Cooling Tower Technical Data Sheet

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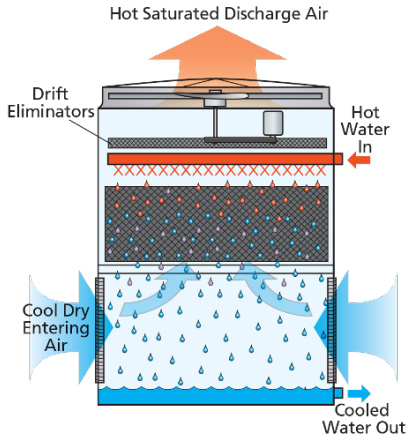
AT 14-3G12

Project Details

Project Name : Multnomah County Yeon Site
Location: TBD Oregon
Date: May 16, 2018
Customer: MFIA Consulting Engineers



Product Description

The original Advanced Technology cooling tower provides an induced-draft, axial fan solution for a wide array of outdoor cooling capacities.

Selection Criteria

Flow:	480.00 GPM
Fluid:	Water
Entering Fluid Temp:	90.00°F
Leaving Fluid Temp:	80.00°F
Wet Bulb:	70.00°F

Required Capacity

2,400.00 MBH
160 Tons

Unit Selected

One(1) EVAPCO AT 14-3G12 at 100.1% capacity (160.17 Tons)

Product Line is CTI/ECC Certified. Selection is rated in accordance with CTI Standard 201 RS

Physical Data Per Unit

Overall Dimensions (WxLxH):	4'-1/2" x 11'-11 3/4" x 10'-6 1/2"
Operating Weight:	4,940 lbs
Shipping Weight:	2,770 lbs
Heaviest Section:	2,010 lbs

*weights and dimensions could vary depending on options selected

IBC Design Capability

IBC Standard Structural Design	
Importance Factor:	1.0
Seismic(SDS):	up to 1.34 g, z/h = 0
Wind Load(P):	up to 119 psf

Fan Motor Data per Unit

# of Fan Motors:	2
Number of Fans:	2
Nameplate Power (460/3/60):	5.00 HP Per Motor
Total Connected Nameplate Power:	10.00 HP

Additional Details

Air Flow:	35,700 CFM

Hydraulic Data

Inlet Pressure Drop:	3.2 psi
Evaporated Water Rate:	3.84 GPM

Layout Criteria

From FACE B/D to wall:	2.00ft
From FACE A/C to wall:	4.00ft
Between FACE B/D ends:	3.00ft
Between FACE A/C sides:	6.00ft

Sound Data(dB(A) @ 5'/50')

Face A (Opp Mtr. Side):	84/72	Face C (Motor Side):	85/72
Face B (End):	80/70	Face D (Opp End):	80/70
Top:	87/74		

Notes: Sound Pressure Levels are according to CTI Standard ATC-128. Sound data is shown for 1 cell operating at full speed. The use of frequency inverters (Variable Frequency Drives) can increase sound levels. Sound Options: None

Shipping Data

1 Basin Sections: (WxLxH): 53" x 147" x 42" ; 760lbs each* | 1 Casing Sections: (WxLxH): 52" x 147" x 94" ; 2010lbs each*
*dimensions and weights above include shipping skids

Accessories

(1) EVAPAK Fill
(1) IBC Standard Structural Design
(1) Contactor w/Transformer and Disconnect for Heater Package
(1) Ladder
(2) Fan Motor: Inverter Capable, Premium Efficient
(1) 1.0 Importance Factor Specified
(1) Vibration Switch
(2) Fan Motor: Shaft Grounding Rings
(2) Fan Motor: Space Heaters
(1) El. Heaters (0F / -18C ambient) (1) 5 kW
(1) 304 Welded Stainless Steel Cold Water Basin

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SECTION 23 65 00
COOLING TOWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes factory assembled and tested, open circuit mechanical induced-draft vertical discharge cooling tower.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, pressure drop, performance curves with selected points indicated, furnished specialties, and accessories.

B. Shop Drawings: Complete set of manufacturer's prints of equipment assemblies, control panels, sections and elevations, and unit isolation. Include the following:

1. Assembled unit dimensions.

2. Weight and load distribution.

3. Required clearances for maintenance and operation.

4. Sizes and locations of piping and wiring connections.

5. Wiring Diagrams: For power, signal, and control wiring. Differentiate between manufacturer installed and field installed wiring.

C. Operation and Maintenance Data: Each unit to include operation and maintenance manual.

1.4 QUALITY ASSURANCE

A. Verification of Performance:

1. The thermal performance shall be certified by the Cooling Technology Institute in accordance with CTI Certification Standard STD-201. Lacking such certification, a field acceptance test shall be conducted within the warranty period in accordance with CTI Acceptance Test Code ATC-105, by a Certified CTI Thermal Testing Agency. The Evaporative Heat Rejection Equipment shall comply with the energy efficiency requirements of ASHRAE Standard 90.1.

2. Unit Sound Performance ratings shall be tested according to CTI ATC-128 standard. Sound ratings shall not exceed specified ratings.

B. Unit shall meet or exceed energy efficiency per ASHRAE 90.1

1.5 WARRANTY

A. Submit a written warranty executed by the manufacturer, agreeing to repair or replace components of the unit that fail in materials and workmanship within the specified warranty period.

1. The Entire Unit shall have a comprehensive five (5) year warranty against defects in

materials and workmanship from date of shipment.

2. Fan Motor/Drive System: Warranty Period shall be Five (5) years from date of unit shipment from Factory (fan motor(s), fan(s), fan shaft(s), bearings, mechanical support, sheaves, bushings and belt(s)).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide cooling towers manufactured by one of the following:

1. EVAPCO Model AT 14-3G12

2. Approved Substitute

2.2 THERMAL PERFORMANCE

A. Each unit shall be capable to cool 480.00 GPM of water entering at 90.00° F leaving at 80.00° F at a design wet bulb of 70.00° F.

2.3 IBC COMPLIANCE

A. The unit structure shall be designed, analyzed, and constructed in accordance with the latest edition of International Building Code (IBC) for: I_P = 1.0, S_{DS} = 1.34; z/h = 0, P = 119 psf.

2.4 COMPONENTS

A. Description: Factory assembled and tested, induced draft counter flow cooling tower complete with fan, fill, louvers, accessories and rigging supports

B. Materials of Construction

1. All cold water basin components including vertical supports, air inlet louver frames and panels up to rigging seam shall be constructed of Type 304 Stainless Steel. All factory cold water basin seams shall be welded for water tight construction. "Series 300" stainless steel shall not be acceptable as equivalent to Type 304 Stainless Steel.

2. Upper Casing, channels and angle supports shall be constructed of heavy gauge mill hot-dip galvanized steel. Fan cowl and guard shall be constructed of galvanized steel. All galvanized steel shall be coated with a minimum of 2.35 ounces of zinc per square foot of area (G-235 Hot-Dip Galvanized Steel designation). During fabrication, all galvanized steel panel edges shall be coated with a 95% pure zinc-rich compound.

C. Fan(s):

1. Fan(s) shall be high efficiency axial propeller type, using a high strength die cast aluminum hub and fiberglass reinforced polypropylene (PPG) wide chord blades. Each fan shall be statically balanced and installed in a closely fitted cowl with venturi air inlet for maximum fan efficiency.

D. Drift Eliminators

1. Drift eliminators shall be constructed entirely of Polyvinyl Chloride (PVC) in easily handled sections. Design shall incorporate three changes in air direction and limit the water carryover to a maximum of 0.001% of the recirculating water rate.

E. Water Distribution System

1. Spray nozzles shall be precision molded ABS, large orifice nozzles utilizing fluidic technology for superior water distribution over the fill media. Nozzles shall be designed to minimize water distribution system maintenance. Spray header and branches shall be Schedule 40 Polyvinyl Chloride (PVC) for corrosion resistance with a steel connection to

attach external piping.

F. Heat Transfer Media

1. Fill media shall be constructed of Polyvinyl Chloride (PVC) of cross-fluted design and suitable for inlet water temperatures up to 130° F. The bonded block fill shall be bottom supported and suitable as an internal working platform. Fill shall be self-extinguishing, have a flame spread of 5 under A.S.T.M. designation E-84-81a, and shall be resistant to rot, decay and biological attack.

G. Air Inlet Louvers

1. The air inlet louver screens shall be constructed from UV inhibited polyvinyl chloride (PVC) and incorporate a framed interlocking design that allows for easy removal of louver screens for access to the entire basin area for maintenance. The louver screens shall have a minimum of two changes in air direction and shall be of a non-planar design to prevent splash-out and block direct sunlight & debris from entering the basin.

H. Make up Float Valve Assembly

1. Make up float assembly shall be a mechanical brass valve with an adjustable plastic float.

I. Pan Strainer

1. Pan Strainer(s) shall be all Type 304 Stainless Steel construction with large area removable perforated screens.

2.5 MOTORS AND DRIVES

A. General requirements for motors are specified in Division 23 Section “Motors”

B. Fan Motor

1. Fan motor(s) shall be totally enclosed, ball bearing type electric motor(s) suitable for moist air service. Motor(s) are Premium Efficient, Class F insulated, 1.15 service factor design. Inverter rated per NEMA MG1 Part 31.4.4.2 and suitable for variable torque applications and constant torque speed range with properly sized and adjusted variable frequency drives.

2. Fan motor(s) shall include strip-type space heaters with separate leads brought to the motor conduit box.

C. Fan Drive

1. The fan drive shall be multigroove, solid back V-belt type with QD tapered bushings designed for 150% of the motor nameplate power. The belt material shall be neoprene reinforced with polyester cord and specifically designed for evaporative equipment service. Fan sheave shall be aluminum alloy construction. Belt adjustment shall be accomplished from the exterior of the unit.

D. Fan Shaft

1. Fan shaft shall be solid, ground and polished steel. Exposed surface shall be coated with rust preventative.

E. Fan Shaft Bearings

1. Fan Shaft Bearings shall be heavy-duty, self-aligning ball type bearings with extended lubrication lines to grease fittings located on access door frame. Bearings shall be designed for a minimum L-10 life of 100,000 hours.

F. Vibration Switch

1. Unit shall be provided with a Vibration Cutout Switch, operating on 120 VAC feed, to

protect the fan and drive assembly from damage in the event of excess vibration. Vibration switch shall be DPDT.

2.6 MAINTENANCE ACCESS

A. Fan Section

1. Circular access door shall be located in the fan section for fan drive and water distribution system access. Swing away motor cover shall be hinged for motor access.

B. Basin Section

1. Framed removable louver panels shall be on two (2) sides of the unit for pan and sump access.

C. Ladder

1. An aluminum straight ladder shall be provided for access to the motor access door.

2.7 ACCESSORIES

A. Basin Heater Package

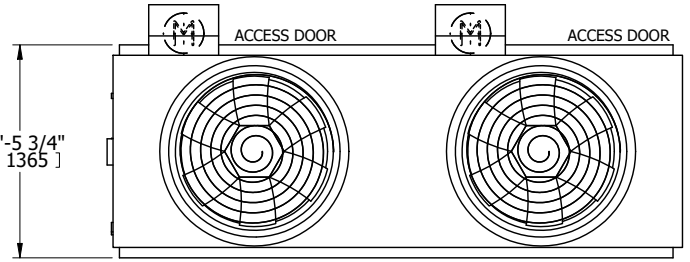
1. Cold water basin shall be fitted with copper element, electric immersion heater(s) with a separate thermostat and low water protection device. Heaters shall be selected to maintain +40° F pan water at 0° F ambient temperature.

2. Electric immersion heater package shall include a factory-supplied NEMA 4x enclosure containing a magnetic contactor with 120 VAC control circuit, transformer, and main power disconnect. Control package wired by others.

UNIT	COOLING TOWER		DWG. #	T3041236-DRJ-ST	REV.	-
MODEL #	AT 14-3G12	SCALE NTS		EVAPCO, INC.	SERIAL #	DATE 5/16/2018

NOTES:
1. (M)- FAN MOTOR LOCATION
2. HEAVIEST SECTION IS UPPER SECTION
3. MPT DENOTES MALE PIPE THREAD
   FPT DENOTES FEMALE PIPE THREAD
   BFW DENOTES BEVELED FOR WELDING
   GVD DENOTES GROOVED
   FLG DENOTES FLANGE
4. +UNIT WEIGHT DOES NOT INCLUDE ACCESSORIES (SEE ACCESSORY DRAWINGS)
5. MAKE-UP WATER PRESSURE
   20 psi MIN [137 kPa], 50 psi MAX [344 kPa]
6. 3/4" [19MM] DIA. MOUNTING HOLES. REFER TO RECOMENDED STEEL SUPPORT DRAWING.
7. DIMENSIONS LISTED AS FOLLOWS:
   ENGLISH FT-IN
   [METRIC] [mm]

FACE C

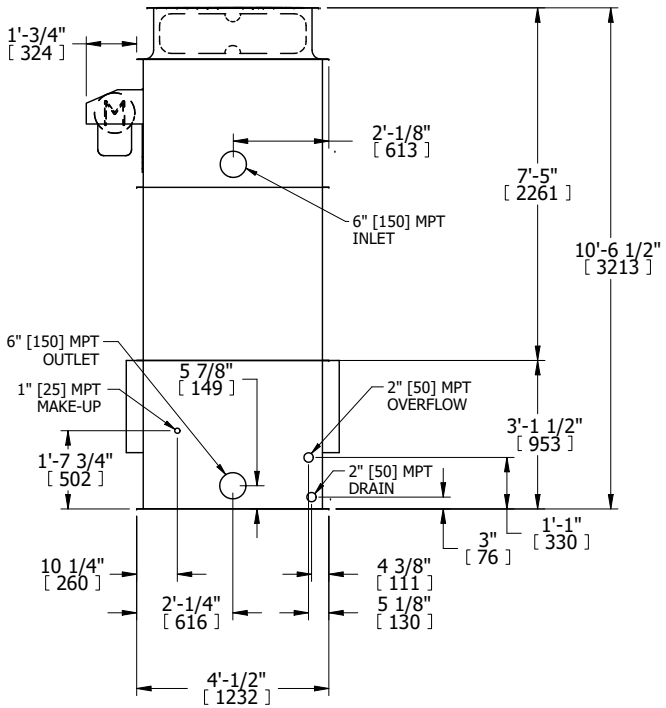


FACE B

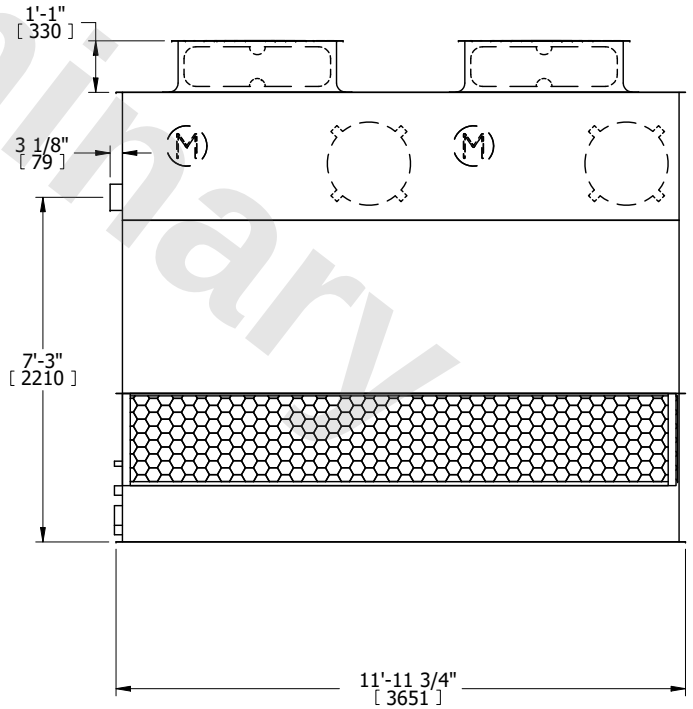
PLAN VIEW

FACE D

FACE A



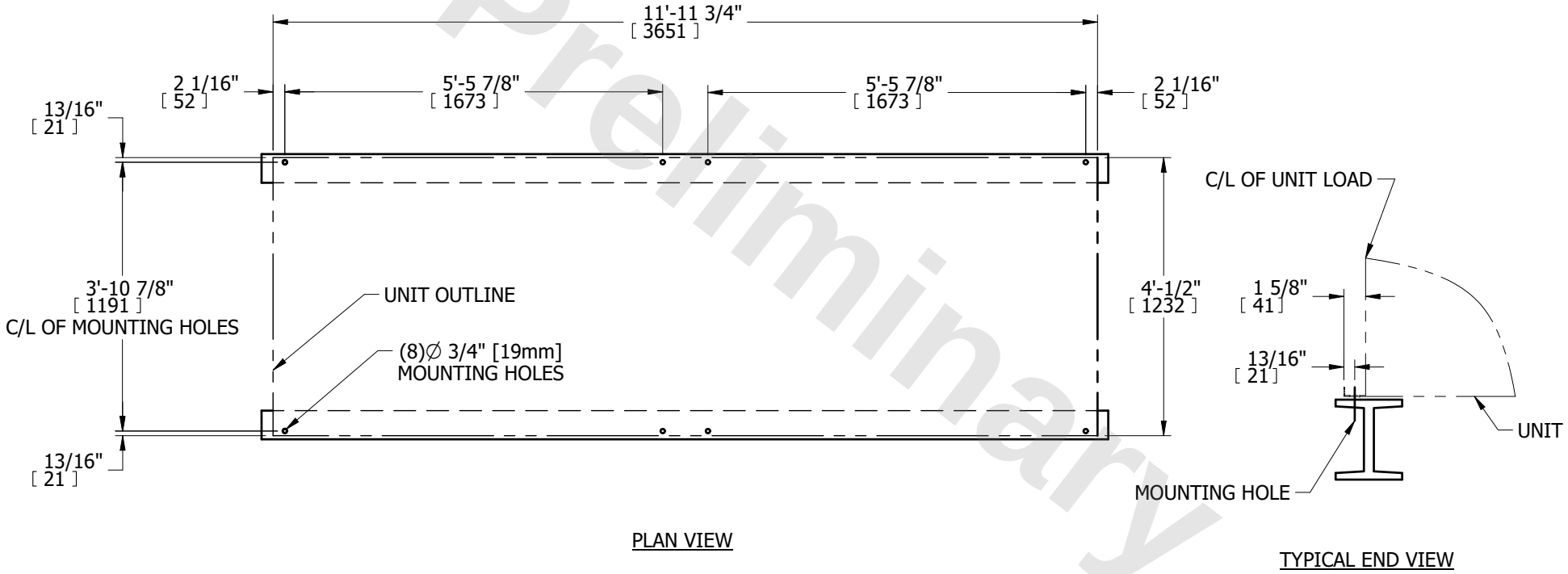
FACE B



FACE A

SHIPPING WEIGHT	2770 lbs+ [1257] kg+	OPERATING WEIGHT	4940 lbs+ [2241] kg+	HEAVIEST SECTION WEIGHT	2010 lbs+ [915] kg+	NO. OF SHIPPING SECTIONS	2	DRAWN BY:	KWC

UNIT			DWG. #	
AT 14-3G12	**EVAPCO, INC.**		SLT30412-DF	
TITLE		SCALE	DRAWN BY	
STEEL SUPPORT CONFIGURATION		N.T.S.	JLG	



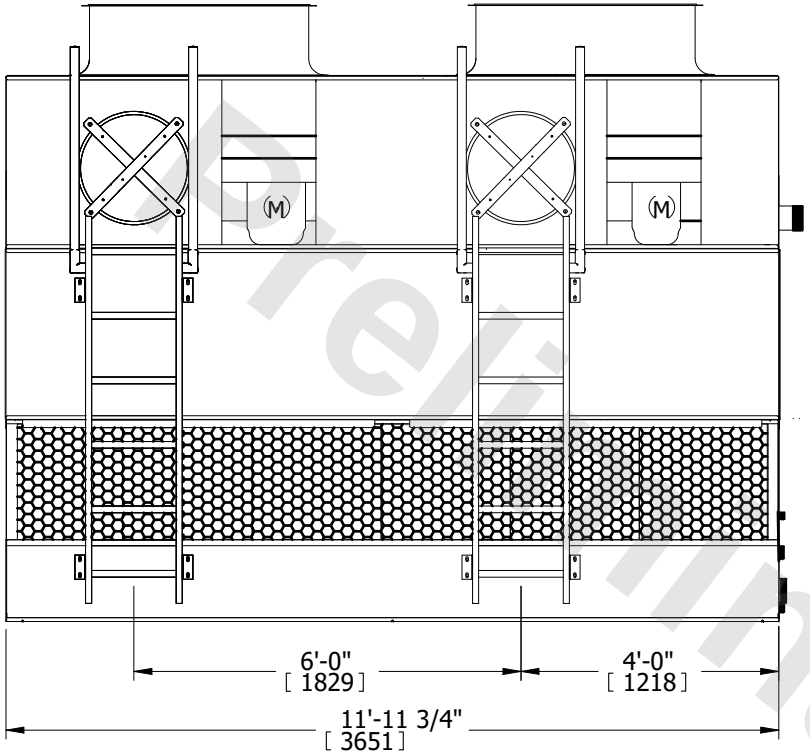
PLAN VIEW

TYPICAL END VIEW

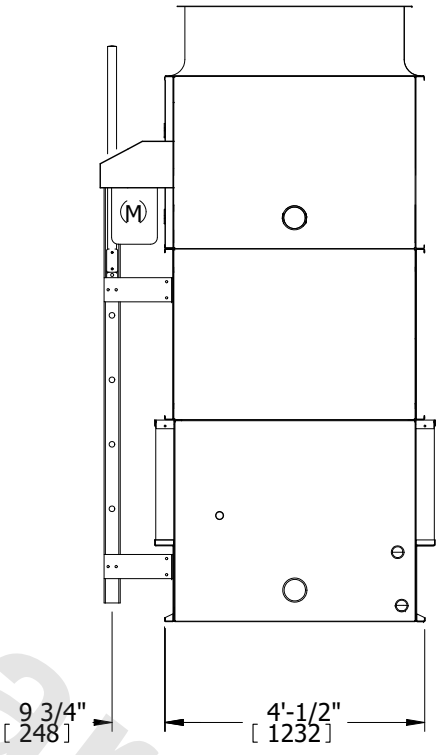
NOTES:

1. BEAMS SHOULD BE SIZED IN ACCORDANCE WITH ACCEPTED STRUCTURAL PRACTICES. MAXIMUM DEFLECTION OF BEAM UNDER UNIT TO BE 1/360 OF UNIT LENGTH NOT TO EXCEED 1/2" [13mm].
2. DEFLECTION MAY BE CALCULATED BY USING 55% OF THE OPERATING WEIGHT AS A UNIFORM LOAD ON EACH BEAM. SEE CERTIFIED PRINT FOR OPERATING WEIGHT.
3. SUPPORT BEAMS AND ANCHOR HARDWARE ARE TO BE FURNISHED BY OTHERS. ANCHOR HARDWARE TO BE ASTM A325 5/8" [16mm] BOLT OR EQUIVALENT.
4. BEAMS MUST BE LOCATED UNDER THE FULL LENGTH OF THE PAN SECTION.
5. SUPPORTING BEAM SURFACE MUST BE LEVEL. DO NOT LEVEL THE UNIT BY PLACING SHIMS BETWEEN THE UNIT MOUNTING FLANGE AND THE SUPPORTING BEAM.
6. THE FACTORY RECOMMENDED STEEL SUPPORT CONFIGURATION IS SHOWN. CONSULT THE FACTORY FOR ALTERNATE SUPPORT CONFIGURATIONS.
7. UNIT SHOULD BE POSITIONED ON STEEL SUCH THAT THE ANCHORING HARDWARE FULLY PENETRATES THE BEAM'S FLANGE AND CLEARS THE BEAM'S WEB.
8. WHEN VIBRATION ISOLATION IS REQUIRED, THE VIBRATION ISOLATORS (BY OTHERS) MUST BE LOCATED UNDER THE SUPPORTING BEAMS AND NOT BETWEEN THE SUPPORTING STEEL BEAMS AND THE UNIT.
9. DIMENSIONS LISTED AS FOLLOWS: ENGLISH FT-IN
   [METRIC] [mm]

UNIT			DWG. #	
AT 14-3G12	**EVAPCO, INC.**		LDT30412-DD	
TITLE		SCALE	DRAWN BY	
VERTICAL LADDER INSTALLATION PACKAGE		N.T.S.	JLG	



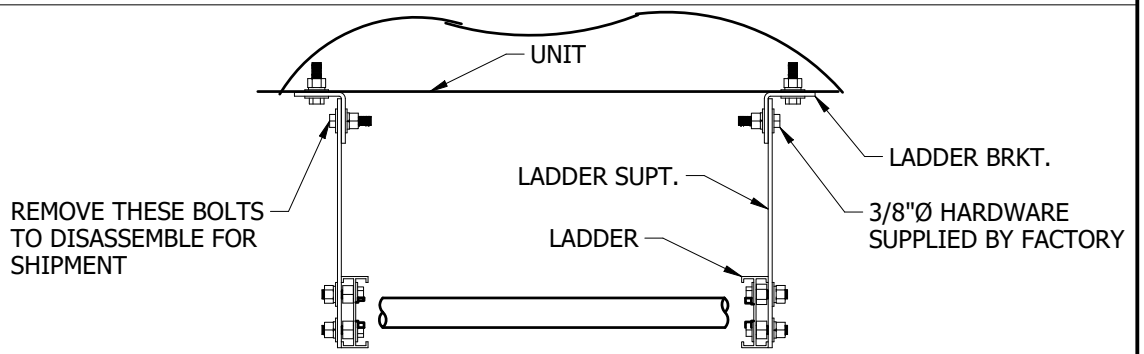
FACE C



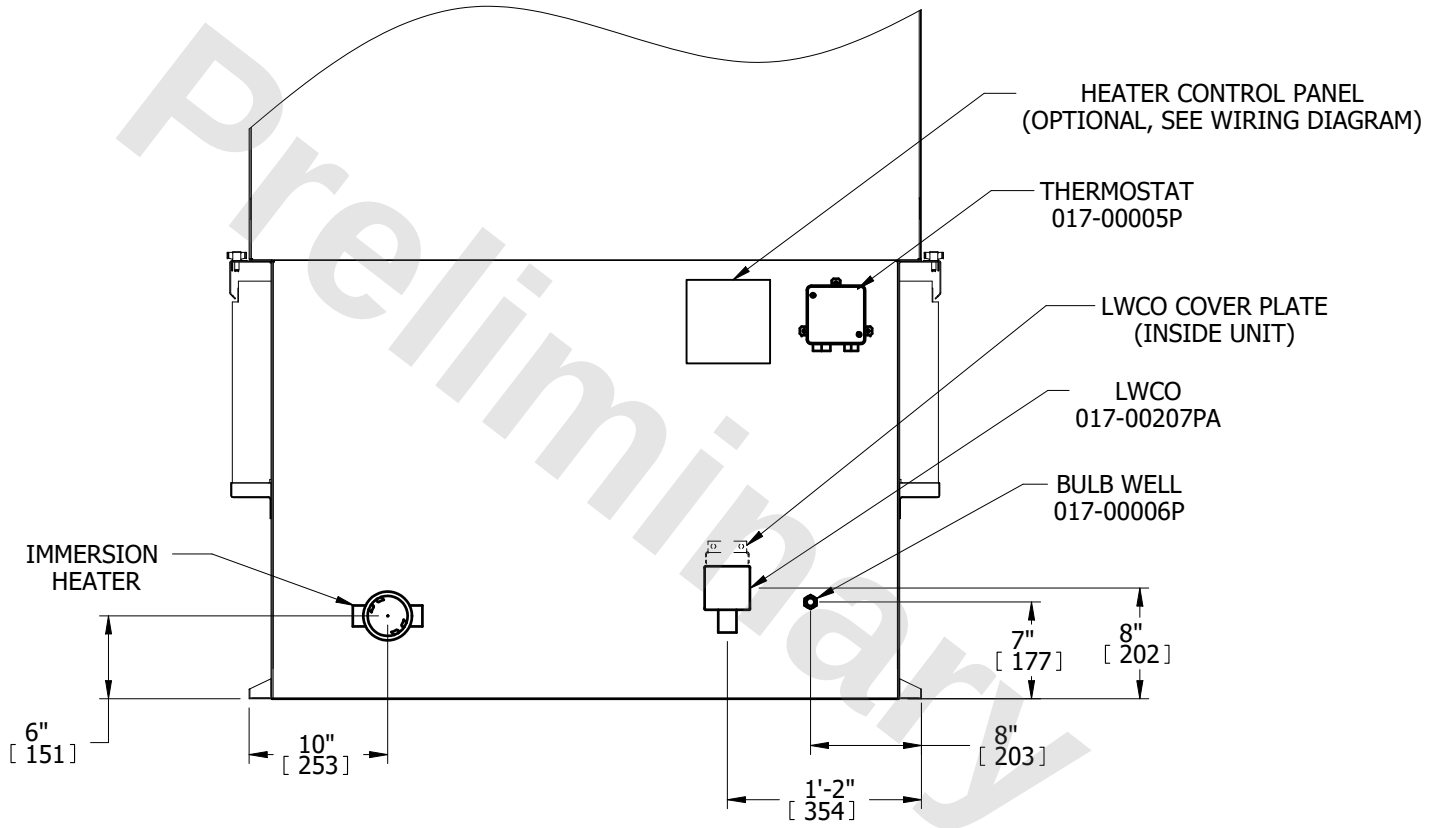
FACE B

* THE BOTTOM OF THE LADDER IS AT THE BASE OF THE UNIT.
IF THE UNIT IS ELEVATED THEN A LADDER EXTENSION SHOULD BE CONSIDERED. (CONSULT FACTORY).
LADDER EXTENSIONS OF UP TO 3 FEET CAN BE ADDED WITHOUT ANY ADDITIONAL SUPPORT. FOR A LADDER EXTENSION LONGER THAN 3 FEET, ADDITIONAL SUPPORT MUST BE PROVIDED BY OTHERS.

NOTES:
1. THE VERTICAL LADDER IS AN INDUSTRIAL GRADE.
2. THE LADDER SHIPS LOOSE FOR FEILD INSTALLATION BY OTHERS.
3. SEE MOUNTING ARRANGEMENT DETAILS AS SHOWN.
4. THE LADDER AND DESIGNS FALL UNDER OSHA REQUIREMENTS.
5. Ⓜ- FAN MOTOR LOCATION
6. DIMENSIONS LISTED AS FOLLOWS: ENGLISH FT-IN
[METRIC] mm



UNIT	AT 14-3G12	EVAPCO, INC.	DWG. #	HLAA30400-DC	
TITLE	HEATER LOCATION		SCALE	N.T.S.	DRAWN BY JLG

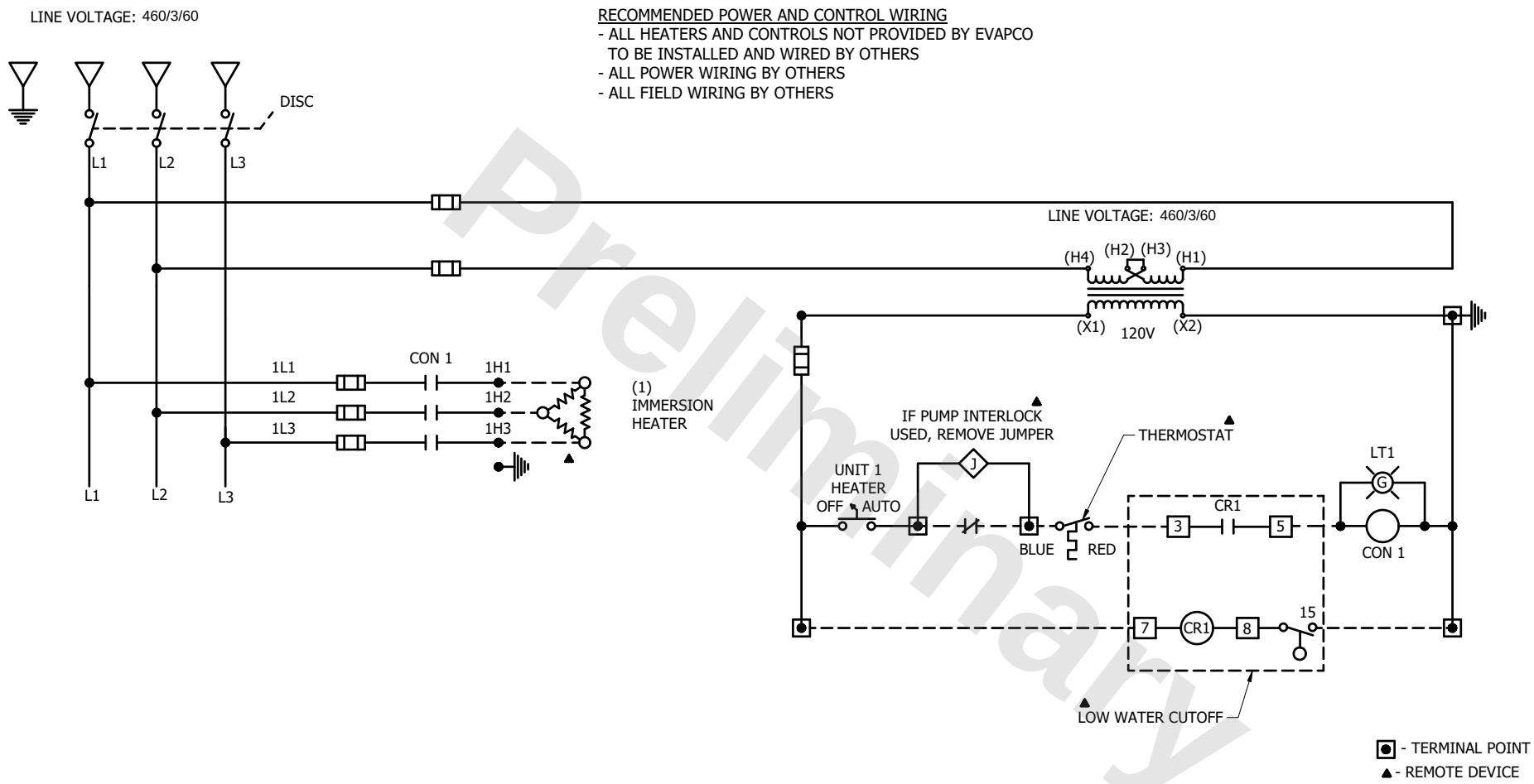


FACE D

NOTES:

1. A MINIMUM OF CLEARANCE IS REQUIRED BETWEEN THE HEATER OUTLET BOX AND THE NEAREST OBSTRUCTION FOR REMOVAL OF THE HEATER.
2. ALL NIPPLES ON UNIT ARE NOT SHOWN IN ORDER TO CLARIFY HEATER COMPONENT LOCATIONS.
3. ALL HEATER COMPONENTS BY EVAPCO ARE FACTORY MOUNTED WHEN POSSIBLE.
4. DIMENSIONS LISTED AS FOLLOWS: ENGLISH FT-IN
   [METRIC] [mm]

UNIT		DWG. #
AT 14-3G12	**EVAPCO, INC.**	B1AU0000-DB
TITLE	SCALE	DRAWN BY
3Ø HEATER WIRING DIAGRAM 1 HEATER	N.T.S.	SLR



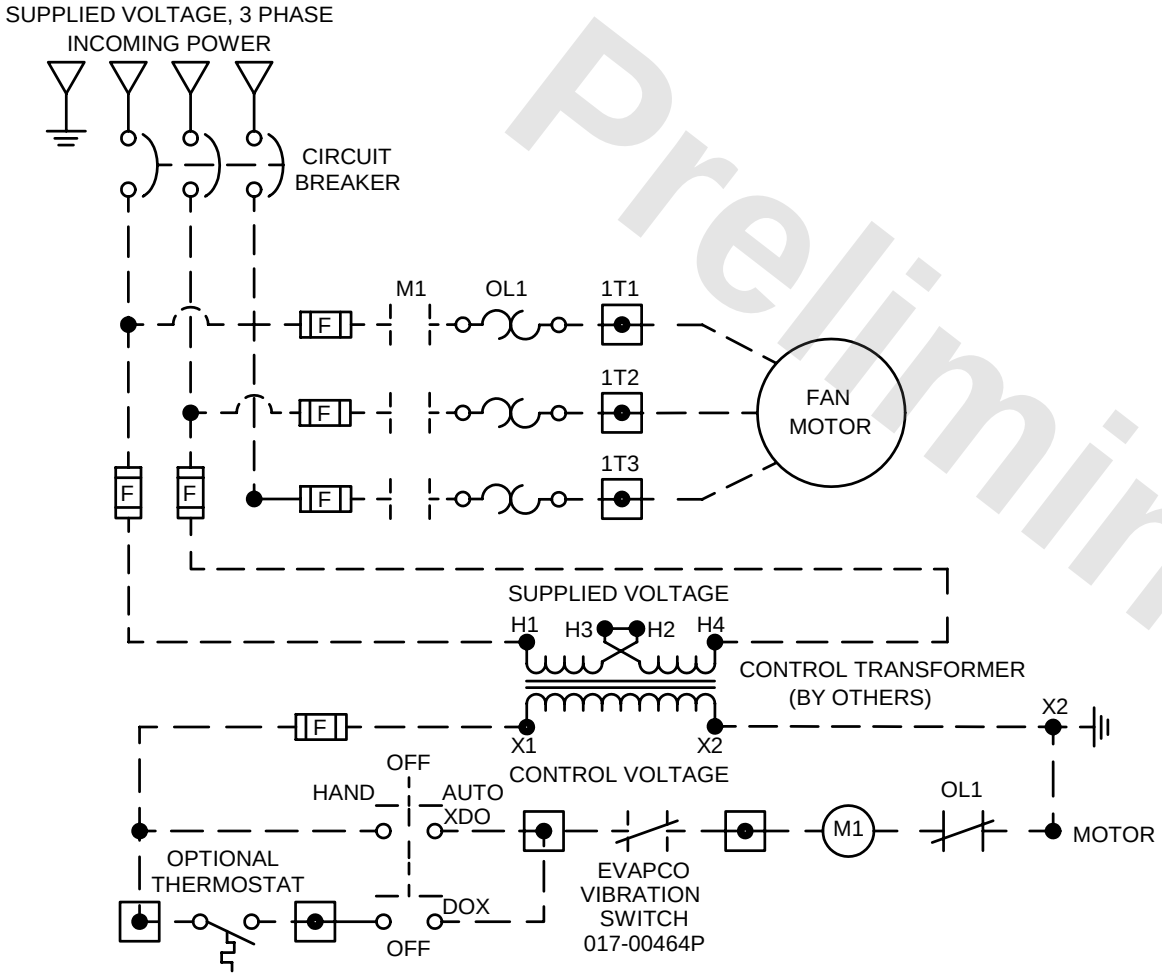
RECOMMENDED POWER AND CONTROL WIRING
- ALL HEATERS AND CONTROLS NOT PROVIDED BY EVAPCO TO BE INSTALLED AND WIRED BY OTHERS
- ALL POWER WIRING BY OTHERS
- ALL FIELD WIRING BY OTHERS

NOTES:
1. DASHED LINES INDICATE FIELD WIRING.
2. THE HEATERS HAVE BEEN SIZED TO MAINTAIN 40° F PAN WATER AT AN AMBIENT TEMPERATURE OF 0° F
3. ALL COMPONENTS BY EVPACO HAVE TYPE 4 ENCLOSURES.
4. AUXILIARY N.C. CONTACT INTERLOCKS IMMERSION HEATERS WITH SPRAY WATER CIRCULATING PUMP TO DE-ENERGIZE HEATERS WHEN SPRAY PUMP IS RUNNING.
5. (1) CONTACTOR IS SUPPLIED FOR EVERY (2) HEATERS
   - CONTACTOR SHOULD BE WIRED WITH SEPARATE SUPPLY TERMINALS FOR EACH HEATER.
6. (1) CONTACTOR IS SUPPLIED PER CELL OF A MULTICELL UNIT
   - PROVIDES FOR INDIVIDUAL CELL OPERATION.

IMMERSION HEATER BY:	EVAPCO
LOW WATER CUTOFF/THERMOSTAT CONTROL BY:	EVAPCO
AUXILIARY N.C. PUMP INTERLOCK BY:	OTHERS
HEATER CONTROL PANEL BY:	EVAPCO
TRANSFORMER BY:	EVAPCO
HEATER CONTACTOR BY:	EVAPCO
FUSED DISCONNECT BY:	EVAPCO

EVAPCO, INC.

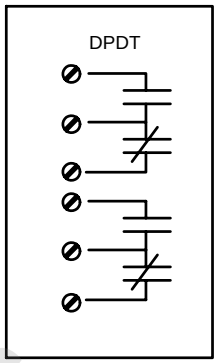
TITLE	DESCRIPTION:		DWG. #
VIBRATION SWITCH	AT 14-3G12	SINGLE SPEED	5/16/2018 V1AU0000-EE



SWITCH CONTACT RATING:

15 AMPS, 125, OR 480 Vac; 1/8 HP, 125 Vac; 1/4 HP, 250 Vac; 1/2 AMP, 125 Vdc; 1/4 AMP, 250 Vdc.

WIRING DIAGRAM:



NOTES:

1. DASHED LINES INDICATE WIRING(BY OTHERS)

ADJUSTMENT

ADJUST THE SWITCH SO THAT DURING FULL SPEED START-UP AND UNDER NORMAL CONDITIONS, THE CONTACTS DO NOT TRIP. FIRST, WITH THE MOTOR OFF, TURN THE ADJUSTMENT SCREW COUNTER-CLOCKWISE (MORE SENSITIVE DIRECTION) UNTIL THE SWITCH TRIPS. NEXT, TURN THE ADJUSTMENT SCREW CLOCKWISE 1/8 TURN (LESS SENSITIVE DIRECTION). RESET THE SWITCH BY DEPRESSING THE PUSH-BUTTON RESET LOCATED ON TOP OF THE SWITCH. START THE MOTOR ON FULL SPEED. IF THE MOTOR TRIPS THE SWITCH, THEN TURN THE ADJUSTMENT SCREW CLOCKWISE AN ADDITIONAL 1/8 TURN. RESET THE SWITCH AND START THE MOTOR AGAIN. REPEAT THE ABOVE PROCEDURE UNTIL THE MOTOR CONTINUES TO RUN.

Full Speed Complete Sound Data

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Sound Pressure Levels (SPL) in dB RE 0.0002 Microbar
Sound Power Levels (PWL) in dB RE 10-12 Watt

Model	AT 14-3G12
Motor	5.00 HP
# Motors	2
Speed	Full Speed

1 Cell Data

	Sound Pressure Level (dB)										
	End		Motor Side		Opp End		Opp Mtr. Side		Top		Sound
	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	Power
Band	(1.5m)	(15m)	(1.5m)	(15m)	(1.5m)	(15m)	(1.5m)	(15m)	(1.5m)	(15m)	Level (db)
63 HZ	86	76	88	77	86	76	88	77	84	76	108
125 HZ	87	80	90	81	87	80	89	81	93	82	113
250 HZ	82	73	84	74	82	73	83	74	87	76	106
500 HZ	79	67	84	68	79	67	83	68	87	73	101
1 KHZ	73	63	79	65	73	63	78	65	81	66	96
2 KHZ	69	59	73	61	69	59	73	61	76	63	93
4 KHZ	64	55	70	57	64	55	70	57	70	62	90
8 KHZ	59	48	69	52	59	48	69	52	63	53	83
Calc dBA	80	70	85	72	80	70	84	72	87	74	104

Sound option(s) selected: None

Remarks:

1. Sound Pressure Levels are according to CTI Standard ATC-128
2. Sound Power Levels are calculated according to the Small Units Section 8
3. Sound from free-field conditions over a reflecting plane with +/-2 db(A) tolerance
4. Noise levels can increase with variable frequency drives depending on the drive manufacturer and the drive configuration
5. Complete unit sound data with all fans operating

50% Speed Complete Sound Data

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Sound Pressure Levels (SPL) in dB RE 0.0002 Microbar
Sound Power Levels (PWL) in dB RE 10-12 Watt

Model	AT 14-3G12
Motor	5.00 HP
# Motors	2
Speed	50% Speed

1 Cell Data

	Sound Pressure Level (dB)										
	End		Motor Side		Opp End		Opp Mtr. Side		Top		Sound
	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	Power
Band	(1.5m)	(15m)	(1.5m)	(15m)	(1.5m)	(15m)	(1.5m)	(15m)	(1.5m)	(15m)	Level (db)
63 HZ	71	61	73	63	71	61	73	63	69	61	94
125 HZ	72	65	75	66	72	65	74	66	78	67	98
250 HZ	67	58	69	59	67	58	68	59	72	61	91
500 HZ	65	53	70	54	65	53	69	54	72	58	87
1 KHZ	62	51	68	54	62	51	68	54	67	52	85
2 KHZ	61	50	68	53	61	50	68	53	64	51	84
4 KHZ	58	49	69	52	58	49	69	52	61	51	83
8 KHZ	55	43	69	50	55	43	69	50	58	44	79
Calc dBA	68	58	76	61	68	58	75	61	73	60	92

Sound option(s) selected: None

Remarks:

1. Sound Pressure Levels are according to CTI Standard ATC-128
2. Sound Power Levels are calculated according to the Small Units Section 8
3. Sound from free-field conditions over a reflecting plane with +/-2 db(A) tolerance
4. Noise levels can increase with variable frequency drives depending on the drive manufacturer and the drive configuration
5. Complete unit sound data with all fans operating