

Report By:

National TAB
1329 E. KEMPER ROAD
SUITE 4210
CINCINNATI, OH 45246



Report: Bethany ES Cafeteria (Clover, SC)

Function: Test, Adjust, & Balance

Date: 01/24/2024

PROJECT

Bethany ES (Clover, SC)

337 Maynard Grayson Rd

CLOVER, SC 29710

Client

Action Mechanical Inc.

PO Box 7325

CHARLOTTE, NC 28241

National TAB

Project: Bethany ES (Clover, SC)

Table Of Contents

Section	Page #
Equipment Calibrations	3
Abbreviations	4
GRD Layout	5
AHU/RTU	6



National TAB

Testing, Adjusting, and Balancing Equipment



Function		Range	Minimum Accuracy	Instrument Information	Calibration Date	Date Due
AIR	AIR PRESSURE	0 in wg to 10 in wg	2% +/- 0.001 in wg	Shortridge ADM-860C S/N M19547	10/17/2023	10/16/2024
	AIR VELOCITY INSTRUMENT	50 fpm to 3900 fpm	+/- 5 % +/- 7 fpm	Shortridge ADM-860C S/N M19548	10/17/2023	10/16/2024
	DIRECT HOOD READING	100 cfm to 2000 cfm	+/- 3 % +/- 7 cfm	Shortridge Flow Hood	10/17/2023	10/16/2024
TEMPERATURE	AIR METER	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - SRH77A S/N 081820093	10/20/2023	10/19/2024
	AIR PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - PD1388 7-6 S/N 5028	10/20/2023	10/19/2024
	IMMERSION METER	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - SRH77A S/N 081820093	10/20/2023	10/19/2024
	IMMERSION PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - PD1388 7-6 S/N 1075	10/20/2023	10/19/2024
	CONTACT METER	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - SRH77A S/N 081820093	10/20/2023	10/19/2024
	CONTACT PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - PD1388 7-6 S/N 4011	10/20/2023	10/19/2024
HUMIDITY	HUMIDITY PROBE	10 % RH to 90 % RH	3% of reading	Cooper ATKINS - SRH77A S/N 090315046	10/20/2023	10/19/2024
ELECTRICAL	VOLTAGE MEASUREMENT	0 VAC to 600 VAC	2 % reading +/- 5 digits	Dwyer CM-1 - S/N 190800099	10/16/2023	10/15/2024
	AMPERAGE MEASUREMENT	0 Amperers to 100 Amperes	2 % reading +/- 5 digits	Dwyer CM-1 - S/N 190800099	10/16/2023	10/15/2024
ROTATION	ROTATION MEASUREMENT	60 rpm to 5000 rpm	2 % reading 2 rpm	Dwyer TAC-L - S/N S1100123	10/16/2023	10/15/2024
HYDRONIC	PRESSURE MEASUREMENT	-30 in Hg to 200 psi	±2% of reading +/- 1 psi	Dwyer 490W-6 - S/N 01L6NK	6/21/2023	6/20/2024
	DIFFERENTIAL PRESSURE MEASUREMENT	0 psi - 80 psi	±2% of reading +/- 1 psi	Dwyer 490W-6 - S/N 01L6NK	6/21/2023	6/20/2024
DALT	DUCT LEAKAGE	-10" - +10" wc	±1% of reading +/- 0.004" wc	Kanomax DALT 6900 S/N: 080439	5/2023	5/2024

Abbreviation List

A = Area (ft ²)	S.F. = Service Factor
AHU = Air Handling Unit	SF = Supply Fan
A _k = Effective Area	SP = Static Pressure
BHP = Brake Horsepower (IP) HP	SR = Supply Register
Btu = British Thermal Unit	T = Temperature
Btu/h = Btuh = BTUH = BTU/Hour	T _{ma} = Mixed Air Temperature
CL = Center Distance (used in belt formula)	T _{oa} = Outside Air Temperature
CD = Ceiling Diffuser	T _{ra} = Return Air Temperature
CF = Correction Factor	H = Head (in wc, ft wc, psi)
CFM = Volumetric Flow: Cubic Feet Per Minute	h = Enthalpy
CO ₂ = Carbon Dioxide	HP = Horsepower
CO = Carbon Monoxide	hr = Hour
C _v = Flow Constant	K _v = Flow constant (SI)
d = Diameter (in.) IP	kW = Kilowatt = 1000 Watts
Δ = Difference or Change (Final - Initial)	LAT = Leaving Air Temperature
DB = Dry Bulb	lb = Pounds
EA = Exhaust Air	LWT = Leaving Water Temperature
EAT = Entering Air Temperature	ma = Mixed Air
EF = Exhaust Fan	MIN = Minimum
Eff = Efficiency	MAX = Maximum
EG = Exhaust Grille	N/A = Not Applicable
ESP = External Static Pressure	NA = No Access
EWT = Entering Water Temperature	NL = Not Listed
°F = Degrees Fahrenheit, °F	NPSHA = Net Positive Suction Head Available
FPB = Fan Powered Box	NS = Not Specified
FLA = Full Load Amps	OA = Outside Air
fpm = Feet per Minute (fpm)	OAT = Outside Air Temperature
ft = Foot	PD = Sheave Pitch Diameter
gal = Gallons	P.D. = Pressure Drop
GPM = Gallons Per Minute (GPM)	PF = Power Factor
h = Enthalpy (BTU/lb dry air)	SG = Supply Grille
P = Pressure	SR = Supply Register
ppm = parts per million	TP = Total Pressure
psi = Pounds Per Square Inch	T _{ra} = Return Air Temperature
psid = PSI Differential	TS = Tip Speed (fpm) IP, (m/s) SI
r = Radius (in)	TSP = Total Static Pressure
% _{ra} = % of Return Air	V = Velocity
RA = Return Air	VAV = Variable Air Volume
RAT = Return Air Temperature	VD = Volume Damper
RF = Return Fan	VFD = Variable Frequency Drive
RG = Return Grille	W = Watt
RH = Relative Humidity	WB = Wet Bulb
RPM = Revolutions Per Minute	wg = wc = water gauge = water column
RTU = Roof Top Unit	WHP = Water Horsepower (IP)
SA = Supply Air	ω = Humidity Ratio

National TAB

Project: Bethany ES (Clover, SC)

System/Unit: AHU/RTU



Asset: RTU-32

AREA:415

Unit Data		
	Design	Actual
MFG	NA	TRANE
Serial Num	-	233811092L
Model Num	NA	WSC036H4RB
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	27X11
Num PreFilter 1	-	2
PreFilter Size 1	-	20X35X2

Test Data		
	Design	Actual
SF CFM	1200	1199
RA CFM	820	781
OA CFM	380	418
RL Voltage	460	487
RL Amperage	1.7	0.96
OA Damper Position	-	0.50" / 15%
Brake Horse Power	0.31	0.17

Motor Data		
	Design	Actual
Motor MFG	-	N/L
Frame	-	N/L
Horsepower	0.75	0.75
Motor Rpm	-	N/L
Phase	3	1
Rated Voltage	460	460
Rated Amperage	1.7	1.7
Service Factor	-	N/L

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.639"
Fan Suction SP	-	-0.72"
Fan Discharge SP	-	0.246"
Total ESP	0.40	0.885"
Fan Total SP	-	0.966"

Completed By: Dale Wheeler on 02/22/2024

National TAB

Project: Bethany ES (Clover, SC)

AHU/RTU



Diffuser Supply (GRD)

RTU-32/415

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
32-1	415	B	10	300	291	305	101.7
32-2	415	B	10	300	288	301	100.3
32-3	415	B	10	300	348	316	105.3
32-4	415	B	10	300	271	277	92.3
Total				1200	1198	1199	99.92%

National TAB

Project: Bethany ES (Clover, SC)

System/Unit: AHU/RTU



Asset: RTU-33

AREA:416

Unit Data		
	Design	Actual
MFG	NA	TRANE
Serial Num	-	233811028L
Model Num	NA	WSC036H4RB
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	27X11
Num PreFilter 1	-	2
PreFilter Size 1	-	20X35X2

Motor Data		
	Design	Actual
Motor MFG	-	N/L
Frame	-	N/L
Horsepower	0.75	0.75
Motor Rpm	-	N/L
Phase	3	3
Rated Voltage	460	460
Rated Amperage	1.7	1.7
Service Factor	-	N/L

Test Data		
	Design	Actual
SF CFM	1200	1136
RA CFM	820	725
OA CFM	380	411
RL Voltage	460	486 AVG.
RL Amperage	1.7	0.88
OA Damper Position	-	0.50" / 15%
Brake Horse Power	0.31	0.38

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.667"
Fan Suction SP	-	-0.771"
Fan Discharge SP	-	0.229"
Total ESP	0.40	0.896"
Fan Total SP	-	1.0"

Completed By: Dale Wheeler on 02/22/2024

National TAB

Project: Bethany ES (Clover, SC)

AHU/RTU



Diffuser Supply (GRD)

RTU-33/416

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
33-1	416	B	10	300	281	276	92.0
33-2	416	B	10	300	237	271	90.3
33-3	416	B	10	300	315	273	91.0
33-4	416	B	10	300	301	316	105.3
Total				1200	1134	1136	94.67%

National TAB

Project: Bethany ES (Clover, SC)

System/Unit: AHU/RTU



Asset: RTU-34

AREA:417

Unit Data		
	Design	Actual
MFG	NA	TRANE
Serial Num	-	233811034L
Model Num	NA	WSC036H4RB
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	27X11
Num PreFilter 1	-	2
PreFilter Size 1	-	20X35X2

Motor Data		
	Design	Actual
Motor MFG	-	N/L
Frame	-	N/L
Horsepower	0.75	0.75
Motor Rpm	-	N/L
Phase	3	1
Rated Voltage	460	460
Rated Amperage	1.7	1.7
Service Factor	-	N/L

Test Data		
	Design	Actual
SF CFM	1200	1226
RA CFM	820	812
OA CFM	380	414
RL Voltage	460	490
RL Amperage	1.7	0.92
OA Damper Position	-	0.50" / 15%
Brake Horse Power	0.31	0.40

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.649"
Fan Suction SP	-	-0.726"
Fan Discharge SP	-	0.214"
Total ESP	0.40	0.863"
Fan Total SP	-	0.94"

Completed By: Dale Wheeler on 02/22/2024

National TAB

Project: Bethany ES (Clover, SC)

AHU/RTU



Diffuser Supply (GRD)

RTU-34/417

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
34-1	417	B	10	300	263	292	97.3
34-2	417	B	10	300	281	293	97.7
34-3	417	B	10	300	348	321	107.0
34-4	417	B	10	300	352	320	106.7
Total				1200	1244	1226	102.17%

National TAB

Project: Bethany ES (Clover, SC)

System/Unit: AHU/RTU



Asset: RTU-35

AREA:418

Unit Data		
	Design	Actual
MFG	NA	TRANE
Serial Num	-	233811022L
Model Num	NA	WSC036H4RB
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	27X11
Num PreFilter 1	-	2
PreFilter Size 1	-	20X35X2

Motor Data		
	Design	Actual
Motor MFG	-	N/L
Frame	-	N/L
Horsepower	0.75	0.75
Motor Rpm	-	N/L
Phase	3	3
Rated Voltage	460	460
Rated Amperage	1.7	1.7
Service Factor	-	N/L

Test Data		
	Design	Actual
SF CFM	1200	1237
RA CFM	820	820
OA CFM	380	417
RL Voltage	460	487 AVG.
RL Amperage	1.7	0.91
OA Damper Position	-	0.50" / 15%
Brake Horse Power	0.31	0.40

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.633"
Fan Suction SP	-	-0.731"
Fan Discharge SP	-	0.231"
Total ESP	0.40	0.864"
Fan Total SP	-	0.962"

Completed By: Dale Wheeler on 02/22/2024

National TAB

Project: Bethany ES (Clover, SC)

AHU/RTU



Diffuser Supply (GRD)

RTU-35/418

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
35-1	418	B	10	300	311	317	105.7
35-2	418	B	10	300	314	321	107.0
35-3	418	B	10	300	335	314	104.7
35-4	418	B	10	300	279	285	95.0
Total				1200	1239	1237	103.08%

National TAB

Project: Bethany ES (Clover, SC)

System/Unit: AHU/RTU



Asset: RTU-36

AREA:400

Unit Data		
	Design	Actual
MFG	NA	TRANE
Serial Num	-	232012038L
Model Num	NA	4WCC4024E1
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	11X9
Num PreFilter 1	-	2
PreFilter Size 1	-	18X25X2

Motor Data		
	Design	Actual
Motor MFG	-	N/L
Frame	-	N/L
Horsepower	0.33	0.50
Motor Rpm	-	1050
Phase	1	1
Rated Voltage	208	208
Rated Amperage	2.8	3.9
Service Factor	-	1.0

Test Data		
	Design	Actual
SF CFM	798	814
RA CFM	698	723
OA CFM	100	91
RL Voltage	208	212
RL Amperage	2.8	1.6
OA Damper Position	-	100% open
Brake Horse Power	-	2.22

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.268"
Fan Suction SP	-	-0.458"
Fan Discharge SP	-	0.21"
Total ESP	0.40	0.478"
Fan Total SP	-	0.668"

Completed By: JOASH ALBIN on 04/26/2024

Notes:

- [1] FILTER WAS PULLED FOR BALANCE
- [2] OA IS NOT WIRED UNABLE TO SET OA DAMPER.

[2a] OA DAMPER SET MANUALLY AT 100% OPEN

Written By: JOASH ALBIN on 04/26/2024

National TAB

Project: Bethany ES (Clover, SC)

AHU/RTU



Diffuser Supply (GRD)

RTU-36/400

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
36-1	401	B	10	266	191	255	95.9
36-2	400	B	10	266	198	283	106.4
36-3	402	B	10	266	242	276	103.8
Total				798	631	814	102.01%

National TAB

Project: Bethany ES (Clover, SC)

System/Unit: AHU/RTU



Asset: RTU-37

AREA:420

Unit Data		
	Design	Actual
MFG	NA	TRANE
Serial Num	-	233811064L
Model Num	NA	WSC048H
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	27X11
Num PreFilter 1	-	2
PreFilter Size 1	-	20X35X2

Motor Data		
	Design	Actual
Motor MFG	-	N/L
Frame	-	N/L
Horsepower	1.0	1.0
Motor Rpm	-	N/L
Phase	3	1
Rated Voltage	460	460
Rated Amperage	2.5	2.5
Service Factor	-	1.0

Test Data		
	Design	Actual
SF CFM	1596	1590
RA CFM	1156	1170
OA CFM	440	420
RL Voltage	460	487
RL Amperage	2.5	1.4
OA Damper Position	-	5/15" / 10%
Brake Horse Power	0.56	0.56

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.83"
Fan Suction SP	-	-0.983"
Fan Discharge SP	-	0.168"
Total ESP	0.40	0.998"
Fan Total SP	-	1.151"

Completed By: Dale Wheeler on 02/22/2024

National TAB

Project: Bethany ES (Clover, SC)

AHU/RTU



Diffuser Supply (GRD)

RTU-37/420

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
37-1	420	B	10	266	265	249	93.6
37-2	420	B	10	266	223	257	96.6
37-3	420	B	10	266	318	286	107.5
37-4	420	B	10	266	278	261	98.1
37-5	420	B	10	266	257	274	103.0
37-6	420	B	10	266	275	263	98.9
Total				1596	1616	1590	99.62%

National TAB

Project: Bethany ES (Clover, SC)

System/Unit: AHU/RTU



Asset: RTU-38

AREA:

Unit Data		
	Design	Actual
MFG	TRANE	TRANE
Serial Num	-	233813143L
Model Num	NA	WHC092H4
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	36X15.5
Num PreFilter 1	-	4
PreFilter Size 1	-	20X25X2

Motor Data		
	Design	Actual
Motor MFG	-	NA
Frame	-	NA
Horsepower	2.75	2.75
Motor Rpm	-	NA
Phase	3	3
Rated Voltage	460	460
Rated Amperage	3.6	3.6
Service Factor	-	1

Test Data		
	Design	Actual
SF CFM	3000	3162
RA CFM	2330	2507
OA CFM	670	655
RL Voltage	460	491/491/493
RL Amperage	3.6	0.8/0.8/0.9
OA Damper Position	-	30%
Brake Horse Power	0.61	0.64

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.11"
Fan Suction SP	-	-0.23"
Fan Discharge SP	-	0.21"
Total ESP	0.40	0.32"
Fan Total SP	-	0.44"

Completed By: Antonio Flores-De La Cruz on 01/15/2024

Notes:

SGRD 38-3 AND 38-4 WERE LEFT HIGH TO AVOID DAMPER CAUSING A LOUD WHISTLE. NO BRANCH DAMPERS

Written By: Antonio Flores-De La Cruz on 01/15/2024

National TAB

Project: Bethany ES (Clover, SC)

AHU/RTU



Diffuser Supply (GRD)

RTU-38/

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
RTU-38-SGRD1	200	D	16X12	400	494	399	99.8
RTU-38-SGRD2	200	D	16X12	400	77	385	96.3
RTU-38-SGRD3	200	D	16X12	400	786	484	121.0
RTU-38-SGRD4	200	D	16X12	400	682	486	121.5
RTU-38-SGRD5	200	D	16X12	400	757	414	103.5
RTU-38-SGRD6	200	D	16X12	400	750	417	104.3
RTU-38-SGRD7	201	A	8	200	220	190	95.0
RTU-38-SGRD8	201	A	8	200	209	182	91.0
RTU-38-SGRD9	201	A	8	200	258	205	102.5
Total				3000	4233	3162	105.4%

Completed By: Antonio Flores-De La Cruz on 01/15/2024

National TAB

Project: Bethany ES (Clover, SC)

System/Unit: AHU/RTU



Asset: RTU-39

AREA:KITCHEN 106C

Unit Data		
	Design	Actual
MFG	NA	TRANE
Serial Num	-	240410598L
Model Num	NA	WSC120H4RGB2FB0A1AB6
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	36x16
Num PreFilter 1	-	4
PreFilter Size 1	-	20X25X2

Motor Data		
	Design	Actual
Motor MFG	-	EBMPAPST
Frame	-	NL
Horsepower	2.75	2.75
Motor Rpm	-	1650
Phase	3	3
Rated Voltage	460	460
Rated Amperage	3.6	3.6
Service Factor	-	1.15

Test Data		
	Design	Actual
SF CFM	4000	4078
RA CFM	3500	3449
OA CFM	500	518
RL Voltage	460	477/475/480
RL Amperage	3.6	2.23/2.54/2.47
OA Damper Position	-	10% open
Brake Horse Power	0.62	1.74

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.94"
Fan Suction SP	-	-1.16"
Fan Discharge SP	-	0.48"
Total ESP	0.1	1.42"
Fan Total SP	-	1.64"

Completed By: JOASH ALBIN on 04/26/2024

National TAB

Project: Bethany ES (Clover, SC)

AHU/RTU



Diffuser Supply (GRD)

RTU-39/KITCHEN 106C

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
RTU-39-SGRD1	106G	G	10	400	1	465	352	400	100.0
RTU-39-SGRD2	106H	A	8	200	1	273	177	214	107.0
RTU-39-SGRD3	106C	G	12	550	1	587	451	562	102.2
RTU-39-SGRD4	106C	G	12	550	1	485	465	562	102.2
RTU-39-SGRD5	106C	G	12	550	1	429	491	577	104.9
RTU-39-SGRD6	106C	G	12	550	1	436	470	558	101.5
RTU-39-SGRD7	106C	G	12	550	1	433	476	550	100.0
RTU-39-SGRD8	106C	G	12	550	1	461	574	558	101.5
RTU-39-SGRD9	106D	A	6	100	1	212	85	103	103.0
Total				4000		3781	3541	4084	102.1%

Completed By: JOASH ALBIN on 04/28/2024