

**URBANDALE CORPORATION
COWAN'S GROVE COMMERCIAL PLAZA
4791 BANK STREET
STATIONARY NOISE CONTROL STUDY**

July 2018

Prepared for:

URBANDALE CORPORATION
2193 Arch Street
Ottawa, Ontario
K1G 2H5

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JLR No.: 25818-002

STATIONARY NOISE CONTROL STUDY

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1.0 INTRODUCTION

Urbandale Corporation (Urbandale) retained the services of J.L. Richards & Associates Limited (JLR) to assess the potential environmental noise impact of the proposed commercial development onto the adjacent residential development. The proposed commercial development is referred to as Cowan's Grove Commercial Plaza, located at 4791 Bank Street in the City of Ottawa (City).

This study is prepared to satisfy the City of Ottawa Environmental Noise Control Guidelines (ENCG) (approved by City Council January 2016) and in particular Parts 1 & 4 in support of the Site Plan Application.

2.0 PROJECT DESCRIPTION

The subject lands, identified on Figure 1 as Cowan's Grove Commercial Plaza, are bounded by future residential to the north, Bank Street to the west, vacant land to the south, and by future residential to the east. Cowan's Grove Commercial Plaza has an area of approximately 1.4 ha and will be comprised of five buildings. Buildings 'A', 'B', 'D', and 'E' are single storey office/retail buildings. Building 'C' is a single storey commercial building with a drive-thru. The remainder of the site consists of landscaped areas and asphalt surfaces for laneways and parking stalls.

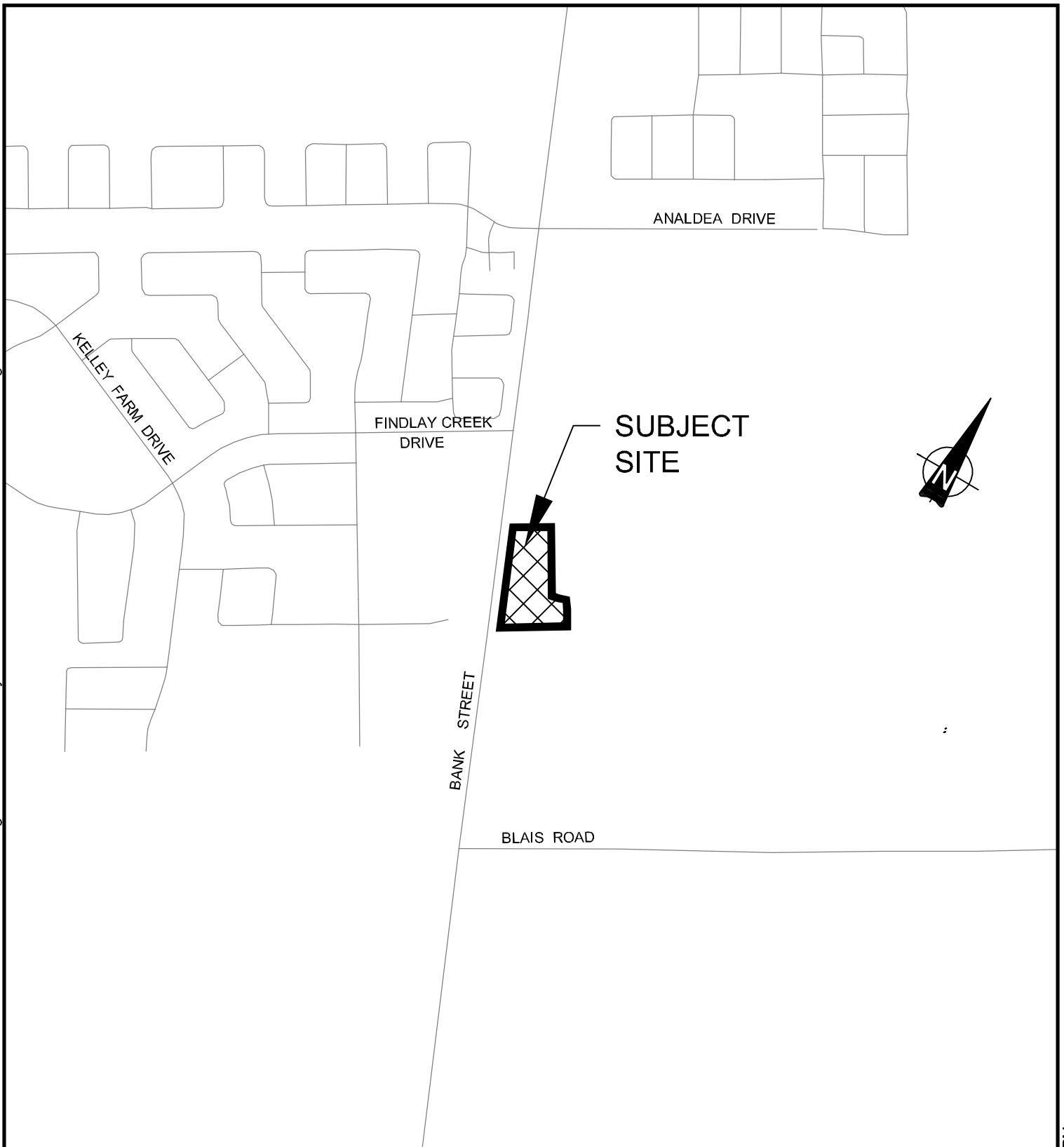
A copy of the Site Plan is provided in Appendix 'A'. Specific requirements of the Noise Control Study (NCS) (such as construction materials for buildings and fencing) will be incorporated into the City's Site Plan Agreement, where applicable.

3.0 STATIONARY NOISE SOURCES

The sole stationary noise sources for this study are the air handling units installed on the building rooftops. The Noise Impact Assessment Stationary Noise Source Drawing N1 (refer to Appendix 'B') shows the approximate location and distances of the proposed air handling units in relation to the existing adjacent developments.

3.1 Stationary Source Sound Level Criteria

The stationary sound level criteria within a community are largely dependent on its location within the City. In the Ministry of the Environment (MOE) guideline NPC-300 and the City's ENCG there are four separate community class areas which are defined by their ambient sound level (see Table 1).



PROJECT: COWAN'S GROVE COMMERCIAL PLAZA
4791 BANK STREET, OTTAWA

DRAWING: LOCATION PLAN

 J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS www.jlrichards.ca	This drawing is copyright protected and may not be reproduced or used for purposes other than execution of the described work without the express written consent of J.L. Richards & Associates Limited.	DESIGN: TB	JLR NO: 25818-002
		DRAWN: TB	DRAWING NO.:
		CHECKED: LJ	FIGURE 1

STATIONARY NOISE CONTROL STUDY

**Table 1: Area Classes for Definition of Stationary Noise Ambient Sound Level
(From the City's ENCG, Part 1 Table 3.0)**

Class 1	Means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as "urban hum". Within the City Class 1 areas generally include all of the urban area as well as lands in proximity to Employment Lands and the 416/417 corridor.
Class 2	Means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 areas. These are the suburban areas of the City outside of the busy core where the urban hum is evident but within the urban boundary. Class 2 areas also include core areas of large and medium sized villages such as Manotick, Greely, Richmond, Carp and Metcalfe. Class 2 areas have the following characteristics: i. sound levels characteristic of Class 1 during daytime (07:00 to 19:00 or to 23:00 hours); and ii. low evening and night background sound level defined by natural environment and infrequent human activity starting as early as 19:00 hours (19:00 or 23:00 to 07:00 hours).
Class 3	Means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as: i. a small community or village; ii. agricultural area; iii. a rural recreational area such as a cottage or a resort area; or iv. a wilderness area. Within the City, Class 3 areas are found in the rural area, Greenbelt and within small residential oriented villages such as Kinburn, Ashton, Sarsfield and Constance Bay.
Class 4	Means an area or specific site that would otherwise be defined as Class 1 or 2 and which: i. is an area intended for development with new noise sensitive land use(s) that are not yet built; ii. is in proximity to existing, lawfully established stationary source(s); and iii. has formal confirmation (designation) from the City of the Class 4 area classification through Council approval. This classification may not be applied retroactively. Existing noise sensitive land use(s) cannot be classified as Class 4 areas until these land uses are replaced, redeveloped or rebuilt. Class 4 is only applied on a property-by-property basis and, if the noise source is removed (i.e., the Provincial ECA is removed or lapses), the classification will become consistent with that of the adjacent lands (either Class 1 or 2). Finally, lands adjacent to undeveloped industrially zoned properties or areas defined as employment lands in the Official Plan may not be classified Class 4. Class 4 is considered to be an extraordinary circumstance that, while proposed by an applicant, can only be classified through a City or Ontario Municipal Board approval of a Planning Act application and accompanying noise study. A list and schedule for each Class 4 area that have been approved by the City is found in Appendix E.

For the purpose of determining the predicted noise levels, the sound level criteria established by the City's ENCG and the NPC-300, Tables 2 and 3 will be used as the maximum acceptable sound levels (Leq) for the existing residential development and the adjacent retirement residence, which are noise sensitive land uses. Cowan's Grove Commercial Plaza is defined by Class 2. Both Table 2 and 3 indicate that the maximum noise level acceptable for Class 2 Land Use is 45 dBA.

STATIONARY NOISE CONTROL STUDY

Table 2: Guidelines for Stationary Noise – Steady and Varying Sound
(From MOE NPC-300, Table C-6)

Time of Day	Class 1 Area		Class 2 Area		Class 3 Area		Class 4 Area	
	Outdoor Point of Reception	Plane of Window	Outdoor Point of Reception	Plane of Window	Outdoor Point of Reception	Plane of Window	Outdoor Point of Reception	Plane of Window
07:00-19:00	50	50	50	50	45	45	55	60
19:00-23:00	50	50	45	50	40	40	55	60
23:00-07:00	-	45	-	45	-	40	-	55

Table 3: Guidelines for Stationary Noise – Impulsive Sound
(From City's ENCG, Part 1 Table 3.2b and MOE NPC-300, Tables C-7 and C-8)

Time of Day	No. of Impulses in Period of One-hour	Class 1 Area		Class 2 Area		Class 3 Area		Class 4 Area	
		Outdoor Point of Reception	Plane of Window	Outdoor Point of Reception	Plane of Window	Outdoor Point of Reception	Plane of Window	Outdoor Point of Reception	Plane of Window
07:00-23:00	≥9	50	50	50	50	45	45	55	60
	7 to 8	55	55	55	55	50	50	60	65
	5 to 6	60	60	60	60	55	55	65	70
	4	65	65	65	65	60	60	70	75
	3	70	70	70	70	65	65	75	80
	2	75	75	75	75	70	70	80	85
	1	80	80	80	80	75	75	85	90
23:00-07:00	≥9	-	45	-	45	-	40	-	55
	7 to 8	-	50	-	50	-	45	-	60
	5 to 6	-	55	-	55	-	50	-	65
	4	-	60	-	60	-	55	-	70
	3	-	65	-	65	-	60	-	75
	2	-	70	-	70	-	65	-	80
	1	-	75	-	75	-	70	-	85

3.2 Stationary Source Noise Requirements

When the sound levels are equal to or less than the specified criteria per Tables 2 and 3 no noise attenuation (control) measures are required.

The following table outlines noise attenuation measures which can be implemented to reduce the noise levels for stationary noise sources to the specified criteria, per the City of Ottawa ENCG.

STATIONARY NOISE CONTROL STUDY

Table 4: Noise Control Measures for New Stationary Noise Sources
(From City's ENCG, Part 1 Table 3.3b)

Primary Mitigation Measure (in order of preference)	Secondary Mitigation Measures
	Landscape plantings and/or non-acoustic fence to obscure noise source
Earth berms (sound barriers)	Required
Development of non-noise producing and insensitive land uses between the source and sensitive receptor within facility.	
Development of additional related uses with enhanced construction and materials within facility between source and sensitive receptor.	
Acoustic Barriers (acoustic barriers)	

3.3 Prediction of Freefield Noise Levels (Stationary)

3.3.1 Rooftop Unit Data

Table 5 summarizes the rooftop air handling unit data that was provided by AAON (refer to Appendix 'C' for more detailed information) to predict noise levels. These units are selected with modulating condenser fans with head pressure control. This will allow the fans to operate at lower RPM and lower noise levels in ambient. We have included fan performance at 87F ambient to show expected operating conditions.

Table 5: Rooftop Unit Data

Building	No. of Air Handling Units (Capacity)	Sound Levels for Rooftop Units at the Source, each	Approximate Height of Building
Building 'A'	8 (3 Ton)	71.0 dBA*	4.25 m (single storey)
Building 'B'	9 (3 Ton)	71.0 dBA*	4.25 m (single storey)
Building 'C'	1 (9 Ton)	73.0 dBA	4.25 m (single storey)
Building 'D'	7 (3 Ton)	71.0 dBA*	4.25 m (single storey)
Building 'E'	4 (3 Ton)	71.0 dBA*	4.25 m (single storey)

*Note: 4-ton sound power level has been used in lieu of 3-ton data availability.

The typical practice for commercial developments is for the supply fan in a heating and cooling rooftop unit to be running continuously during normal operating hours. While the compressor turns on and off at various times during the day, depending on cooling demands. The noise level difference between the fan continuously running and the compressor turning on is considered negligible. For the purposes of this Study, it is assumed that all of the heating and cooling units are running 24 hr/day.

The future residential dwellings fronting on Longworth Avenue (Block 225) and Shuttleworth Drive (Block 221) are 2-storey townhouses. For the purposes of this Study, it is assumed that the point of reception for the plane of rear wall is 2.5 m above the ground for the first level and the point of reception is 4.5 metres above the ground for the second floor bedroom windows. The future residential dwellings located on the north part of Block 223 are expected to be Stacked Townhomes. For the purposes of this Study, it is assumed that the point of reception for the plane of wall is 4.5 m above the ground for the first level and the point of reception is 6.5 metres above the ground for the second floor bedroom windows. As summarized in Table 5, Buildings 'A' to 'E' are all single storey.

3.3.2 Rooftop Unit Noise Level Calculations

Table 5 summarizes the sound pressure level data provided for the respective rooftop units of each of the five proposed commercial buildings. The following formula (from the 2005 ASHRAE Fundamentals Handbook, page 7.3 (12)) was used to combine decibel levels and determine a representative total decibel level on the rooftop of each commercial building.

$$L_{sum} = 10 \log(10^{(L_1/10)} + 10^{(L_2/10)} + \dots)$$

The following formula (from the 2005 ASHRAE Fundamentals Handbook, page 7.8 (28)) was then used to determine a corresponding value at the exterior wall of the closest residential dwelling units.

$$\text{Free Field } L_p = L_w + 10 \log(Q/4 \pi r^2) + 10.5$$

L_p = Sound Pressure

L_w = Sound Power

Q = Directivity = 2 flat surface, 4 junction
two large surfaces, 8 in a corner

r = distance from source in ft

Noise receivers R1, R2, and R3 represent the residential dwellings as shown on Drawing N1. Results have been summarized in Table 6, refer to Appendix 'D' for detailed calculations.

STATIONARY NOISE CONTROL STUDY

Table 6: Estimated Stationary Noise Levels (Air Handling Units)

	Representative Sound Pressure Level on Roof (total for all units)	Distance used in Calculations for Closest Noise-Sensitive Receptor			Estimated Freefield Sound Pressure Level at Rear Wall of Closest Noise-Sensitive Receptors		
		R1	R2	R3	R1	R2	R3
Building 'A' Office/Retail	80.0 dBA	19.7m	58.7m	154.4m	45.4 dBA	44.6 dBA	43.9 dBA
Building 'B' Office/Retail	80.5 dBA	63.8m	25.1m	76.5m			
Building 'C' Drive-Thru	73.0 dBA	98.0m	81.5m	104.1m			
Building 'D' Office/Retail	79.5 dBA	153.5m	116.7m	78.0m			
Building 'E' Office/Retail	77.0 dBA	160.9m	89.6m	18.6m			

3.3.3 Rooftop Unit Summary of Findings

The results indicate that the City's stationary noise criterion will not be exceeded. As noted previously, these results are based on the assumption that all the rooftop units will be operating simultaneously 24 hours a day using the air handling units selected for this study. Depending on commercial building occupancy, this could vary over time. Further to this, the criteria have not been adjusted to account for the background noise levels associated with vehicular traffic on Bank Street. Based on the City of Ottawa's Official Plan, Bank Street is classified as an Urban Arterial with an AADT of 35,000. In JLR's experience this amount of vehicular traffic will generate between 65-70 dBA. Comparing the 65 dBA noise level to the predicted stationary noise level at receiver R1 (45.5 dBA) and using the nomograph method to add decibels, it can be expected that the noise levels will not be affected with the addition of the proposed stationary noise source. Regardless, a conservative analytic approach has been used to predict the noise levels from the proposed stationary noise source.

In addition, the results presented are conservative for the following reasons:

- Rooftop unit data for 4-ton equipment has been used because data is not available from the supplier for 3-ton units.
- Shielding of noise by the various commercial buildings near the sensitive receivers has not been accounted for in the calculations.
- Both air compressors and supply fans are assumed to operate 24 hours per day whereas normal operation allows compressors to turn on & off as required.

4.0 CONCLUSION AND RECOMMENDATIONS

Predicted noise levels are expected to be below the City of Ottawa ENCG and MOE criteria for day-time and night-time living areas for the residential units adjacent to the Commercial Plaza. Therefore, no control measures are required to mitigate the noise from the rooftop air handling units.

4.1 Site Plan Agreement and Notices on Title

It is recommended that the above-noted mitigation measures be included in the Site Plan and in the Offers of Purchase and Sale and/or lease agreements of the five commercial buildings, and be registered on Title. It is recommended at the time of Building Permit Application that the developer confirm that rooftop air handling units do not exceed the noise levels selected for use in this study.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:



Thomas Blais, A.Sc.T.
J.L. Richards & Associates Limited

Reviewed by:

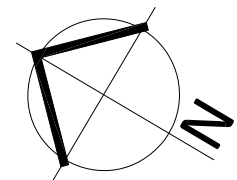


Lee Jablonski, P.Eng.
J.L. Richards & Associates Limited

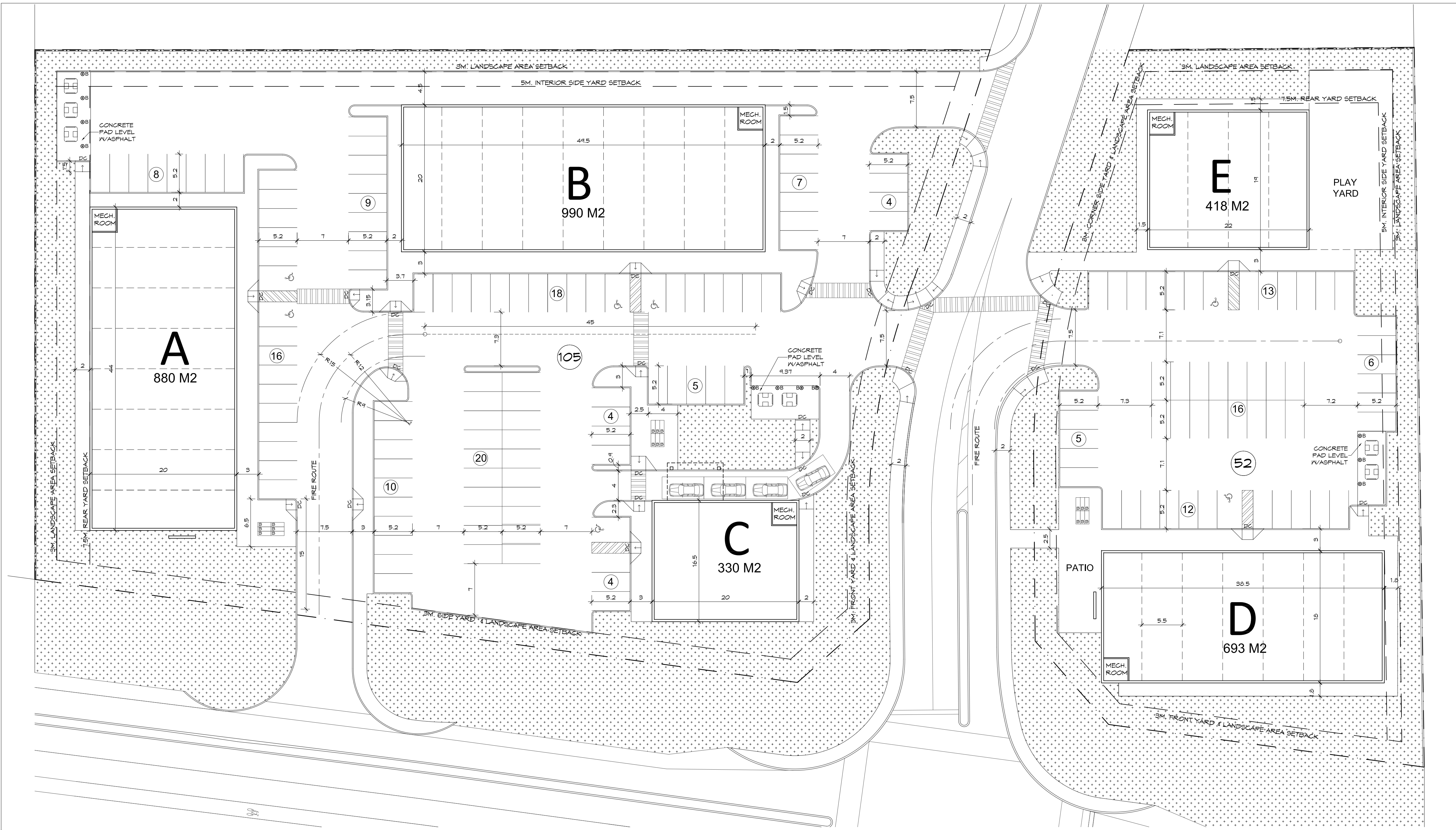
Appendix A

Site Plan

0 5 10 m 20 m



SITE PLAN LEGEND	
SYMBOL	DESCRIPTION
---	PROPERTY LINE
---	SETBACK LINE
---	NEW CURB
DC	NEW DEPRESSED CURB
▲	SITE / BUILDING ENTRANCE
⊙LS	LAMP STANDARD
OB	BOLLARD
ⓈP	ACCESSIBLE PARKING SIGN
ⓈF	FIRE ROUTE SIGN
DEV	ELECTRIC CAR CHARGING STATION
♿	ACCESSIBLE PARKING SPACE
□	STANDARD PARKING SPACE (2.6 X 5.2 M.)
Ⓢ	BICYCLE PARKING SPACE (2.6 X 1.8M)
▨	LANDSCAPED AREA
▨	PAINTED LINES
---	NEW 2M. HIGH PRIVACY WOOD FENCE
☑	EARTH BIN SYSTEM WASTE CONTAINER



1 SITE PLAN
A-1 SCALE: 1 : 300

Client:

Key Plan:
Plan Clé:

T.N. = TRUE NORTH
P.N. = PROJECT
NORTH

P.N.
T.N.

APPROVED ☐ REFUSED ☐

THIS ____ DAY OF _____, 20__

ISSUED FOR COORDINATION 07 / 04 / 2018
ISSUED FOR COORDINATION 07 / 03 / 2018
Issue: Date:

Prime Consultant:
Expert-Consult:

DREDGE LEAHY 100 - 25 Holland Ave.
Ottawa, ON K1Y 4R9
613.724.9865
dl-arch.ca
ARCHITECTS INC.

Sub Consultant:
Expert-Consult:

Project:
Project:

COWAN'S GROVE PLAZA

4791 BANK ST. OTTAWA, ON

Drawing:
Dessin:

SITE PLAN

Drawn by:
Dessiné par:

S.G.

Scale:
Echelle:

1 : 300

Designed by:
Conçu par:

S.G.

Date:

06/15/18

Approved by:
Approuvé par:

M.D.

Client Project No.
No. du Projet du Client:

Project No.:
No. du Projet:

1420

Sheet No.:
No. de la feuille:

A-1

Appendix B

Noise Receiver Locations –
Drawing N1

Appendix C

AAON Data Sheets



Unit Rating

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.259 (SN: 6114768-)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RQ-003-4-V-EB09-319:A000-D00-PKC-0BA-00EAHB3-00-00A0H00VX

Tag: 3 Ton Suite (1000sqft)

(Values do not account for changes described in SPA)

Job Information

Job Name: *Urbandale - JLR*
Job Number: *Job #470*
Site Altitude: *0 ft*
Refrigerant: *R-410A*

Static Pressure

External: *0.60 in. wg.*
Evaporator: *0.11 in. wg.*
Filters Clean: *0.05 in. wg.*
Dirt Allowance: *0.35 in. wg.*

Cooling Section

	Gross	Net
Total Capacity:	<i>37.54</i>	<i>35.93 MBH</i>
Sensible Capacity:	<i>30.54</i>	<i>28.94 MBH</i>
Latent Capacity:	<i>6.99 MBH</i>	
Mixed Air Temp:	<i>78.75 °F DB</i>	<i>64.71 °F WB</i>
Entering Air Temp:	<i>78.75 °F DB</i>	<i>64.71 °F WB</i>
Lv Air Temp (Coil):	<i>54.77 °F DB</i>	<i>53.91 °F WB</i>
Lv Air Temp (Unit)	<i>56.00 °F DB</i>	<i>54.41 °F WB</i>
Supply Air Fan:	<i>1 x RQ185D60-ECM @ 0.54 BHP</i>	
SA Fan RPM / Width:	<i>1472 / 1.750"</i>	
Evaporator Coil:	<i>5.3 ft² / 3 Rows / 14 FPI</i>	
Evaporator Face Velocity:	<i>228.6 fpm</i>	

Rating Information

Cooling Capacity (MBH): *37.4*
Cooling SEER: *18.2*
Cooling EER: *13.85*
Rated in accordance with AHRI 210/240

Application EER @ Op. Conditions: *12.5*

Electrical Data

Rating: *575/3/60*
Unit FLA: *8*

Minimum Circuit Amp: *9*
Maximum Overcurrent: *15*

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	1		575	3			3.7
Condenser Fans:	1	0.333	230	1	1110	2.8	
Supply Fan:	1	1.00	460	1	1750	3.5	
Combustion:	1	0.09	460	1	3000	0.7	

Cabinet Sound Power Levels*

Octave Bands:	63	125	250	500	1000	2000	4000	8000
Discharge LW(dB):	80	79	81	75	69	66	63	58
Return LW(dB):	77	76	71	63	61	59	51	44

**Sound power levels are given for informational purposes only. The sound levels are not guaranteed.*

Unit Information

****WEIGHT AND PERFORMANCE DO NOT INCLUDE SPA**

Approx. Op./Ship Weights: *830 / 830 lbs. (±5%)*
Supply CFM/ESP: *1200 / 0.6 in. wg.*
Final Filter FV / Qty: *216.00 fpm / 2*
Outside CFM: *300*
Ambient Temperature: *90 °F DB / 72 °F WB*
Return Temperature: *75 °F DB / 62 °F WB*

Economizer: *0.12 in. wg.*
Heating: *0.15 in. wg.*
Cabinet: *0.03 in. wg.*
Total: *1.41 in. wg.*

Heating Section

PreHeat Type: *Std (No Preheat)*
Heating Type: *Nat. Gas Heat*
Heating CFM: *1200*
Total Capacity: *48.6 MBH*
OA Temp: *-17.0 DB / -17.0°F WB*
RA Temp: *72.0 °F DB / 50.0 °F WB*
Entering Air Temp: *49.8 °F DB / 37.8 °F WB*
Leaving Air Temp: *87.3 °F DB / 55.3 °F WB*
Input: *60.0 MBH*
Heater Qty (Hi/Low): *1*
Consumption: *60.0 MBH*
Operation: *N/A*
Total Turndown Ratio: *3.3:1*



18.5" STAR Plenum

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.259 (SN: 6114768-)

JOB INFORMATION:

Job Name: *Urbandale - JLR*
Job Tag: *3 Ton Suite (1000sqft)*
Rep Firm: *850*
Date: *07-26-2017*
07-26-2017

WHEEL SPECIFICATION:

Max RPM: *2,200*
Diameter x Qty: *18.5 in. x 1*
CFM: *1200*
Tip Speed: *7,129 FPM*
Inertia: *7,129 FPM*

OPERATING CONDITIONS:

Air Flow: *1,200 CFM*
Static Pressure: *1.41 in. Wg.*
Relief Dampers DP: *0.00 in. Wg.*

TSP: *1.41 in. Wg.*
Site Altitude: *0.00 Ft*
TSP @ Sea Level: *1.41 in. Wg.*

MOTOR SELECTION:

Rated HP / Bypass: *1 / No*
Frame Size: *48*
Nominal RPM: *1760*
VAC/PH/HZ: *575/3/60*
Efficiency: *Standard / 0.85*
Enclosure Type: *ODP*
Max Inertial Load: *15 WR²*

FAN PERFORMANCE:

RPM: *1472*
BHP: *0.54*
Efficiency: *49.7%*
In/Out Velocity: */ FPM*
Plenum Out Velocity: *20 FPM*

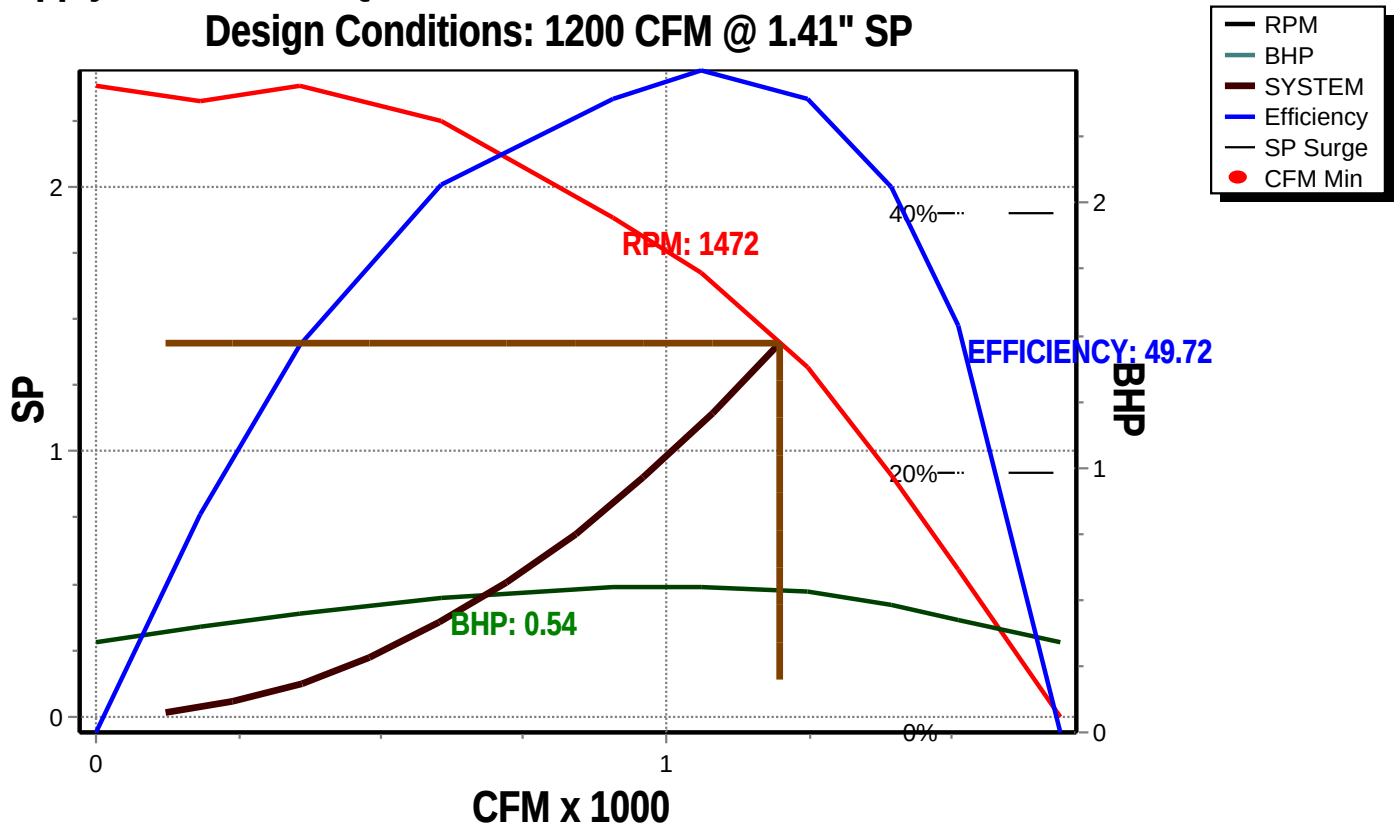
FAN SOUND POWER (Inlet/Outlet):

Octave Band:		(Re 10 ⁻¹² watts)						
1	2	3	4	5	6	7	8	
80	79	81	77	72	70	67	62	
80	79	81	77	72	70	67	62	

SOUND POWER A-Weighted: **81 / 81 dB**

Max Duct SP with Blocked Airway: **2.4 in. Wg. @ 1472 rpm**

Supply Fan Model: RQ185D60-ECM @ 1472 RPM and 100% Width
Design Conditions: 1200 CFM @ 1.41" SP





Unit Submittal

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.259 (SN: 6114768-)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RQ-003-4-V-EB09-319:A000-D00-PKC-0BA-00EAHB3-00-00A0H00VX
Tag: 3 Ton Suite (1000sqft)

Job Name: *Urbandale - JLR*
Job Number: *Job #470*

Unit Submittal For:
Unit Submittal Date: *July 26, 2017*

	Base Option	Description
R	Series	Roof Top Unit
Q	Generation	Tenth Generation
003	Unit Size	Three
4	Voltage	575V/3Ø/60Hz
V	Interior Protection	Vertical Discharge and Return
E	Refrigerant Style	R-410A VCC - High Efficiency
B	Unit Configuration	Air-Cooled Cond. + 6 Row Evap. Coil
0	Coil Coating	Standard
9	Cooling/Heat Pump Staging	Modulating - 1 Variable Capacity Compressor
3	Heating Type	Natural Gas Stainless Steel
1	Heating Designation	Heat 1 - 60 MBtuh
9	Heating Staging	Modulating Gas - Temperature Control

	Feature Option	Description
A	1A. RA/OA Section	Economizer
0	1B. RA/EA Blower Configuration	Standard - None
0	1C. RA/EA Blower	Standard - None
0	1D. RA/EA Blower Motor	Standard - None
D	2. OA Control	Fully Modulating Actuator - Enthalpy Limit
0	3. Heat Options	Standard
0	4. Maintenance Options	Standard
P	5A. SA Blower Configuration	1 Blower + High Efficiency EC Motor
K	5B. SA Blower	19" Direct Drive Backward Curved Plenum - 60% Width
C	5C. SA Motor	1 HP 1750 rpm
0	6A. Pre Filter Type	Standard - None
B	6B. Unit Filter Type	4" Pleated - 30% Eff
A	6C. Filter Options	Clogged Filter Switch
0	7. Refrigeration Control	Standard - Adj Comp. Cooling Lock Out Through Unit Controls
0	8. Refrigeration Options	Standard
E	9. Refrigeration Accessories	ECM Condenser Fan - Head Pressure Control
A	10. Power Options	Non-fused Disconnect Power Switch - 100 Amps
H	11. Safety Options	Remote Safety Shutdown Terminals
B	12. Controls	Phase & Brown Out Protection
3	13. Special Controls	VAV Single Zone Unit Controller - VAV Cool + VAV Heat
0	14A. Preheat Configuration	Standard - None
0	14B. Preheat Sizing	Standard - None
0	15. Glycol Percent	Water or No WSHP
0	16. Interior Cabinet Options	Standard - Double Wall + R-13 Foam Insulation + Stainless Steel Drain Pan
A	17. Exterior Cabinet Options	Base Insulation
0	18. Customer Code	Standard
H	19. Code Options	ETL U.S.A. + Canada Listing
0	20. Crating	Standard
0	21. Water-Cooled Cond.	Standard - None
V	22. Control Vendors	VCCX w/ BACnet MSTP
X	23. Type	Special Price Authorization + AAON Gray Paint



VCCX Components

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.259 (SN: 6114768-)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RQ-003-4-V-EB09-319:A000-D00-PKC-0BA-00EAHB3-00-00A0H00VX

Tag: 3 Ton Suite (1000sqft)

Job Name: *Urbandale - JLR*

Job Number: *Job #470*

VCCX For:

VCCX Date: *July 26, 2017*

Hardware Included For VCCX Controller

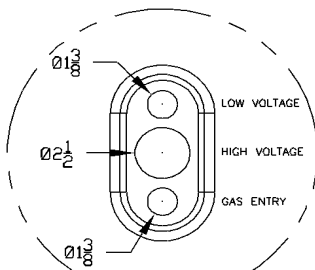
Part #	Included Parts	Assigned Channel	BACnet Point
V87900	VCCX CONTROLLER		
P94320	Space Temp Sensor	VCCX control point AI 1	AI:12
V13050	OSA Temp/Hum Sensor	EBUS2 communicating sensor	AI:16,AI:17,AI:18,AI:19
P94320	Space Temp Slide Adjust	VCCX control point AI 2	AI:8
R82890	Supply Temp Sensor - Field Installed	VCCX control point AI 3	AI:9
	Supply Fan Control Signal 0-10VDC	VCCX control point AO 1	AI:22
	Economizer	VCCX control point AO 2	AI:30
R62330	Proof of Air Flow	VCCX control point BI 1	BI:6
R64580	Dirty Filter Sensor	VCCX control point BI 2	BI:25
	Safety Shut Down	VCCX control point BI 8	BI:26
	Supply Fan	Configured Relay point	BI:63
V61520	DIGITAL REFRIGERATION MODULE		
V38410	Discharge Pressure Sensor A	RSMD point AI2	AI:50
R63950	Modulated Condenser Signal A	RSMD point AO1	BI:
	Comp Status Input A	RSMD point BI1	
	Emergency Shutdown	RSMD point BI4	BI:81,82
	Condenser Enable AB	RSMD Fixed Relay point	BI:78,BI:85
	Comp Enable A	RSMD Fixed Relay point	AI:46
	Comp Enable B	RSMD Fixed Relay point	BI:77,BI:84

RQ CABINET ECONOMIZER VERTICAL ~ 1-6 TON

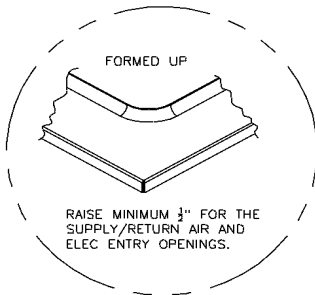
CLEARANCES

LOCATION	• UNIT SIZE •
	1 - 6 TON
OUTSIDE AIR (BACK)	36*
HXC (FRONT)	36
LEFT SIDE	24
RIGHT SIDE	48
TOP	UNOBSTRUCTED

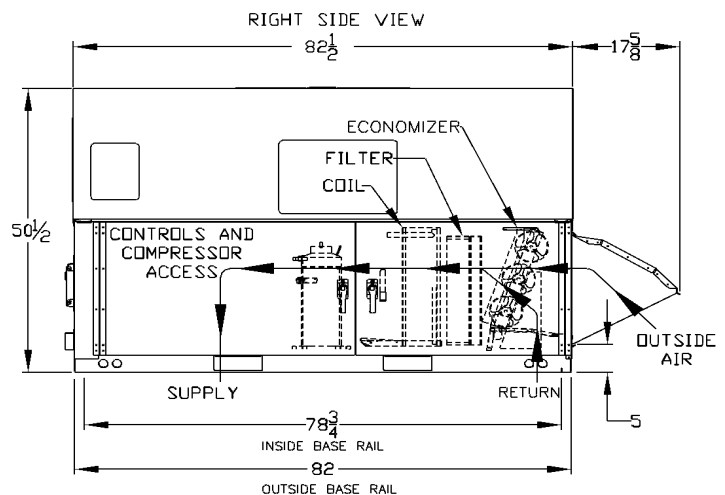
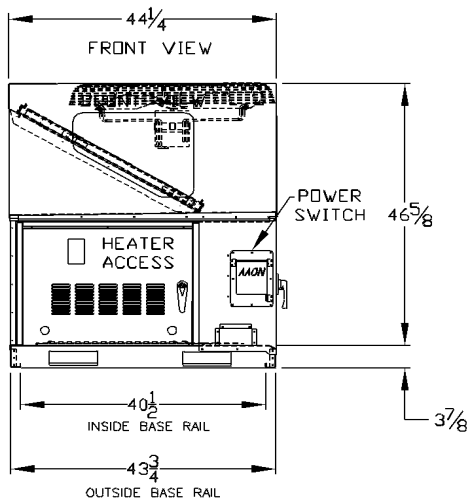
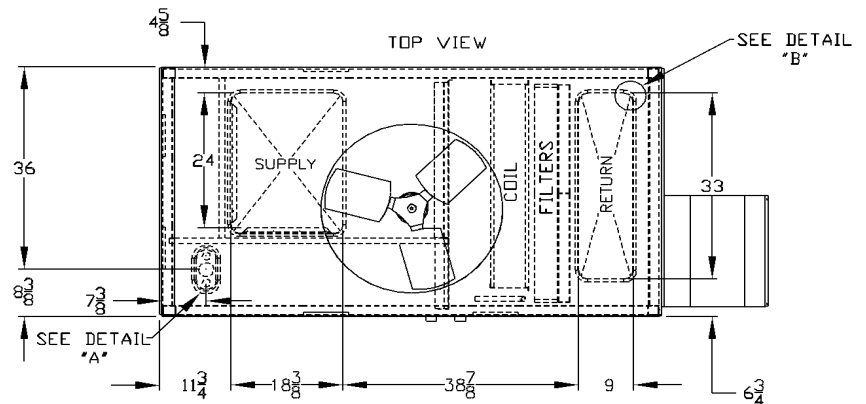
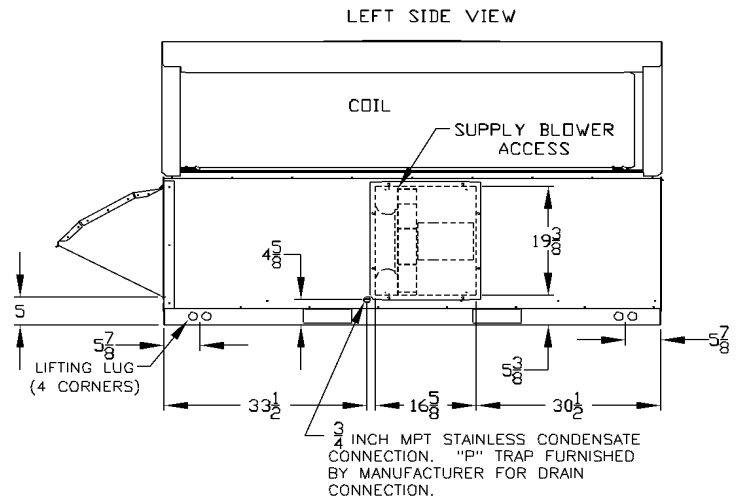
*CLEARANCE IS MEASURED FROM THE END OF THE OUTSIDE AIR RAIN HOOD



DETAIL A



DETAIL B

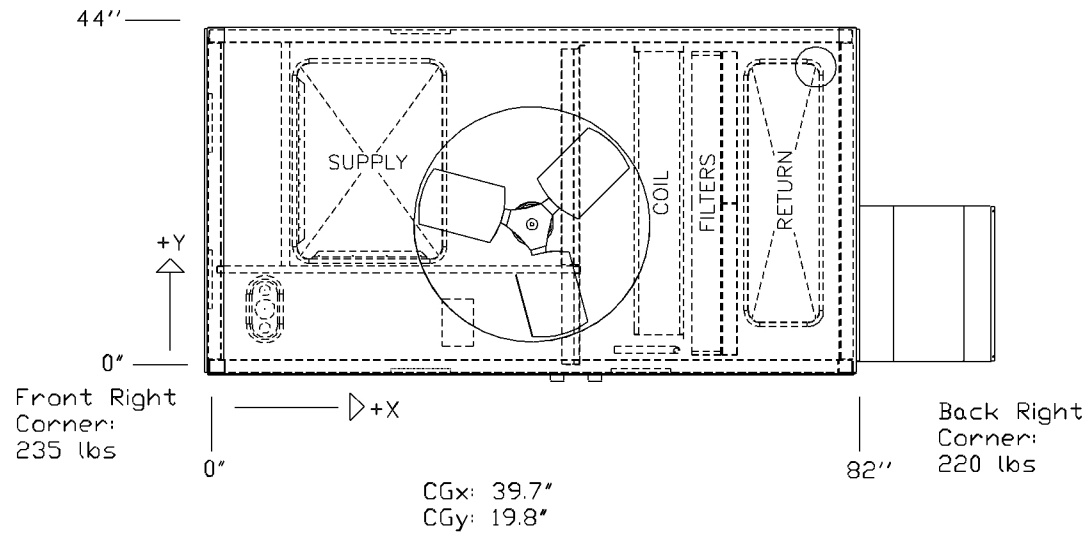


RQ-00007 REV:E 04/12/16 AAS
NOTE: ALL DIMENSIONS ARE IN INCHES

AAON®

Front Left
Corner:
194 lbs

Back Left
Corner:
182 lbs



Total Weight:
830 lbs ($\pm 5\%$)

This weight estimate does not account for any SPAs.



Unit Rating

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.259 (SN: 6114768-)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-011-4-0-EA09-3F9:A000-D00-DCD-0BA-00EAHB3-00-00A0H00VB

Tag: 9 Ton Suite (3000sqft)

Job Information

Job Name: *Urbandale - JLR*
Job Number: *Job #470*
Site Altitude: *0 ft*
Refrigerant: *R-410A*

Static Pressure

External: *0.60 in. wg.*
Evaporator: *0.15 in. wg.*
Filters Clean: *0.07 in. wg.*
Dirt Allowance: *0.35 in. wg.*

Cooling Section

	Gross	Net
Total Capacity:	123.36	119.07 MBH
Sensible Capacity:	96.18	91.89 MBH
Latent Capacity:	27.19 MBH	
Mixed Air Temp:	78.75 °F DB	64.71 °F WB
Entering Air Temp:	78.75 °F DB	64.71 °F WB
Lv Air Temp (Coil):	53.57 °F DB	52.66 °F WB
Lv Air Temp (Unit)	54.66 °F DB	53.11 °F WB
Digital Comp. Capacity Ratio:	100%	
Supply Air Fan:	1 x RN185 @ 1.46 BHP	
SA Fan RPM / Width:	1487 / 4.140"	
Evaporator Coil:	14.6 ft ² / 3 Rows / 14 FPI	
Evaporator Face Velocity:	246.9 fpm	

Rating Information

Cooling Capacity (MBH): *121.0*
Cooling EER: *12.2*
Cooling IEER: *14.9*

Rated in accordance with AHRI 340/360

Application EER @ Op. Conditions: *11.7*

Electrical Data

Rating: *575/3/60*
Unit FLA: *20*

Minimum Circuit Amp: *21*
Maximum Overcurrent: *25*

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	1		575	3			5.8
Compressor 2:	1		575	3			5.8
Condenser Fans:	2	0.333	460	1	1110	2.8	
Supply Fan:	1	2.00	575	3	1760	2.7	
Combustion:	1	0.09	460	1	3010	0.7	

Cabinet Sound Power Levels*

Octave Bands:	63	125	250	500	1000	2000	4000	8000
Discharge LW(dB):	83	83	86	80	73	72	67	60
Return LW(dB):	78	75	75	67	64	61	51	40

**Sound power levels are given for informational purposes only. The sound levels are not guaranteed.*



18.5" STAR Plenum

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.259 (SN: 6114768-)

JOB INFORMATION:

Job Name: *Urbandale - JLR*
Job Tag: *9 Ton Suite (3000sqft)*
Rep Firm: *850*
Date: *07-26-2017*

WHEEL SPECIFICATION:

Max RPM: *2,200*
Diameter x Qty: *18.5 in. x 1*
CFM: *3600*
Tip Speed: *7,202 FPM*
Inertia: *3 WR²*

OPERATING CONDITIONS:

Air Flow: *3,600 CFM*
Static Pressure: *1.44 in. Wg.*
Relief Dampers DP: *0.00 in. Wg.*

TSP: *1.44 in. Wg.*
Site Altitude: *0.00 Ft*
TSP @ Sea Level: *1.44 in. Wg.*

MOTOR SELECTION:

Rated HP / Bypass: *2 / No*
Frame Size: *145T*
Nominal RPM: *1760*
VAC/PH/HZ: *575/3/60*
Efficiency: *Premium / 0.865*
Enclosure Type: *ODP*
Max Inertial Load: *27 WR²*

FAN PERFORMANCE:

RPM: *1487*
BHP: *1.46*
Efficiency: *56.0%*
In/Out Velocity: *2057 / 2156 FPM*
Plenum Out Velocity: *60 FPM*

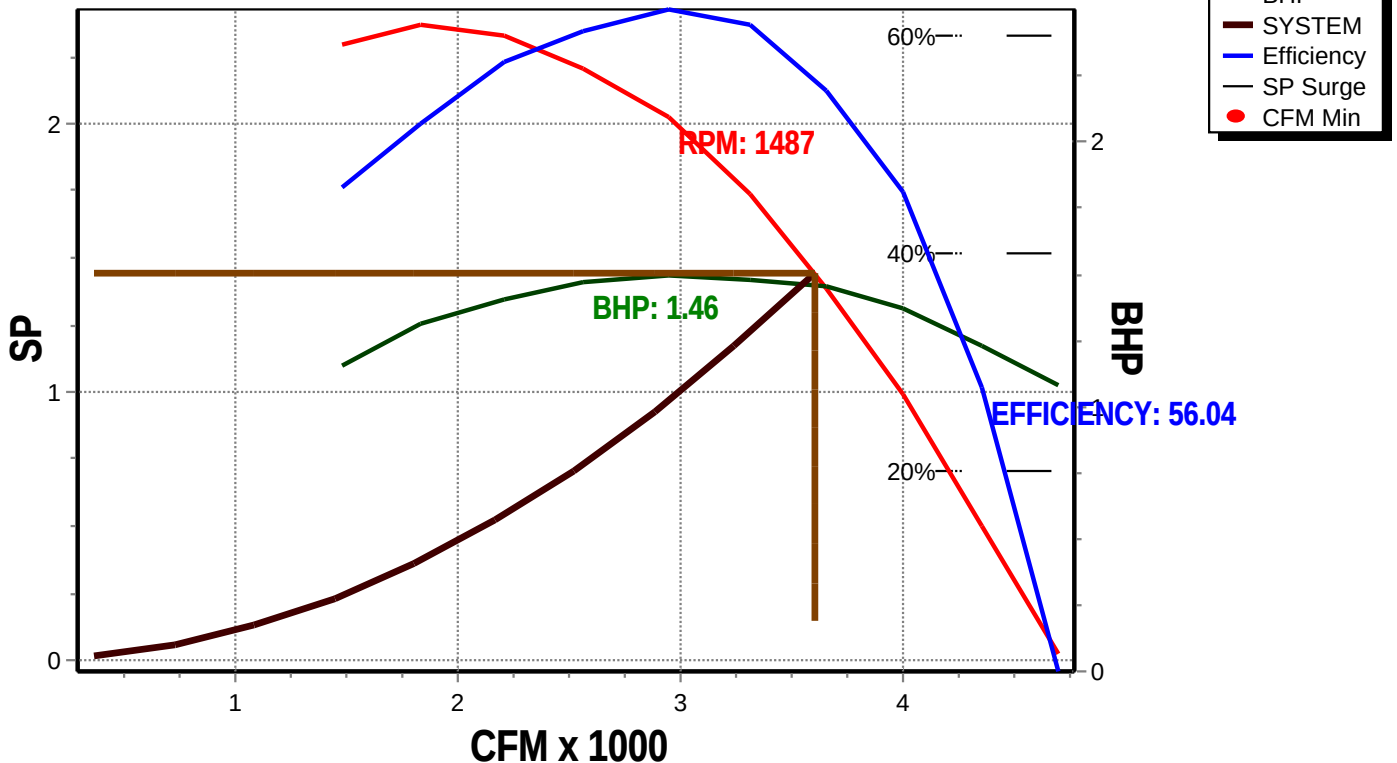
FAN SOUND POWER (Inlet/Outlet):

Octave Band:		(Re 10 ⁻¹² watts)						
1	2	3	4	5	6	7	8	
83	83	86	82	76	75	71	64	
83	83	86	82	76	75	71	64	

SOUND POWER A-Weighted: **85 / 85 dB**

Max Duct SP with Blocked Airway: **2.4 in. Wg. @ 1487 rpm**

Supply Fan Model: RN185 @ 1487 RPM and 100% Width
Design Conditions: 3600 CFM @ 1.44" SP





Unit Submittal

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.259 (SN: 6114768-)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-011-4-0-EA09-3F9:A000-D00-DCD-0BA-00EAHB3-00-00A0H00VB
Tag: 9 Ton Suite (3000sqft)

Job Name:
Job Number:

Urbandale - JLR
Job #470

Unit Submittal For:
Unit Submittal Date:

July 26, 2017

	Base Option	Description
R	Series	Roof Top Unit
N	Generation	Ninth Generation
011	Unit Size	Eleven
4	Voltage	575V/3Ø/60Hz
0	Interior Protection	Standard
E	Refrigerant Style	R-410A VCC - High Efficiency
A	Unit Configuration	Air-Cooled Cond. + Std Evap. Coil
0	Coil Coating	Standard
9	Cooling/Heat Pump Staging	Modulating - 1 VCC + 1 On/Off Comp.
3	Heating Type	Natural Gas Stainless Steel
F	Heating Designation	Heat F - 195 MBtuh
9	Heating Staging	Modulating Gas - Temperature Control

	Feature Option	Description
A	1A. RA/OA Section	Economizer
0	1B. RA/EA Blower Configuration	Standard - None
0	1C. RA/EA Blower	Standard - None
0	1D. RA/EA Blower Motor	Standard - None
D	2. OA Control	Fully Modulating Actuator - Enthalpy Limit
0	3. Heat Options	Standard
0	4. Maintenance Options	Standard
D	5A. SA Blower Configuration	1 Blower + Premium Efficiency Motor + 1 VFD
C	5B. SA Blower	18.5" Direct Drive Backward Curved Plenum
D	5C. SA Motor	2.0 hp - 1760 rpm
0	6A. Pre Filter Type	Standard - None
B	6B. Unit Filter Type	4" Pleated - 30% Eff
A	6C. Filter Options	Clogged Filter Switch
0	7. Refrigeration Control	Standard - Adj Comp. Cooling Lock Out Through Unit Controls
0	8. Refrigeration Options	Standard
E	9. Refrigeration Accessories	ECM Condenser Fan - Head Pressure Control
A	10. Power Options	Non-fused Disconnect Power Switch - 100 Amps
H	11. Safety Options	Remote Safety Shutdown Terminals
B	12. Controls	Phase & Brown Out Protection
3	13. Special Controls	VAV Single Zone Unit Controller - VAV Cool + VAV Heat
0	14A. Preheat Configuration	Standard - None
0	14B. Preheat Sizing	Standard - None
0	15. Glycol Percent	Water or No WSHP
0	16. Interior Cabinet Options	Standard - Double Wall + R-13 Foam Insulation + Stainless Steel Drain Pan
A	17. Exterior Cabinet Options	Base Insulation
0	18. Customer Code	Standard
H	19. Code Options	ETL U.S.A. + Canada Listing
0	20. Crating	Standard
0	21. Water-Cooled Cond.	Standard - None
V	22. Control Vendors	WattMaster VCC-X Controls + Integrated BACnet MSTP
B	23. Type	Standard - Includes AAON Gray Paint



VCCX Components

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.259 (SN: 6114768-)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN - 011 - 4 - 0 - EA09 - 3F9 : A000 - D00 - DCD - 0BA - 00EAHB3 - 00 - 00A0H00VB

Tag: 9 Ton Suite (3000sqft)

Job Name: **Urbandale - JLR**

Job Number: **Job #470**

VCCX For:

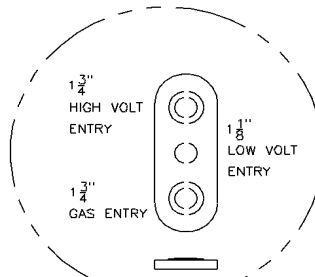
VCCX Date: **July 26, 2017**

Hardware Included For VCCX Controller

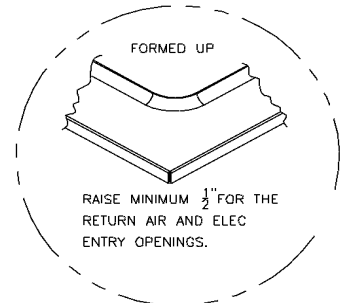
Part #	Included Parts	Assigned Channel	BACnet Point
V87900	VCCX CONTROLLER		
P94320	Space Temp Sensor	VCCX control point AI 1	AI:12
V13050	OSA Temp/Hum Sensor	EBUS2 communicating sensor	AI:16,AI:17,AI:18,AI:19
P94320	Space Temp Slide Adjust	VCCX control point AI 2	AI:8
R82890	Supply Temp Sensor - Field Installed	VCCX control point AI 3	AI:9
	Supply Fan Control Signal 0-10VDC	VCCX control point AO 1	AI:22
	Economizer	VCCX control point AO 2	AI:30
R62330	Proof of Air Flow	VCCX control point BI 1	BI:6
R64580	Dirty Filter Sensor	VCCX control point BI 2	BI:25
	Safety Shut Down	VCCX control point BI 8	BI:26
	Supply Fan	Configured Relay point	BI:63
V61520	DIGITAL REFRIGERATION MODULE		
R57800	Comp Discharge Temp A	RSMD point AI5	AI:56
V38391	Suction Pressure Sensor A	RSMD point AI1	AI:48
V38410	Discharge Pressure Sensor A	RSMD point AI2	AI:50
V38410	Discharge Pressure Sensor B	RSMD point AI4	AI:55
R63950	Modulated Condenser Signal B	RSMD point AO2	AI:44
R63950	Modulated Condenser Signal A	RSMD point AO1	BI:
	Comp Status Input A	RSMD point BI1	
	Comp Status Input B	RSMD point BI2	BI:79
	Emergency Shutdown	RSMD point BI4	BI:81,82
	Condenser Enable AB	RSMD Fixed Relay point	BI:78,BI:85
	Comp Enable A	RSMD Fixed Relay point	AI:46
	Comp Enable B	RSMD Fixed Relay point	BI:77,BI:84
	Condenser Enable B	RSMD Fixed Relay point	BI:86
V12090	MODULATING GAS MODULE		
	ModGas Gas Valve Signal	MODGAS-X	
	ModGas High Speed Enable	MODGAS-X	AI:43
	ModGas Low Speed Enable	MODGAS-X	

RN SERIES B - CABINET WITH ECONOMIZER ~ 9-15 TON

CLEARANCES	
LOCATION	• UNIT SIZE • 9 - 15 TON
OUTSIDE AIR (BACK)	48
CONTROLS SIDE (FRONT)	48
LEFT SIDE	6
RIGHT SIDE	48
TOP	UNOBSTRUCTED



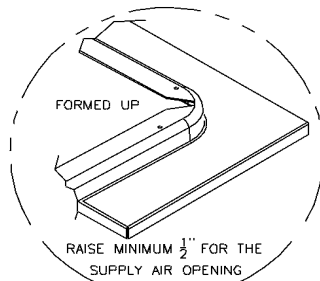
DETAIL A



DETAIL B

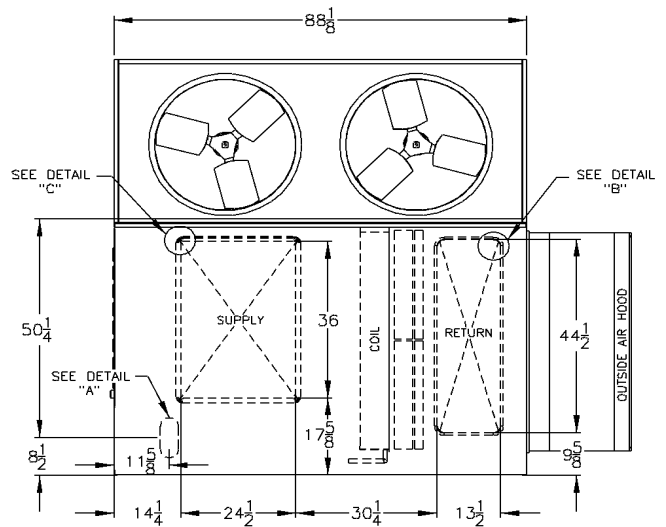
NUMBER OF CONDENSER FANS

9 & 11 TON - 1 FAN
13 & 15 TON - 2 FANS

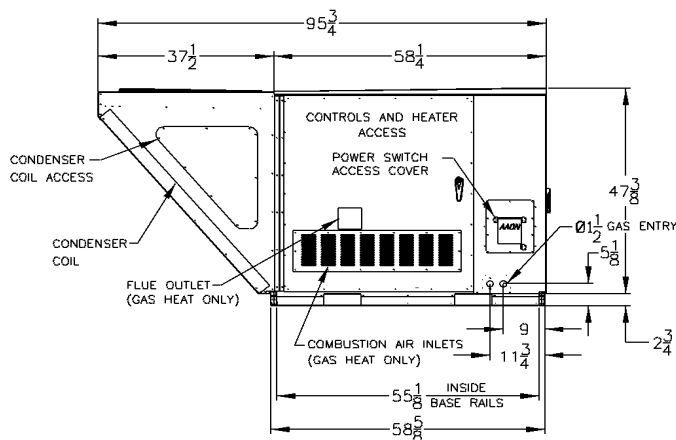


DETAIL C

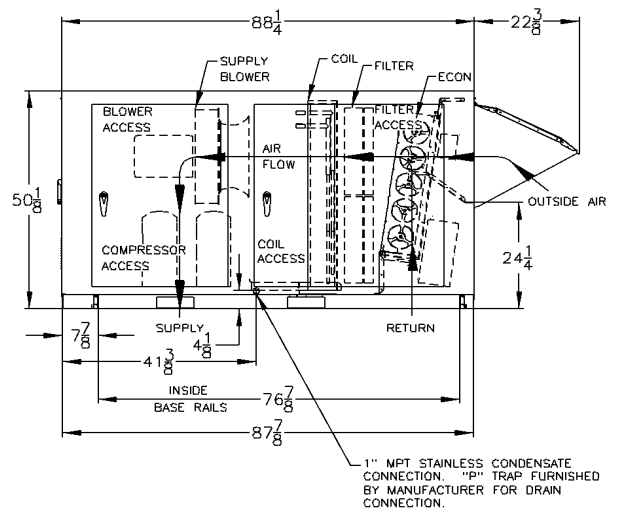
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

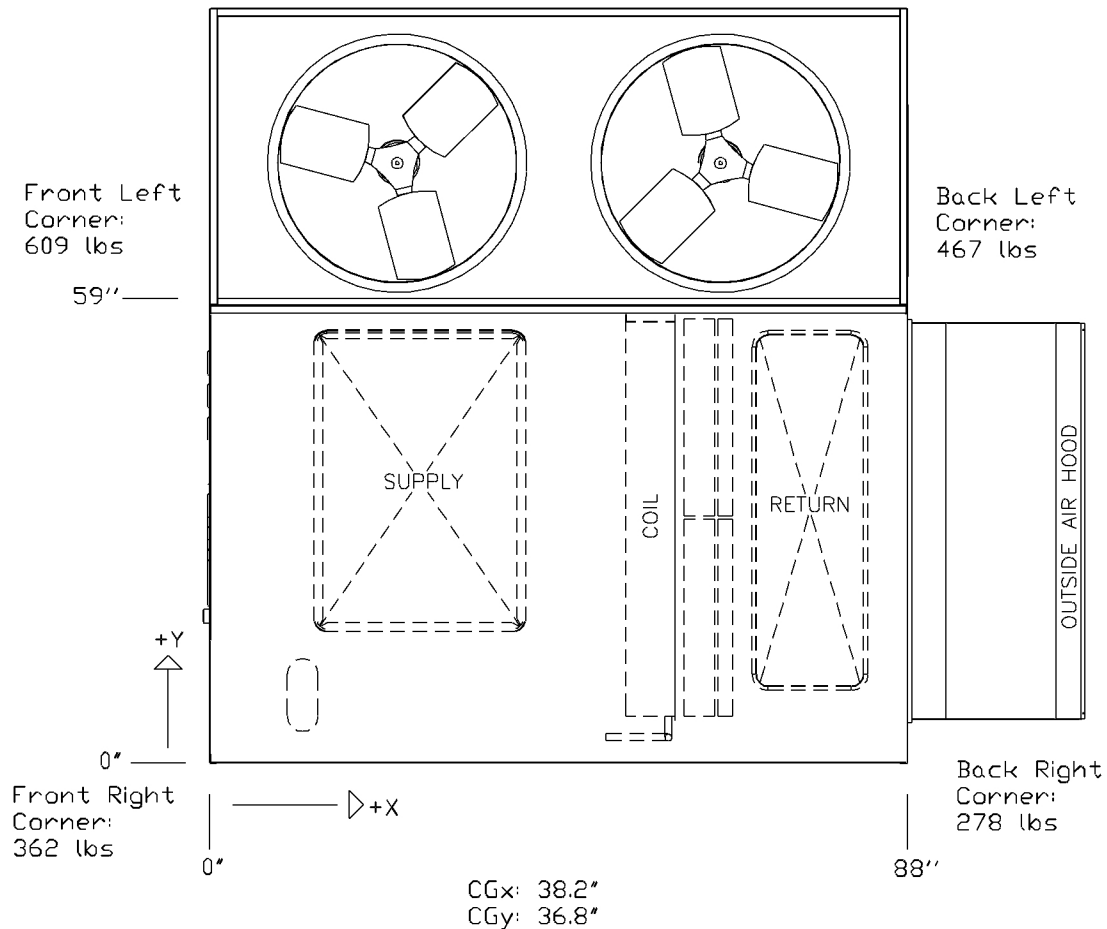


RNB-00002 REV:B 08/30/11 JRL
NOTE: ALL DIMENSIONS ARE IN INCHES

RNB CABINET AIR COOLED CONDENSING UNIT



RN-011-4-0-EA09-3F9:A000-D00-DCD-0BA-00EAHB3-00-00A0H00VB



Disclaimer:
This weight estimate does not account for any SPAs.

AAON Low Sound Ziehl Abegg Condenser Fan Radiated Sou

Sound Pressure Level in a
Hemispherical Free Field

Dist (ft)

15

			Sound Power Level									Sound Pressure Level									
Fans			63	125	250	500	1000	2000	4000	8000	LwA	63	125	250	500	1000	2000	4000	8000	dBA	
RQ 2 & 3 Ton	Inlet	1										7									
	Outlet											7									
	Total											10									
RQ 4-6 Ton & RN 6 & 7 Ton	Inlet	1	61	63	64	64	64	60	56	52	68	40	42	43	43	43	39	35	31	47	
	Outlet		61	64	66	65	65	59	54	52	68	40	43	45	44	44	38	33	31	47	
	Total		64	67	68	68	68	63	58	55	71	43	45	47	46	46	41	37	34	50	
RN A 8 & 10 Ton	Inlet	1	63	72	69	68	68	64	60	54	72	42	51	48	47	47	43	39	33	51	
	Outlet		67	72	71	69	68	64	60	55	72	46	51	50	48	47	43	39	34	51	
	Total		68	75	73	72	71	67	63	58	75	47	54	52	50	50	46	42	36	54	
RN B 9 & 11 Ton	Inlet	2	65	65	65	67	67	62	57	52	70	44	44	44	46	46	41	36	31	49	
	Outlet		64	64	66	68	67	61	56	52	70	43	43	45	47	46	40	35	31	49	
	Total		68	68	69	71	70	65	60	55	73	46	46	47	49	49	43	38	34	52	
RN B 13/15 Ton	Inlet	2	69	75	72	71	70	67	63	57	75	48	54	51	50	49	46	42	36	53	
	Outlet		69	75	74	72	70	67	62	57	75	48	54	53	51	49	46	41	36	54	
	Total		72	78	76	75	73	70	66	60	78	51	57	55	53	52	49	44	39	56	
RN C 13/14/15/16/18/20	Inlet	2	68	75	72	71	70	67	63	57	75	47	54	51	50	49	46	42	36	53	
	Outlet		68	75	74	72	70	67	62	57	75	47	54	53	51	49	46	41	36	54	
	Total		71	78	76	75	73	70	66	60	78	50	57	55	53	52	49	44	39	56	
RN C 25 & 30 Ton	Inlet	3	72	77	73	73	72	69	65	59	76	51	56	52	52	51	48	44	38	55	
	Outlet		73	78	77	74	72	69	64	59	77	52	57	56	53	51	48	43	38	56	
	Total		75	80	78	76	75	72	67	62	80	54	59	57	55	54	51	46	41	58	
RN 26,31 & 40 Ton	Inlet	4	72	78	75	74	73	70	66	60	78	51	57	54	53	52	49	45	39	56	
	Outlet		72	78	77	75	73	70	65	60	78	51	57	56	54	52	49	44	39	57	
	Total		75	81	79	78	76	73	69	63	81	54	60	58	56	55	52	47	42	60	
RN 50,60 & 70 Ton	Inlet	6	75	80	76	76	75	72	68	62	79	54	59	55	55	54	51	47	41	58	
	Outlet		75	80	79	77	75	72	67	62	80	54	59	58	56	54	51	46	41	58	
	Total		78	83	81	79	78	75	70	65	82	57	62	59	58	57	54	49	44	61	
RN 55,65 & 75 Ton	Inlet	4	77	83	83	81	79	75	71	66	84	58	63	62	60	58	55	51	45	63	
	Outlet		77	83	84	82	79	76	70	67	84	61	66	64	62	61	58	53	48	65	
	Total		80	86	87	85	82	79	74	70	87	63	68	66	64	63	60	55	50	67	
RN 90-140 Ton	Inlet	8	80	86	86	84	82	78	74	69	87	65	70	68	66	65	62	57	52	69	
	Outlet		80	86	87	85	82	79	73	70	87	67	72	70	68	67	64	59	54	71	
	Total		83	89	90	88	85	82	77	73	90	69	74	72	71	69	66	61	56	74	

Tested in Accordance with AMCA 300 - Updated 6-15-15

** - RQ 2 and 3 ton data incomplete.



fan data

version FANselect V 1.01 (170516), AMCA V 1.01 May, 2015 / 1.17.05.16 | 67432 | (user ZAFS57432)

9/5/2017

1



type	ZN063-ZIL.DG.V7P2
article no.	163321+00701321 Portfolio STD-WW

technical data

motor	ECblue	
mains supply	-	3~ 460V 60Hz
ambient temperature, max. limit (t _r)	°C	60
efficiency η_{statA}	%	58,7
efficiency η_{actual} η_{target}	%	64,8 40
ErP-conformity	2015 EC controller integrated	
grille influence	yes measured	

fan data

SFP-class SFP-value (P_{SFP})	- Ws/m ³	1 108
airflow volume (q_v)	ft ³ /min	3000.0
pressure, stat. (p_{sF}) tot. (p_F)	Pa	50 62
electrical power input (P_{sys})	W	153
system eff., stat. ($\eta_{sF,sys}$) tot. ($\eta_{F,sys}$)	%	46.3 57.7
fan speed (n) max. (n_{max})	1/min	615 1200
fan speed, set value (% n_{max})	%	51
frequency (f_{BP}) (f_{max})	Hz	60 60
voltage (U_{DP})	V	460
current (I_{DP})	A	0.38
acoustics, suction side ($L_{w(A),5}$) ($L_{w,5}$)	dB	60 66
acoustics, pressure side ($L_{w(A),6}$) ($L_{w,6}$)	dB	61 66
dimensions (w x h x d)	mm	790 x 790 x 290
product weight (m_{pr})	kg	18.8

PF:PF_00; BR:BR_53; q_v :3000.0 ft³/min; p_{sF} :50 Pa; t_a :87 °F; p :1.16 kg/m³; STotl:+10 %





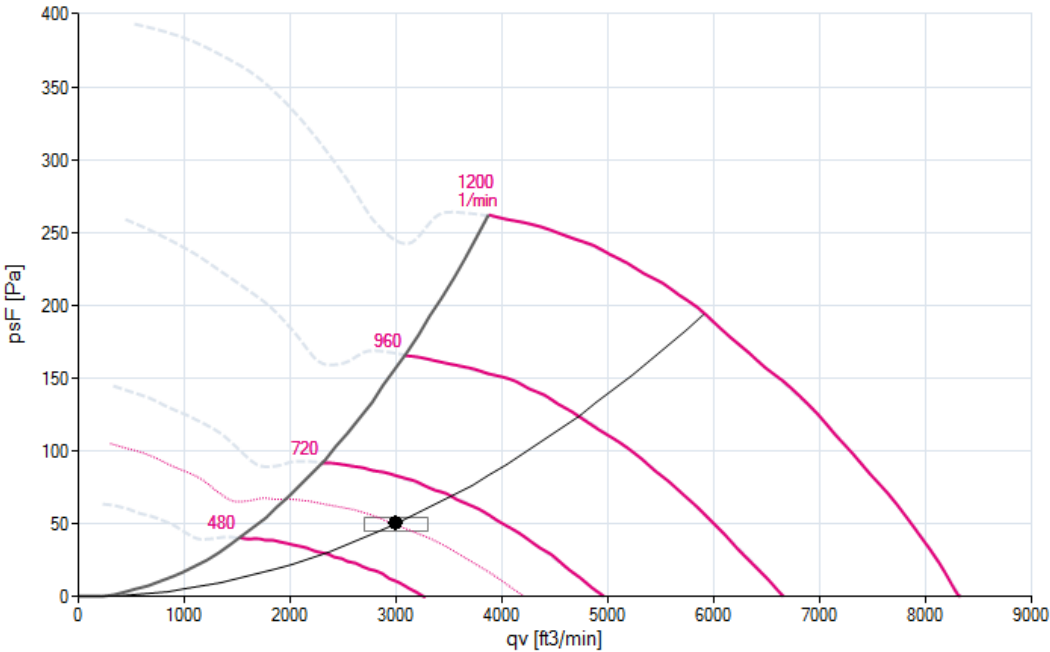
performance curve / acoustics

version FANselect V 1.01 (170516), AMCA V 1.01 May, 2015 / 1.17.05.16 | 67432 | (user ZAFS57432)

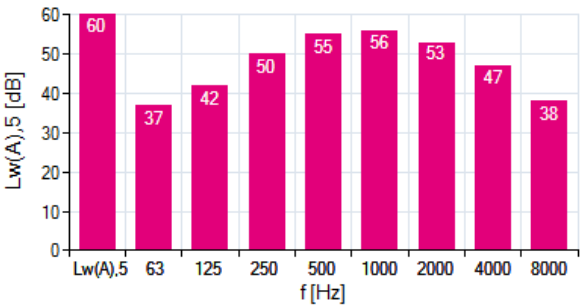
9/5/2017

1 **ZN063-ZIL.DG.V7P2** Measured in ZAPLUS with diffusor with guard grille on pressure side with airflow direction V in installation type A according to ISO 5801
163321+00701321 | Portfolio measurement density 1.16 [kg/m³]
STD-WW

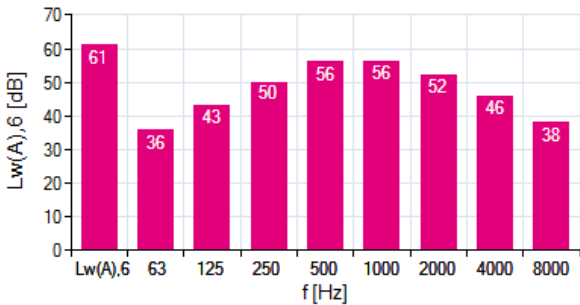
air performance p_{sF}



acoustics ($L_{w(A),5}$)



acoustics ($L_{w(A),6}$)



1 ZN063-ZIL.DG.V7P2									
f [Hz]	sum	63	125	250	500	1000	2000	4000	8000
$L_{w(A),5}$	60	37	42	50	55	56	53	47	38
$L_{w,5}$	66	62	57	58	58	56	52	46	38

f [Hz]	sum	63	125	250	500	1000	2000	4000	8000
$L_{w(A),6}$	61	36	43	50	56	56	52	46	38
$L_{w,6}$	66	61	58	59	59	56	51	45	38





efficiency / power input

9/5/2017

version FANselect V 1.01 (170516), AMCA V 1.01 May, 2015 / 1.17.05.16 | 67432 | (user ZAFS57432)

1

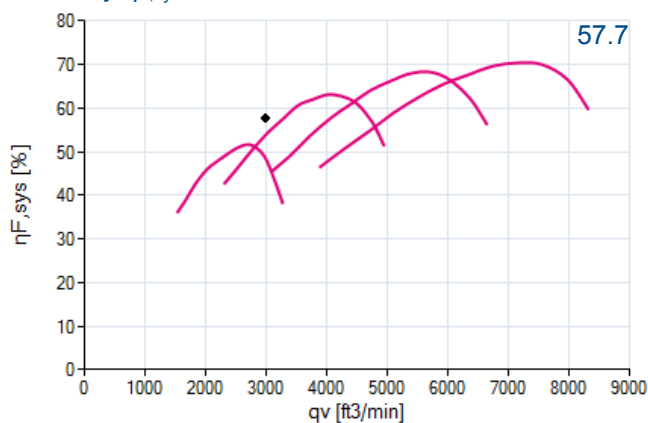
ZN063-ZIL.DG.V7P2

163321+00701321 | Portfolio
STD-WW

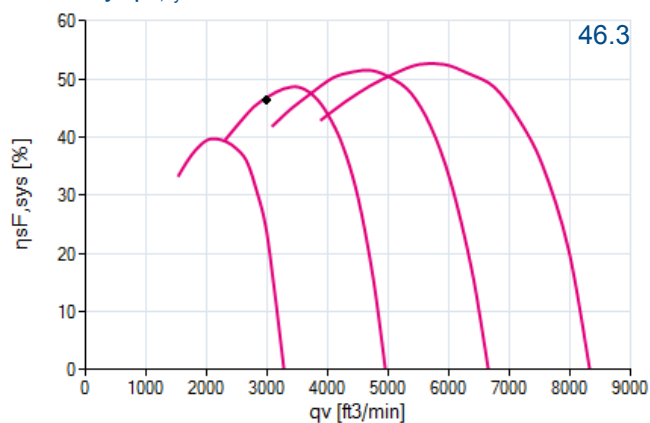
Measured in ZAPLUS with diffuser with guard grille on pressure side with airflow direction V in installation type A according to ISO 5801

measurement density 1.16 [kg/m³]

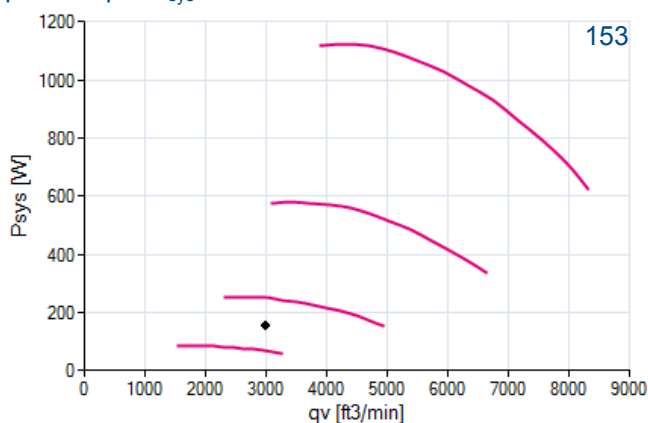
efficiency $\eta_{F,sys}$



efficiency $\eta_{sF,sys}$



power input P_{sys}





fan data

version FANselect V 1.01 (170516), AMCA V 1.01 May, 2015 / 1.17.05.16 | 67432 | (user ZAFS57432)

9/5/2017

1



type	ZN063-ZIL.DG.V7P2
article no.	163321+00701321 Portfolio STD-WW

technical data

motor		ECblue
mains supply	-	3~ 460V 60Hz
ambient temperature, max. limit (t _r)	°C	60
efficiency η _{statA}	%	58,7
efficiency N _{actual} N _{target}	%	64,8 40
ErP-conformity		2015 EC controller integrated
grille influence		yes measured

fan data

SFP-class SFP-value (P_{SFP})	- Ws/m ³	1 120
airflow volume (q_v)	ft ³ /min	4500.0
pressure, stat. (p_{sF}) tot. (p_F)	Pa	50 78
electrical power input (P_{sys})	W	255
system eff., stat. ($\eta_{sF,sys}$) tot. ($\eta_{F,sys}$)	%	41.7 64.6
fan speed (n) max. (n_{max})	1/min	774 1200
fan speed, set value (% n_{max})	%	64
frequency (f_{BP}) (f_{max})	Hz	60 60
voltage (U_{DP})	V	460
current (I_{DP})	A	0.51
acoustics, suction side ($L_{w(A),5}$) ($L_{w,5}$)	dB	65 69
acoustics, pressure side ($L_{w(A),6}$) ($L_{w,6}$)	dB	65 69
dimensions (w x h x d)	mm	790 x 790 x 290
product weight (m_{pr})	kg	18.8

PF:PF_00; BR:BR_53; q_v :4500.0 ft³/min; p_{sF} :50 Pa; t_a :87 °F; p :1.16 kg/m³; STol:+-10 %





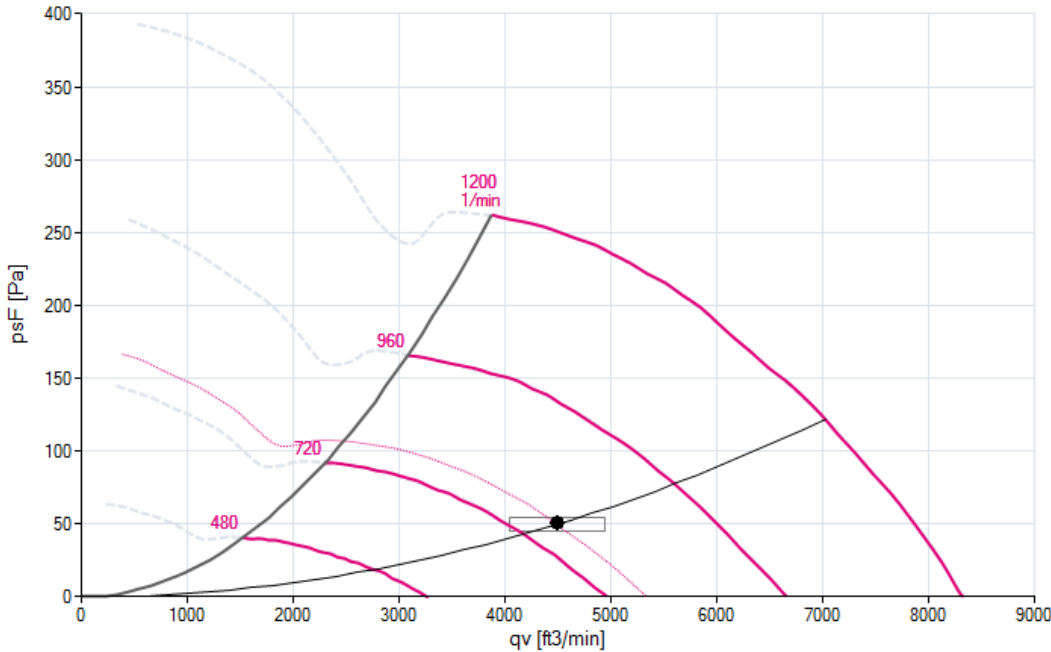
performance curve / acoustics

version FANselect V 1.01 (170516), AMCA V 1.01 May, 2015 / 1.17.05.16 | 67432 | (user ZAFS57432)

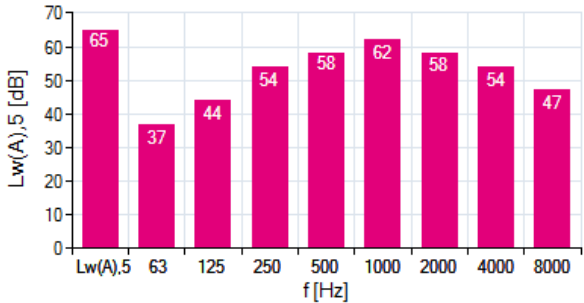
9/5/2017

1 **ZN063-ZIL.DG.V7P2** Measured in ZPlus with diffusor with guard grille on pressure side with airflow direction V in installation type A according to ISO 5801
163321+00701321 | Portfolio measurement density 1.16 [kg/m³]
STD-WW

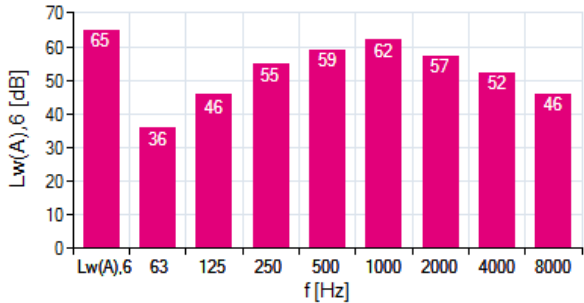
air performance p_{sF}



acoustics ($L_{w(A),5}$)



acoustics ($L_{w(A),6}$)



f [Hz]	sum	63	125	250	500	1000	2000	4000	8000
$L_{w(A),5}$	65	37	44	54	58	62	58	54	47
$L_{w,5}$	69	61	59	62	62	62	57	53	47

f [Hz]	sum	63	125	250	500	1000	2000	4000	8000
$L_{w(A),6}$	65	36	46	55	59	62	57	52	46
$L_{w,6}$	69	60	60	63	62	62	56	51	47

NOTE:
FAN ACOUSTIC PERFORMANCE IS FOR
INDIVIDUAL FANS ONLY. UNIT
SOUND VALUES WILL BE ~3dB HIGHER
THAN PUBLISHED AS UNIT HAS 2 FANS.



FANselect

efficiency / power input

9/5/2017

version FANselect V 1.01 (170516), AMCA V 1.01 May, 2015 / 1.17.05.16 | 67432 | (user ZAFSS57432)

1

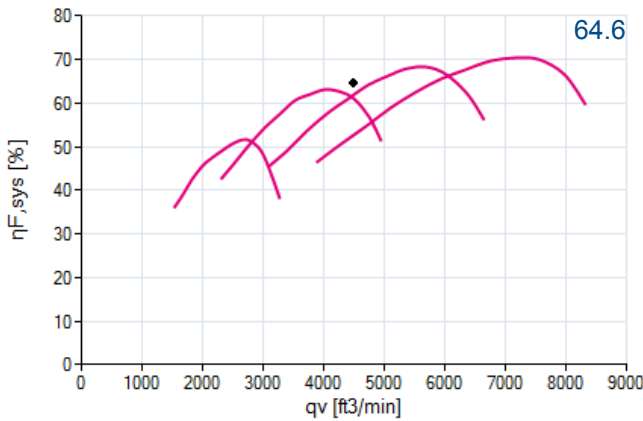
ZN063-ZIL.DG.V7P2

Measured in ZAPLUS with diffuser with guard grille on pressure side with airflow direction V in installation type A according to ISO 5801

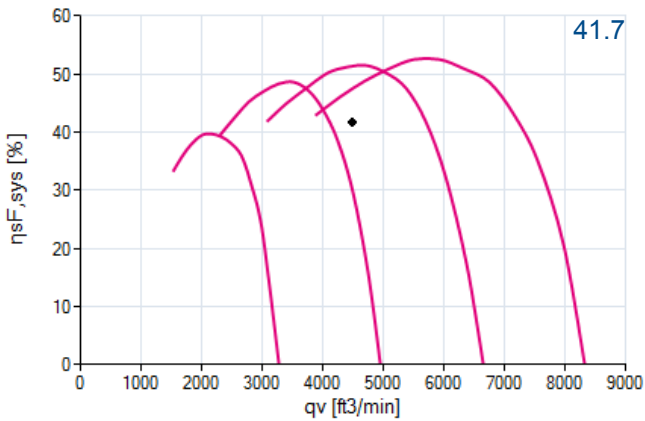
163321+00701321 | Portfolio
STD-WW

measurement density 1.16 [kg/m³]

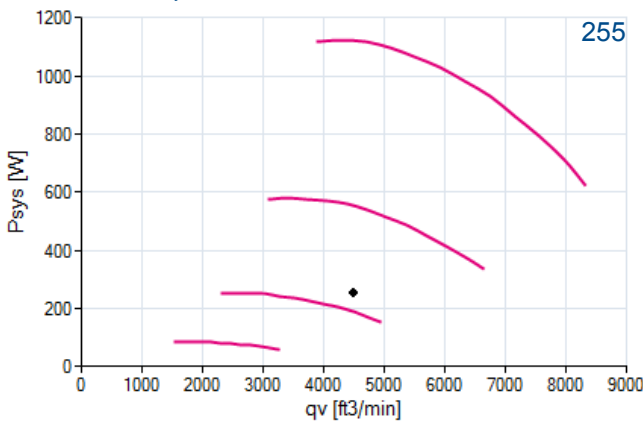
efficiency $\eta_{F,sys}$



efficiency $\eta_{sF,sys}$



power input P_{sys}



Appendix D

Stationary Noise
Source Predictions

APPENDIX 'D'

Combining Sound Levels Power or Pressure
Lsum=10log(10^(L1/10)+10^(L2/10)+....)
ASHRAE 2005 Fundamentals 7.3 eq. 12

Air Handling Unit Size*	Building 'A'	Building 'B'	Building 'C'	Building 'D'	Building 'E'
3 Ton	71.0	71.0		71.0	71.0
3 Ton	71.0	71.0		71.0	71.0
3 Ton	71.0	71.0		71.0	71.0
3 Ton	71.0	71.0		71.0	71.0
3 Ton	71.0	71.0		71.0	
3 Ton	71.0	71.0		71.0	
3 Ton	71.0	71.0		71.0	
3 Ton	71.0	71.0			
9 Ton			73.0		
Total dBA	80.0	80.5	73.0	79.5	77.0

*Note: 4 ton sound power level has been used in lieu of 3 ton data availability

Convert From Sound Power to Sound Pressure
ASHRAE 2005 Fundamentals 7.8 (28)
Free Field Lp=Lw+10log(Q/4 pi r^2)+10.5
Lp = Sound Pressure
Lw = Sound Power
Q = Directivity = 2 flat surface, 4 junction two large surfaces, 8 in a corner
r = distance from source in ft

R1	Unit Size*	Sound Power dBA	Sound Pressure @ Receiver Distance (m) (Approx.)	Estimated Attenuation dBA	Estimated dBA @ R1
Building 'A'	3 ton	71.0	23.0		36.0
	3 ton	71.0	20.7		36.9
	3 ton	71.0	19.7		37.3
	3 ton	71.0	20.3		37.0
	3 ton	71.0	22.2		36.3
	3 ton	71.0	28.7		34.0
	3 ton	71.0	28.9		34.0
	3 ton	71.0	33.2		32.8
Building 'B'	3 ton	71.0	63.8		27.1
	3 ton	71.0	69.1		26.4
	3 ton	71.0	74.0		25.8
	3 ton	71.0	79.0		25.2
	3 ton	71.0	84.0		24.7
	3 ton	71.0	89.2		24.2
	3 ton	71.0	94.3		23.7
	3 ton	71.0	99.5		23.2
Building 'C'	9 ton	73.0	98.0		25.4
Building 'D'	3 ton	71.0	153.5		19.5
	3 ton	71.0	158.9		19.2
	3 ton	71.0	164.3		18.9
	3 ton	71.0	169.7		18.6
	3 ton	71.0	175.1		18.3
	3 ton	71.0	180.5		18.1
	3 ton	71.0	186.1		17.8
Building 'E'	3 ton	71.0	160.9		19.1
	3 ton	71.0	166.3		18.8
	3 ton	71.0	171.7		18.5
	3 ton	71.0	177.0		18.2
	Total R1 dBA				45.4

*Note: 4 ton sound power level has been used in lieu of 3 ton data availability

R2	Unit Size*	Sound Power dBA	Sound Pressure @ Receiver Distance (m) (Approx.)	Estimated Attenuation dBA	Estimated dBA @ R2
Building 'A'	3 ton	71.0	58.7		27.8
	3 ton	71.0	61.9		27.4
	3 ton	71.0	65.4		26.9
	3 ton	71.0	69.2		26.4
	3 ton	71.0	73.2		25.9
	3 ton	71.0	77.4		25.4
	3 ton	71.0	81.7		25.0
	3 ton	71.0	86.2		24.5
Building 'B'	3 ton	71.0	29.3		33.9
	3 ton	71.0	26.9		34.6
	3 ton	71.0	25.4		35.1
	3 ton	71.0	25.1		35.2
	3 ton	71.0	26.1		34.9
	3 ton	71.0	28.1		34.2
	3 ton	71.0	30.9		33.4
	3 ton	71.0	34.4		32.5
Building 'C'	9 ton	73.0	81.5		27.0
Building 'D'	3 ton	71.0	116.7		21.9
	3 ton	71.0	120.6		21.6
	3 ton	71.0	124.5		21.3
	3 ton	71.0	128.7		21.0
	3 ton	71.0	132.8		20.7
	3 ton	71.0	137.0		20.5
	3 ton	71.0	141.5		20.2
Building 'E'	3 ton	71.0	89.6		24.2
	3 ton	71.0	95.6		23.6
	3 ton	71.0	100.9		23.1
	3 ton	71.0	106.1		22.7
	Total R2 dBA				44.6

*Note: 4 ton sound power level has been used in lieu of 3 ton data availability

R3	Unit Size*	Sound Power dBA	Sound Pressure @ Receiver Distance (m) (Approx.)	Estimated Attenuation dBA	Estimated dBA @ R2
Building 'A'	3 ton	71.0	154.4		19.4
	3 ton	71.0	155.4		19.4
	3 ton	71.0	156.6		19.3
	3 ton	71.0	158.0		19.2
	3 ton	71.0	159.5		19.1
	3 ton	71.0	161.3		19.0
	3 ton	71.0	163.1		18.9
	3 ton	71.0	165.2		18.8
Building 'B'	3 ton	71.0	76.8		25.5
	3 ton	71.0	82.2		24.9
	3 ton	71.0	87.6		24.3
	3 ton	71.0	93.0		23.8
	3 ton	71.0	98.4		23.3
	3 ton	71.0	103.8		22.9
	3 ton	71.0	109.2		22.4
	3 ton	71.0	114.6		22.0
Building 'C'	9 ton	73.0	104.1		24.8
Building 'D'	3 ton	71.0	81.3		25.0
	3 ton	71.0	79.9		25.1
	3 ton	71.0	78.9		25.3
	3 ton	71.0	78.2		25.3
	3 ton	71.0	78.0		25.4
	3 ton	71.0	78.1		25.3
	3 ton	71.0	78.7		25.3
Building 'E'	3 ton	71.0	18.6		37.8
	3 ton	71.0	19.4		37.4
	3 ton	71.0	21.7		36.5
	3 ton	71.0	25.0		35.2
	Total R3 dBA				43.9

*Note: 4 ton sound power level has been used in lieu of 3 ton data availability



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