Vertical Units (AC Type)

AC Type
Air Turnover Units

Air turnover units are extremely effective at heating and cooling large buildings. Few units are required to cover vast spaces and provide even temperatures throughout. High levels of inventory and storage have very little effect on performance.
Since air turnover system requires no discharge ductwork the units can virtually be placed anywhere.
When located near dock doors air turnover units provide quick recovery to infiltration.

Typical Selection

1. Determine building volume
2. Subtract expected inventory to determine net volume
3. Select recommended air turns based on Figure 1
4. Calculate total air volume required
5. Using standard ASHRAE methods determine building heat loss
6. Select qty of units required
7. Select ICE AC Series model required

Example – Heating Application

Building dimensions (LxWxH).
300’ x 200’ x 30’ = 1,800,000 cu. ft.
Expected inventory displaces approximately 20% of building volume.
1,800,000 – (1,800,000 x 0.2) = 1,440,000 cu. ft.
Select recommended air turns/hour, from Figure 1.
2.3
Total air capacity: Net Bldg Volume x Air Turns/Hr ÷ 60 Min/Hr = CFM
55,200 CFM
Building heat loss = 1,600,000 Btu/Hr
Unit Selection from performance specification tables
AC model 054

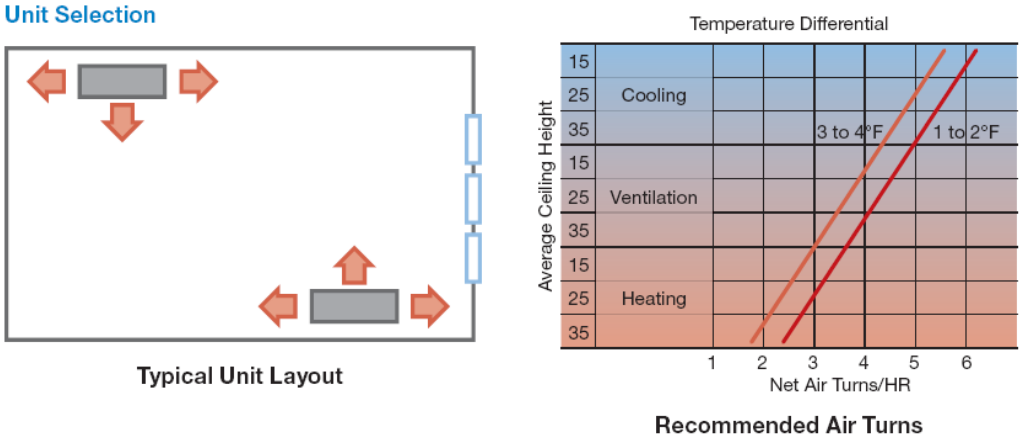


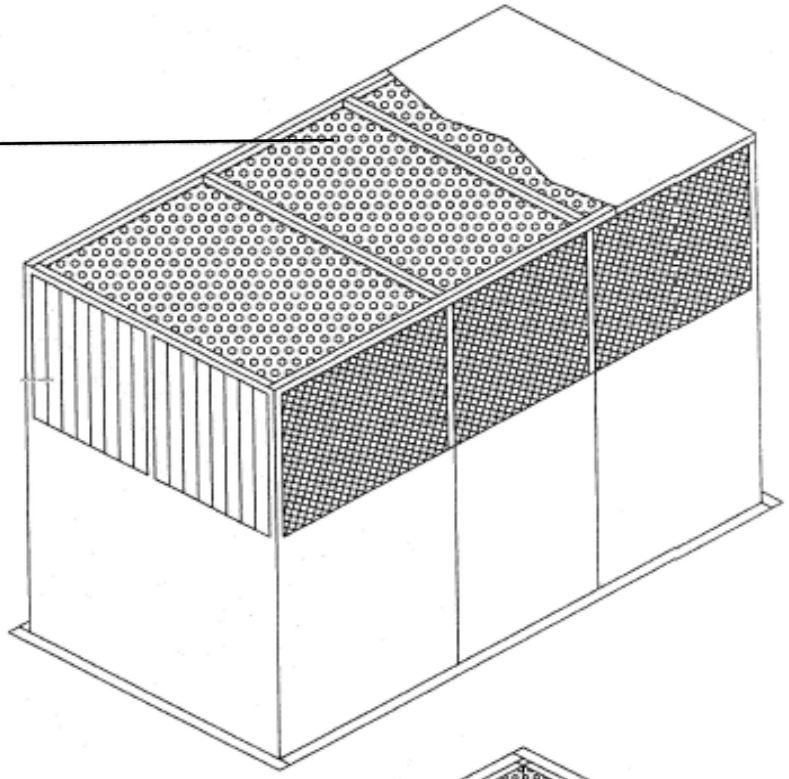
Figure 1

Performance Specificaitons

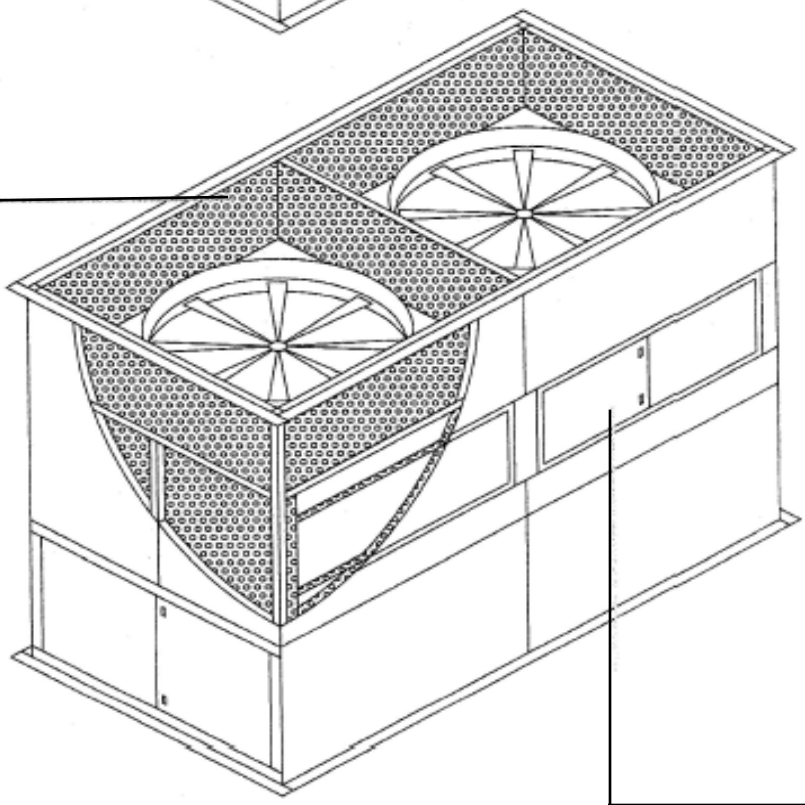
Model	SCFM Range	Fan Qty.	Fan Dia.	Fan HP		Heat Output BTUH
				w/o Filters	w/ Filters	
AC 024	6,500~8,000	2	24	1/2	3/4	200,000
	8,000~10,000	2	24	1/2	3/4	300,000
	10,000~14,000	2	24	3/4	1	400,000
AC 030	9,000~12,000	2	24	1/2	3/4	450,000
	12,000~15,000	2	30	3/4	1	600,000
	15,000~18,000	2	30	1	1-1/2	750,000
AC 042	18,000~22,000	2	36	1-1/2	2	650,000
	22,000~30,000	2	42	2	3	850,000
	30,000~36,000	2	42	3	5	1,000,000
AC 048	36,000~40,000	2	48	2	3	650,000
	40,000~45,000	2	48	3	5	1,000,000
	45,000~49,000	2	48	5	5	1,750,000
AC 054	45,000~50,000	2	54	3	5	850,000
	50,000~58,000	2	54	5	7-1/2	1,750,000
	58,000~64000	2	54	5	7-1/2	2,500,000
AC 060	64,000~72,000	2	60	5	7-1/2	1,250,000~2,000,000
	72,000~85,000	2	60	7-1/2	10	2,750,000~3,250,000
	85,000~100,000	2	60	10	15	3,500,000~4,000,000

Sound Attenuation
Sound attenuation is optional on all AC Series units.

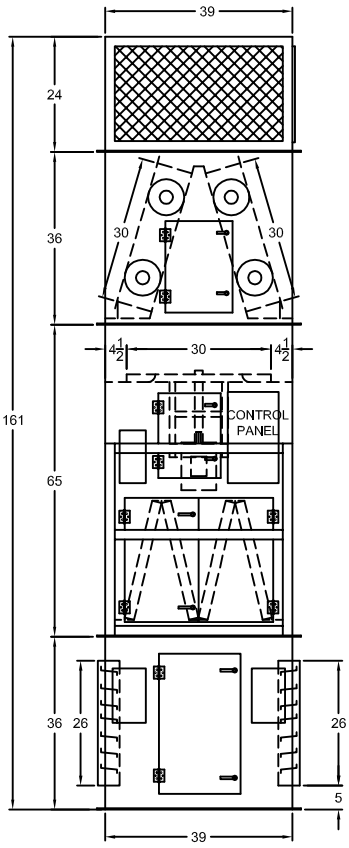
Two inch thick insulation with Perforated liner in top of Discharge section



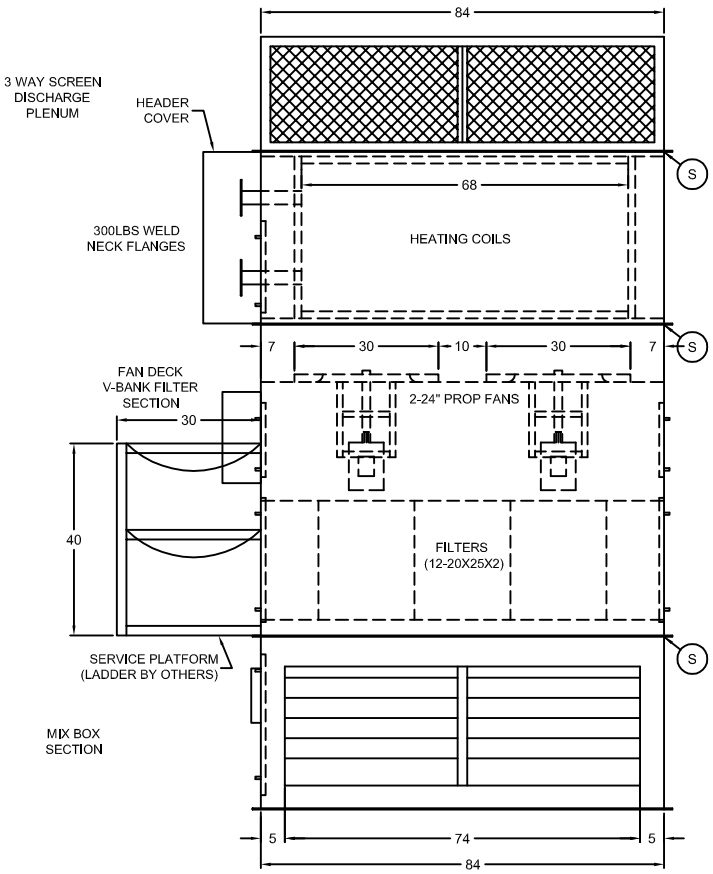
Sound attenuation package: Perforated liners provided on fan section including fan divider partitions. Sound is captured by the liners and muffled in the two inch thick fiberglass insulation.



Hinged fan/motor access doors.



SIDE VIEW



FRONT VIEW

NOTES:
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

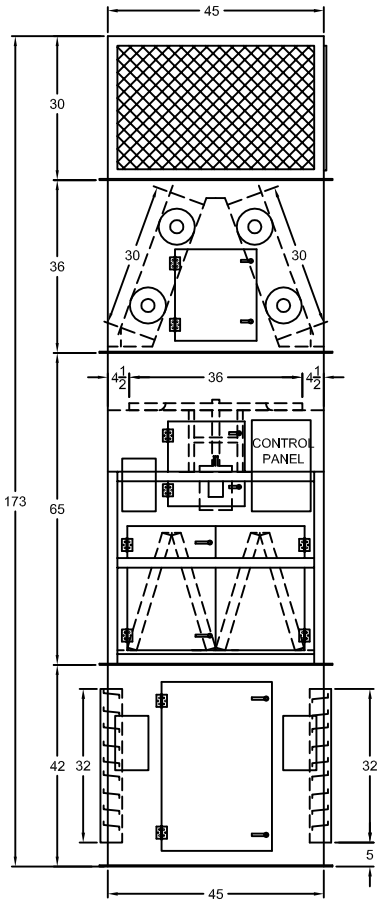
ICG
WESTERN
AC SERIES

Rev	By	Revision Description	Date

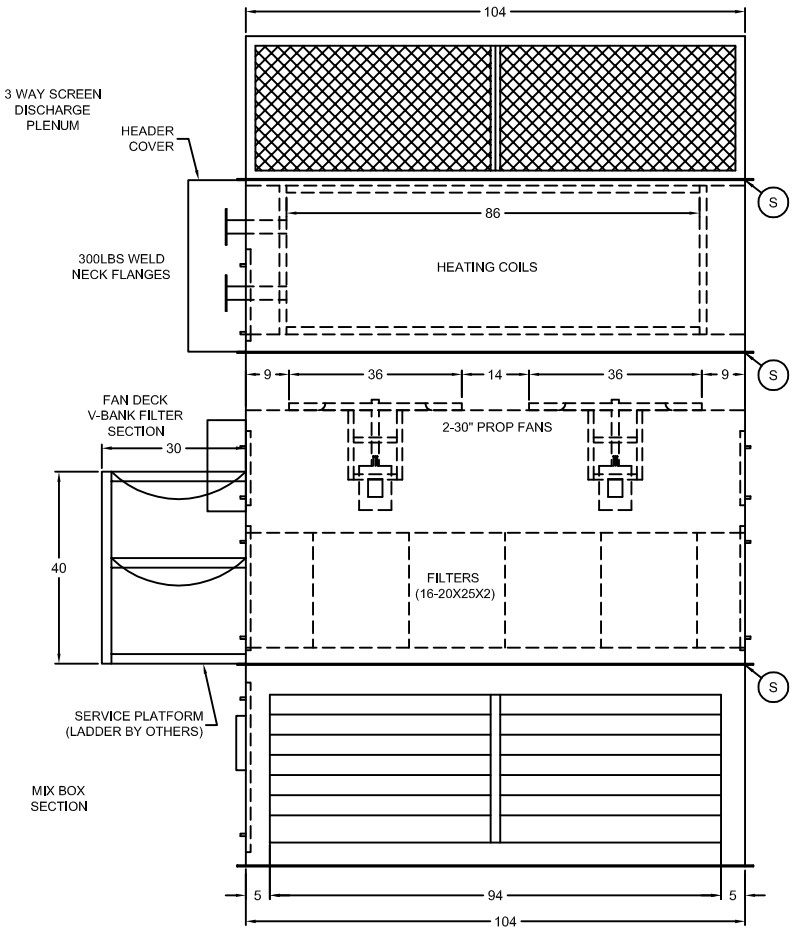
TITLE

AC 024 VERTICAL AIR TURNOVER
c/w 3-WAY DISCHARGE, V-BANK FILTER
HEATING COIL AND MIX BOX SECTION

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
JR		1:40	60-27484
CHK. BY	DATE	JOB NO.	PAGE
			L-4



SIDE VIEW



FRONT VIEW

NOTES:
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

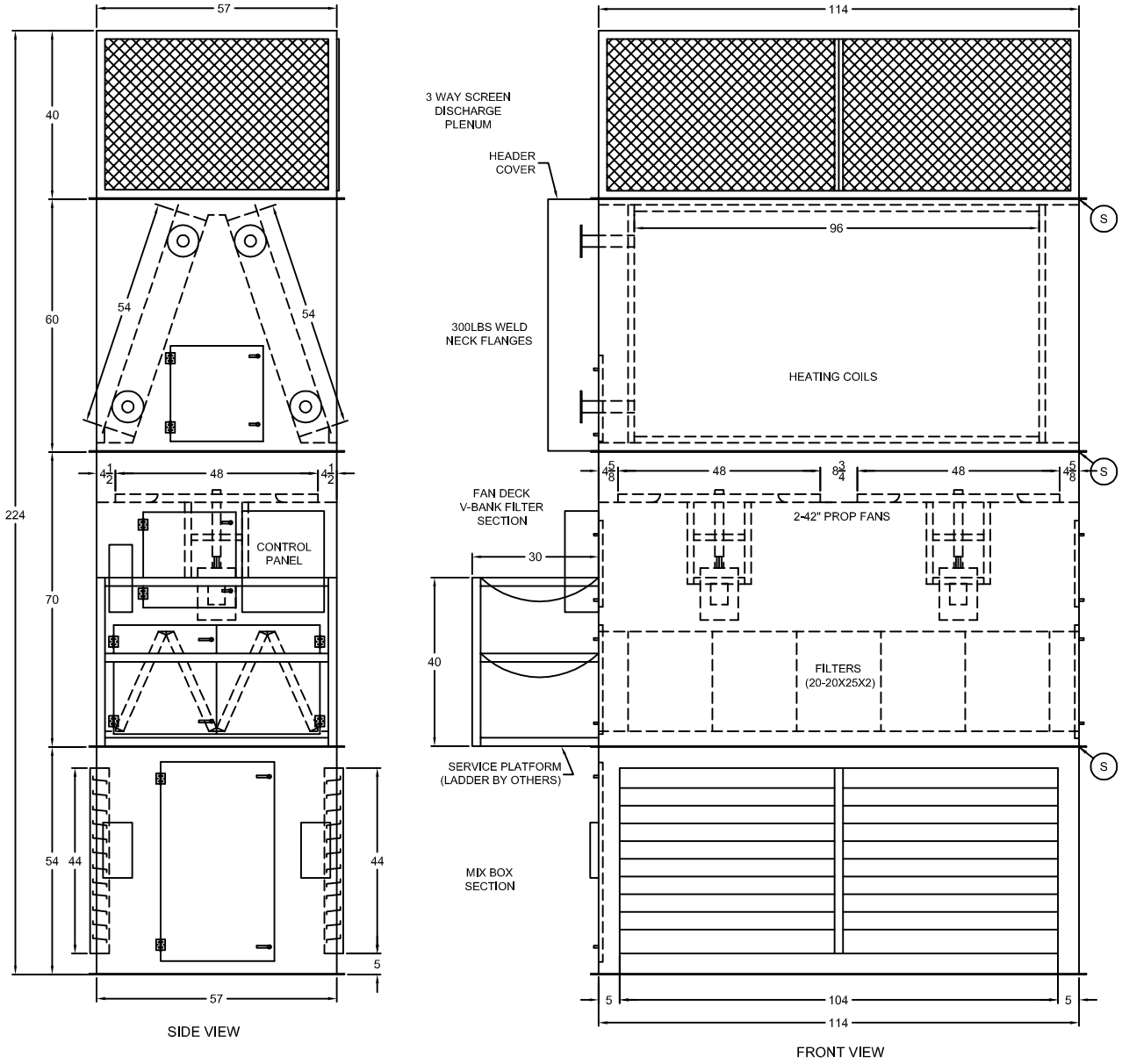
WESTERN
AC SERIES

Rev	By	Revision Description	Date

TITLE

AC 030 VERTICAL AIR TURNOVER
c/w 3-WAY DISCHARGE, V-BANK FILTER
HEATING COIL AND MIX BOX SECTION

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
JR		1:40	
CHK. BY	DATE	JOB NO.	PAEG
			L-5



NOTES:
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

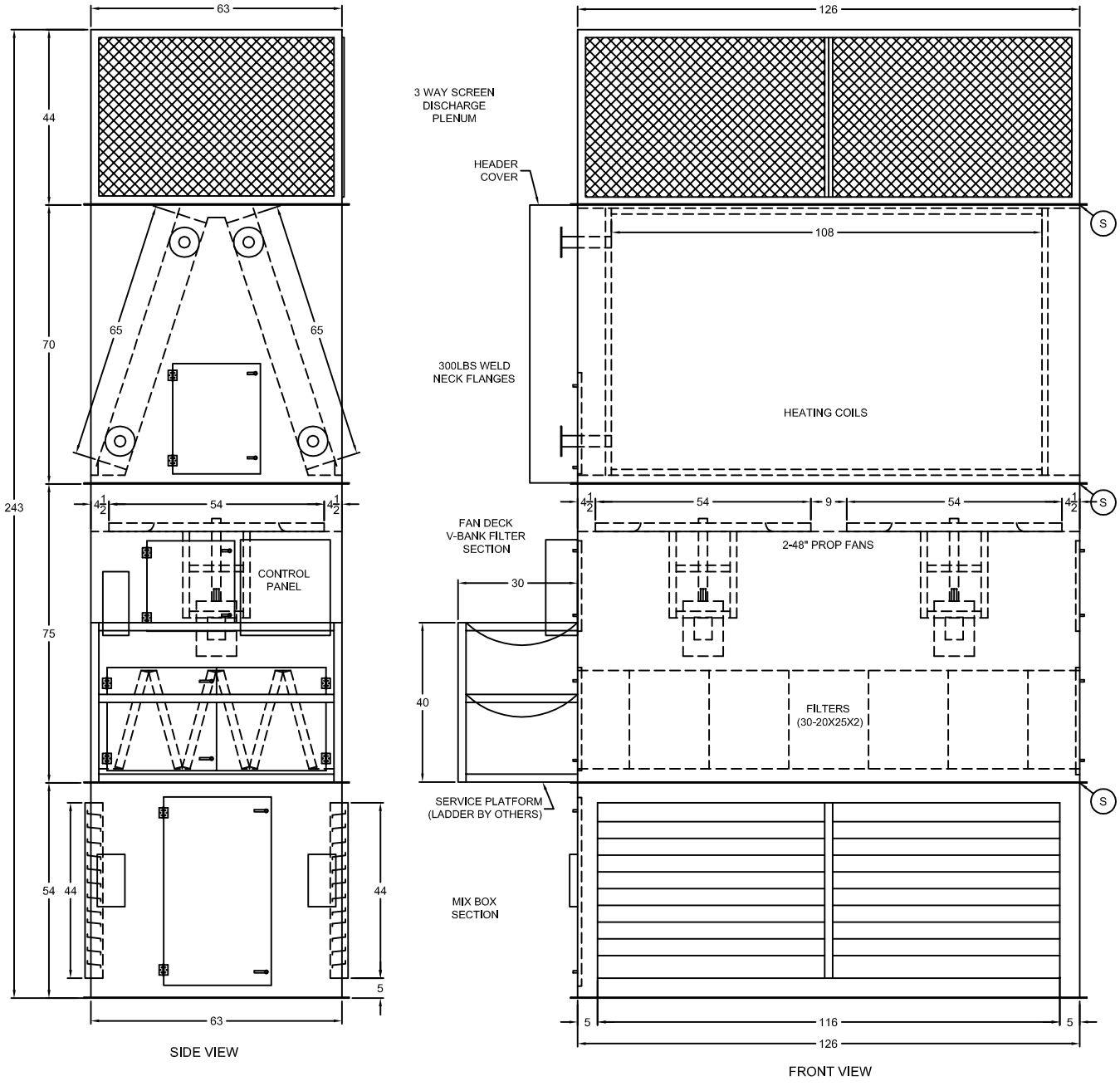
WESTERN
AC SERIES

Rev	By	Revision Description	Date

TITLE

AC 042 VERTICAL AIR TURNOVER
c/w 3-WAY DISCHARGE, V-BANK FILTER
HEATING COIL AND MIX BOX SECTION

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
JR		1:40		
CHK. BY	DATE		JOB NO.	PAGE L-6



NOTES:
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

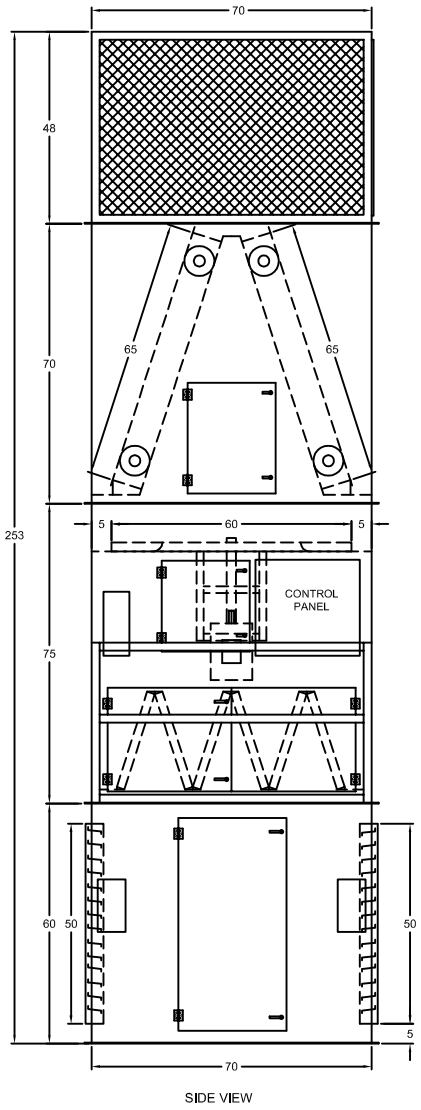
WESTERN
AC SERIES

Rev	By	Revision Description	Date

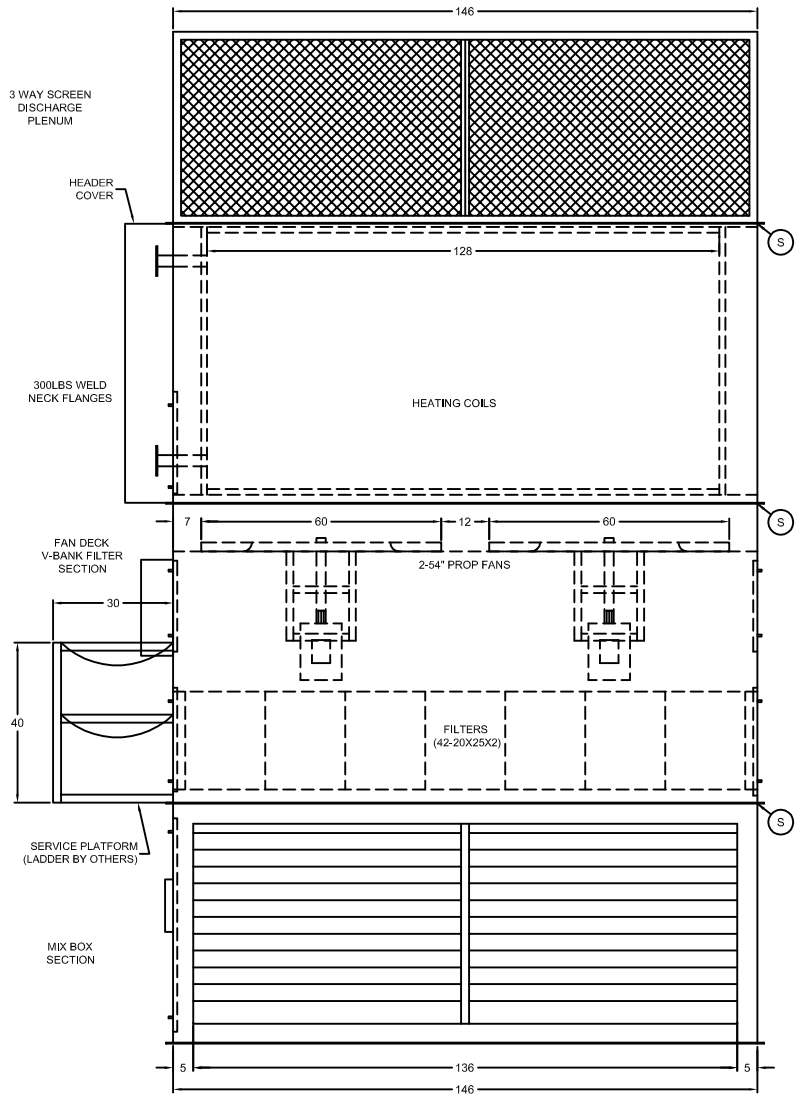
TITLE

AC 048 VERTICAL AIR TURNOVER
c/w 3-WAY DISCHARGE, V-BANK FILTER
HEATING COIL AND MIX BOX SECTION

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
JR		1:40		
CHK. BY	DATE		JOB NO.	PAGE L-7



SIDE VIEW



FRONT VIEW

NOTES:
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

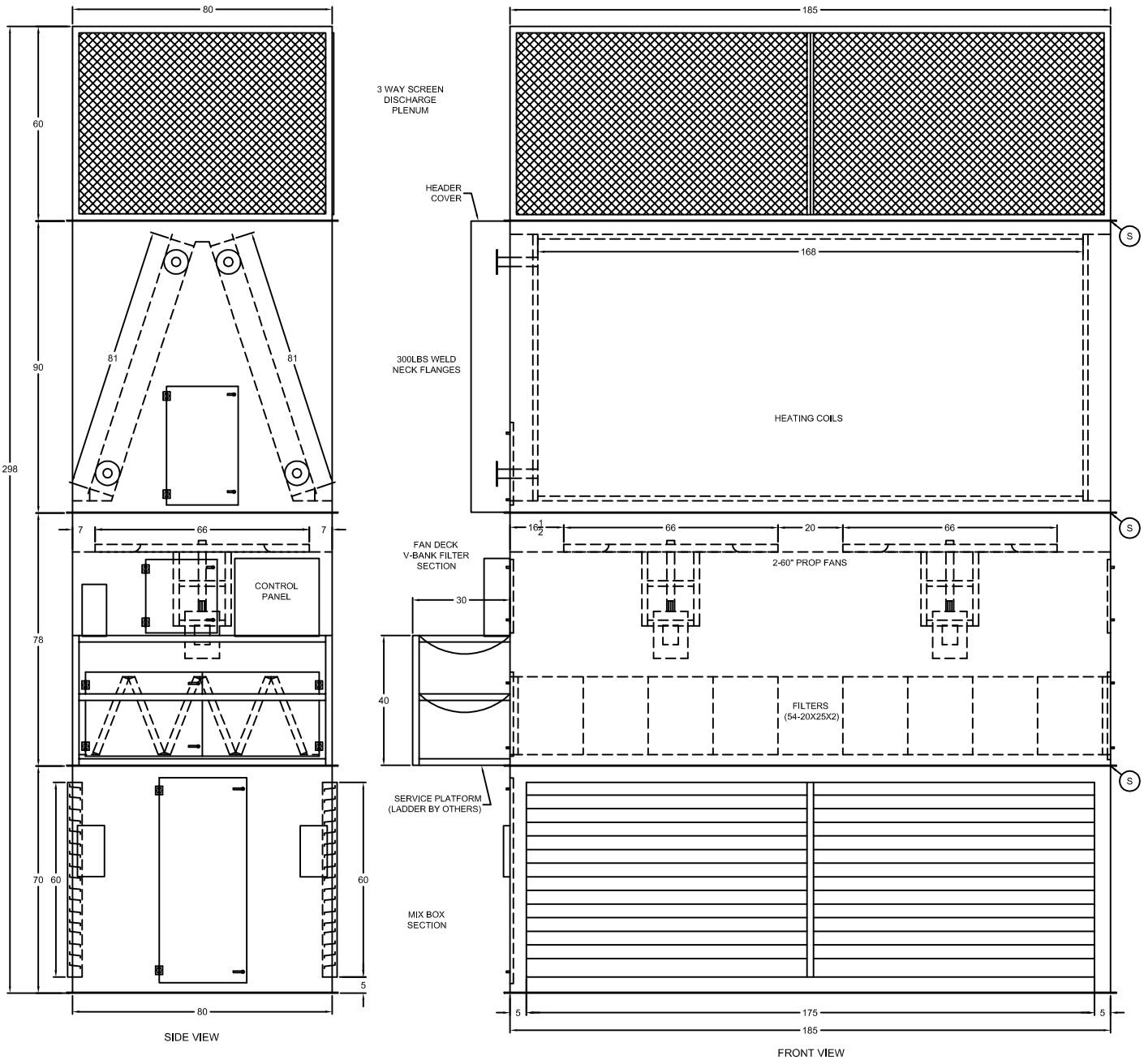
WESTERN
AC SERIES

Rev	By	Revision Description	Date

TITLE

AC 054 VERTICAL AIR TURNOVER
c/w 3-WAY DISCHARGE, V-BANK FILTER
HEATING COIL AND MIX BOX SECTION

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
JR		1/4"=1'		
CHK. BY	DATE		JOB NO.	PAGE L-8



NOTES:
DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

WESTERN
AC SERIES

Rev	By	Revision Description	Date

TITLE

AC 060 VERTICAL AIR TURNOVER
c/w 3-WAY DISCHARGE, V-BANK FILTER
HEATING COIL AND MIX BOX SECTION

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
JR		1/4"=1'		
CHK. BY	DATE		JOB NO.	PAGE L-9

Engineering Specification

Unit Tag:

Unit air volume (CFM):	Supply Voltage:
Capacity Input (MBH):	Fuel:
Capacity Output (MBH):	Gas supply pressure
Minimum Efficiency:	Connection (inches):
Temperature rise (deg F)	Unit FLA (amps):
Recommended stack size:	Unit MCA (amps):
Exhauster outlet size:	Unit MFS (amps)
Approx. weight (lbs):	

Supply ICE Model AC size ( ) indirect fired air turnover unit. Unit(s) is to be designed for indoor installation. The capacity and configuration shall be as detailed on the drawings.

Certification

Unit shall be completely ETL certified, listed and labeled. Manufacturer shall have a minimum of ten years experience in production of such equipment.

Testing

Unit to be completely factory run tested. An instantaneous flow meter shall be used to confirm the firing rate. A combustion analyzer shall print the results of the tuned analysis. A detailed test report and installation and maintenance manual shall be sent with the unit.

Unit Construction

Unit exterior casing shall be constructed of minimum 18 gauge bonderized type steel rich with zinc. The unit shall incorporate a minimum of 3 in. structural iron welded support frame. All structural iron frames shall be primed with a zinc rich high build rust inhibitor. Units provided with just sheet metal framing instead of a complete structural welded iron frame are unacceptable.

The unit is to be insulated with acoustic fiberglass duct liner with a minimum thickness of two inches. The insulation shall provide sound attenuation throughout the filter, fan deck, heat exchanger and discharge section. The insulation must be lined with perforated steel to develop a “sound trap”. The perforated liners shall cover the two inch insulations and ensure insulation is held in place throughout the filter, fan deck, heat exchanger and discharge section.
To ensure the casings are airtight all panels shall overlap and be caulked. Each section of the unit shall have pre-punched structural angle iron mating flanges for final assembly. After assembly of all of the casing the entire unit is to be de-greased and cleaned with solvent. The unit is to be finished coated with medium grey industrial catalyzed epoxy paint minimum 3 mil thickness.

Blower / Motor Section

Unit shall have a hinged fan access door w/ electric safety door switches to provide easy access to maintain and inspect motors, belts & bearings. Unit shall be supplied with three low noise turbine type propeller fans. Each propeller fan shall have a minimum of six fabricated steel blades. The unit shall be statically and dynamically balanced at the factory. The fan wheel shall be mounted on a heavy duty machined and polished solid steel shaft. The shafts maximum operating speed is not to exceed 75% of its first critical speed.

The propeller motors shall be T-frame ODP type with a 1.15 s.f. The motors shall be mounted on a fully adjustable base. The entire propeller assembly is to be mounted on minimum half inch thick full perimeter neoprene to provide vibration absorption. The propellers are to be driven with adjustable 1.5 s.f. V-belt drives the bearings are to be heavy duty pillow block type.

Fan bearings shall have an L-10 bearing life base of 100,000 hours. Bearings are to be equipped with automatic greasing canisters. Microprocessor controlled greasing canisters shall deliver 350 psig lubrication on a precision cycle to increase bearing longevity and practically eliminate bearing maintenance. All six unit bearings are to be automatically lubricated every second day from a 240 cc lubrication canister. The greasing canisters with pump driven microprocessor are to be located in the main control panel for ease of adjustment.

Filter Section

A V-Bank filter section shall be provided with hinged access doors on both sides. Flat filter sections visually displayed on unit exterior are unacceptable. Angular racks shall hold 2 in. thick 30% efficient pleated type filters. Filters shall have an average arrestance of 76.4% in accordance with ashrae standard 52.1 Filter velocities not to exceed 500 FPM.

Mixbox and Damper Section

An integral mix box section shall support the unit and provide access to the dampers. Return Air and Inlet dampers are to be of galvanized steel construction. A minimum of six breaks per blade shall be provided to strengthen the blades. Maximum leakage rate not to exceed 3 cfm per sq. ft. Dampers are to be operated with a minimum of two 150 lb-in. actuators per damper section.

Heating Coils

Heating coils are intended for use with water, glycol, or other appropriate heat transfer fluids. Coils are to be designed to maximize performance under specified conditions with minimal air-side pressure drop. All water coils designed with 1/2” or 5/8” tubes are to be ARI performance certified and shall bear the ARI symbol.
Tubes and return bends shall be constructed from seamless UNS C12200 copper conforming to ASTM B224 and ASTM E527. Properties shall be O50 light annealed with a maximum grain size of 0.040 mm. Tubes are to mechanically expanded into fins (secondary surface) for maximum heat transfer. Materials are to be 3/8” diameter x (0.014, 0.022) wall thickness, 1/2” diameter x (0.016, 0.025) wall thickness, or 5/8” diameter x (0.020, 0.025, 0.035, 0.049) wall thickness.

Secondary surface (fins) shall be of the plate-fin design using aluminum or copper, with die-formed collars. Fin design to be flat, waffle, or sine-wave in a staggered tube pattern to meet performance requirements.
Collars will hold fin spacing at specified density, and cover the entire tube surface. Aluminum properties are to be Alloy 1100 per ASTM B209, with O (soft) temper; copper is to be Alloy 11000 per ASTM B152-06 with soft (anneal) temper. Fins are to be free of oils and oxidation.
Headers are to be constructed of seamless UNS C12200, Type L (drawn) copper material sized to match specified connection size. Type K (drawn) copper headers and Schedule 40 steel headers shall be offered as optional materials.
Die-formed copper end caps are brazed on the inside of the headers, unless spun-closed (for sizes up to 1-3/8"). 1/4" vents and drains are to be provided for all fluid coils.
Connection material shall be copper, or Schedule 40 steel or red brass pipe. The type of connection is to be sweat type, MPT or FPT, grooved, or flanged as required.
Coil casing material shall be of G90 galvanized steel, 16 gauge minimum. Heavier material, stainless steel, copper, or aluminum casing are to be provided as required.
Intermediate tube supports are to be provided on all coils 48" and longer fin length. Coil casing on top and bottom of coils are to have double-flange construction, allowing for vertical stacking of coils.
All coils are to be brazed with minimum 5% silver content (BCup-3) filler material to insure joint integrity. Low-fuming, flux-coated bronze braze-weld material is to be used for ferrous to non-ferrous joints.
Coils shall be tested at 550 psig using dry nitrogen, submerged under water. Dual-operator verification shall determine that all coils are leak-free.
Heating coils shall be designed to withstand 300ºF maximum operating fluid temperature, and 250 psig maximum operating pressure.

Discharge Section

Discharge section shall be double lined with two inch thick insulation and perforated liner. Discharge section shall acoustically attenuate airborne noise and provide bi-directional control. Minimum 2 in. thick steel blades shall be painted with industrial
medium grey epoxy paint to match unit. Each blade shall be individually adjustable. A dual bank of airfoil type blades shall provide vertical and horizontal air diffusion control.

Control / Manifold Compartment

Unit controls shall be contained within a hinged enclosure mounted on floor section of the unit for easy access. Control enclosure shall have a dead front fused disconnect switch. Terminal strip, components and all wiring shall be labeled and/or numbered. Wiring in the control panel shall be run in panduit wiring duct. The controls for the heater shall include;

- blower motor starter w/ambient compensated overloads and auxiliary contact(s).
- control fuse block w/ slowblow fuse
- inlet temperature control sensor
- return air sensor temperature control sensor
- manual reset temperature high limit safety switch
- differential air proving safety switch & fan switch

All wiring external to control enclosure shall be run in conduit.

Remote Control Panel

Control panel shall consist of a enclosure w/ lamacoid identification labels, control switches. Control panel shall include;

- blower light
- Nema system on-off system switch
- Nema Off-Heat-Auto switch
- temperature selector w/ LCD readout

Temperature controller shall consist of a microprocessor based solid state programmer.
Control module is to include fully adjustable set points and differentials. A LCD display shall provide current space temperatures and set points.