

Report By:

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



Report: TAB REPORT
Function: Test, Adjust, & Balance
Date: 08/09/2023

PROJECT

**07-31-23 FIVE GUYS #0501 - HAGERSTOWN,
MD**

18007 GARLAND GROH BLVD

HAGERSTOWN, MD 21740

Client

Five Guys Enterprises LLC
20718 Richmond Highway

Lorton, VA 22079

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)

Existing RTU's were replaced and the scope for these units was to balance each within tolerance of nominal flow of the units or airflows provided on the submittals (if provided). 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. Outside air was set to ensure negative building pressure without exceeding the account requirements for maximum outside air ratio. The outside air damper was adjusted until the airflow was within these requirements. Any equipment that fell outside of that tolerance is noted throughout the report.

Kitchen Exhaust Hood & Associated Fans

Each kitchen exhaust fan was measured at the hood filter bay utilizing a velocity matrix and a manufacturer's correction factor. Each filter velocity is multiplied by the manufacturer's corrected area. The sum of these readings equals the total flow of the exhaust fans. The total flow of the exhaust was then adjusted to within tolerance of the design flow. Any EF's that fell outside of this tolerance is noted throughout the report.

MUA (Make Up Air Unit) w/ PSP.

Total flow for the MAU (Make-up Air Unit) unit was measured using manufacturer procedures. Either total traverse of the unit at the inlet with a velocity grid or via readings taken at the discharge of the hood's perforated supply plenum multiplied by the manufacturer's corrected area. Adjustments to the fan speed were made to bring the unit to within design tolerance. Any MUA's that fell outside of this 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 of $-0.02''$ wc to $+0.02''$ wc and that the pressure measurement coincides with the actual and design net airflow. Any deviations from these standards are noted throughout the report.

The hood capture was tested at the perimeter of the hood and the cook top level with the equipment heat on to ensure satisfactory hood capture and containment.

If any remaining issues were identified during the TAB process that we were unable to resolve, then those issues are noted on the following pages.

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		4000	3885	3200	3059	800	826	20.0%	21.3%						
RTU-2		2000	1640	1600	1265	400	375	20.0%	22.9%						
MUA-1											2104				
KEF-1												4005			
EF-2															0
TOTALS		6000	5525	4800	4324	1200	1201			0	2104	0	4005	0	0

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	1200	3305
TOTAL EXHAUST	0	4005
NET AIRFLOW	1200	-700

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H2O)
FRONT	-0.0022
SIDE	
REAR	-0.0044
AVERAGE	-0.0033

FINAL CHECKS

- ACTUAL NET AIRFLOW COINCIDES WITH DESIGN: ✘

- MEASURED PRESSURES COINCIDES WITH ACTUAL NET AIRFLOW: ✔

- PRESSURE FALLS WITHIN IMC TOLERANCE OF +/-0.02" W.C. ✔

NOTES:

EF-2 was found to be not in operation.

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



RTU-1
08/07/2023

RTU2

Comment:



RTU-2(1)
08/07/2023

KEF1

Comment:



KEF-1
08/07/2023

KEF2

Comment:

EF3

Comment:



MUA-1
08/07/2023

MUA1

Comment:



RR_EF
08/07/2023

HOOD1

Comment:

HOOD2

Comment:



Hood-2
08/07/2023



07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

CheckList Information

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

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

Created Date : 07/31/2023 - Brianna Biggs - National TAB

CheckList Item Details

INITIAL SITE WALKTHROUGH

All diffusers and grilles are installed and match design? N/A

Comment:

Unable to determine without a Mechanical of plans.

All hood filters installed and accounted for? Yes

Comment:

Hoods are wired and have power? Yes

Comment:

Hood is free of alarms? N/A

Comment:

Thermostats have power? Yes

Comment:

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

Comment:

N/A



07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

CheckList Information

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

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

Created Date : 07/31/2023 - Brianna Biggs - 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

Comment:

DCV Max damper opening position is set to minimum? Yes

Comment:

Free cooling enthalpy set point set for lowest setting (Typically "D") Yes

Comment:

Motors are all operating below the FLA rating? Yes

Comment:

Are belts tight?

Comment:

Yes

If direct drive unit is the speed controller working.

Comment:

Is gas piping installed and valves turned on?

Yes

Comment:

Unit free of noticeable noise and vibration

Yes

Comment:

EF's

Rotation is correct?

Yes

Comment:

Belts are tight?

Comment:

Grease cup installed on hood fan?

Yes

Comment:

Hinge kit installed installed on hood fan?

N/A

Comment:

Lean fan back. Is grease duct installation adequate and is duct ran all the way to the base of the fan?

N/A

Comment:

Flex conduit is long enough so that fan can be completely tilted back?

N/A

Comment:

There is no major leakage around base of fan?

Comment:

No major leakage

Is the motor operating below the motor FLA rating?

Comment:

Yes

For restroom fan(s) is the back draft damper installed and can it fully open?

Comment:

Yes

Unit free of noticeable noise and vibration?

Comment:

MUA

Rotation is correct?

Yes

Comment:

Gas piping is installed and valves are in on position?

Yes

Comment:

Heater tested and is functional?

Yes

Comment:

Internal motorized damper is fully opening?

Yes

Comment:

Motor is operating below the FLA rating?

Yes

Comment:

Unit free of noticeable noise and vibration?

Yes

Comment:

HOODS

Kitchen equipment installed in proper places?

Comment:

Kitchen equipment installation was incomplete while on site.

Can kitchen equipment be turned on for final smoke test?

Comment:

No, kitchen equipment was not installed yet

DOCUMENTATION

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

N/A

Comment:



07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

CheckList Information

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

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

Created Date : 07/31/2023 - Brianna Biggs - National TAB

CheckList Item Details

TEST, ADJUST, AND BALANCE ALL EQUIPMENT:

DURING TESTING MAKE NOTE OF THE FOLLOWING:

Is space free of drafting?	Yes
----------------------------	-----

Comment:

Is space comfortable in all areas?	Yes
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Comment:

Is the space free of ventilation noise?	Yes
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Comment:

If deviations from design were necessary to resolve 1-3 what were they? Otherwise put "NA".

Comment:

N/A



07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

CheckList Information

Name : TECH - STEP 4: FINAL TESTS **Status :** Not Completed
Assigned Organization : National TAB **Asset :**
Requesting Organization : National TAB
Created Date : 07/31/2023 - Brianna Biggs - National TAB

CheckList Item Details

FINAL TESTS

HOOD CAPTURE TEST

List equipment turned on for testing

Comment:

No, equipment start up not complete

List smoke candle type used

Comment:

S102 45 sec emitter

Smoke test capture - Perimeter of hood

Comment:

100%

Smoke test capture - Top of cooking surface

Comment:

100%

WITNESS

Date test was completed

07/31/2023

Comment:

TAB tech name / Firm

Comment:

David Annan/ National TAB

Site super name / Firm

Comment:

N/A

Owner representative name / Firm (if Applicable)

Comment:

N/A

Building pressure at front & back doors (All Systems On)

Comment:

Front: -0.0023" Back door: -0.0044"

ADDITIONAL

Do actual net building airflow, design net building airflow, and pressure coincide? If not why? (All three should either be positive or negative)

Comment:

Yes

Thermostats are programmed?

Comment:

Yes

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Project: 07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

System/Unit: AHU/RTU



Asset: RTU1

AREA:

Unit Data		
	Design	Actual
MFG	NA	Carrier
Serial Num	-	1223P37323
Model Num	NA	48FCEM12A2A5
Type	-	RTU
Configuration	-	Vertical
Num OA Filters 1	-	2
OA Filter Size 1	-	23X13
Num Final Filter 1	-	4
Final Filter Size 1	-	20X20X2

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

Drive Data		
	Design	Actual
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	DD
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	4000	3885
SF RPM	-	1984
RA CFM	3200	3059
OA CFM	800	826
RL Voltage	-	208/208/208
RL Amperage	-	6.4/5.6/6.3
SF Rotation	-	CCW
RA Damper Position	-	100%
Min OA Damper Position	-	0%
Min OA Damper Type	-	SBD
OA Enthalpy Setpt	-	NA

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.57"
Fan Suction SP	-	-1.40"
Fan Discharge SP	-	0.19"
Total ESP	-	0.76"
Fan Total SP	-	1.59"

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

Completed By: David Annan on 08/02/2023

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Project: 07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

System/Unit: AHU/RTU



Asset: RTU2

AREA:

Unit Data		
	Design	Actual
MFG	NA	Trane
Serial Num	-	23181838PA
Model Num	NA	GBC060A3EMB0B
Type	-	RTU
Configuration	-	Vertical
Num OA Filters 1	-	1
OA Filter Size 1	-	26X14
Num Final Filter 1	-	4
Final Filter Size 1	-	16X16X2

Motor Data		
	Design	Actual
Motor MFG	-	Marathon
Frame	-	56
Horsepower	-	1
Motor Rpm	-	1725
Phase	-	3
Rated Voltage	-	208
Rated Amperage	-	5.0

Drive Data		
	Design	Actual
Motor Sheave Size	-	5/8"
Motor Bore Size	-	VL34
Motor Sheave SetPt	-	0 turns open
Fan Sheave Size	-	AK39
Fan Sheave Bore	-	3/4"
Belt CL Distance	-	18"
Num of Belts	-	1
Belt Size	-	AX40
Belt Alignment	-	Good

Test Data		
	Design	Actual
SF CFM	2000	1640
SF RPM	-	1124
RA CFM	1600	1262
OA CFM	400	378
RL Voltage	-	208/208/208
RL Amperage	-	2.6/2.5/2.6
SF Rotation	-	CW
RA Damper Position	-	Marked
Min OA Damper Position	-	Marked
Min OA Damper Type	-	SBD
OA Enthalpy Setpt	-	E

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.26"
Fan Suction SP	-	-0.99"
Fan Discharge SP	-	0.32"
Total ESP	-	0.58"
Fan Total SP	-	1.31"

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

Completed By: David Annan on 08/02/2023

Notes:

Unable to speed up fan speed setting. Recommend a pulley change to get to suggested design flow of 2000 CFM.

Written By: David Annan on 08/02/2023

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Project: 07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

System/Unit: FAN - Exhaust



Asset: KEF1

AREA:

Unit Data		
	Design	Actual
MFG	NA	Marshall
Model Num	NA	N/L
Serial Num	-	N/L
Type	-	Utility
Configuration	-	Vertical

Motor Data		
	Design	Actual
Motor MFG	-	Nidec
Frame	-	184T
Horsepower	-	5.00
Motor Rpm	-	1765
Phase	-	3
Voltage (rated)	-	208
Amperage (rated)	-	13.70
Service Factor	-	1.15

Drive Data		
	Design	Actual
Motor Sheave Size	-	4 3/4"
Motor Bore Size	-	1 1/4"
Motor Sheave SetPt	-	1 Turn out
Fan Sheave Size	-	6 3/8"
Fan Sheave Bore	-	1 3/8"
Belt CL Distance	-	11 5/8"
Num of Belts	-	2
Belt Size	-	B38

Test Data		
	Design	Actual
CFM	-	4005
Fan RPM	-	1376
Fan Rotation	-	CCW
Motor RPM	-	1731
RL Voltage	-	208/208/208
RL Amperage	-	10.6/10.9/11.0
Suction ESP	-	-2.20"
Discharge ESP	-	ATM
Total ESP	-	2.20"

Completed By: David Annan on 08/02/2023

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Project: 07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

System/Unit: FAN - Supply



Asset: MUA1

AREA:

Unit Data		
	Design	Actual
MFG	NA	Marshall
Model Num	NA	V2-HOM
Serial Num	-	24015-E
Type	-	MUA
Configuration	-	Vertical

Motor Data		
	Design	Actual
Motor MFG	-	Baldor
Frame	-	145T
Horsepower	-	2
Motor Rpm	-	1740
Phase	-	3
Voltage (rated)	-	208
Amperage (rated)	-	5.8
Service Factor	-	1.15

Drive Data		
	Design	Actual
Motor Sheave Size	-	3 3/4"
Motor Bore Size	-	7/8"
Fan Sheave Size	-	3 7/8"
Fan Sheave Bore	-	3/4"
Belt CL Distance	-	14"
Num of Belts	-	1
Belt Size	-	A37
Belt Alignment Verified	-	Good

Gas Heat		
	Design	Actual
Heater Operates (y/n)	-	Yes
Flame Status (pass/fail)	-	Pass
Inlet Air Temp SetPt	-	N/A
Discharge Air Temp SetPt	-	N/A
Air Flow Switch SP Actual	-	0.32"

Test Data		
	Design	Actual
CFM	-	2104
SF RPM	-	1380
Motor RPM	-	1709
RL Voltage	-	208/208/209
RL Amperage	-	3.0/3.1/3.1
Total ESP	-	NA
Fan Discharge SP	-	NA

General		
	Design	Actual
Fan Rotation Correct	-	Yes

Completed By: David Annan on 08/02/2023

Notes:
Intake filters were very dirty. Readings were taken without filters.

Written By: David Annan on 08/02/2023

National TAB

Project: 07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

System/Unit: Kitchen Hood Type I



Asset: HD1

AREA:

Unit Data		
	Design	Actual
MFG	NA	Marshall
Model Num	NA	N/L
Job / Serial Num	-	N/L
Type	-	Type I Canopy
Hood length	-	96"
Hood Width	-	34"
Supply Plenum Type	-	Back Shelf

Test Data Exhaust		
	Design	Actual
Filter Type	-	Baffle
Filter Size 1	-	16X16
Filter Qty 1	-	6
Filter AK factor size 1	-	1.62
Filter Total AK Area	-	9.72
Filter1 FPM	-	145
Filter2 FPM	-	167
Filter3 FPM	-	200
Filter4 FPM	-	226
Filter5 FPM	-	232
Filter6 FPM	-	212
Filter Ave FPM(corr)	-	197
CFM	-	1915

Cooking Equipment		
	Design	Actual
Item 1	-	Grill
Item 2	-	Grill

Completed By: David Annan on 07/31/2023

National TAB

Project: 07-31-23 FIVE GUYS #0501 - HAGERSTOWN, MD

System/Unit: Kitchen Hood Type I



Asset: HD2

AREA:

Unit Data		
	Design	Actual
MFG	NA	Marshall
Model Num	NA	N/L
Job / Serial Num	-	N/L
Type	-	Type I Canopy
Hood length	-	96"
Hood Width	-	34"
Supply Plenum Type	-	Back Shelf

Test Data Supply		
	Design	Actual
CFM	-	

Test Data Exhaust		
	Design	Actual
Filter Type	-	Baffle
Filter Size 1	-	16X16
Filter Qty 1	-	6
Filter AK factor size 1	-	1.62
Filter Total AK Area	-	9.72
Filter1 FPM	-	193
Filter2 FPM	-	244
Filter3 FPM	-	229
Filter4 FPM	-	230
Filter5 FPM	-	197
Filter6 FPM	-	195
Filter Ave FPM(corr)	-	215
CFM	-	2090

Cooking Equipment		
	Design	Actual
Item 1	-	Fryer
Item 2	-	Fryer

Completed By: David Annan on 07/31/2023