

Report By:

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

NATIONAL

TAB

Comfort. Under control.

Report: TAB REPORT
Function: Test, Adjust, & Balance
Date: 05/31/2023

PROJECT

05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

806 ELM ST

BOSCOBEL, WI 53805

Client

Oliphant Heating
208 WOLLARD BLVD

RICHMOND, MO

CheckList List

- TECH - SITE PICTURES
- TECH - STEP 1: INITIAL WALKTHROUGH
- TECH - STEP 2: UNIT DATA AND EVAL
- TECH - STEP 3: TEST, ADJUST AND BALANCE
- TECH - STEP 4: FINAL TESTS

Project Summary

The summary below provides a quick understanding of our scope of work and general testing procedures. Enclosed in the report is further detail about your building performance including recommendations, asset data, and pictures. Our focus is to work with the trades to remedy any issues or deficiencies during the actual field balancing and not after the balancing has occurred to achieve a positive environment and outcome. The level of success is determined by the availability of the trades, possible parts needed, or time constraints.

RTU's (Roof Top Units) w/ Diffusers

Each of the RTU's were measured at their terminal devices or via traverse to establish a total flow for that unit. Each RTU was adjusted to within tolerance of the engineer's design flow. Each outlet was then adjusted to within tolerance of the design flow. Outside air was measured by reading the intake air opening with a velocity grid and multiplying by the free area. The outside air damper was adjusted until the airflow was within the design requirements. Any equipment that fell outside of that tolerance is noted throughout the report.

General Exhaust Fans w/ Grilles

The general exhaust fans were measured by reading each air device with a flow hood. The total airflow for each fan is equivalent to the sum of these readings. Fan speed was then adjusted so that the airflow was within tolerance of design. Each terminal device was balanced to within tolerance of the design volume using the installed volume dampers. Any equipment that fell outside of this tolerance is noted throughout the report.

Final Building Tests

After completing the test and balance the final building pressure was measured. It was confirmed that the building pressure fell within acceptable tolerances and that the pressure measurement coincides with the actual and design net airflow. Any deviations from these standards are noted throughout the report.

AIR BALANCE SCHEDULE

UNIT	AREA SERVED	HVAC SUPPLY		HVAC RETURN		HVAC OUTDOOR		OA %		HOOD MAKE-UP		HOOD EXHAUST		GENERAL EXH.	
		DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL
RTU-1	STORAGE	1750	1686	1600	1531	150	155	8.6%	9.2%						
RTU-2	WEST SALES	2800	2869	2150	2243	650	626	23.2%	21.8%						
RTU-3	EAST SALES	2800	2889	2150	2225	650	664	23.2%	23.0%						
RTU-4	SOUTH SALES	3500	3584	2725	2826	775	758	22.1%	21.1%						
EF-1	RESTROOM													75	70
EF-2	RESTROOM													75	78
TOTALS		10850	11028	8625	8825	2225	2203			0	0	0	0	150	148

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	2225	2203
TOTAL EXHAUST	150	148
NET AIRFLOW	2075	2055

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H2O)
FRONT	0.0243"
SIDE	0.0238"
REAR	0.0234"
AVERAGE	0.0238

FINAL CHECKS

- ACTUAL NET AIRFLOW COINCIDES WITH DESIGN: ✓

- MEASURED PRESSURES COINCIDES WITH ACTUAL NET AIRFLOW: ✓

- PRESSURE FALLS WITHIN IMC TOLERANCE OF +/-0.03" W.C. ✓

NOTES:



Rooftop
05/31/2023

RTU-1



RTU-1
05/31/2023

RTU-2



RTU-2(1)
05/31/2023

RTU-3



RTU-3
05/31/2023

RTU-4



RTU-4
05/30/2023

EF-1



EF-1
05/31/2023

EF-2



EF-2
05/31/2023



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CheckList Information

Name : TECH - STEP 1: INITIAL WALKTHROUGH **Status :** Not Completed

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

CheckList Item Details

INITIAL SITE WALKTHROUGH

Review Plan Review Checklist, has it been signed off and meets our standards to start balancing? If not contact processor to ensure job is ready.	Yes
All diffusers and grilles are installed and match design?	Yes
Thermostats have power?	Yes
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	Yes



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CheckList Information

Name : TECH - STEP 2: UNIT DATA AND EVAL **Status :** Not Completed

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

CheckList Item Details

UNIT DATA AND EVALUATION WHILE GATHERING UNIT DATA CHECK THE FOLLOWING:

RTU's/AHU's	
Economizers are assembled and functional?	Yes
DCV Max damper opening position is set to minimum?	Yes
Free cooling enthalpy set point set for lowest setting (Typically "D")	Yes, ES5
Motors are all operating below the FLA rating?	Yes
Are belts tight?	Yes
If direct drive unit is the speed controller working.	Yes
Is gas piping installed and valves turned on?	Yes
Unit free of noticeable noise and vibration	Yes
EF's	
Rotation is correct?	Yes
Belts are tight?	NA, direct drive.
There is no major leakage around base of fan?	Yes
Is the motor operating below the motor FLA rating?	Yes
For restroom fan(s) is the back draft damper installed and can it fully open?	NA, ceiling fans. Fans are functional.

Unit free of noticeable noise and vibration?

Yes

DOCUMENTATION

Have trades/general contractor been notified about any issues and are they created on FaciliBuild?

Yes



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05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

CheckList Information

Name : TECH - STEP 3: TEST, ADJUST AND BALANCE **Status :** Not Completed

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

CheckList Item Details

TEST, ADJUST, AND BALANCE ALL EQUIPMENT:

DURING TESTING MAKE NOTE OF THE FOLLOWING:

Is space free of drafting?	Yes
Is space comfortable in all areas?	Yes
Is the space free of ventilation noise?	Yes
If deviations from design were necessary to resolve 1-3 what were they? Otherwise put "NA".	NA



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CheckList Information

Name : TECH - STEP 4: FINAL TESTS **Status :** Not Completed

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

CheckList Item Details

FINAL TESTS

ADDITIONAL

Thermostats are programmed?

No, thermostats were set to fan on and set to cool at 75 degrees per GC.

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Project: 05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

System/Unit: AHU/RTU



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Asset: RTU1

AREA:STORAGE

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	2222C10471
Model Num	48GCE	48GCEM05F2
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	28X14.25
Num Final Filter 1	-	2
Final Filter Size 1	-	16X25X2

Motor Data		
	Design	Actual
Motor MFG	-	NL
Frame	-	NL
Horsepower	1.4	NL
Motor Rpm	-	NL
Phase	3	1
Rated Voltage	208	208
Rated Amperage	-	7.1

Drive Data		
	Design	Actual
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	7.6V
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	Actual
SF CFM	1750	1686
SF RPM	-	1698
RA CFM	1600	1531
OA CFM	150	155
RL Voltage	-	207
RL Amperage	-	1.9
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 91% LOW: 82%
Min OA Damper Position	-	HIGH: 2.8V (9%) LOW: 3.45V (18%)
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	ES5

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.23"
Fan Suction SP	-	-0.59"
Fan Discharge SP	-	0.42"
Total ESP	1.0"	0.65"
Fan Total SP	-	1.01"

General		
	Design	Actual
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

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Project:05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

AHU/RTU



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Diffuser Supply (GRD)

RTU1/STORAGE

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	STORAGE	D	14X6	363	0.52	392	418	356	98.1
SGRD2	STORAGE	D	14X6	363	0.52	343	396	337	92.8
SGRD3	STORAGE	D	14X6	363	0.52	392	399	340	93.7
SGRD4	STORAGE	D	14X6	363	0.52	429	410	349	96.1
SGRD5	OFFICE	A	8"	100	1.0	229	121	103	103.0
SGRD6	RR VESTIBUL E	A	8"	100	1.0	196	112	95	95.0
SGRD7	RESTROOM	C	8"	50	1.0	90	61	52	104.0
SGRD8	RESTROOM	C	8"	50	1.0	80	63	54	108.0

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Project: 05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

System/Unit: AHU/RTU



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Asset: RTU2

AREA: WEST SALES

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	4522P42527
Model Num	48FCE	48HCED08A2
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	35"X19.5"
Num Final Filter 1	-	4
Final Filter Size 1	-	20X20X2

Motor Data		
	Design	Actual
Motor MFG	-	MARATHON
Frame	-	NL
Horsepower	2.4	NL
Motor Rpm	-	1670
Phase	3	3
Rated Voltage	208	208-230
Rated Amperage	-	6.7-6.6

Drive Data		
	Design	Actual
Motor Sheave Size	-	MV44
Motor Bore Size	-	5/8"
Motor Sheave SetPt	-	5 TURNS OPEN
Fan Sheave Size	-	AFD74
Fan Sheave Bore	-	1"
Belt CL Distance	-	16.5"
Num of Belts	-	1
Belt Size	-	A48
Belt Alignment	-	VERIFIED

Test Data		
	Design	Actual
SF CFM	2800	2869
SF RPM	-	731
RA CFM	2150	2243
OA CFM	650	626
RL Voltage	-	206/206/207
RL Amperage	-	2.3/2.4/2.8
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 88% LOW: 72%
Min OA Damper Position	-	HIGH: 3.0V (12%) LOW: 4.2V (28%)
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	ES5

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.46"
Fan Suction SP	-	-0.65"
Fan Discharge SP	-	0.53"
Total ESP	1.00"	0.99"
Fan Total SP	-	1.18"

General		
	Design	Actual
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

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Project:05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

AHU/RTU



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Diffuser Supply (GRD)

RTU2/WEST SALES

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	SALES	B	12"	350	1.0	219	207	368	105.1
SGRD2	SALES	B	12"	350	1.0	452	419	375	107.1
SGRD3	SALES	B	12"	350	1.0	444	397	335	95.7
SGRD4	SALES	B	12"	350	1.0	375	368	366	104.6
SGRD5	SALES	B	12"	350	1.0	333	334	365	104.3
SGRD6	SALES	B	12"	350	1.0	429	410	370	105.7
SGRD7	SALES	B	12"	350	1.0	509	447	350	100.0
SGRD8	SALES	B	12"	350	1.0	410	373	340	97.1

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Project: 05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

System/Unit: AHU/RTU



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Asset: RTU3

AREA:EAST SALES

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	4522P42542
Model Num	48FCE	48HCED08A2
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	35"X16.5"
Num Final Filter 1	-	4
Final Filter Size 1	-	20X20X2

Motor Data		
	Design	Actual
Motor MFG	-	MARATHON
Frame	-	56HZ
Horsepower	2.4	NL
Motor Rpm	-	1670
Phase	3	3
Rated Voltage	208	208-230
Rated Amperage	-	6.7-6.6

Drive Data		
	Design	Actual
Motor Sheave Size	-	MV44
Motor Bore Size	-	5/8"
Motor Sheave SetPt	-	5 TURNS OPEN
Fan Sheave Size	-	AFD74
Fan Sheave Bore	-	1"
Belt CL Distance	-	16.75"
Num of Belts	-	1
Belt Size	-	A48
Belt Alignment	-	VERIFIED

Test Data		
	Design	Actual
SF CFM	2800	2889
SF RPM	-	726
RA CFM	2150	2225
OA CFM	650	664
RL Voltage	-	207/206/206
RL Amperage	-	2.2/2.1/2.6
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 86% LOW: 75%
Min OA Damper Position	-	HIGH: 3.15V (14%) LOW: 4.05 (25%)
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	ES5

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.43"
Fan Suction SP	-	-0.64"
Fan Discharge SP	-	0.51"
Total ESP	1.00"	0.94"
Fan Total SP	-	1.15"

General		
	Design	Actual
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

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Project:05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

AHU/RTU



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Diffuser Supply (GRD)

RTU3/EAST SALES

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	SALES	B	12"	350	1.0	393	371	356	101.7
SGRD2	SALES	B	12"	350	1.0	421	423	329	94.0
SGRD3	SALES	B	12"	350	1.0	427	402	361	103.1
SGRD4	SALES	B	12"	350	1.0	413	360	378	108.0
SGRD5	SALES	B	12"	350	1.0	363	356	371	106.0
SGRD6	SALES	B	12"	350	1.0	239	248	343	98.0
SGRD7	SALES	B	12"	350	1.0	410	401	375	107.1
SGRD8	SALES	B	12"	350	1.0	373	350	376	107.4

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Project: 05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

System/Unit: AHU/RTU



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Asset: RTU4

AREA:SOUTH SALES

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	0123P70609
Model Num	48FCE	48FCEM12F2
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	35"X19.5"
Num Final Filter 1	-	4
Final Filter Size 1	-	20X20X2

Motor Data		
	Design	Actual
Motor MFG	-	NL
Frame	-	NL
Horsepower	3	NL
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	208	208
Rated Amperage	-	6.4

Drive Data		
	Design	Actual
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	8.0V
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	Actual
SF CFM	3500	3584
SF RPM	-	1665
RA CFM	2725	2826
OA CFM	775	758
RL Voltage	-	206/207/206
RL Amperage	-	3.2/3.3/3.4
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 85% LOW: 78%
Min OA Damper Position	-	HIGH: 3.2V (15%) LOW: 3.8V (22%)
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	ES5

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.64"
Fan Suction SP	-	-0.93"
Fan Discharge SP	-	0.62"
Total ESP	1.00"	1.26"
Fan Total SP	-	1.55"

General		
	Design	Actual
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

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Project:05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

AHU/RTU



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Diffuser Supply (GRD)

RTU4/SOUTH SALES

Asset									
Asset Name	Location	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	SALES	B	12"	440	1.0	459	417	472	107.3
SGRD2	SALES	B	12"	435	1.0	544	520	452	103.9
SGRD3	SALES	B	12"	435	1.0	559	506	442	101.6
SGRD4	SALES	B	12"	440	1.0	469	432	457	103.9
SGRD5	SALES	B	12"	440	1.0	417	418	470	106.8
SGRD6	SALES	B	12"	435	1.0	561	521	427	98.2
SGRD7	SALES	B	12"	435	1.0	501	486	422	97.0
SGRD8	SALES	B	12"	440	1.0	461	442	442	100.5

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Project: 05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

System/Unit: FAN - Exhaust



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Asset: EF1

AREA:RESTROOMS

Unit Data		
	Design	Actual
MFG	GREENHECK	BROAN
Model Num	SP-B110	AE80B-B
Serial Num	-	32B10H3
Type	CEILING	CEILING
Configuration	VERTICAL	VERTICAL

Test Data		
	Design	Actual
CFM	75	70

Motor Data		
	Design	Actual
Horsepower	80W	80W
Phase	1	1
Voltage (rated)	120	120
Amperage (rated)	-	0.3

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Project: 05-29-23 FAMILY DOLLAR - BOSCOBEL, WI

System/Unit: FAN - Exhaust



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Asset: EF2

AREA:RESTROOMS

Unit Data		
	Design	Actual
MFG	GREENHECK	BROAN
Model Num	SP-B110	AE80B-B
Serial Num	-	32B10H3
Type	CEILING	CEILING
Configuration	VERTICAL	VERTICAL

Test Data		
	Design	Actual
CFM	75	78

Motor Data		
	Design	Actual
Horsepower	80W	80W
Phase	1	1
Voltage (rated)	120	120
Amperage (rated)	-	0.3

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