

Report By:

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1329 E. KEMPER ROAD
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Report: TAB Report
Function: Test, Adjust, & Balance
Date: 11/05/2024
Completed By: National TAB

PROJECT
Panera (Visalia, CA)

806 W. Riggan Ave.

Visalia, CA 93291

Client

B&M Builders, Inc.
11330 Sunrise Park Drive
Suite C
Rancho Cordova, CA 95742

National TAB

Project: Panera (Visalia, CA)

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CERTIFICATION



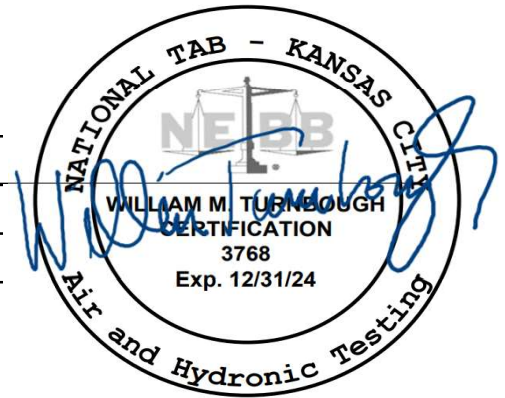
PROJECT: Panera - Visalia, CA

The data presented in this report is a record of system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems. The measurements shown, and the information given, in this report are certified to be accurate and complete, at the time and date information was gathered. Any variances from design quantities, which exceed NEBB tolerances, are noted in the TAB report project summary.

NEBB TAB FIRM: National TAB - Kansas City
REGISTRATION NO: 3768
CERTIFIED BY: Will Turnbough
DATE: 11/6/2024

Submitted and Certified by:

NEBB TAB FIRM: National TAB - Kansas City
TAB PROFESSIONAL: Will Turnbough
REGISTRATION NO: CP-24289
CERTIFICATION EXP: 12/31/2024



Project Summary

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.

Kitchen Exhaust Hood (Type II) & Associated Fans

Each kitchen exhaust fan was measured by traversing the ductwork or ductwork opening at the hood. The total flow of the exhaust fan was then adjusted to 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 by readings taken at the discharge of the hood's perforated supply plenum. Readings taken with a velocity matrix were averaged and multiplied by a manufacturer's corrected area. Adjustments to the fan speed were made in order 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.

Issue List

- RTU-3 INCORRECT OA DAMPER LENGTH



Panera (Visalia, CA)

Project Issue Information

Issue Name : RTU-3 INCORRECT OA DAMPER LENGTH
Description : Outside air damper length does not cover entire OA vent. Side gap causing outside airflow to be 1,700 CFM resulting in extreme positive building pressure. Temporarily sealed gap to reduce outside airflow and reduce building pressure. Recommend mechanical contractor permanently resolve.

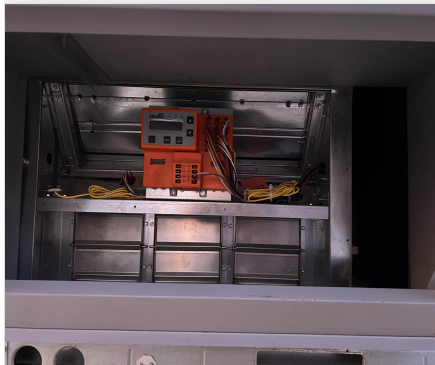
Created By : National TAB **Assigned To :** National TAB - Will Turnbough

Status : Open

Priority : High **Asset Tag :**

Originated Date : 11/06/2024 - David Nicolas Sanchez - National TAB

Project Issue File Details



11/06/2024

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	4000	3899	3695	3574	305	325	7.6%	8.3%						
RTU-2	DINING	4000	3992	3275	3200	725	792	18.1%	19.8%						
RTU-3	BOH	2000	2044	1530	1531	470	513	23.5%	25.1%						
MUA-1	HOOD									1072	1019				
EF-1	HOOD											1472	1475		
EF-2	RESTROOM													300	280
EF-3	BOH													400	402
EF-4	BOH													400	398
TOTALS		10000	9935	8500	8305	1500	1630			1072	1019	1472	1475	1100	1080

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	2572	2649
TOTAL EXHAUST	2572	2555
NET AIRFLOW	0	94

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H2O)
FRONT	0.0098
SIDE	0.0094
REAR	0.0099
AVERAGE	0.0097

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:



National TAB

Project: Panera (Visalia, CA)
System/Unit: AHU/RTU



Asset: RTU-1

AREA: KITCHEN

Unit Data		
	Design	Actual
MFG	NA	CARRIER
Serial Num	-	1824P39250
Model Num	NA	48GCDM12A2M5A
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	35.5X17.5
Num PreFilter 1	-	4
PreFilter Size 1	-	20X19.5

Test Data		
	Design	Actual
SF CFM	3815	3899
RA CFM	3510	3574
OA CFM	305	325
RL Voltage	208	213/213/212
RL Amperage	-	6.22/5.98/6.12
OA Damper Position	-	5%
Brake Horse Power	2.25	N/A

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

Performance Data		
	Design	Actual
MA Plenum SP	-	-2.18"
Fan Suction SP	-	-2.32"
Fan Discharge SP	-	0.16"
Total ESP	0.8	2.34"
Fan Total SP	-	2.48"

Completed By: David Nicolas Sanchez on 11/05/2024



National TAB

Project: Panera (Visalia, CA)

AHU/RTU



Diffuser Supply (GRD)

RTU-1/KITCHEN

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	KITCHEN	S1	24X24	545	258	589	108.1
SGRD2	KITCHEN	S1	24X24	545	274	593	108.8
SGRD3	KITCHEN	S1	24X24	545	210	496	91.0
SGRD4	KITCHEN	S1	24X24	545	284	598	109.7
SGRD5	KITCHEN	S1	24X24	545	264	588	107.9
SGRD6	KITCHEN	S1	24X24	545	236	495	90.8
SGRD7	KITCHEN	S1	24X24	545	194	540	99.1
Total				3815	1720	3899	102.2%

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Project: Panera (Visalia, CA)

System/Unit: AHU/RTU



Asset: RTU-2

AREA:DINING, RR

Unit Data		
	Design	Actual
MFG	NA	CARRIER
Serial Num	-	1824P39249
Model Num	NA	48GCDM12A2M5A
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	35.5X17.5
Num PreFilter 1	-	4
PreFilter Size 1	-	20X19.5

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

Test Data		
	Design	Actual
SF CFM	4000	3992
RA CFM	3275	3200
OA CFM	725	792
RL Voltage	208	211/213/213
RL Amperage	-	6.30/6.24/6.15
OA Damper Position	-	10%
Brake Horse Power	2.25	N/A

Performance Data		
	Design	Actual
MA Plenum SP	-	-1.49"
Fan Suction SP	-	-1.57"
Fan Discharge SP	-	0.11"
Total ESP	0.8	1.60"
Fan Total SP	-	1.68"

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National TAB

Project: Panera (Visalia, CA)

AHU/RTU



Diffuser Supply (GRD)

RTU-2/DINING, RR

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	DINING	S5	60X6	220	58	203	92.3
SGRD2	DINING	S5	60X6	220	69	223	101.4
SGRD3	DINING	S1	24X24	235	195	229	97.4
SGRD4	DINING	S5	60X6	220	114	204	92.7
SGRD5	DINING	S1	24X24	235	198	254	108.1
SGRD6	DINING	S1	24X24	340	185	331	97.4
SGRD7	DINING	S1	24X24	340	27	348	102.4
SGRD8	DINING	S1	24X24	340	104	346	101.8
SGRD9	DINING	S1	24X24	235	240	229	97.4
SGRD10	DINING	S1	24X24	235	146	251	106.8
SGRD11	DINING	S1	24X24	340	199	356	104.7
SGRD12	DINING	S5	60X6	220	89	219	99.5
SGRD13	DINING	S6	60X6	80	46	82	102.5
SGRD14	DINING	S7	12X12	100	51	91	91.0
SGRD15	DINING	S6	12X12	100	55	98	98.0
SGRD16	DINING	S1	24X24	200	248	213	106.5
SGRD17	DINING	S1	24X24	340	98	315	92.6
Total				4000	2122	3992	99.8%



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Project: Panera (Visalia, CA)

System/Unit: AHU/RTU



Asset: RTU-3

AREA: KITCHEN, OFFICE

Unit Data		
	Design	Actual
MFG	NA	CARRIER
Serial Num	-	0824C08237
Model Num	NA	48GCGJ06A2M5A
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	28.5X14
Num PreFilter 1	-	4
PreFilter Size 1	-	15.5X15.5

Motor Data		
	Design	Actual
Motor MFG	-	NL
Frame	-	NL
Horsepower	-	NL
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	208	208
Rated Amperage	-	9.2
Service Factor	-	NL

Test Data		
	Design	Actual
SF CFM	2000	2044
RA CFM	1530	1531
OA CFM	470	513
RL Voltage	208	211/213/213
RL Amperage	-	6.85/6.68/6.73
OA Damper Position	-	10%
Brake Horse Power	1.05	N/A

Performance Data		
	Design	Actual
MA Plenum SP	-	-1.48"
Fan Suction SP	-	-1.70"
Fan Discharge SP	-	0.50"
Total ESP	0.8	1.98"
Fan Total SP	-	2.20"

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National TAB

Project: Panera (Visalia, CA)

AHU/RTU



Diffuser Supply (GRD)

RTU-3/KITCHEN, OFFICE

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	BOH	S1	24X24	400	361	401	100.3
SGRD2	OFFICE	S6	12X12	150	153	157	104.7
SGRD3	BOH	S4	24X24	250	343	265	106.0
SGRD4	BOH	S1	24X24	400	98	398	99.5
SGRD5	BOH	S1	24X24	400	188	387	96.8
SGRD6	BOH	S1	24X24	400	140	436	109.0
Total				2000	1283	2044	102.2%



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Project: Panera (Visalia, CA)

System/Unit: FAN - Exhaust



Asset: EF-1

AREA:OVEN HOOD

Unit Data		
	Design	Actual
MFG	NA	CAPTIVEAIRE
Model Num	NA	DU50HFA
Serial Num	-	6698220
Type	CRE UPBLAST	UPBLAST

Test Data		
	Design	Actual
CFM	1472	1475
RL Voltage	-	121
RL Amperage	-	4.73
Total ESP	0.70	0.54"

Motor Data		
	Design	Actual
Motor MFG	-	NEMA
Frame	-	NL
Horsepower	0.50	0.50
Motor Rpm	1541	1800
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	NL
Service Factor	-	NL

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Project: Panera (Visalia, CA)
System/Unit: FAN - Exhaust



Asset: EF-2

AREA:RESTROOM

Unit Data		
	Design	Actual
MFG	NA	NA
Model Num	NA	NA
Serial Num	-	NL
Type	CR DNBLAST	DOWNBLAST

Motor Data		
	Design	Actual
Motor MFG	-	VAR-GREEN
Frame	-	NL
Horsepower	0.167	0.167
Motor Rpm	-	1750
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	2.2
Service Factor	-	NL

Drive Data	
	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

Test Data		
	Design	Actual
CFM	300	280
Fan RPM	-	NA
RL Voltage	-	NA
RL Amperage	-	NA
Suction ESP	-	-0.28"
Discharge ESP	-	ATMS
Total ESP	0.375	0.28"
Brake Horse Power	-	NA

Completed By: David Nicolas Sanchez on 11/05/2024



National TAB

Project: Panera (Visalia, CA)

FAN - Exhaust



Diffuser Ret/Exh (GRD)

EF-2/RESTROOM

Asset								
Asset Name	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
EGRD1	E1	8	150	1	141	141	141	94.0
EGRD2	E1	8	150	1	139	139	139	92.7
Total			300		280	280	280	93.33%



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Project: Panera (Visalia, CA)
System/Unit: FAN - Exhaust



Asset: EF-3

AREA:DW HOOD

Unit Data		
	Design	Actual
MFG	NA	CAPTIVEAIRE
Model Num	NA	DUH30HFA
Serial Num	-	6698220
Type	CRE UPBLAST	UPBLAST

Test Data		
	Design	Actual
CFM	400	402
RL Voltage	-	122
RL Amperage	-	3.96
Total ESP	0.50	0.18"

Motor Data		
	Design	Actual
Motor MFG	-	HSSA
Frame	-	NL
Horsepower	0.25	0.25
Motor Rpm	1124	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	3.8
Service Factor	-	1.0

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Project: Panera (Visalia, CA)
System/Unit: FAN - Exhaust



Asset: EF-4

AREA: SOUP HOOD

Unit Data		
	Design	Actual
MFG	NA	CAPTIVEAIRE
Model Num	NA	DUH30HFA
Serial Num	-	6698220
Type	CRE UPBLAST	UPBLAST

Test Data		
	Design	Actual
CFM	400	398
RL Voltage	-	120
RL Amperage	-	4.0
Total ESP	0.50	0.12"

Motor Data		
	Design	Actual
Motor MFG	-	HSSA
Frame	-	NL
Horsepower	0.25	0.25
Motor Rpm	1124	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	3.8
Service Factor	-	1.0

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National TAB

Project: Panera (Visalia, CA)

System/Unit: FAN - Supply



Asset: MUA-1

AREA:OVEN HOOD

Unit Data		
	Design	Actual
MFG	NA	CAPTIVEAIRE
Model Num	NA	A1-D.250-15D
Serial Num	-	6698220
Type	GAS FIRED	MUA

Motor Data		
	Design	Actual
Motor MFG	-	NEMA
Frame	-	NL
Horsepower	1.0	1.0
Motor Rpm	1525	1800
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	NL
Service Factor	-	NL

Test Data		
	Design	Actual
CFM	1072	1019
RL Voltage	-	122
RL Amperage	-	2.32
Suction ESP	-	NA
Discharge ESP	-	NA
Total ESP	0.70	NA
Brake Horse Power	-	0.521

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National TAB

Project: Panera (Visalia, CA)



System/Unit: Kitchen Hood Type I

Asset: HOOD-1

AREA:

Unit Data		
	Design	Actual
MFG	NA	CAPTIVEAIRE
Model Num	NA	REVENT
Job / Serial Num	-	NL
Type	-	TYPE II CANOPY
Hood length	80	80"
Hood Width	90	90"
Supply Plenum Type	-	PSP
Supply Plenum Width	16	16"
Supply Plenum Length	80	80"

Test Data Exhaust		
	Design	Actual
CFM	1472	1475

Cooking Equipment	
	Actual
Item 1	OVEN

Test Data Supply		
	Design	Actual
Total AK Area	-	8.55
Kv factor (Vel)	-	0.91
Num of Readings	-	6
Reading1 FPM	-	155
Reading2 FPM	-	114
Reading3 FPM	-	129
Reading4 FPM	-	123
Reading5 FPM	-	101
Reading6 FPM	-	164
Ave FPM(corr)	-	131
CFM	1072	1019

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National TAB

Project: Panera (Visalia, CA)



System/Unit: Kitchen Hood Type II

Asset: HOOD-2

AREA:DW HOOD

Unit Data		
	Design	Actual
MFG	NA	CAPTIVEAIRE
Model Num	NA	4224 VHB-G
Serial Num	-	6698220
Type	TYPE II CANOPY	TYPE II CANOPY
Hood length	48	48"
Hood Width	42	42"

Test Data		
	Design	Actual
Exhaust CFM	400	432

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National TAB

Project: Panera (Visalia, CA)



System/Unit: Kitchen Hood Type II

Asset: HOOD-3

AREA: SOUP HOOD

Unit Data		
	Design	Actual
MFG	NA	CAPTIVEAIRE
Model Num	NA	4224 VHB-G
Serial Num	-	6698220
Type	TYPE II CANOPY	TYPE II CANOPY
Hood length	48	48"
Hood Width	42	42"

Test Data		
	Design	Actual
Exhaust CFM	400	438

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National TAB

Testing, Adjusting, and Balancing Equipment



Function		Range	Minimum Accuracy	Instrument Information	Calibration Date	Date Due
AIR	AIR PRESSURE	0 in wg to 10 in wg	2% +/- 0.001 in wg	Evergreen S-PVF-1 24D-00509	6/17/2024	6/17/2025
	AIR VELOCITY INSTRUMENT	50 fpm to 3900 fpm	+/- 5 % +/- 7 fpm	Evergreen S-PVF-1 24D-00509	6/17/2024	6/17/2025
	DIRECT HOOD READING	100 cfm to 2000 cfm	+/- 5 % +/- 7 cfm	Evergreen S-PVF-1 24D-00509	6/17/2024	6/17/2025
TEMPERATURE	AIR METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	AIR PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	IMMERSION METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	IMMERSION PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	CONTACT METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	CONTACT PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
HUMIDITY	HUMIDITY PROBE	10 % RH to 90 % RH	3% of reading	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
ELECTRICAL	VOLTAGE MEASUREMENT	0 VAC to 600 VAC	2 % reading +/- 5 digits	Klein Tools CL800 S/N 1220C-C1	9/18/2024	9/18/2025
	AMPERAGE MEASUREMENT	0 Amperers to 100 Amperes	2 % reading +/- 5 digits	Klein Tools CL800 S/N 1220C-C1	9/18/2024	9/18/2025
ROTATION	ROTATION MEASUREMENT	60 rpm to 5000 rpm	2 % reading 2 rpm	Shimpo DT 207Lp S/N D1690029R	9/18/2024	9/18/2025

Abbreviation List

A = Area (ft ²)	S.F. = Service Factor
AHU = Air Handling Unit	SF = Supply Fan
A _k = Effective Area	SP = Static Pressure
BHP = Brake Horsepower (IP) HP	SR = Supply Register
Btu = British Thermal Unit	T = Temperature
Btu/h = Btuh = BTUH = BTU/Hour	T _{ma} = Mixed Air Temperature
CL = Center Distance (used in belt formula)	T _{oa} = Outside Air Temperature
CD = Ceiling Diffuser	T _{ra} = Return Air Temperature
CF = Correction Factor	H = Head (in wc, ft wc, psi)
CFM = Volumetric Flow: Cubic Feet Per Minute	h = Enthalpy
CO ₂ = Carbon Dioxide	HP = Horsepower
CO = Carbon Monoxide	hr = Hour
C _v = Flow Constant	K _v = Flow constant (SI)
d = Diameter (in.) IP	kW = Kilowatt = 1000 Watts
Δ = Difference or Change (Final - Initial)	LAT = Leaving Air Temperature
DB = Dry Bulb	lb = Pounds
EA = Exhaust Air	LWT = Leaving Water Temperature
EAT = Entering Air Temperature	ma = Mixed Air
EF = Exhaust Fan	MIN = Minimum
Eff = Efficiency	MAX = Maximum
EG = Exhaust Grille	N/A = Not Applicable
ESP = External Static Pressure	NA = No Access
EWT = Entering Water Temperature	NL = Not Listed
°F = Degrees Fahrenheit, °F	NPSHA = Net Positive Suction Head Available
FPB = Fan Powered Box	NS = Not Specified
FLA = Full Load Amps	OA = Outside Air
fpm = Feet per Minute (fpm)	OAT = Outside Air Temperature
ft = Foot	PD = Sheave Pitch Diameter
gal = Gallons	P.D. = Pressure Drop
GPM = Gallons Per Minute (GPM)	PF = Power Factor
h = Enthalpy (BTU/lb dry air)	SG = Supply Grille
P = Pressure	SR = Supply Register
ppm = parts per million	TP = Total Pressure
psi = Pounds Per Square Inch	T _{ra} = Return Air Temperature
psid = PSI Differential	TS = Tip Speed (fpm) IP, (m/s) SI
r = Radius (in)	TSP = Total Static Pressure
% _{ra} = % of Return Air	V = Velocity
RA = Return Air	VAV = Variable Air Volume
RAT = Return Air Temperature	VD = Volume Damper
RF = Return Fan	VFD = Variable Frequency Drive
RG = Return Grille	W = Watt
RH = Relative Humidity	WB = Wet Bulb
RPM = Revolutions Per Minute	wg = wc = water gauge = water column
RTU = Roof Top Unit	WHP = Water Horsepower (IP)
SA = Supply Air	ω = Humidity Ratio

