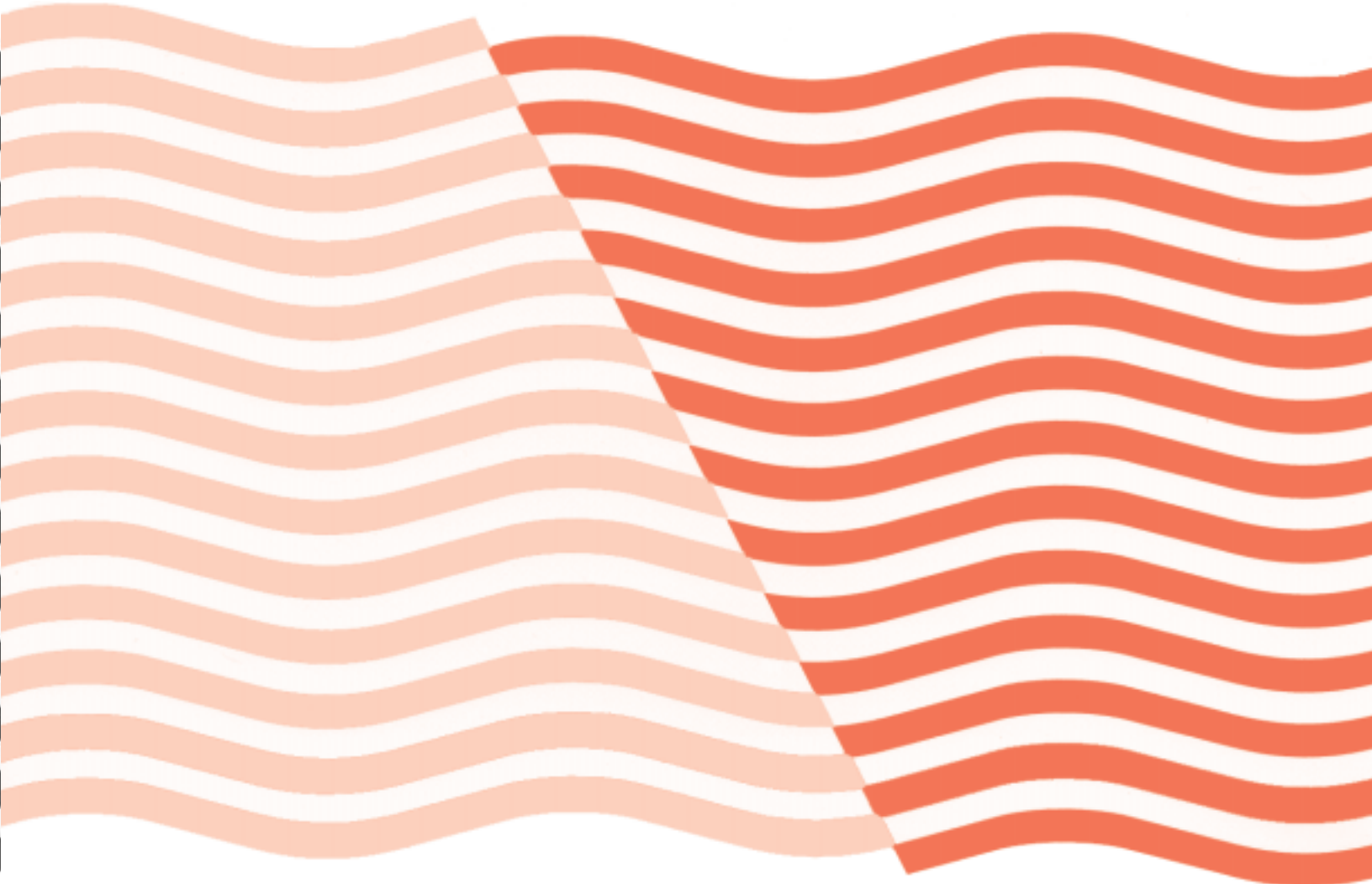
AAON Coil Products

CA Series

2 to 25 tons Condensing Units

Effective October 2001



AAON Coil Products, Inc.
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CA SERIES CONDENSING UNITS

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ALL MODEL AND FEATURE NUMBERS MUST BE COMPLETED TO PROPERLY IDENTIFY THE UNIT & TO INSURE PROMPT ORDER PROCESSING.

INTRODUCTION

The CA Series condensing units reflect the proven reliability and engineering excellence from the premier manufacturer of rooftop products - ***AAON, Inc.***

All equipment is shipped to the customer, ready to be installed. All available options are conveniently factory installed to minimize field labor and expense.
Each condensing unit has been completely factory assembled, piped, wired and tested.

STANDARD FEATURES

- Controls and compressor(s) are mounted in a separate compartment with an access panel.
- Scroll Compressor(s).
- External crankcase heater(s) furnished on 8 through 25 ton sizes.
- Time delay on each compressor start-up.
- Single point power connection.
- Laminated color coded wiring diagram permanently affixed to the inside of the control compartment.
- Manual reset high pressure switch.
- Automatic reset low pressure switch.
- Operation to 55°F ambient.
- Liquid line filter drier.
- Service valves for suction and liquid lines.
- Direct drive propeller condenser fan; Horizontal discharge on 2 through 5 ton; Vertical discharge on 8 through 25 ton.
- Heavy wire guards to protect the condenser fan and coil.
- Unit contains Test Report, Wiring Diagram and Installation Manual.
- Rigid basepan design with built-in forklift opening from all sides on the 8 ton and larger sizes.

EQUIPMENT DESIGN

A scroll compressor is used throughout the product. These rugged compressors have an integral cast iron frame, cast iron scrolls and Teflon impregnated bearings with built-in oil filtration. The 2 to 5 ton model have one compressor. The 8 and 10 ton models can be selected with one or two compressors. The 13 to 25 ton models have two compressors.

The 2 through 5 ton CA Series condensing units are designed in one cabinet size. The 8 through 25 ton sizes are in another cabinet size. Similar features, options and construction are used throughout the 2 to 25 ton size range.

OPTIONAL FEATURES

Low Ambient Operation

Two head pressure controls are available for lower ambient operation. Both of these are also furnished with a time delay relay to bypass the low pressure switch during start-up.

- Cycling condenser fan to allow operation to 35°F.
- Electronic condenser fan speed control to allow operation down to 0°F.

Hot Gas Bypass

The factory installed hot gas bypass option is provided for applications requiring reduced evaporator capacity or any time that job conditions may require protection from freezing of the evaporator coil.

Corrosion Protection

The condenser coil fins are available with two optional levels of protection.

- High-density phenolic sealer
- Copper fins

Control Circuit Transformer

This transformer is factory installed and matched to the primary power source.

'CA SERIES' MODEL MASTER

MODEL NUMBER

TYPE	GEN.	NOM. TONS	VOLTAGE
	A	-	-

FEATURES

AMB. CTL	REFRIG.	CTRLS	CAB.	OPEN	WARR.	TYPE
1	2	3	4	5	6	7

TYPE
C = CONDENSING UNIT

GENERATION
A = FIRST GENERATION

NOMINAL TONS
02 =	2 Tons
03 =	3 Tons
04 =	4 Tons
05 =	5 Tons
08 =	8 Tons
10 =	10 Tons
13 =	13 Tons (2 comp.)
16 =	16 Tons (2 comp.)
20 =	20 Tons (2 comp.)
25 =	25 Tons (2 comp.)

VOLTAGE
1 =	208 / 230v / 1ø / 60Hz
2 =	208 / 230v / 3ø / 60Hz
3 =	460v / 3ø / 60Hz
4 =	575v / 3ø / 60Hz
5 =	200 / 230v / 3ø / 50Hz
6 =	380 / 415v / 3ø / 50Hz

AMBIENT CONTROL (1)
Ø = **STANDARD**
A = CYCLING FAN*
B = FAN SPEED CONTROL*
*With Low Ambient Start

REFRIGERATION OPTIONS (2)
Ø = **STANDARD**
A = HOT GAS BYPASS

CONTROL (3)
Ø = **STANDARD**
A = CONTROL CIRCUIT TRANSFORMER

CABINET (4)
Ø = **STANDARD**
P = PHENOLIC COATED COIL
C = COPPER FINNED COIL

OPEN (5)
Ø = STANDARD
A = DUAL COMPRESSORS FOR 8 & 10 TON UNITS

WARRANTY (6)
Ø = **STANDARD (One Year Standard Warranty Only)**
A = SECOND TO FIFTH YEAR EXTENDED COMPRESSOR WARRANTY

TYPE (7)
Ø = STANDARD
X = SPECIAL

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index

Specifications

Single Compressor	Unit Size					
	02	03	04	05	08	10
60 Hertz Ratings at Std. Conditions (1)						
Capacity, MBH (KW)	27.0 (7,9)	36.1 (10,6)	51.0 (14,9)	65.2 (19,1)	103.5 (30,3)	133.3 (39,0)
EER (COP)	11.9 (3,5)	13.5 (3,9)	12.6 (3,7)	12.8 (3,7)	14.1 (4,1)	13.1 (3,8)
50 Hertz Ratings at Std. Conditions (1)						
Capacity, KW	6,69	8,84	12,64	15,73	25,59	32,70
COP	3,36	3,76	3,71	3,67	4,09	3,88
Compressors						
Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Number	1	1	1	1	1	1
R-22 Holding Charge, lbs. (kg)	2 (,91)	3 (1,4)	4 (1,81)	4 (1,81)	5 (2,27)	5 (2,27)
Oil Charge, Oz. (g)	42 (1191)			66 (1871)	85 (2409)	140 (3969)
Condenser Coils						
Quantity / Rows	1 / 1	1 / 2		1 / 3	1 / 3	
Finned Height, in. (mm)	24 (610)			28 / (711)	38 (965)	
Finned Length, in. (mm)	43 (1092)				55 (1397)	
Condenser Fans						
Quantity / Diameter, in. (mm)	1 / 22 (559)				1 / 26 (660)	
Fan & Motor RPM, 60/50 Hz	1050 / 875				1050 / 875	
Shipping Weight, Lbs. (kg)	192 (87)	205 (93)	214 (97)	232 (105)	679 (308)	689 (313)

Two Compressor	Unit Size					
	08	10	13	16	20	25
60 Hertz Ratings at Std. Conditions (1)						
Capacity, MBH (KW)	101.9 (29,9)	130.3 (38,2)	162.4 (47,5)	207.4 (60,7)	266.4 (78,0)	320.1 (93,7)
EER (COP)	12.5 (3,7)	12.6 (3,7)	14.8 (4,3)	14.2 (4,1)	13.1 (3,8)	12.1 (3,5)
50 Hertz Ratings at Std. Conditions (1)						
Capacity, KW	24,98	31,16	39,75	51,07	65,53	78,73
COP	3,69	3,66	4,31	4,17	3,90	3,31
Compressors						
Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Number	2	2	2	2	2	2
R-22 Holding Charge, lbs. (kg)	4 (1,81)	4 (1,81)	4 (1,81)	5 (2,27)	5 (2,27)	5 (2,27)
Oil Charge, Oz. (g)	42 (1191)	66 (1871)	66 (1871)	85 (2410)	140 (3969)	
Condenser Coils						
Quantity / Rows	2 / 2		2 / 3			
Finned H x L each, in. (mm)	38 x 55 (965 x 1397)					
Condenser Fans						
Quantity / Diameter, in. (mm)	1 / 26 (660)		2 / 26 (660)			
Fan & Motor RPM, 60/50 Hz	1050 / 875					
Shipping Weight, Lbs. (kg)	721 (327)	745 (338)	796 (361)	882 (400)	902 (409)	1080 (490)

Note 1 - Standard Conditions are 45 degrees F (7,2 C) saturated suction temperature and 95 degree F (35 C)ambient.

Electrical Data - One Compressor Units

Unit Size	Power Source			Full Load Amps (FLA)	Minimum Circuit Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
	Code	Voltage	Hz.			
02	1	208/230 - 1 Ph	60	16.2	19.3	30
	2	208/230 - 3 Ph	60	11.4	13.4	20
	3	460 - 3 Ph	60	5.7	6.7	15
	5	200/230 - 3 Ph	50	11.3	13.2	20
	6	380/415 - 3 Ph	50	5.6	6.6	15
03	1	208/230 - 1 Ph	60	18.8	22.5	35
	2	208/230 - 3 Ph	60	13.2	15.6	25
	3	460 - 3 Ph	60	6.6	7.8	15
	5	200/230 - 3 Ph	50	13.2	15.6	25
	6	380/415 - 3 Ph	50	6.6	7.8	15
04	1	208/230 - 1 Ph	60	23.2	28.0	45
	2	208/230 - 3 Ph	60	16.4	19.6	30
	3	460 - 3 Ph	60	8.2	9.8	15
	4	575 - 3 Ph	60	6.5	7.8	15
	6	380/415 - 3 Ph	50	8.2	9.8	15
05	1	208/230 - 1 Ph	60	32.9	40.1	60
	2	208/230 - 3 Ph	60	20.9	25.2	40
	3	460 - 3 Ph	60	10.8	13.1	20
	4	575 - 3 Ph	60	8.5	10.3	15
	5	200/230 - 3 Ph	50	20.9	25.2	40
	6	380/415 - 3 Ph	50	10.8	13.1	20
08	2	208/230 - 3 Ph	60	35.8	43.0	70
	3	460 - 3 Ph	60	18.3	22.0	35
	4	575 - 3 Ph	60	13.6	16.3	25
	5	200/230 - 3 Ph	50	32.4	39.6	60
	6	380/415 - 3 Ph	50	16.7	20.4	35
10	2	208/230 - 3 Ph	60	37.0	44.5	70
	3	460 - 3 Ph	60	19.0	22.9	35
	5	200/230 - 3 Ph	50	33.6	41.1	70
	6	380/415 - 3 Ph	50	17.4	21.3	35

Electrical Data - Two Compressor Units

Unit Size	Power Source			Full Load Amps (FLA)	Minimum Circuit Ampacity (MCA)	Maximum Overcurrent Protection (MOP)
	Code	Voltage	Hz.			
08	1	208/230 - 1 Ph	60	48.8	54.2	70
	2	208/230 - 3 Ph	60	30.8	34.0	40
	3	460 - 3 Ph	60	16.8	18.6	25
	4	575 - 3 Ph	60	12.1	13.4	20
	6	380/415 - 3 Ph	50	16.8	18.6	25
10	1	208/230 - 1 Ph	60	62.8	70.0	90
	2	208/230 - 3 Ph	60	39.8	44.1	60
	3	460 - 3 Ph	60	20.6	22.8	30
	4	575 - 3 Ph	60	15.9	17.6	20
	5	200/230 - 3 Ph	50	42.4	47.0	60
	6	380/415 - 3 Ph	50	20.4	22.6	30
13	2	208/230 - 3 Ph	60	51.0	55.6	70
	3	460 - 3 Ph	60	25.0	27.3	60
	4	575 - 3 Ph	60	20.4	22.3	25
	5	200/230 - 3 Ph	50	44.2	48.9	60
	6	380/415 - 3 Ph	50	21.8	24.1	30
16	2	208/230 - 3 Ph	60	71.6	78.8	100
	3	460 - 3 Ph	60	36.6	40.3	50
	4	575 - 3 Ph	60	27.2	29.9	40
	5	200/230 - 3 Ph	50	64.8	72.0	100
	6	380/415 - 3 Ph	50	33.4	37.1	50
20	2	208/230 - 3 Ph	60	89.4	98.9	125
	3	460 - 3 Ph	60	38.0	41.9	50
	5	200/230 - 3 Ph	50	67.2	74.7	100
	6	380/415 - 3 Ph	50	34.8	38.7	50
25	2	208/230 - 3 Ph	60	95.8	106.1	125
	3	460 - 3 Ph	60	50.6	56.1	70
	4	575 - 3 Ph	60	40.2	44.5	60
	5	200/230 - 3 Ph	50	84.0	99.3	125
	6	380/415 - 3 Ph	50	47.4	52.9	70

Application Information

Selection

Use the AAON furnished PC software to determine the selection and performance of the condensing units. The software will allow the user to input the exact job design conditions that may be specified other than standard rating and design conditions.

The software will also allow the selection of the condensing unit in combination with an AAON manufactured air handler.

The performance of the combination will be calculated with the availability of screen or printed output.

General

All CA condensing units have lifting areas at the underside of the equipment to allow moving and placement without physical damage. Arrange any spreader bars, blocking or other lifting devices to prevent any damage to the coils or cabinet of the condensing unit. These condensing units may be placed on a roof or at ground level since they are designed for exposure to weather.

When roof mounted, a steel frame must be provided that will support the unit above the roof itself.

When installed at ground level, a substantial base must be provided that will not settle.

Location

Airflow to and from the condensing unit must not be restricted. Doing so will have the result of decreased performance and efficiency. The installation position must provide at least 3 feet of side clearance for proper airflow into the coils. When units are mounted adjacent to each other the clearance required between them would be 6 feet.

Condensing units should not be installed in an enclosure or pit that is deeper than the height of the unit. When a recessed installation is used the side clearance requirement is doubled to 6 feet for the inlet air.

The CA-02 through CA-05 model sizes have a horizontal airflow pattern. The discharge air side of one unit should not be aligned with the intake of another. The discharge air should be faced away from the adjacent building or structure.

The CA-08 through the CA-25 models have a vertical air discharge. There must be no obstruction above the equipment that may deflect this air back to the inlet of the condensing unit. Do not place the unit under an overhang.

In colder climate areas, special design consideration must be given to prevent snow accumulation. The condenser coils and fan discharge must be free of any obstructions for proper unit operation.

Condensing unit operation can also be affected by wind. It is good practice to position the unit so its length is parallel with the prevailing wind.

Service Clearance

One end of the CA condensing unit contains the access area that must be accessible for periodic service. This area contains the compressor, controls, safety devices and refrigerant service and shutoff valves.

It is recommended that a minimum of 4 feet be left free at this end of the unit for proper and easier servicing.

Refrigerant Piping

This section is not intended to provide all the information required by the designer or installer of the refrigerant piping between the condensing units and the low side components. The appropriate sections of the ASHRAE Guide and the ASME standards should be used for final information.

The piping between the condenser and low side must assure:

- Minimum pressure drop
- Continuous oil return
- Prevention of liquid refrigerant slugging or carryover.

Acceptable system design and installation will include consideration as follows.

General
Use only clean type L copper tubing (type K for underground) that has been joined with high temperature brazing alloy.

All AAON CA condensing units have factory furnished liquid and suction line shutoff valves. The pipe sizes must be selected to meet the actual installation conditions and not simply based on the connection sizes at the evaporator and/or condensing unit.

Suction Line
The suction line pipe size should be selected to have a maximum pressure drop of 3 PSI for the equivalent length of piping that is used. This corresponds to approximately 2^0F with R-22.

Any vertical suction risers should be checked to confirm that oil will be returned to the compressor. (Use the following tables for pipe sizing information.)

All suction lines must be pitched in the direction of flow and supported to maintain their position.

Full insulation must be used between the evaporator and the condensing unit.

A suction accumulator is not included as part of the AAON CA condensing unit and must be field furnished and installed if required by job conditions.

Liquid Line
The liquid line pipe size should be selected to have a maximum pressure drop of 6 PSI which corresponds to approximately 2^0F with R-22.

The AAON CA condensing units have a built in filter drier. The units do not include a liquid line solenoid valve and this must be field furnished and installed if required by job conditions.

(Optional) Hot Gas Line
The hot gas bypass option is a system that maintains evaporator pressure at or above a minimum value. This will prevent the coil from freezing and also keep the velocity of the refrigerant gas sufficiently high for proper oil return to the compressor when the cooling is at light load conditions.

Pressure drop in the hot gas line is normally designed not to exceed the equivalent of a 2 degree F change in saturation temperature. The recommended sizing table below is based on a 1 degree F change in saturation temperature.

Hot gas bypass lines must be insulated to minimize heat loss and condensation of gas inside the piping and to prevent injury from high temperature surfaces.

R-22 Suction Line Capacity
Pressure Loss = 3 PSI (2^0F)
at 40^0F saturated suction

Line Size - in.	Max. Tons
5/8	1.1
7/8	2.9
1 1/8	5.8
1 3/8	10.1
1 5/8	16.0

R-22 Liquid Line Capacity
Pressure Loss = 3 PSI (1^0F)
at 100^0F liquid

Line Size - in.	Max. Tons
1/2	3.6
5/8	6.7
7/8	18.2

Note: Pressure loss, PSI/100 feet of equivalent line length due to line friction. (Corresponding change in R-22 saturation temperature.)

R-22 Hot Gas Bypass Line Capacity
Pressure Loss = 3 PSI (1^0F)
at 40^0F saturated suction

Line Size - in.	1/2	5/8	7/8	1 1/8	1 3/8
Tons	.85	1.6	4.2	8.5	14.8

Note: Pressure loss, PSI/100 feet of equivalent line length due to line friction. (Corresponding change in R-22 saturation temperature.)

Minimum Tons of Capacity to Carry Oil Up a Suction Riser at 40^0F saturated suction

Line Size - in.	3/4	7/8	1 1/8	1 3/8	1 5/8	2 1/8
Min. Tons	.8	1.1	1.8	2.9	4.0	7.2

Fitting Losses in Equivalent Feet of Straight Copper Tubing

Tubing Size - in.	90^0 Std.	90^0 Long Rad	90^0 Street	45^0 Std	45^0 Street	180^0 Std
1/2	1.4	.9	2.3	.7	1.1	2.3
5/8	1.6	1.0	2.5	.8	1.3	2.5
7/8	2.0	1.4	3.2	.9	1.6	3.2
1 1/8	2.6	1.7	4.1	1.3	2.1	4.1
1 3/8	3.3	2.3	5.6	1.7	3.0	5.6
1 5/8	4.0	2.6	6.3	2.1	3.4	6.3
2 1/8	5.0	3.3	8.2	2.6	4.5	8.2

Note: The equivalent feet for a piping system must include the equivalent length of straight tubing for all the fittings, as well as, any valves that are added to the system.

Weight of Refrigerant 22 in Type L Copper Tubing (Pounds/100Feet)

Line Size - in.	Liquid at 100^0F	Suction at 40^0F
3/8	4.3	.065
1/2	7.9	.120
5/8	12.7	.195
7/8	26.4	.405
1 1/8	45.0	.690
1 3/8	68.6	1.05
1 5/8	-	1.49
2 1/8	-	2.58

AAON Coil Products
CA Condensing Unit Guide Specifications

Section 15.xxx
Air-Cooled Condensing Units

Part 1 - General

1.01 Summary
This section includes design, performance, refrigerants, controls, and installation requirements for air-cooled scroll compressor condensing units.

1.02 References
Comply with the applicable Standards and/or Codes of ETL, cETL, NEC, ASHRAE Standard 90.1, and OSHA as adopted by the State.

1.03 Submittals
A. Submit shop drawings and product data in accordance with the specifications.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.

2. Summary of all auxiliary utility requirements such as: electricity, water, gas, etc. Summary shall indicate quality and quantity of each required utility.

3. Single line schematic drawing of the power field hookup requirements, indicating all items which are furnished.

4. Schematic diagram of control system indicating points for field interface and/or connection.

5. Diagram shall fully delineate field and factory wiring.

6. Installation manuals.

1.04 Quality Assurance
A. Qualifications: Equipment manufacturer must specialize in the manufacture of the products specified and have ten years experience with the equipment and refrigerant offered.

B. Regulatory Requirements: Comply with the codes and standards specified.

1.05 Delivery and Handling
A. Condensing unit shall be delivered to the jobsite with a factory holding charge and be factory charged with oil by the manufacturer.

B. Comply with the manufacturers instructions for rigging and handling equipment.

1.06. Warranty
The refrigeration equipment manufacturer's warranty shall be for a period of one year from date of equipment start up but not more than 14 months from shipment. The warranty shall cover material and workmanship that prove defective within the above period, excluding refrigerant.

1.07 Maintenance
Maintenance of the unit shall be the responsibility of the owner and performed in accordance with the manufacturer's instructions.

Part 2 - Products

2.01 Acceptable Manufacturers
A. AAON, Inc.

B. (Approved Equal)

2.02 Unit Description
Provide and install as shown on the plans factory assembled, air-cooled scroll compressor condensing units in the quantity specified. Each unit shall consist of a hermetic compressor(s), air-cooled condenser section, control system, suction and liquid connection valves, and all components necessary for safe and controlled unit operation when connected to the specified low side equipment.

2.03 Design Requirements

A. General: Provide a complete scroll compressor condensing unit as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes in effect.

B. Performance: Refer to the schedule of performance on the drawings. The unit shall be capable of stable operation to a minimum of 55^0F outdoor temperature.

2.04 Condensing Unit Features

A. Compressors: The compressors shall be a sealed hermetic scroll type with a forced feed lubrication system and oil charge. The compressor motor shall be refrigerant gas cooled, high torque, hermetic induction type, two-pole, with inherent thermal protection on all phases and shall be mounted on RIS vibration isolators. Models 8 tons and larger shall be furnished with a crankcase heater.

B. Condenser: The condenser coil(s) shall consist of seamless copper tubes mechanically bonded into plate type fins. The fins shall have full drawn collars to completely cover the tubes. A subcooling section shall be an integral part of the main condenser coil. Condenser fan(s) shall be propeller type arranged for horizontal air discharge on 2 through 5 ton models (vertical air discharge on 8 through 25 ton models) and individually driven by direct drive fan motor(s). The fan discharge area shall be equipped with a heavy-gauge fan guard. Fan motor(s) shall be weather protected, single-phase, direct-drive, 1100 rpm, open drip-proof type. The condenser coil(s) shall be mechanically protected from physical damage by a wire guard covering the full face area of the coil.

C. Refrigerant Circuit: The condensing unit shall be furnished with a liquid line filter drier and service valves for liquid and suction connections. The finished field installed refrigerant circuit furnished by the contractor shall include the low side cooling components, refrigerant, thermal expansion valve, liquid line (insulated hot gas bypass line) and insulated suction line.

D. Control System: A centrally located weatherproof control panel shall contain the field power connection points, control terminal block and control system. Power and starting components shall include fan motor contactors, time delay relay(s) for the compressor(s), inherent fan motor overload protection and unit power terminal blocks for connection to remote disconnect switch. Safety and operating controls shall include a manually reset high pressure switch and an automatic reset low pressure switch. Barrier panels shall be furnished to protect against accidental contact with line voltage when accessing the control system.

E. Service Accessibility: Entrance to the separate compressor(s) and control compartment shall be through an access panel.

F. Wiring Diagrams:

1. Wiring diagrams shall be in color and marked to match the color and markings of the wires and shall be both “point-to-point” and “ladder” diagrams.

2. Diagrams shall be laminated in plastic and permanently fixed to the control compartment door.

3. Installation and maintenance manuals shall be supplied with each unit within the control compartment.

2.05 Options and Accessories

The following options are to be available, as may be required, and shall be factory supplied and mounted:

A. Phenolic coated condenser coil.

B. Copper fin condenser coil.

C. Hot gas bypass.

D. Cycling condenser fan control for low ambient operation to 35^0 F

E. Electronic condenser fan speed control for low ambient operation to 0^0 F

Part 3 - Execution

3.01 Installation

A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.

B. Adjust and level unit on supports.

C. Install refrigerant piping in accordance with drawings.

D. Evacuate the system and charge with refrigerant in accordance with standard practice.

E. Coordinate electrical installation with electrical contractor.

F. Coordinate controls with control contractor.

G. Provide all appurtenances required to insure a fully operational and functional system.

3.02 Startup

A. Check and assure proper system charge of refrigerant and oil.

B. Provide testing, and starting of system, and instruct the Owner in its proper operation and maintenance.

END OF SECTION

AAON

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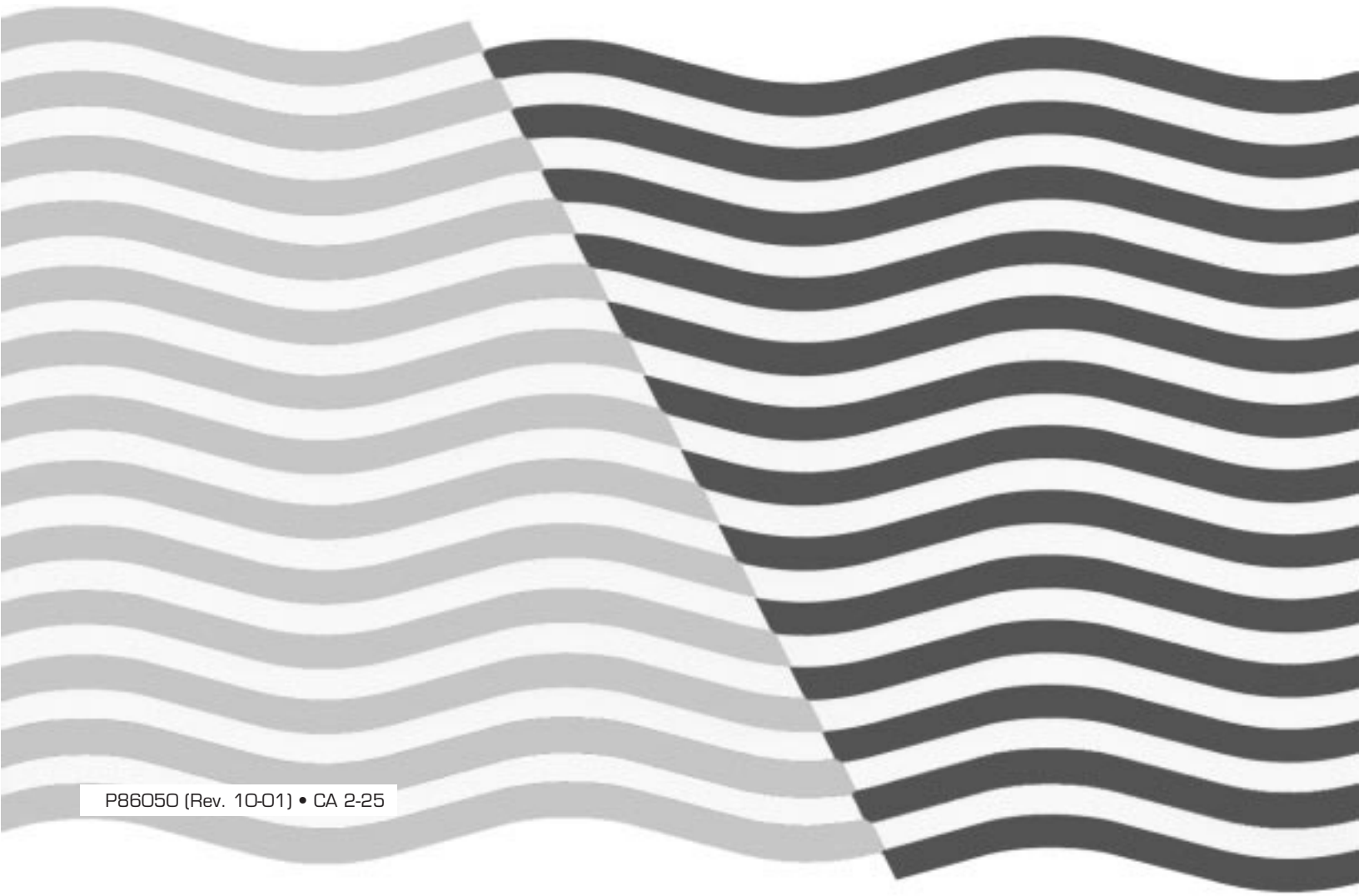
Serving the HVAC & Refrigeration Industry



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