

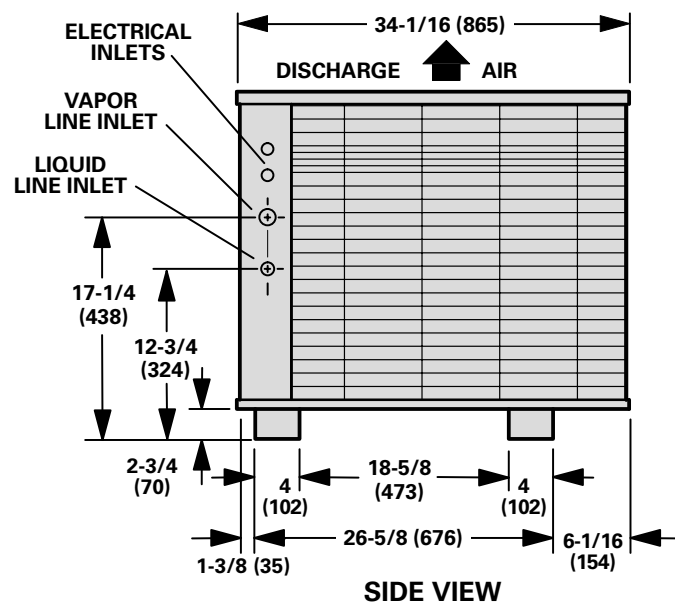
DIMENSIONS – inches (mm)



INLET AIR
INLET AIR
TOP VIEW



FRONT VIEW



SIDE VIEW

RATINGS

Outdoor Unit Model No. ★Sound Rating Number (bels)	†Ratings											Indoor Unit	Check and Expansion Valve Kit Required
	Cool. Cap. Btuh (kW)	High Temp. Htg. Cap. Btuh (kW)	Low Temp. Htg. Cap. Btuh (kW)	Total Unit Cool. Watts	SEER (EER) (Btuh/Watt)	Cool. C.O.P.	Total Unit High Temp. Htg. Watts	◆HSPF Region IV	High Temp. Htg. C.O.P.	Total Unit Low Temp. Htg. Watts	Low Temp. Htg. C.O.P.		
AR12-411 (7.6)	34,800 (20.4)	38,000 (22.3)	22,200 (13.0)	3260	12.80 (10.70)	3.14	3400	7.60	3.3	2990	2.2	*CB19-41, *CBH19-41	●Factory Installed
	35,000 (20.5)	38,500 (22.6)	22,400 (13.1)	3420	12.10 (10.20)	2.99	3530	7.20	3.2	3100	2.1	**C26-51(FC)	
	36,200 (21.2)	38,500 (22.6)	22,400 (13.1)	3360	13.00 (10.80)	3.17	3350	7.60	3.4	2950	2.2	*CB19-51, *CBH19-51	

★Sound Rating Number in accordance with conditions included in ARI Standard 270.

◆Heating Seasonal Performance Factor.

†Rated in accordance with conditions included in ARI Standard 210/240 with 25 ft. (7.6 m) of connecting refrigerant lines;

NOTE — Field trial units are not certified and ratings will not appear in the ARI directory.

Cooling Ratings — 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering indoor coil air.

High Temperature Heating Ratings — 47°F (8°C) db/43°F (6°C) wb outdoor air temperature and 70°F (21°C) db entering indoor coil air.

Low Temperature Heating Ratings — 17°F db/15°F wb outdoor air temperature and 70°F (21°C) db entering indoor coil air.

●Furnished as standard with coil unit.

*Blower powered indoor coil unit.

**For FM21 Heat Pump Control use with any Lennox furnace that meets system design requirements. See FM21 bulletin in this section for additional data.

COOLING AND HEATING RATINGS

NOTE — For Temperatures and Capacities not shown in tables, see bulletin — Cooling Unit Rating Table Correction Factor Data in Miscellaneous Engineering Data section.

AR12-411 — COOLING CAPACITY — CB19-41 — CBH19-41

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																							
			85°F (29°C)						95°F (35°C)						105°F (41°C)						115°F (46°C)					
			Total Cooling Capacity		Compressor Motor Watts Input	Sensible To Total Ratio (S/T)			Total Cooling Capacity		Compressor Motor Watts Input	Sensible To Total Ratio (S/T)			Total Cooling Capacity		Compressor Motor Watts Input	Sensible To Total Ratio (S/T)			Total Cooling Capacity		Compressor Motor Watts Input	Sensible To Total Ratio (S/T)		
			L/s	cfm		kW	Btuh	Dry Bulb	75°F 24°C	80°F 27°C		85°F 29°C	kW	Btuh	Dry Bulb	75°F 24°C		80°F 27°C	85°F 29°C	kW	Btuh	Dry Bulb		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17.2°C)	540	1150	10.3	35,300	2380	.77	.92	1.00	9.9	33,700	2690	.78	.94	1.00	9.3	31,800	3030	.80	.95	1.00	8.7	29,600	3430	.82	.97	1.00
	615	1300	10.6	36,000	2390	.81	.96	1.00	10.1	34,500	2690	.82	.97	1.00	9.5	32,500	3040	.84	.99	1.00	8.9	30,300	3440	.85	1.00	1.00
	685	1450	10.8	36,800	2390	.84	.99	1.00	10.3	35,200	2700	.85	1.00	1.00	9.8	33,300	3050	.87	1.00	1.00	9.1	31,100	3450	.89	1.00	1.00
67°F (19.4°C)	540	1150	10.9	37,300	2390	.60	.75	.89	10.4	35,600	2700	.60	.76	.91	9.8	33,600	3050	.61	.78	.92	9.1	31,100	3450	.62	.79	.94
	615	1300	11.1	37,900	2400	.62	.78	.93	10.6	36,200	2710	.62	.80	.95	10.0	34,100	3060	.63	.81	.96	9.3	31,600	3460	.65	.83	.98
	685	1450	11.3	38,500	2400	.64	.82	.97	10.8	36,700	2710	.65	.83	.98	10.1	34,600	3060	.66	.85	.99	9.4	32,100	3460	.67	.87	1.00
71°F (21.7°C)	540	1150	11.7	39,800	2410	.44	.58	.72	11.1	38,000	2720	.44	.59	.74	10.5	35,800	3070	.44	.60	.75	9.7	33,200	3470	.45	.61	.77
	615	1300	11.8	40,400	2410	.44	.60	.76	11.3	38,600	2720	.45	.61	.77	10.6	36,300	3070	.45	.62	.79	9.9	33,700	3470	.46	.63	.81
	685	1450	12.0	40,900	2420	.45	.63	.79	11.4	39,000	2720	.46	.64	.81	10.8	36,700	3080	.46	.65	.83	10.0	34,000	3480	.47	.66	.85

NOTE — All values are gross capacities and do not include indoor coil blower motor heat deduction.

AR12-411 — HEATING CAPACITY — CB19-41 — CBH19-41

Indoor Coil Air Volume 70°F db (21°C db)	Air Temperature Entering Outdoor Coil																			
	65°F (18°C)				45°F (7°C)				25°F (-4°C)				5°F (-15°C)				-15°F (-28°C)			
	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input		
L/s	cfm	kW		Btuh	kW		Btuh	kW		Btuh	kW		Btuh	kW		Btuh	kW		Btuh	kW
540	1150	13.6	46,500	3190	10.7	36,400	2935	7.6	25,800	2660	4.8	16,500	2225	2.4	8200	1705				
615	1300	13.8	47,000	3060	10.8	36,900	2805	7.7	26,300	2530	5.0	17,000	2095	2.5	8700	1575				
685	1450	13.9	47,500	2980	11.0	37,400	2725	7.9	26,800	2450	5.1	17,500	2015	2.7	9200	1495				

NOTE — Heating capacities include the effect of defrost cycles in the temperature range where they occur.

AR12-411 — HEATING PERFORMANCE — 1300 cfm (615 L/s) Indoor Coil Air Volume (CB19/CBH19-41)

*Outdoor Temperature		Compressor Motor Watts Input	Total Output	
°F	°C		Btuh	kW
65	18	3060	47,000	13.8
60	16	2995	44,500	13.0
55	13	2930	42,000	12.3
50	10	2870	39,500	11.6
47	8	2830	38,000	11.1
45	7	2805	36,900	10.8
40	4	2740	34,300	10.1
35	2	2680	31,600	9.3
30	-1	2605	28,900	8.5
25	-4	2530	26,300	7.7
20	-7	2455	23,600	6.9
17	-8	2410	22,000	6.4
15	-9	2355	21,200	6.2
10	-12	2225	19,100	5.6
5	-15	2095	17,000	5.0
0	-18	1965	14,900	4.4
-5	-21	1835	12,800	3.8
-10	-23	1705	10,800	3.2
-15	-26	1575	8700	2.5
-20	-29	1445	6600	1.9

*Outdoor temperature 70% relative humidity. Indoor temperature 70°F (21°C).

