



Environmental System Performance Specialists

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TEST & BALANCE REPORT

VA MEDICAL CENTER UPGRADING INPATIENT PHARMACY CLEAN ROOM RENO, NEVADA HVAC SURVEY

CLIENT: **ROMANYK CONSULTING CORP.**

MECHANICAL ENGINEER: **BLACK & VEATCH**

PROJECT NUMBER: 20257-S

DATE: 5/27/2016

TECHNICIAN: CHRIS GORTON

TBE: MICHAEL T. RENOVICH



THIS IS TO CERTIFY THAT RSANALYSIS, INC. HAS BALANCED THE SYSTEM DESCRIBED HEREIN TO THEIR OPTIMUM PERFORMANCE CAPABILITIES, UNLESS OTHERWISE NOTED IN THE PROJECT SUMMARY. THE TESTING AND BALANCING HAS BEEN PERFORMED IN ACCORDANCE WITH THE STANDARD REQUIREMENTS AND PROCEDURES OF THE ASSOCIATED AIR BALANCE COUNCIL AND THE RESULTS OF THESE TESTS ARE HEREIN RECORDED.



Table of Contents

DESCRIPTION	PAGE
PERFORMANCE GUARANTEE	A
CERTIFICATE	B-C
GENERAL NOTES	D
SYMBOL SHEET	E
TEST & BALANCE INSTRUMENTATION	F
PROJECT SUMMARY	G
UNIT	
(E) AHU-10	1-6
DUCT TRAVERSE ZONE TOTALS	7
EF-P2	8
DUCT TRAVERSE ZONE TOTALS	9
BSC-1	10
CRITICAL ROOM PRESSURES	11
SCHEMATIC	

GENERAL NOTES

Date	27-May-16	RSA Job #	20257-F
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1	Correction for temperature and altitude have been made on all test results shown in this report.
2	Ceiling diffusers were measured with a direct CFM read-out meter (see calibration sheet).
3	Balance factors for exhaust sidewall and supply grilles were calculated from the core area and measured with a rotating vane anemometer.
4	All corrections for instruments used for testing and balancing are traceable back to the national bureau of standards and are tested in our own labs.

SYMBOL SHEET

A	F.S.R. - Floor Supply Register	OPEN - No Terminal Device Installed
AHU - Air Handling Unit	FT. HD. - Feet of Head	OSA Min. - Outside Air Minimum
AC or ACU - Air Conditioning Unit	FTU - Fan Terminal Unit	OAT - Outside Air Temperature
ACCU - Air Cooled Condensing Unit	G	P
ADJ P.D. - Adjusted Pitch Diameter	GPM - Gallons Per Minute	PF - Power Factor
AMP - Amperage	GFH - Gas Fired Heater	PHC - Preheat Coil
AVG. - Average	GFHC - Gas Fired Heating Coil	PH - Phase (s)
B	H	PMP - Circulating Pump
B.H.P. - Brake Horsepower	HC - Heating Coil	P.P. - Perforated Plate
C	Heater O.L. - Thermal Overload Protection For Motors	PSI - Pounds Per Square Inch
C.D. - Ceiling Diffuser	HEPA - High Efficiency Particulate Arrestance	P.T. - Pitot Traverse
CFM - Cubic Feet Per Minute	H.F. - Hepa Filter	R
C.E. - Ceiling Exhaust	HOA - Hand/Off/Auto Switch	RA - Return Air
CEF - Ceiling Exhaust Fan	H.P. - Horsepower	RF - Return Air Fan
CH - Chiller	HPS - High Pressure Steam	R.G. - Return Grille
CHWR - Chilled Water Return	HRC - Heat Recovery Coil or Heat Reclaim Coil	RHC - Reheat Coil
CHW or CHWS - Chilled Water Supply	HVAC - Heating, Ventilation & Air Conditioning	RPM - Revolutions Per Minute
C.R. - Ceiling Return	HWR - Hot Water Return or Heating Water Return	S
CT - Cooling Tower	HWS - Hot Water Supply or Heating Water Supply	SA - Supply Air
CWR - Condenser Water Return	HX - Heat Exchanger	SAT - Supply Air Temperature
CW or CWS - Condenser Water Supply	I	S.D. - Supply Diffuser
D	I.D. - Inside Diameter	SEF - Smoke Exhaust Fan
DB - Dry Bulb	L	SF (Air) - Supply Fan
D.D. - Direct Drive	LAT - Leaving Air Temperature	S.F. (Electric) - Service Factor
D.P. - Difference, Net Increase or Decrease	L.D. - Linear Supply Diffuser	SHC - Steam Heating Coil
DIA - Diameter	LPS - Low Pressure Steam	SP "WC" - Static Pressure, Measured in Inches of Water Column
D.N.A. - Data Not Available	L.R.D. - Linear Return Diffuser	S.W.E - Sidewall Exhaust
D.N.L. - Data Not Listed	L.T. - Light Troffer	S.W.R. - Sidewall Return
E	LWG - Low Wall Griller	S.W.S. Sidewall Supply
EAT - Entering Air Temperature	LWR - Low Wall Return	T
EDC - Electric Duct Coil	LWT - Leaving Water Temperature	TAB - Test, Adjust, & Balance
EDH - Eclectic Duct Heater	M	TSP - Total Static Pressure
EF - Exhaust Fan	MAU/MUA - Make Up Air Unit	U
EMCS - Energy Management Control System (s)	MBH - 1000 Btu's Per Hour	UH - Unit Heater
EWT - Entering Water Temperature	N	V
F	N.A. - Not Accessible	V - Volts
FCU - Fan Coil Unit	N.I. - Not Installed	VAV - Variable Air Volume
F.D. - Floor Diffuser	N.T. - Not Taken	VD - Volume Damper
FH - Fume Hood	N.V.L. - No Valid Location	VFD - Variable Frequency Drive
FG - Floor Grille	N.Z. - Nozzle	VP - Velocity Pressure
F.E. - Floor Exhaust or Return	O	W
F.L.A. - Full Load Amperage	O.D. - Outside Diameter	W - Watts
FPB - Fan Powered Box		WB - Wet Bulb
FPM - Feet Per Minute		W.G. - Water Gauge
F.S. - Floor Supply		Misc.
		ΔP - Differential (Delta) Pressure
		ΔT - Differential (Delta) Temperature



TEST & BALANCE INSTRUMENTATION

Date	27-May-16	RSA Job #	20257-F	Technician	Chris Gorton
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THE FOLLOWING INSTRUMENTS WERE USED TO RECORD AND SET EACH DEVICE ON THIS PROJECT.

INSTRUMENT	MANUFACTURER	MODEL	SERIAL NO.	CALIBRATION DUE DATE
RVA	Alnor	RV	A16242	4/21/2017
AMP Probe	Fluke	333	78703536	3/18/2017
Tachometer	Jaquet	252	736025	3/28/2017
Air Data Multimeter	Shortridge	ADM 860C	M04150	8/21/2016



Project Summary

Date:	5/27/2016
Project:	Upgrading Inpatient Pharmacy Clean Rm HVAC Survey - VA Medical Center, Reno, NV
Job Number:	20257-F
Technician:	Chris Gorton

Scope of Work

Survey current airflow and pressurization in Inpatient Pharmacy clean rooms and other areas served by AHU-10, and EF-P2. Survey fan performance of these two systems.

Observations & Outcomes

All testing and documentation of the above criteria is shown within this report.

Both terminal units served by AHU-10 are currently throttled and putting unnecessary restriction on the supply system.

The included schematic drawing shows actual duct dimensions, were accessible.

CAV-P1 does not have a velocity controller installed. Unit is currently pressure dependent.

Existing supply air to the two Sterile Storage offices are provided by a system other than AHU-10, and are being delivered 110 CFM each.

EF-P1 is exhausting 440 CFM from Sterile Storage.

In our efforts to constantly improve in all aspects of our performance, we would appreciate any feedback, positive or negative, regarding your experience with the RSA team.

Please click the link below to be directed to our Quality Assurance Survey. Thank you!

[RSA Quality Assurance](#)

AIR MOVING EQUIPMENT DATA

Date	27-May-16	Area Served	Pharmacy Clean Rooms		Unit	(E) AHU-10	
Unit Information							
Fan Identification	SF-10		Equipment MFG		American Incorporated		
Equipment Location	Building 1D - Roof		Model Number		112203-NYBAF-2600		
Type/Size	-		Serial Number		610179		
Fan Data							
Measurement	Method	Specified	Actual	Fan			
Total Fan CFM	Traverse	2,600	2,753 (2)	Fan Sheave	-		
Total S/A CFM	Outlets	2,600	2,535	Fan Shaft	-		
Total R/A CFM	100% OSA	-	-	Shaft C/C	-		
O/A CFM		100%	100%	Belt Size/Number	-		
Fan RPM		DNL	- (1)	Motor			
TSP <input checked="" type="checkbox"/> ESP <input type="checkbox"/>		5.39"	4.06"	Motor Sheave	-		
Inlet SP		-0.95"		Motor Shaft	-		
Discharge SP		+3.11"		Sheave Adj.	-		
Pre / Final Filter ΔP	P	0.12"	F	0.55"	Fixed Sheave	<input checked="" type="checkbox"/>	
Control Set Point		+2.6"					
Motor Data							
Motor MFG.	US Motors			Specified	Actual		
Motor HP	5		Voltage	460	400	402	401
Service Factor	1.15		Amperage	6.2	5.5	5.4	5.3
Phase/Hz	3/60		Motor BHP	DNL	3.79		
Heater Size/Rating	-		Motor RPM	1765	1505		
Motor Frame#	184T		Speed (VFD)	-	52.0 HZ		
Temperature Data							
Clg E.A.T.	-	Clg L.A.T.	-	Htg E.A.T.	-	Htg L.A.T.	-
Fan Static Profile							

Static Profile on Next Page

Remarks

(1) Not authorized for unit shut down, not able to remove sheave/belt guard.

(2) Flow monitoring station display = 2,650 CFM.

STATIC PROFILE SHEET

Date	27-May-16	Area Served	Pharmacy Clean Rooms	Unit	(E) AHU-10
<div> <div>EA</div> <div>RA</div> <div>OSA</div> <div>SA</div> <div>Filter</div> <div>EF</div> <div>HX</div> <div>Pre</div> <div>HHW</div> <div>CHW</div> <div>SF</div> <div>Final</div> </div> <div> <div>+0.09"</div> <div>+0.11"</div> <div>-0.56"</div> <div>-0.61"</div> <div>-0.07"</div> <div>-0.19"</div> <div>-0.47"</div> <div>-0.54"</div> <div>-0.95"</div> <div>+3.11"</div> <div>+2.56"</div> </div>					
<div>Remarks</div>					

[illegible]

Remarks

(1) Terminal unit has no velocity controller installed, unit is pressure dependent, main damper has a manual handle installed and is set at 65% open.

(2) Terminal unit main damper controlling to CFM set point at 50 % open.

* Unnecessary system restriction due to both terminal units being throttled.

DIFFUSER & GRILLE TEST SHEET (SUPPLY)[illegible]