Report By:

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

Report: TAB REPORT

Function: Test, Adjust, & Balance

Date: 09/16/2025

Completed By: National TAB

PROJECT

Fifth Third Bank (Union, KY)

Lot 11 Sec 2 Union Promenade

Union, KY 41091

Client

Mechanical Optimizers

2145 Patterson Street

Cincinnati, OH 45214

National TAB

Project: Fifth Third Bank (Union, KY)

Table Of Contents

CERTIFICATION

PROJECT: Fifth Third Bank (Union, KY)

The data presented in this report is a record of system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB *Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.* Any variances from design quantities, which exceed NEBB tolerances, are noted in the Test-Adjust-Balance Report Project Summary.

The air distribution system has been tested and balanced and final adjustments have been made in accordance with NEBB standards and the project specifications.

NEBB TAB FIRM:	National TAB
REGISTRATION NO:	3629
CERTIFIED BY:	Joe Hertenstein
DATE:	9/16/2025

The hydronic distribution system has been tested and balanced and final adjustments have been made in accordance with NEBB standards and the project specifications.

NEBB TAB FIRM:	National TAB
REGISTRATION NO:	3629
CERTIFIED BY:	Joe Hertenstein
DATE:	

Submitted and Certified by:

NEBB TAB FIRM:	National TAB
TAB PROFESSIONAL:	Joe Hertenstein
SIGNATURE:	
REGISTRATION NO:	3629
CERTIFICATION EXP:	12/31/2025

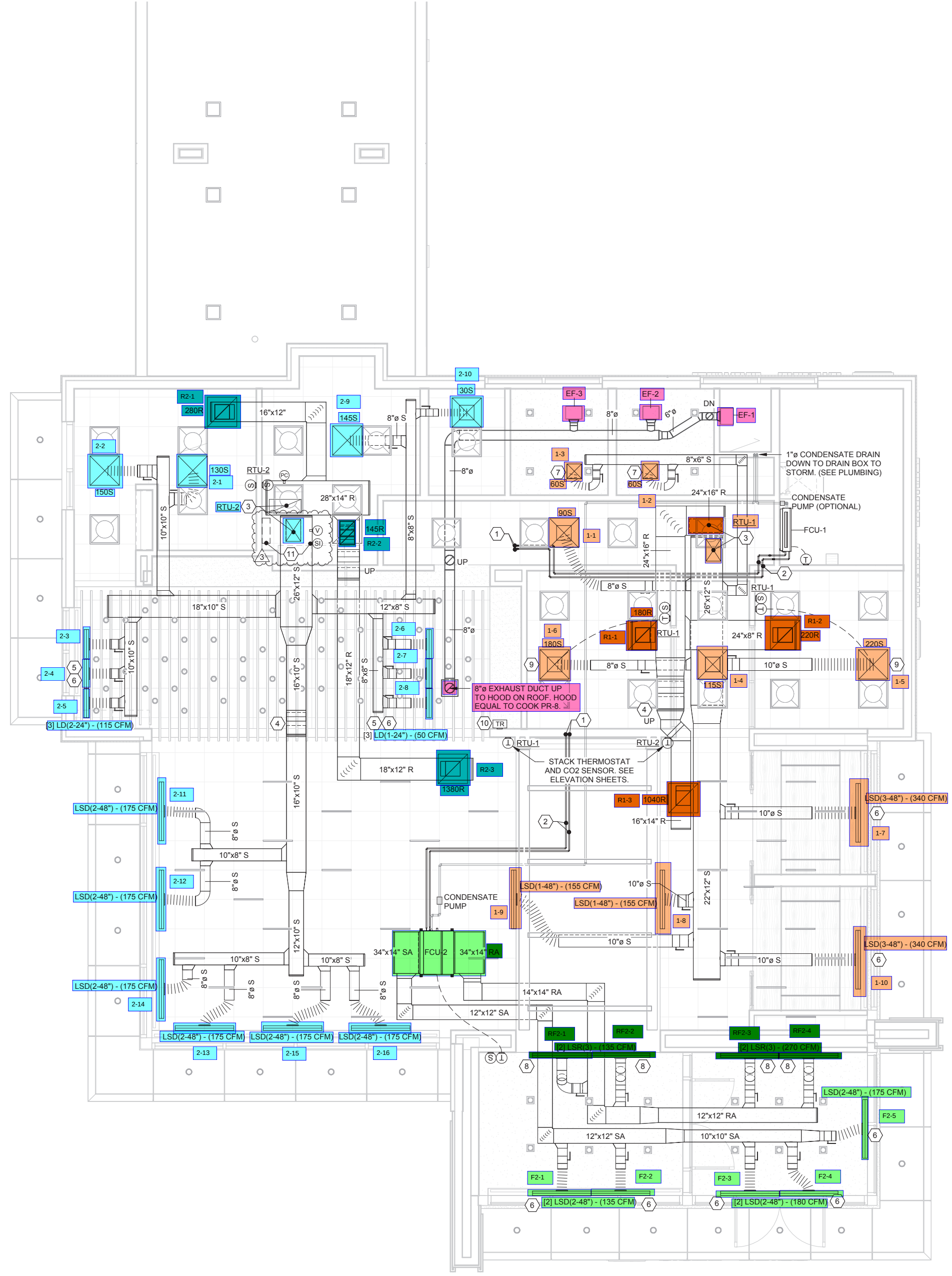
National TAB

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	Evergreen S-PVF-1 24D-00281	3/14/2025	3/14/2026
	AIR VELOCITY INSTRUMENT	50 fpm to 3900 fpm	+/- 5 % +/- 7 fpm	Evergreen S-PVF-1 24D-00281	3/14/2025	3/14/2026
	DIRECT HOOD READING	100 cfm to 2000 cfm	+/- 5 % +/- 7 cfm	Evergreen S-PVF-1 24D-00281	3/14/2025	3/14/2026
TEMPERATURE	AIR METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	AIR PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	IMMERSION METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	IMMERSION PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	CONTACT METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	CONTACT PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
HUMIDITY	HUMIDITY PROBE	10 % RH to 90 % RH	3% of reading	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
ELECTRICAL	VOLTAGE MEASUREMENT	0 VAC to 600 VAC	2 % reading +/- 5 digits	Klein Tools CL800 S/N 1220C-C1	9/18/2024	9/18/2025
	AMPERAGE MEASUREMENT	0 Amperers to 100 Amperes	2 % reading +/- 5 digits	Klein Tools CL800 S/N 1220C-C1	9/18/2024	9/18/2025
ROTATION	ROTATION MEASUREMENT	60 rpm to 5000 rpm	2 % reading 2 rpm	Shimpo DT 207Lp S/N D1690029R	9/18/2024	9/18/2025
HYDRONIC	PRESSURE MEASUREMENT	-30 in Hg to 200 psi	±2% of reading +/- 1 psi	Hydronic Manometer - Dwyer 490W-6-HKIT S/N: 359515093207912	10/17/2024	10/17/2025
	DIFFERENTIAL PRESSURE MEASUREMENT	0 psi - 80 psi	±2% of reading +/- 1 psi	Hydronic Manometer - Dwyer 490W-6-HKIT S/N: 359515093207912	10/17/2024	10/17/2025

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
CO2 = 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



1 MECHANICAL PROPOSED CEILING PLAN
1/4" = 1'-0"

MECHANICAL KEYED NOTES:

1. REFRIGERANT PIPING UP THRU ROOF TO OUTDOOR UNIT.
2. ROUTE REFRIGERANT PIPING AS HIGH AS POSSIBLE TO OUTDOOR UNIT ON ROOF. ROUTE AND SIZE PER MANUFACTURER'S RECOMMENDATIONS (TYP.).
3. DUCT UP AND TRANSITION TO FULL SIZE OF UNIT OPENING WITH FLEX CONNECTION AT UNIT.
4. DUCT TO RISE ABOVE STRUCTURAL BEAM. COORDINATE WITH STRUCTURAL.
5. IN UPPER CEILING. PAINT BLACK.
6. PROVIDE REMOTE CABLE OPERATED DAMPER IN PLENUM SLOTS WITH OPERATION AT SLOT FACE.
7. PROVIDE REMOTE CABLE OPERATED DAMPER IN CEILING FOR DAMPER OPERATION.
8. LSR(3) WITH FULL SIZE SHEETMETAL PLENUM, 12" HIGH. INSIDE TO BE PAINTED FLAT BLACK. CONNECT TO 8"ø DUCT TO PLENUM.
9. SUPPLY DIFFUSER TO BE VAV TYPE WITH PETROLEUM BASED WAX CONTROLLED DAMPER. DAMPER SHALL CLOSE TO KEEP SPACE FROM BEING OVERHEATED ONCE ROOM TEMPERATURE IS SATISFIED (72°F ADJUSTABLE). DIFFUSER EQUAL TO PRICE ACUTHERM ST THERMA-FUSER. PROVIDE WALL MOUNTED TEMPERATURE SENSOR.
10. TEMPERATURE AND RELATIVE HUMIDITY DISPLAY EQUAL TO AUTOMATION COMPONENTS, INC. COORDINATE WITH IOT. SEE CONTROL SEQUENCE.
11. INSTALL SINGLE MUSEUM360 DIFFUSER WITH THE FILLOWING TUBE LENGTHS: SKINNY TUBE (CONNECTS FROM THE DIFFUSER TO THE ATOMIZER/BOTTLE OF OIL): MAX 6-10 FF. THICK TUBE (CONNECTS FROM THE DIFFUSER TO THE ATOMIZER/BOTTLE OF OIL): MAX 3-5 FT (3)

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ISSUE	BY	DATE	DESCRIPTION
	K/V	04/16/24	PERMIT SET
1	K/V	06/17/24	ADDENDUM 1
3	G	12/30/24	ADD RECEPTACLE

PROJECT INFORMATION BLOCK

JOB #	230645/15-323.00
DATE:	10/21/2024
DRAWN BY:	VO
CHECKED BY:	RK

SHEET TITLE

MECHANICAL PROPOSED CEILING PLAN

SHEET NUMBER

M-301

National TAB

Project: Fifth Third Bank (Union, KY)

System/Unit: AHU/RTU

Asset: RTU-1 AREA:MEETING

Unit Data		
	Design	**Actual**
MFG	NA	CARRIER
Serial Num	-	4624C09822
Model Num	NA	48GCSL05E3M5-3W4R0
Configuration	-	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	28.25”x14.25”
Num PreFilter 1	-	2
PreFilter Size 1	-	15.5”x24.5”

Motor Data		
	Design	**Actual**
Phase	-	3
Rated Voltage	-	230
Rated Amperage	-	5.5

Test Data		
	Design	**Actual**
SF CFM	1715	1811
SF RPM	-	2075
RA CFM	1535	1619
OA CFM	180	192
RL Voltage	-	213/214/214
RL Amperage	-	2.6/2.6/2.7
SF System SetPt	-	2075 RPM
OA Damper Position	-	18%

Performance Data		
	Design	**Actual**
Fan Suction SP	-	-1.0
Fan Discharge SP	-	0.33
Total ESP	1.00	1.08
Fan Total SP	-	1.33

Completed By: Corey Dick on 09/09/2025

Notes:
Diffuser 5 has damper wide open with unit at design speed and all other diffusers in design. Diffuser is still not receiving proper airflow.

Written By: Corey Dick on 09/09/2025

National TAB

Project:Fifth Third Bank (Union, KY)

AHU/RTU

Diffuser Supply (GRD)

RTU-1/MEETING

Asset							
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**CFM(1)**	**FINAL CFM**	**% to design**
1-1		S	8	90	205	96	106.7
1-2	MEN'S RESTROOM	S		60	95	66	110.0
1-3	WOMEN'S RR	S		60	91	60	100.0
1-4		S		115	219	118	102.6
1-5		S	10	220	82	229	104.1
1-6		S	8	180	153	188	104.4
1-7		LSD	10	340	389	354	104.1
1-8		LSD	10	155	187	169	109.0
1-9	VESTIBULE/ENTRANCE	LSD	10	155	157	162	104.5
1-10		LSD	10	340	345	369	108.5
Total				1715	1923	1811	105.6%

National TAB

Project: Fifth Third Bank (Union, KY)

System/Unit: AHU/RTU

Asset: RTU-2 AREA:LOUNGE

Unit Data		
	Design	**Actual**
MFG	NA	CARRIER
Serial Num	-	4524C09465
Model Num	NA	48GCRL06E2M5-3W4R0
Configuration	-	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	28.25”x14.25”
Num PreFilter 1	-	4
PreFilter Size 1	-	15.5”x15.5”

Motor Data		
	Design	**Actual**
Phase	-	3
Rated Voltage	-	230
Rated Amperage	-	9.2

Test Data		
	Design	**Actual**
SF CFM	2000	2077
SF RPM	-	2350
RA CFM	1750	1820
OA CFM	250	257
RL Voltage	-	213/214/214
RL Amperage	-	9.1/9.2/9.1
SF System SetPt	-	2350 RPM
OA Damper Position	-	18%

Performance Data		
	Design	**Actual**
Fan Suction SP	-	-1.25
Fan Discharge SP	-	0.34
Total ESP	1.00	1.34
Fan Total SP	-	1.59

Completed By: Corey Dick on 09/10/2025

Notes:
Diffusers 9 and 10 did not have individual dampers installed. Rather, there was a single branch damper connected to both of the diffusers. In order to get enough air to the larger security room the small phone room was left high.

Written By: Corey Dick on 09/10/2025

National TAB

Project:Fifth Third Bank (Union, KY)

AHU/RTU

Diffuser Supply (GRD)

RTU-2/LOUNGE

Asset							
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**CFM(1)**	**FINAL CFM**	**% to design**
2-1		S	24x24	130	128	118	90.8
2-2		S	24x24	150	126	158	105.3
2-3		S	24x24	115	109	104	90.4
2-4		S	24x24	115	105	105	91.3
2-5		S	24x24	115	99	109	94.8
2-6		S	24x24	50	45	45	90.0
2-7		S	24x24	50	43	45	90.0
2-8		S	24x24	50	42	46	92.0
2-9	LOUNGE	S	24x24	145	104	136	93.8
2-10		S	24x24	30	45	92	306.7
2-11		LSD	48	175	169	191	109.1
2-12		LSD	48	175	114	186	106.3
2-13		LSD	48	175	93	192	109.7
2-14		LSD	48	175	141	191	109.1
2-15		LSD	48	175	117	167	95.4
2-16		LSD	48	175	112	192	109.7
Total				2000	1592	2077	103.85%

National TAB

Project: Fifth Third Bank (Union, KY)

System/Unit: Fan Coil

Asset: FCU-2 AREA:VESTIBULE/ENTRANCE

Unit Data		
	Design	**Actual**
MFG	NA	MITSUBISHI ELECTRIC
Model Num	NA	PEAD-A24AA9
Serial Num	-	45R01098
Type	-	HORIZONTAL DUCTED
Configuration	-	HORIZONTAL

Motor Data		
	Design	**Actual**
Horsepower	-	0.162
Phase	-	1
Voltage (rated)	-	208
Amperage (rated)	-	1.65
Brake Horse Power	-	0.055

Test Data		
	Design	**Actual**
SFAN CFM	800	784
SFAN Rotation	-	CORRECT
Motor Speed SetPt	-	HIGH
RL Voltage	-	213
RL Amperage	-	0.55
RA CFM	800	784
OA CFM	-	0

Performance Data		
	Design	**Actual**
Suction ESP	-	-0.1
Discharge ESP	-	0.12
Fan Inlet SP	-	-0.1
Fan Discharge SP	-	0.12
Total Fan SP	-	0.22

Completed By: Corey Dick on 09/10/2025

National TAB

Project:Fifth Third Bank (Union, KY)

Fan Coil

Diffuser Supply (GRD)

FCU-2/VESTIBULE/ENTRANCE

Asset							
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**CFM(1)**	**FINAL CFM**	**% to design**
F2-1	LOBBY	LSD		135	217	142	105.2
F2-2	LOBBY	LSD		135	215	137	101.5
F2-3	VESTIBULE	LSD		180	63	163	90.6
F2-4	VESTIBULE	LSD		180	71	166	92.2
F2-5	VESTIBULE	LSD		175	232	176	100.6
Total				805	798	784	97.39%

National TAB

Project: Fifth Third Bank (Union, KY)

System/Unit: FAN - Exhaust

Asset: EF-1 AREA:JANITOR'S CLOSET

Unit Data		
	Design	**Actual**
MFG	NA	GREENHECK
Model Num	NA	SP-B90
Serial Num	-	193105904-0045
Type	-	CEILING

Motor Data		
	Design	**Actual**
Motor MFG	-	GREENHECK
Motor Rpm	-	950
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	1.15

Test Data		
	Design	**Actual**
CFM	50	55
System SetPt	-	CONTROLLER MARKED
RL Voltage	-	INACCESSIBLE
RL Amperage	-	0.16
Suction ESP	-	CEILING MOUNTED
Discharge ESP	-	ATM
Total ESP	0.33	CEILING MOUNTED

Completed By: Corey Dick on 09/15/2025

National TAB

Project: Fifth Third Bank (Union, KY)

System/Unit: FAN - Exhaust

Asset: EF-2 AREA:MEN'S RESTROOM

Unit Data		
	Design	**Actual**
MFG	NA	GREENHECK
Model Num	NA	SP-B110
Serial Num	-	196532049-0054
Type	-	CEILING

Motor Data		
	Design	**Actual**
Motor MFG	-	GREENHECK
Motor Rpm	-	950
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	1.15

Test Data		
	Design	**Actual**
CFM	70	74
System SetPt	-	CONTROL MARKED
RL Voltage	-	INACCESSIBLE
RL Amperage	-	0.95
Suction ESP	-	CEILING
Discharge ESP	-	ATM
Total ESP	0.33	CRILING

Completed By: Corey Dick on 09/15/2025

National TAB

Project: Fifth Third Bank (Union, KY)

System/Unit: FAN - Exhaust

Asset: EF-3 AREA:WOMEN'S RR

Unit Data		
	Design	**Actual**
MFG	NA	GREENHECK
Model Num	NA	SP-B110
Serial Num	-	196531049-0039
Type	-	CEILING

Motor Data		
	Design	**Actual**
Motor MFG	-	GREENHECK
Motor Rpm	-	950
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	1.15

Test Data		
	Design	**Actual**
CFM	70	69
System SetPt	-	CONTROL MARKED
RL Voltage	-	INACCESSIBLE
RL Amperage	-	0.93
Suction ESP	-	CEILING
Discharge ESP	-	ATM
Total ESP	0.33	CEILING

Completed By: Corey Dick on 09/15/2025