

Report By:

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



Report: TAB REPORT
Function: Test, Adjust, & Balance
Date: 08/15/2022
Completed By: National TAB

PROJECT
07-25 CULVERS - BARABOO, WI (REVIVE)

N/A

BARABOO, WI

Client

Culvers
540 Water St

Prairie Du Sac, WI 53578

National TAB

Project: 07-25 CULVERS - BARABOO, WI (REVIVE)

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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

- RTU Condition
- RTU-2 (Kitchen): Low Supply Airflow and Distribution



07-25 CULVERS - BARABOO, WI (REVIVE)

Project Issue Information

Issue Name : RTU Condition
Description : RTUs are in need of cleaning. Evaporator coils have significant buildup and OA filters appear clogged. Blower wheels could also use cleaning. Addressing these items on kitchen unit should help improve airflow.
Created By : National TAB **Assigned To :** National TAB - Michael McDonnell
Status : Open
Priority : Low **Asset Tag :**
Originated Date : 12/19/2024 - Michael McDonnell - National TAB

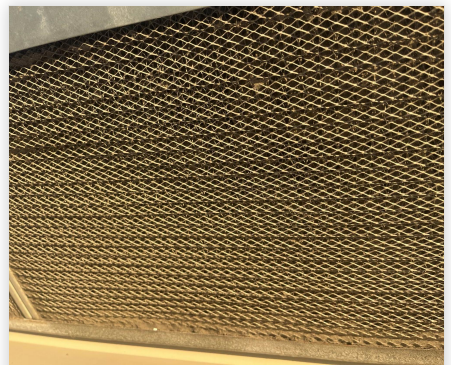
Project Issue File Details



12/19/2024



12/19/2024



12/19/2024



07-25 CULVERS - BARABOO, WI (REVIVE)

Project Issue Information

Issue Name : RTU-2 (Kitchen): Low Supply Airflow and Distribution
Description : Kitchen RTU is a 20 ton unit and is supplying 244 cfm/ton to the space. Ideally, we would like airflow to be between 350 and 400 cfm per ton. The Units motor sheave appears frozen or stuck in place and could not be adjusted. There is not much room on the pulley and a sheave change would be required to increase airflow. Consult NTAB for change.

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

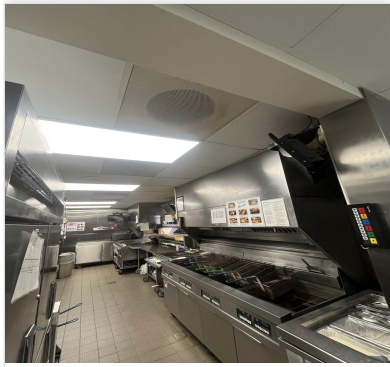
Project Issue File Details



12/19/2024

Project Issue Response Details

- **12/19/2024 National TAB - Michael McDonnell**
 - Fair majority of airflow is being delivered to the griddle (HD-1) side of the kitchen. Verified low diffusers had damper full open. Not causing any issues, but a full diffuser balance of the system could improve comfort.



12/19/2024

AIR BALANCE SCHEDULE

UNIT	AREA SERVED	HVAC SUPPLY		HVAC RETURN		HVAC OUTDOOR		OA %		HOOD MAKE-UP		HOOD EXHAUST		GENERAL EXH.	
		TONNAGE	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL
RTU-1	DINING	17.5 TON UNIT	6583		4535		2048	#VALUE!	31.1%						
RTU-2	KITCHEN	20 TON UNIT	4871		3126		1745	#VALUE!	35.8%						
PRV-1	RESTROOMS														263
PRV-2	HOOD 1												1596		
PRV-3	HOOD2												1567		
PRV-4	HOOD3												307		
TOTALS		0	11454	0	7661	0	3793			0	0	0	3470	0	263

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	0	3793
TOTAL EXHAUST	0	3733
NET AIRFLOW	0	60

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H2O)
FRONT	0.002
SIDE	0.003
REAR	0.004
AVERAGE	0.003

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: RTU's
- 02: EXHAUST FANS
- 03: HOODS
- 04: FINAL TESTS



Comfort. Under control.

07-25 CULVERS - BARABOO, WI (REVIVE)

CheckList Information

Name : 01: RTU's **Status :** Completed

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

Created Date : 12/19/2024 - Michael McDonnell - 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?	Fail
---	------

Comment:

Pre-specification.

Economizers are assembled and functional?	Pass
---	------

Comment:

Motors are all operating below the FLA rating?	
--	--

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:



Comfort. Under control.

07-25 CULVERS - BARABOO, WI (REVIVE)

CheckList Information

Name : 02: EXHAUST FANS **Status :** Completed

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

Created Date : 12/19/2024 - Michael McDonnell - 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:

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:



Comfort. Under control.

07-25 CULVERS - BARABOO, WI (REVIVE)

CheckList Information

Name : 03: HOODS **Status :** Completed

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

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

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

CheckList Item Details

Exhaust Hoods

Are hoods powered and free of alarms? Pass

Comment:

Are hoods hung Level? Pass

Comment:

Are temperature Sensors installed? 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:

HOOD CAPTURE TEST

List equipment turned on for testing:

Comment:

Griddle, Fryer

Smoke Test Capture - Perimeter of Hood

Comment:

100%

Smoke Test Capture - Top of Cooking Surface

Comment:

100%

List smoke candle used:

Comment:



Comfort. Under control.

07-25 CULVERS - BARABOO, WI (REVIVE)

CheckList Information

Name : 04: FINAL TESTS **Status :** Completed

Assigned Organization : National TAB **Asset :**

Requesting Organization : National TAB

Created Date : 12/19/2024 - Michael McDonnell - 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 N/A

Comment:

Units not interlocked, operating on schedule.

When hoods are turned on, verify the economizers open to the minimum position N/A

Comment:

Units not interlocked, operating on schedule.

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: 07-25 CULVERS - BARABOO, WI (REVIVE)

System/Unit: AHU/RTU



Comfort. Under control.

Asset: RTU1

AREA: DINING

Unit Data		
	Design	Actual
MFG	NA	LENNOX
Serial Num	-	5611G01635
Model Num	NA	LGH210H4BM1Y
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	3
OA Filter Size 1	-	24X13
Num Final Filter 1	-	6
Final Filter Size 1	-	24X24X2

Motor Data		
	Design	Actual
Motor MFG	-	NL
Frame	-	NL
Horsepower	5	5.0
Motor Rpm	-	1750
Phase	3	3
Rated Voltage	208	200-230
Rated Amperage	-	14.6-13.6

Drive Data	
	Actual
Motor Sheave Size	VP65
Motor Bore Size	1-1/8"
Motor Sheave SetPt	2.5 TURNS OPEN
Fan Sheave Size	BK110H
Fan Sheave Bore	1-7/16"
Belt CL Distance	21.25"
Num of Belts	1
Belt Size	BX66
Belt Alignment	VERIFIED

Test Data		
	Design	Actual
SF CFM	-	6583
SF RPM	-	948
RA CFM	-	4619
OA CFM	-	1964
RL Voltage	-	213/213/213
RL Amperage	-	10.8/10.5/10.3
SF Rotation	-	CCW, CORRECT
RA Damper Position	-	MECHANICALLY LINKED
Min OA Damper Position	-	SET BY POTENTIOMETER-MARKED
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	D

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.29"
Fan Suction SP	-	-0.53"
Fan Discharge SP	-	0.61"
Total ESP	1.3"	0.90"
Fan Total SP	-	1.14"

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

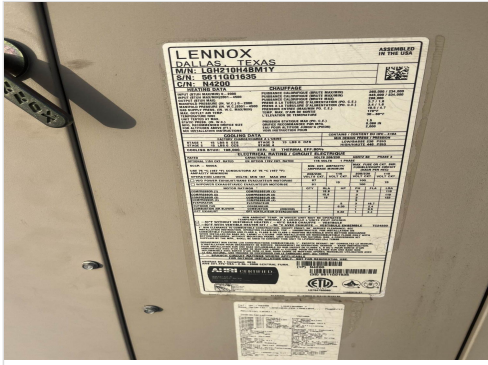
Completed By: Michael McDonnell on 12/19/2024

Notes:

- [1] UNIT IN NEED OF CLEANING-EVAPORATOR COIL DIRTY, OA FILTERS CLOGGED, BLOWER WHEEL DIRTY.
- [2] UNIT OPERATING AT 376 CFM/ TON: WITHIN ACCEPTABLE RANGE OF 350-400 CFM/TON

Written By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



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Project: 07-25 CULVERS - BARABOO, WI (REVIVE)

System/Unit: AHU/RTU



Comfort. Under control.

Asset: RTU2

AREA:KITCHEN

Unit Data		
	Design	Actual
MFG	NA	LENNOX
Serial Num	-	5611G01636
Model Num	NA	LGH240H4BM2Y
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	NA [1]
OA Filter Size 1	-	-
Num Final Filter 1	-	6
Final Filter Size 1	-	24X24X2

Motor Data		
	Design	Actual
Motor MFG	-	BALDOR
Frame	-	184T
Horsepower	5	5.0
Motor Rpm	-	1750
Phase	3	3
Rated Voltage	208	200-230
Rated Amperage	-	14.6-13.6

Drive Data	
	Actual
Motor Sheave Size	VP65B
Motor Bore Size	1-1/8"
Motor Sheave SetPt	FROZEN- APPEARS 1-2 OPEN
Fan Sheave Size	BK110H
Fan Sheave Bore	1-7/16"
Belt CL Distance	21"
Num of Belts	1
Belt Size	BX66
Belt Alignment	VERIFIED

Test Data		
	Design	Actual
SF CFM	-	4871
SF RPM	-	990
RA CFM	-	3126
OA CFM	-	1745
RL Voltage	-	213/213/213
RL Amperage	-	10.0/9.6/9.7
SF Rotation	-	CCW, CORRECT
RA Damper Position	-	MECHANICALLY LINKED
Min OA Damper Position	-	SET BY POTENTIOMETER-MARKED
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	D

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.46"
Fan Suction SP	-	-0.64"
Fan Discharge SP	-	0.84"
Total ESP	1.5"	1.30"
Fan Total SP	-	1.48"

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 LOW ON AIRFLOW: 243 CFM /TON. MOTOR SHEAVE IS FROZEN-PULLEY CHANGE NEEDED TO INCREASE AIRFLOW.
- [2] OA TO SUPPLY RATIO HIGH, UNIT HAS HUMIDITY CONTROL.
- [3] UNIT IN NEED OF CLEANING-EVAPORATOR COIL DIRTY, OA FILTERS CLOGGED, BLOWER WHEEL DIRTY.
- [4] OA DUCTED TO REAR PARAPET LOUVRE.

Written By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



12/19/2024



12/19/2024

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Project: 07-25 CULVERS - BARABOO, WI (REVIVE)

System/Unit: FAN - Exhaust



Comfort. Under control.

Asset: PRV-1

AREA:RESTROOMS

Unit Data		
	Design	Actual
MFG	ACCUREX	ACCUREX
Model Num	XREB-090-D	XRED-090-D-X
Serial Num	-	12471697 1106
Type	DOWNBLAST	DOWNBLAST
Configuration	HORIZONTAL	VERTICAL

Test Data		
	Design	Actual
CFM	-	263
Fan RPM	-	1050
Fan Rotation	-	CW, CORRECT
Motor RPM	-	1050
RL Voltage	-	119
RL Amperage	-	NR

Motor Data		
	Design	Actual
Motor MFG	-	MCMILLAN
Horsepower	1/15	1/15
Motor Rpm	1550	1550
Phase	1	1
Voltage (rated)	115	120
Amperage (rated)	-	1.2

Drive Data	
	Actual
Motor Sheave SetPt	LOW SPEED

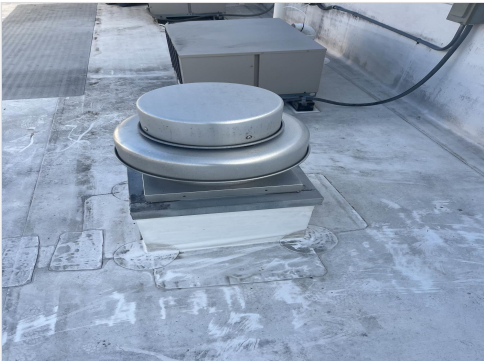
Completed By: Michael McDonnell on 12/19/2024

Notes:

[1] FAN NOT OPERATING

Written By: on

Unit Data - PHOTO LOG



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Project: 07-25 CULVERS - BARABOO, WI (REVIVE)

System/Unit: FAN - Exhaust



Comfort. Under control.

Asset: PRV-2

AREA:HOOD 1- GRIDDLE

Unit Data		
	Design	Actual
MFG	ACCUREX	ACCUREX
Model Num	XRUB-161XP-15	XRUB-161XP-15-G
Serial Num	-	12471698 1106
Type	UPBLAST	UPBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	Actual
Motor MFG	-	WEG
Frame	-	D56
Horsepower	1.5	1.0
Motor Rpm	1725	1740
Phase	3	3
Voltage (rated)	208	208-230
Amperage (rated)	-	3.76
Service Factor	-	1.15

Drive Data	
	Actual
Motor Sheave Size	VP50
Motor Bore Size	5/8"
Motor Sheave SetPt	2.5 TURNS OPEN
Fan Sheave Size	3.5"
Fan Sheave Bore	1"
Belt CL Distance	5.5"
Num of Belts	1
Belt Size	4L270

Test Data		
	Design	Actual
CFM	1500	1561
Fan RPM	2337	2170
Fan Rotation	-	CW, CORRECT
Motor RPM	-	1726
RL Voltage	-	121/120/121
RL Amperage	-	3.2/3.2/3.0
Suction ESP	-	-1.44"
Discharge ESP	-	ATM
Total ESP	2.4"	1.44"

Completed By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



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Project: 07-25 CULVERS - BARABOO, WI (REVIVE)

System/Unit: FAN - Exhaust



Comfort. Under control.

Asset: PRV-3

AREA:HOOD 2- FRYER

Unit Data		
	Design	Actual
MFG	ACCUREX	ACCUREX
Model Num	XRUB-141-7	XRUB-141-7-G
Serial Num	-	124716991106
Type	UPBLAST	UPBLAST
Configuration	VERTICAL	VERTICAL

Test Data		
	Design	Actual
CFM	1500	1561
Fan RPM	1348	1067
Fan Rotation	-	CW, CORRECT
Motor RPM	-	1767
RL Voltage	-	209/210/210
RL Amperage	-	2.0/1.9/1.9
Suction ESP	-	-1.1"
Discharge ESP	-	ATM
Total ESP	1.0"	1.1"

Motor Data		
	Design	Actual
Motor MFG	-	WEG
Frame	-	B56
Horsepower	3/4	3/4
Motor Rpm	1725	1740
Phase	3	3
Voltage (rated)	208	208-230
Amperage (rated)	-	2.65-2.40
Service Factor	-	1.25

Drive Data	
	Actual
Motor Sheave Size	3.25"
Motor Bore Size	5/8"
Motor Sheave SetPt	4.5 TURNS OPEN
Fan Sheave Size	4"
Fan Sheave Bore	3/4"
Belt CL Distance	6"
Num of Belts	1
Belt Size	AX23

Completed By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



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National TAB

Project: 07-25 CULVERS - BARABOO, WI (REVIVE)

System/Unit: FAN - Exhaust



Comfort. Under control.

Asset: PRV-4

AREA:HOOD 3- DISHWASHER

Unit Data		
	Design	Actual
MFG	ACCUREX	ACCUREX
Model Num	XRED-090-D	XRED-090-D
Serial Num	-	12471700 1106
Type	DONWBLAST	DOWNBLAST
Configuration	HORIZONTAL	HORIZONTAL

Test Data		
	Design	Actual
CFM	350	307
Fan RPM	1530	1050
Fan Rotation	-	CW, CORRECT
Motor RPM	-	1050
System SetPt	-	LOW SPEED
RL Voltage	-	120
RL Amperage	-	NR

Motor Data		
	Design	Actual
Motor MFG	-	MCMILLAN
Horsepower	1/15	1/15
Motor Rpm	1550	1050/1350/1550
Phase	1	1
Voltage (rated)	115	120
Amperage (rated)	-	1.2

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Unit Data - PHOTO LOG



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Project: 07-25 CULVERS - BARABOO, WI (REVIVE)

System/Unit: Kitchen Hood Type I



Comfort. Under control.

Asset: HD1

AREA:GRIDDLE

Unit Data		
	Design	Actual
MFG	HALTON	ACCUREX
Model Num	XGEP-FB-5.33S	XGEP-FB-5.33S
Job / Serial Num	-	NL
Type	TYPE I LOW PROXIMITY	TYPE I LOW PROXIMITY
Hood length	64"	64"
Hood Width	26"	26"

Test Data Exhaust		
	Design	Actual
Filter Type	GREASE GRABBER	GREASE GRABBER
Filter Size 1	16X16	16X16
Filter Qty 1	4	4
Filter AK factor size 1	1.53	1.53
Filter Total AK Area	6.12	6.12
Filter1 FPM	-	253
Filter2 FPM	-	248
Filter3 FPM	-	257
Filter4 FPM	-	285
Filter Ave FPM(corr)	-	260.75
CFM	-	1596

Cooking Equipment	
	Actual
Item 1	GRIDDLE

Completed By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



12/19/2024

National TAB

Project: 07-25 CULVERS - BARABOO, WI (REVIVE)

System/Unit: Kitchen Hood Type I



Comfort. Under control.

Asset: HD2

AREA:FRYER

Unit Data

	Design	Actual
MFG	ACCUREX	ACCUREX
Model Num	XXEP	XXEP
Job / Serial Num	-	NL
Type	TYPE I LOW PROXIMITY	TYPE I LOW PROXIMITY
Hood length	83"	83"
Hood Width	26"	26"

Test Data Exhaust

	Design	Actual
Filter Type	XTRACTOR	XTRACTOR
Filter Size 1	16X16	16X16
Filter Qty 1	5	5
Filter AK factor size 1	1.53	1.53
Filter Total AK Area	7.65	7.65
Filter1 FPM	-	200
Filter2 FPM	-	207
Filter3 FPM	-	214
Filter4 FPM	-	208
Filter5 FPM	-	195
Filter Ave FPM(corr)	-	204.80
CFM	-	1567

Cooking Equipment

	Actual
Item 1	FRYER

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Unit Data - PHOTO LOG



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National TAB

Project: 07-25 CULVERS - BARABOO, WI (REVIVE)
 System/Unit: Kitchen Hood Type II



Comfort. Under control.

Asset: HD3

AREA: DISHWASHING

Unit Data		
	Design	Actual
MFG	ACCUREX	ACCUREX
Model Num	XD3	XD3
Serial Num	-	12487830
Type	TYPE II CANOPY	TYPE II CANOPY
Hood length	42"	42"
Hood Width	42"	42"

Test Data		
	Design	Actual
Exhaust CFM	350	307

Completed By: Michael McDonnell on 12/19/2024

Unit Data - PHOTO LOG



12/19/2024