

**Report By:**

**National TAB  
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SUITE 4210  
CINCINNATI, OH 45246**



**Report: FINAL TAB REPORT  
Function: Test, Adjust, & Balance  
Date: 09/27/2022**

**PROJECT**  
**09-19 FIVE GUYS #MA0461 - RANDOLPH, MA**  
7 WARREN ST  
RANDOLPH, MA 02368

**Client**

Five Guys Enterprises LLC  
20718 Richmond Highway  
Lorton, VA 22079

# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

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## 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.

### DOAS w/ Diffusers

Each of the DOAS were measured at their terminal devices or via traverse to establish a total flow for that unit. Each DOAS 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.

### 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.

### 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.

### 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	KITCHEN	2400	2407	1850	1847	550	560	22.9%	23.3%						
RTU-2	DINING	3000	3182	2250	2397	750	785	25.0%	24.7%						
MUA-1	KITCHEN HOOD									2718	2536				
EF-1	HD-2 FRYER											3600	3630		
EF-2	MENS RESTROOM													100	0
EF-3	WOMENS RESTROOM													100	0
<b>TOTALS</b>		5400	5589	4100	4244	1300	1345			2718	2536	3600	3630	200	0

#### NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	4018	3881
TOTAL EXHAUST	3800	3630
<b>NET AIRFLOW</b>	<b>218</b>	<b>251</b>

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H2O)
FRONT	0.0021
SIDE	0.0014
REAR	0.0012
<b>AVERAGE</b>	<b>0.0016</b>

#### FINAL CHECKS

- ACTUAL NET AIRFLOW COINCIDES WITH DESIGN: ✓

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- MEASURED PRESSURES COINCIDES WITH ACTUAL NET AIRFLOW: ✓

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

NOTES:



Comfort. Under control.

### 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

#### CheckList Information

**Name :** TECH - SITE PICTURES **Status :** NotSubmitted  
**Assigned Organization :** National TAB **Asset :**  
**Requesting Organization :** National TAB

#### CheckList Item Details

STORE FRONT

YES



FuseIT6fa7e5c7744e44a...

RTU-1

YES



FuseIT523a37612d8f427...

RTU-2

YES



FuseITc52e7e295fd9402...

MAU-1

YES



FuseIT78b903dfe131404...

KEF-1

YES



FuseIT8f9545ef844f494...

EF-2

DOES NOT RUN



FuseITb30c46b6800945d...

EF-3

DOES NOT RUN



FuseIT5a819a22de0744a...

HOOD-1 &2

YES



FuseIT2eaf838d7e154c0...

FILTER RECOMMENDATION

INSTALL 2 BLOCK OFF FILTERS 1-16X16" 1-16X20" IN THE SAME LOCATIONS AS THE CARDBOARD COVERED FILTERS.



FuseIT0584ff26b448460...

Notes/Comments :



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### 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

#### CheckList Information

**Name :** TECH - STEP 1: INITIAL WALKTHROUGH **Status :** NotSubmitted

**Assigned Organization :** National TAB **Asset :**

**Requesting Organization :** National TAB

#### CheckList Item Details

##### INITIAL SITE WALKTHROUGH

All diffusers and grilles are installed and match design?	N/A
All hood filters installed and accounted for?	YES
Hoods are wired and have power?	YES
Hood is free of alarms?	YES
Thermostats have power?	YES
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	N/A

#### Notes/Comments :



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### 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

#### CheckList Information

**Name :** TECH - STEP 2: UNIT DATA AND EVAL **Status :** NotSubmitted  
**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
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?	N/A
Grease cup installed on hood fan?	N/A UTILITY FAN
Hinge kit installed installed on hood fan?	N/A UTILITY FAN
Lean fan back. Is grease duct installation adequate and is duct ran all the way to the base of the fan?	YES

Flex conduit is long enough so that fan can be completely tilted back?	YES
There is no major leakage around base of fan?	YES THERE IS NO LEAKAGE TO NOTE
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?	N/A FOR CEILING FANS
Unit free of noticeable noise and vibration?	YES
<b>MUA</b>	
Rotation is correct?	YES
Gas piping is installed and valves are in on position?	YES
Heater tested and is functional?	YES
Internal motorized damper is fully opening?	YES
Motor is operating below the FLA rating?	YES
Unit free of noticeable noise and vibration?	YES
<b>HOODS</b>	
Kitchen equipment installed in proper places?	YES
Can kitchen equipment be turned on for final smoke test?	YES, STORE IS OPERTIONAL
<b>DOCUMENTATION</b>	
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	N/A

**Notes/Comments :**

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### 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

#### CheckList Information

**Name :** TECH - STEP 3: TEST, ADJUST AND BALANCE **Status :** NotSubmitted

**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

##### Notes/Comments :



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### 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

#### CheckList Information

**Name :** TECH - STEP 4: FINAL TESTS **Status :** NotSubmitted  
**Assigned Organization :** National TAB **Asset :**  
**Requesting Organization :** National TAB

#### CheckList Item Details

##### FINAL TESTS

##### HOOD CAPTURE TEST

List equipment turned on for testing	GRIDDLES AND FRYERS
List smoke candle type used	45 SEC SMOKE AND COOKING AFFLUENT.
Smoke test capture - Perimeter of hood	100% WHILE WATCHING COOKING AFFLUENT AND 100% WHILE WATCHING 45 SEC SMOKE
Smoke test capture - Top of cooking surface	100% WHILE WATCHING COOKING AFFLUENT AND 100% WHILE WATCHING 45 SEC SMOKE

##### WITNESS

Date test was completed	09/20/2022
TAB tech name / Firm	TYLER/NTAB
Site super name / Firm	N/A
Owner representative name / Firm (if Applicable)	N/A
Building pressure at front & back doors (All Systems On)	YES, SLIGHT POSITIVE

##### ADDITIONAL

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

Notes/Comments :



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### 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

#### CheckList Information

**Name :** TECH - STEP 5: FINAL DOCUMENTATION **Status :** NotSubmitted

**Assigned Organization :** National TAB **Asset :**

**Requesting Organization :** National TAB

#### CheckList Item Details

##### FINAL DOCUMENTATION

Marked Data capture complete for all assets?	YES
Picture file sent to processing team or uploaded?	YES, IN THE CHECKLIST
Balance schedule complete and uploaded?	YES
Prelim report generated and reviewed?	YES

##### Notes/Comments :

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# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

System/Unit: AHU/RTU



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Asset: RTU1

AREA:

Unit Data			Test Data		
	Design	Actual		Design	Actual
MFG	CARRIER	CARRIER	SF CFM	2400	2407
Serial Num	-	2322C06969	SF RPM	2522	NA
Model Num	48FCFM07A3ASA0A0A0	48FCFM07A3ASA0A0A0	RA CFM	-	1847
Type	RTU	RTU	OA CFM	550	560
Configuration	VERTICAL	VERTICAL	RL Voltage	-	204.4/203.9/203.5
Num OA Filters 1	-	1	RL Amperage	-	5.08/5.06/5.07
OA Filter Size 1	-	30X16	SF Rotation	-	CORRECT
Num Final Filter 1	-	2	RA Damper Position	-	MECHANICAL LINKAGE
Final Filter Size 1	-	16X16	Min OA Damper Position	-	1.5"

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

Drive Data		
	Design	Actual
Motor Sheave SetPt	-	8.69V

Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	D

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.79"
Fan Suction SP	-	-1.11
Fan Discharge SP	-	0.86"
Total ESP	0.90"	1.65"
Fan Total SP	-	1.97"

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

Completed By: Tyler Youells

Notes:

# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

## System/Unit: AHU/RTU



Comfort. Under control.

Asset: RTU2

AREA:

Unit Data		
	Design	Actual
MFG	CARRIER	CARRIER
Serial Num	-	1022P35689
Model Num	48TCEM08A2ASA0A0A0	48TCEM08A2A5A0
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	36X20
Num Final Filter 1	-	4
Final Filter Size 1	-	20X16

Motor Data		
	Design	Actual
Motor MFG	-	MARATHON
Frame	-	56HZ
Horsepower	-	2.9
Motor Rpm	-	1725
Phase	3	3
Rated Voltage	208	208
Rated Amperage	-	8.8

Drive Data		
	Design	Actual
Motor Sheave Size	-	1VM50
Motor Bore Size	-	0.875"
Motor Sheave SetPt	-	2 TURNS OUT
Fan Sheave Size	-	AFD84
Fan Sheave Bore	-	1"
Belt CL Distance	-	17.5"
Num of Belts	-	1
Belt Size	-	AX52
Belt Alignment	-	GOOD

Test Data		
	Design	Actual
SF CFM	3000	3182
SF RPM	872	900
RA CFM	-	2397
OA CFM	750	785
RL Voltage	-	204.5/204.7/205.5
RL Amperage	-	6.04/5.97/6.22
SF Rotation	-	CCW
RA Damper Position	-	MECHANICAL LINKAGE
Min OA Damper Position	-	2"
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	D

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.72"
Fan Suction SP	-	-1.04"
Fan Discharge SP	-	0.45"
Total ESP	0.90"	1.17"
Fan Total SP	-	1.49"

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

Completed By: Tyler Youells

Notes:

# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

System/Unit: FAN - Exhaust



Comfort. Under control.

Asset: EF2

AREA:MENS RR

Unit Data		
	Design	Actual
<b>MFG</b>	NA	NUTONE
<b>Model Num</b>	NA	671RP
<b>Serial Num</b>	-	NA

Test Data		
	Design	Actual
<b>CFM</b>	90	0

Motor Data		
	Design	Actual
<b>Motor MFG</b>	-	NA
<b>Horsepower</b>	-	NA
<b>Motor Rpm</b>	-	NA
<b>Phase</b>	-	1
<b>Voltage (rated)</b>	-	115
<b>Amperage (rated)</b>	-	0.8

Completed By: Tyler Youells

Notes:

# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

System/Unit: FAN - Exhaust



Comfort. Under control.

Asset: EF3

AREA:WOMENS RR

Unit Data		
	Design	Actual
MFG	NA	NUTONE
Model Num	NA	671RP
Serial Num	-	NA

Test Data		
	Design	Actual
CFM	90	0

Motor Data		
	Design	Actual
Motor MFG	-	NA
Horsepower	-	NA
Motor Rpm	-	NA
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	0.8

Completed By: Tyler Youells

Notes:

# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

## System/Unit: FAN - Exhaust



Comfort. Under control.

Asset: KEF1

AREA:

Unit Data		
	Design	Actual
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	NA	CASRE24DD
Serial Num	-	3814636
Type	-	UTILITY
Configuration	-	VERTICAL

Motor Data		
	Design	Actual
Motor MFG	-	TECO
Frame	-	215T
Horsepower	-	5
Motor Rpm	-	1135
Phase	-	3
Voltage (rated)	-	230
Amperage (rated)	-	14.3
Service Factor	-	1.15

Drive Data		
	Design	Actual
Motor Sheave SetPt	-	50.8HZ

Test Data		
	Design	Actual
CFM	3600	3630
Fan RPM	-	961
Fan Rotation	-	CCW
Motor RPM	-	961
RL Voltage	-	205.3/204.8/204.9
RL Amperage	-	8.04/8.04/9.76
Suction ESP	-	NA
Discharge ESP	-	NA
Total ESP	-	NA

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Notes:

# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

## System/Unit: FAN - Supply



Comfort. Under control.

Asset: MAU1

AREA:HD1,2

Unit Data		
	Design	Actual
MFG	CAPTIVE AIRE	CAPTIVE AIRE
Model Num	A1-D.250-G10	A1-D.250-G10
Serial Num	-	942932
Type	-	GAS FIRED MAU
Configuration	-	VERTICAL DISCHARGE

Test Data		
	Design	Actual
CFM	2718	2536
SF RPM	-	1444
Motor RPM	-	1722
RL Voltage	-	204.3/205.6/204.4
RL Amperage	-	4.82/5.21/5.16
Total ESP	-	NA
Fan Discharge SP	-	NA

Motor Data		
	Design	Actual
Motor MFG	-	WEG
Frame	-	56
Horsepower	-	3
Motor Rpm	-	1710
Phase	-	3
Voltage (rated)	-	208
Amperage (rated)	-	6.2
Service Factor	-	1.15

General		
	Design	Actual
Fan Rotation Correct	-	YES

Drive Data		
	Design	Actual
Motor Sheave Size	-	1VL40
Motor Bore Size	-	0.875"
Fan Sheave Size	-	4.5"
Fan Sheave Bore	-	0.75"
Belt CL Distance	-	13.5"
Num of Belts	-	1
Belt Size	-	A-38
Belt Alignment Verified	-	GOOD

Gas Heat		
	Design	Actual
Heater Operates (y/n)	-	YES
Flame Status (pass/fail)	-	PASS
Inlet Air Temp SetPt	-	55
Discharge Air Temp SetPt	-	60
Air Flow Switch SP Actual	-	-0.452"

Completed By: Tyler Youells

Notes:

# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

System/Unit: Kitchen Hood Type I



Comfort. Under control.

Asset: HD1

AREA:

Unit Data		
	Design	Actual
MFG	CAPTIVE AIRE	CAPTIVE AIRE
Model Num	NA	NL
Job / Serial Num	-	NL
Type	-	TYPE I LOW PROXIMITY
Hood length	-	108
Hood Width	-	30
Supply Plenum Type	-	PSP
Supply Plenum Width	-	108
Supply Plenum Length	-	12

Test Data Exhaust		
	Design	Actual
Filter Type	-	BAFFLES
Filter Size 1	-	16X16
Filter Size 2	-	16X20
Filter Qty 1	-	3
Filter Qty 2	-	3
Filter AK factor size 1	-	1.62
Filters AK factor size 2	-	2.08
Filter Total AK Area	-	11.1
Filter1 FPM	-	174
Filter2 FPM	-	170
Filter3 FPM	-	157
Filter4 FPM	-	172
Filter5 FPM	-	170
Filter6 FPM	-	167
Filter Ave FPM(corr)	-	169
CFM	1800	1876

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

Test Data Supply		
	Design	Actual
Total AK Area	-	9
Kv factor (Vel)	-	0.87
Num of Readings	-	9
Reading1 FPM	-	165
Reading2 FPM	-	124
Reading3 FPM	-	143
Reading4 FPM	-	192
Reading5 FPM	-	222
Reading6 FPM	-	157
Reading7 FPM	-	109
Reading8 FPM	-	147
Reading9 FPM	-	150
Ave FPM(corr)	-	157
CFM	1359	1229

Completed By: Tyler Youells

Notes:

# National TAB

Project: 09-19 FIVE GUYS #MA0461 - RANDOLPH, MA

## System/Unit: Kitchen Hood Type I



Comfort. Under control.

Asset: HD2

AREA:

Unit Data		
	Design	Actual
MFG	CAPTIVE AIRE	CAPTIVE AIRE
Model Num	NA	NL
Job / Serial Num	-	NL
Type	-	TYPE I LOW PROXIMITY
Hood length	-	108
Hood Width	-	30
Supply Plenum Type	-	PSP
Supply Plenum Width	-	12
Supply Plenum Length	-	108

Test Data Exhaust		
	Design	Actual
Filter Type	-	BAFFLES
Filter Size 1	-	16X16
Filter Size 2	-	16X20
Filter Qty 1	-	2
Filter Qty 2	-	2
Filter AK factor size 1	-	1.62
Filters AK factor size 2	-	2.08
Filter Total AK Area	-	7.4
Filter1 FPM	-	232
Filter2 FPM	-	232
Filter3 FPM	-	237
Filter4 FPM	-	247
Filter Ave FPM(corr)	-	237
CFM	1800	1754

Cooking Equipment		
	Design	Actual
Item 1	-	4 BANK FRYER

Test Data Supply		
	Design	Actual
Total AK Area	-	9
Kv factor (Vel)	-	0.87
Num of Readings	-	9
Reading1 FPM	-	182
Reading2 FPM	-	156
Reading3 FPM	-	166
Reading4 FPM	-	184
Reading5 FPM	-	191
Reading6 FPM	-	167
Reading7 FPM	-	158
Reading8 FPM	-	141
Reading9 FPM	-	157
Ave FPM(corr)	-	167
CFM	1359	1307

Completed By: Tyler Youells

Notes: