Report By:

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

Report: TAB REPORT

Function: Test, Adjust, & Balance

Date: 12/19/2024

Completed By: National TAB

PROJECT

12-16-24 CULVERS SAUK CITY, WI

716 Phillips Blvd

Sauk City , WI 53583

Client

Culvers Franchising System Inc

1240 Water Street

Prairie du Sac, WI 53578

National TAB

Project: 12-16-24 CULVERS SAUK CITY, WI

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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.

RTU's (Roof Top Units)
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.

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.

General Exhaust Fans
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.

Issue List

- HD-2: Smoke Capture

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Project Issue Information

Issue Name : HD-2: Smoke Capture

Description : Once cooking began, slight Smoke loss was noticed on the left side of the fryer hood. Fryer has room to be moved over to the right, recommend it is moved over. Additionally, only 3 diffusers are installed on the cookline and each is outputting a high volume of air. Recommend 2 additional diffusers are added between hoods to improve capture.

Created By : National TAB

Assigned To : National TAB - Michael McDonnell

Status : Open

Priority : Medium

Asset Tag :

Originated Date : 12/19/2024 - Michael McDonnell - National TAB

Project Issue File Details

12/19/2024

12/19/2024

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NATIONAL TAB

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	DINING	-	5173	-	3865	-	1308	#VALUE!	25.3%						
RTU-2	KITCHEN	-	4912	-	3648	-	1264	#VALUE!	25.7%						
MAU	BOH									-	1473				
PRV 2	HOOD1											-	1586		
PRV 3	HOOD2											-	1635		
PRV-1	RESTROOM													-	580
TOTALS		0	10085	0	7513	0	2572			0	1473	0	3221	0	580

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	0	4045
TOTAL EXHAUST	0	3801
NET AIRFLOW	0	244

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H20)
FRONT	0.008
SIDE	0.006
REAR	0.006
AVERAGE	**0.0067**

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:

CheckList List

- 01: RTUs/AHUs
- 02.EXHAUST FANS
- 03.HOOD 1
- 04.HOOD 2
- 05.FINAL TEST

12-16-24 CULVERS SAUK CITY, WI

CheckList Information

Name :	01: RTUs/AHUs	**Status :**	Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	12/15/2024 - Wale Odofin - National TAB		
Completed Date :	12/19/2024 - Michael McDonnell - National TAB		

CheckList Item Details

RTU's/AHU's

Thermostats installed and have power?	Pass
Comment:	
All diffusers and grilles are installed and match design?	N/A
Comment:	
Cookline diffusers have at 12-18" of straight duct out of the top of the diffusers and a rigid 90 degree fitting?	N/A
Comment:	
Economizers are assembled and functional?	Pass
Comment:	
Motors are all operating below the FLA rating?	Pass
Comment:	
Are belts tight?	Pass
Comment:	

If direct drive unit is the speed controller working?	N/A
Comment:	
Is gas piping installed and valves turned on?	Pass
Comment:	
Unit free of noticeable noise and vibration	Pass
Comment:	

12-16-24 CULVERS SAUK CITY, WI

CheckList Information

Name :	02.EXHAUST FANS	**Status :**	Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	12/15/2024 - Wale Odofin - National TAB		
Completed Date :	12/19/2024 - Michael McDonnell - National TAB		

CheckList Item Details

EF's

Rotation is correct?	Pass
Comment:	
Belts are tight?	N/A
Comment:	
Hinge kit installed installed on hood fan?	Pass
Comment:	
Lean fan back. Is grease duct installation adequate and is duct ran all the way to the base of the fan?	Pass
Comment: Corrected by owner rep.	
Flex conduit is long enough so that fan can be completely tilted back?	Pass
Comment:	
There is no major leakage around base of fan?	Pass
Comment:	

Is the motor operating below the motor FLA rating?	Pass
Comment:	
For restroom fan(s) is the back draft damper installed and can it fully open?	Pass
Comment:	
Unit free of noticeable noise and vibration?	Pass
Comment:	

12-16-24 CULVERS SAUK CITY, WI

CheckList Information

Name :	03.HOOD 1	**Status :**	Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	12/15/2024 - Wale Odofin - National TAB		
Completed Date :	12/19/2024 - Michael McDonnell - National TAB		

CheckList Item Details

HD-1

Is the hood powered and free of alarms?	Pass
Comment:	
Is the hood hung Level?	Pass
Comment:	
Are hood lights installed and are they powered?	Pass
Comment:	
Are the correct number and size of filters installed, and are they installed correctly?	Pass
Comment:	
Is the grease cup installed?	Pass
Comment:	
Document any other issues or discrepancies.	
Comment:	
None	

HOOD CAPTURE TEST

List equipment turned on for testing:

Comment:

Griddle

Smoke Test Capture - Perimeter of Hood

Comment:

100%

Smoke Test Capture - Top of Cooking Surface

Comment:

100%

List smoke candle used:

Comment:

12-16-24 CULVERS SAUK CITY, WI

CheckList Information

Name :	04.HOOD 2	**Status :**	Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	12/15/2024 - Wale Odofin - National TAB		
Completed Date :	12/19/2024 - Michael McDonnell - National TAB		

CheckList Item Details

HD-2

Is the hood powered and free of alarms?	Pass
Comment:	
Is the hood hung Level?	Pass
Comment:	
Are hood lights installed and are they powered?	Pass
Comment:	
Are the correct number and size of filters installed, and are they installed correctly?	Pass
Comment: Assortment of Filters	
Is the grease cup installed?	Pass
Comment:	
Document any other issues or discrepancies.	
Comment: Slight Smoke loss on left side of hood.	

HOOD CAPTURE TEST

List equipment turned on for testing:

Comment:

Fryer

Smoke Test Capture - Perimeter of Hood

Comment:

100%

Smoke Test Capture - Top of Cooking Surface

Comment:

90%-slight loss out left side. Recommend fryer is moved over or additional cookline diffusers installed.

List smoke candle used:

Comment:

45 second smoke emitter.

12-16-24 CULVERS SAUK CITY, WI

CheckList Information

Name :	05.FINAL TEST	**Status :**	Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	12/15/2024 - Wale Odofin - National TAB		
Completed Date :	12/19/2024 - Michael McDonnell - National TAB		

CheckList Item Details

FINAL CHECKS

When hoods are turned off, verify the economizers shut	Pass
Comment:	
When hoods are turned on, verify the economizers open to the minimum position	Pass
Comment:	
Is space free of drafting?	Pass
Comment:	
Is space comfortable in all areas?	Pass
Comment:	
Is the space free of ventilation noise?	Pass
Comment:	

BUILDING PRESSURE

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

Comment:

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Project: 12-16-24 CULVERS SAUK CITY, WI

System/Unit: AHU/RTU

Asset: RTU1 AREA:DINING

Unit Data		
	Design	**Actual**
MFG	NA	LENNOX
Serial Num	-	5611C01644
Model Num	NA	LGH180H4BS2Y
Type	-	RTU
Configuration	-	VERTICAL
Num OA Filters 1	-	3
OA Filter Size 1	-	23X213
Num Final Filter 1	-	6
Final Filter Size 1	-	24X24X2

Motor Data		
	Design	**Actual**
Motor MFG	-	BALDOR RELIANCE
Frame	-	56YZ
Horsepower	-	3.0
Motor Rpm	-	1725
Phase	-	3
Rated Voltage	-	200-230
Rated Amperage	-	9.6-9.0

Drive Data	
	Actual
Motor Sheave Size	3.75"
Motor Bore Size	7/8"
Motor Sheave SetPt	FROZEN 2-3 TURNS OPEN
Fan Sheave Size	7"
Fan Sheave Bore	1-7/16"
Belt CL Distance	20.75"
Num of Belts	1
Belt Size	BX56
Belt Alignment	VERIFIED

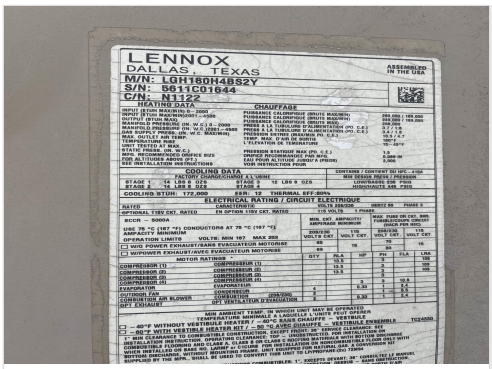
Test Data		
	Design	**Actual**
SF CFM	-	5173
SF RPM	-	832
RA CFM	-	3865
OA CFM	-	1308
RL Voltage	-	210/210/211
RL Amperage	-	8.2/8.4/8.4
SF Rotation	-	CORRECT
SF System SetPt	-	CAV
RA Damper Position	-	MECHANICALLY LINKED
Min OA Damper Position	-	26%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	5.0 MA

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.49"
Fan Suction SP	-	-0.74"
Fan Discharge SP	-	0.51"
Total ESP	-	1.00"
Fan Total SP	-	1.25"

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

Completed By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



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Project: 12-16-24 CULVERS SAUK CITY, WI

System/Unit: AHU/RTU

Asset: RTU2 AREA:KITCHEN

Unit Data		
	Design	**Actual**
MFG	NA	LENNOX
Serial Num	-	5611C01645
Model Num	NA	LGH180H4B2SY
Type	-	RTU
Configuration	-	VERTICAL
Num OA Filters 1	-	3
OA Filter Size 1	-	23X13
Num Final Filter 1	-	6
Final Filter Size 1	-	24X24X2

Motor Data		
	Design	**Actual**
Motor MFG	-	INTERLINK
Frame	-	56HZ
Horsepower	-	3.0
Motor Rpm	-	1750
Phase	-	3
Rated Voltage	-	200-230
Rated Amperage	-	8.0-7.8

Drive Data	
	Actual
Motor Sheave Size	3.75"
Motor Bore Size	7/8"
Motor Sheave SetPt	FROZEN 2-3 TURNS OPEN
Fan Sheave Size	7"
Fan Sheave Bore	1-7/16"
Belt CL Distance	20.5"
Num of Belts	1
Belt Size	BX56
Belt Alignment	VERIFIED

Test Data		
	Design	**Actual**
SF CFM	-	4912
SF RPM	-	860
RA CFM	-	3648
OA CFM	-	1264
RL Voltage	-	211/210/210
RL Amperage	-	7.8/8.0/8.0
SF Rotation	-	CORRECT
SF System SetPt	-	CAV
RA Damper Position	-	MECHANICALLY LINKED
Min OA Damper Position	-	26%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	5.0 MA

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.52"
Fan Suction SP	-	-0.77"
Fan Discharge SP	-	0.68"
Total ESP	-	1.20"
Fan Total SP	-	1.45"

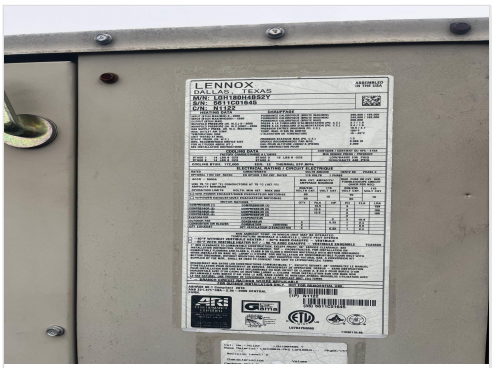
General	
	Actual
Fan Rotation Correct	YES
Unit Filters Clean	YES
Condensate Drain Installed	YES

Completed By: Michael McDonnell on 12/19/2024

Notes:
[1] UNIT INSTALLED ON CURB ADAPTER
[2] EVAPORATOR COIL IN NEED OF CLEANING
[3] ONLY 3 DIFFUSERS ON COOKLINE WITH HIGH AIRFLOW. RECOMMEND ADDITIONAL DIFFUSERS ADDED BETWEEN HOODS-SHOULD IMPROVE CAPTURE ON HD-2.
[4] UNIT AT 327 CFM/TON-MOTOR OPERATING AT FLA.

Written By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



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Project: 12-16-24 CULVERS SAUK CITY, WI

System/Unit: FAN - Exhaust

Asset: PRV1 AREA:RESTROOM

Unit Data		
	Design	**Actual**
MFG	NA	ACCUREX
Model Num	NA	XRED-098-4-VG-1-19-X
Serial Num	-	19159149
Type	-	DOWNBLAST
Configuration	-	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	VARI-GREEN
Horsepower	-	1/4
Motor Rpm	-	300-1750
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	2.85
Service Factor	-	1.25

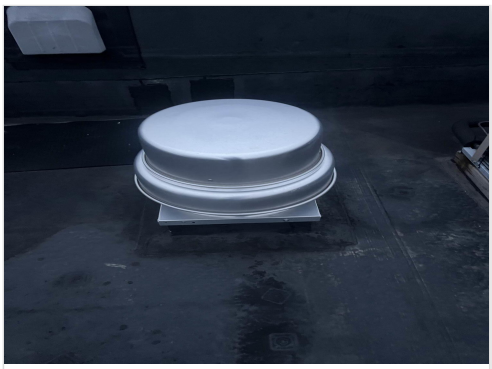
Test Data		
	Design	**Actual**
CFM	-	580
Fan RPM	-	DD
Fan Rotation	-	CW, CORRECT
Motor RPM	-	DD
System SetPt	-	10 ON SPEED CONTROLLER
RL Voltage	-	121
RL Amperage	-	1.5
Total ESP	-	0.64"
Fan Inlet SP	-	-0.64"
Fan Discharge SP	-	ATM

Completed By: Michael McDonnell on 12/19/2024

Notes:
[1] FAN SERVES BOTH CUSTOMER RR AND EMPLOYEE RR. CUSTOMER RR AT APPROPRIATE FLOW FOR NEGATIVE SPACE. EMPLOYEE RR HIGH ON EXHAUST (220CFM), NOT ANTICIPATED TO CAUSE ANY ISSUE.

Written By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



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National TAB

Project: 12-16-24 CULVERS SAUK CITY, WI

System/Unit: FAN - Exhaust

Asset: PRV2 AREA:HD-1 GRIDDLE

Unit Data		
	Design	**Actual**
MFG	NA	ACCUREX
Model Num	NA	XCUE-140-10-VG-1-26-G
Serial Num	-	25683674
Type	-	UPBLAST
Configuration	-	VERTICAL

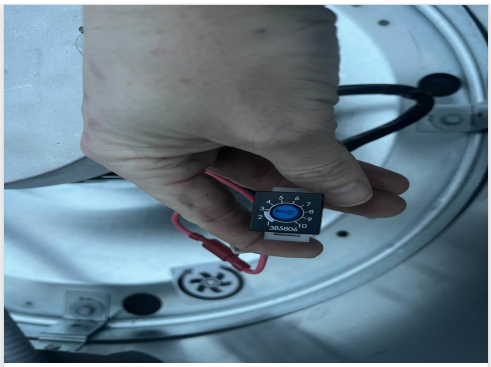
Motor Data		
	Design	**Actual**
Motor MFG	-	VARI-GREEN
Horsepower	-	1.0
Motor Rpm	-	300-1750
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	11.5

Test Data		
	Design	**Actual**
CFM	-	1586
Fan RPM	-	DD
Fan Rotation	-	CCW, CORRECT
Motor RPM	-	DD
System SetPt	-	"8" ON SPEED CONTROLLER
RL Voltage	-	121
RL Amperage	-	6.5
Total ESP	-	1.42"
Fan Inlet SP	-	-1.42"
Fan Discharge SP	-	ATM

Completed By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG

12/19/2024



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National TAB

Project: 12-16-24 CULVERS SAUK CITY, WI

System/Unit: FAN - Exhaust

Asset: PRV3 AREA:HD-2 FRYER

Unit Data		
	Design	**Actual**
MFG	NA	ACCUREX
Model Num	NA	XCUE-140-10-VG-1-26-G
Serial Num	-	25683675
Type	-	UPBLAST
Configuration	-	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	VARI-GREEN
Horsepower	-	1.0
Motor Rpm	-	300-1750
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	11.5

Test Data		
	Design	**Actual**
CFM	-	1635
Fan RPM	-	DD
Fan Rotation	-	CCW, CORRECT
Motor RPM	-	DD
System SetPt	-	6.5
RL Voltage	-	121
RL Amperage	-	2.7
Total ESP	-	0.68
Fan Inlet SP	-	-0.68"
Fan Discharge SP	-	ATM

Completed By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG

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Project: 12-16-24 CULVERS SAUK CITY, WI

System/Unit: FAN - Supply

Asset: MAU1 AREA:BOH

Unit Data		
	Design	**Actual**
MFG	NA	REZNOR
Model Num	NA	NL
Type	-	MAU
Configuration	-	HORIZONTAL

Motor Data		
	Design	**Actual**
Motor MFG	-	CENTURY
Frame	-	56
Horsepower	-	3/4
Motor Rpm	-	1725
Phase	-	3
Voltage (rated)	-	208-230
Amperage (rated)	-	2.6
Service Factor	-	1.25

Drive Data	
	Actual
Motor Sheave Size	3.75"
Motor Bore Size	7/8"
Fan Sheave Size	AK64
Fan Sheave Bore	1"
Belt CL Distance	18"
Num of Belts	1
Belt Size	AX48
Belt Alignment Verified	VERIFIED

Gas Heat		
	Design	**Actual**
Heater Operates (y/n)	-	YES
Flame Status (pass/fail)	-	PASS

Test Data		
	Design	**Actual**
CFM	-	1473
SF RPM	-	824
Motor RPM	-	1746
SF System SetPt	-	CAV
RL Voltage	-	210/210/210
RL Amperage	-	2.1/2.3/2.3

General	
	Actual
Fan Rotation Correct	YES

Completed By: Michael McDonnell on 12/19/2024

Notes:
[1] MAU IS CONDITIONED AND CONTROLLED VIA THERMOSTAT IN OFFICE. SERVES 3 GRILLES IN BOH.

Written By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG

12/19/2024

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Project: 12-16-24 CULVERS SAUK CITY, WI

System/Unit: Kitchen Hood Type I

Asset: HD1 AREA:GRIDDLE

Unit Data		
	Design	**Actual**
MFG	NA	GREENHECK
Model Num	NA	NL
Job / Serial Num	-	NL
Type	-	TYPE I CANOPY
Hood length	-	83"
Hood Width	-	48"

Test Data Exhaust		
	Design	**Actual**
Filter Type	-	BAFFLE
Filter Size 1	-	16X16
Filter Size 2	-	16X20
Filter Qty 1	-	4
Filter Qty 2	-	1
Filter AK factor size 1	-	1.53
Filters AK factor size 2	-	2.10
Filter Total AK Area	-	8.22
Filter1 FPM	-	219
Filter2 FPM	-	181
Filter3 FPM	-	178
Filter4 FPM	-	182
Filter5 FPM	-	207
Filter Ave FPM(corr)	-	193
CFM	-	1586

Cooking Equipment	
	Actual
Item 1	GRIDDLE

Completed By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG

12/19/2024

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National TAB

Project: 12-16-24 CULVERS SAUK CITY, WI

System/Unit: Kitchen Hood Type I

Asset: HD2 AREA:FRYER

Unit Data		
	Design	**Actual**
MFG	NA	GREENHECK
Model Num	NA	NL
Job / Serial Num	-	NL
Type	-	TYPE I CANOPY
Hood length	-	106"
Hood Width	-	48"

Test Data Exhaust		
	Design	**Actual**
Filter Type	-	BAFFLE
Filter Size 1	-	16X16
Filter Size 2	-	16X20
Filter Qty 1	-	3
Filter Qty 2	-	3
Filter AK factor size 1	-	1.53
Filters AK factor size 2	-	2.10
Filter Total AK Area	-	10.89
Filter1 FPM	-	148
Filter2 FPM	-	158
Filter3 FPM	-	164
Filter4 FPM	-	152
Filter5 FPM	-	140
Filter6 FPM	-	139
Filter Ave FPM(corr)	-	150.16
CFM	-	1635

Cooking Equipment	
	Actual
Item 1	FRYER

Completed By: Michael McDonnell on 12/19/2024

Notes:
[1] SLIGHT SMOKE LOSS ON LEFT SIDE- RECOMMEND FRYER IS MOVED TO RIGHT

Written By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG

12/19/2024

12/19/2024