Report By:

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

NATIONAL TAB

Comfort. Under control.

Report: Starr Electric (Charlotte, NC) TAB REPORT
Function: Test, Adjust, & Balance
Date: 05/18/2023

PROJECT

Starr Electric (Charlotte, NC)

1808 Norland Road

Charlotte, NC 28205

Client

Action Mechanical Inc.

PO Box 7325

CHARLOTTE, NC 28241

National TAB

Project: Starr Electric (Charlotte, NC)

Table Of Contents

CERTIFICATION

PROJECT: Starr Electric (Charlotte, NC)

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 Standards for Testing, Adjusting, and Balancing of Environmental Systems.* Any variances from design quantities, which exceed NEBB tolerances, are noted in the Test-Adjust-Balance Report Project Summary.

The air distribution system has been tested and balanced and final adjustments have been made in accordance with NEBB standards and the project specifications.

NEBB TAB FIRM: National TAB-Southeast
REGISTRATION NO: 3755
CERTIFIED BY: J. Scott Springer 23312
DATE: 5/18/2023

The hydronic distribution system has been tested and balanced and final adjustments have been made in accordance with NEBB standards and the project specifications.

NEBB TAB FIRM: National TAB-Southeast
REGISTRATION NO: 3086
CERTIFIED BY: J. Scott Springer 23312
DATE:

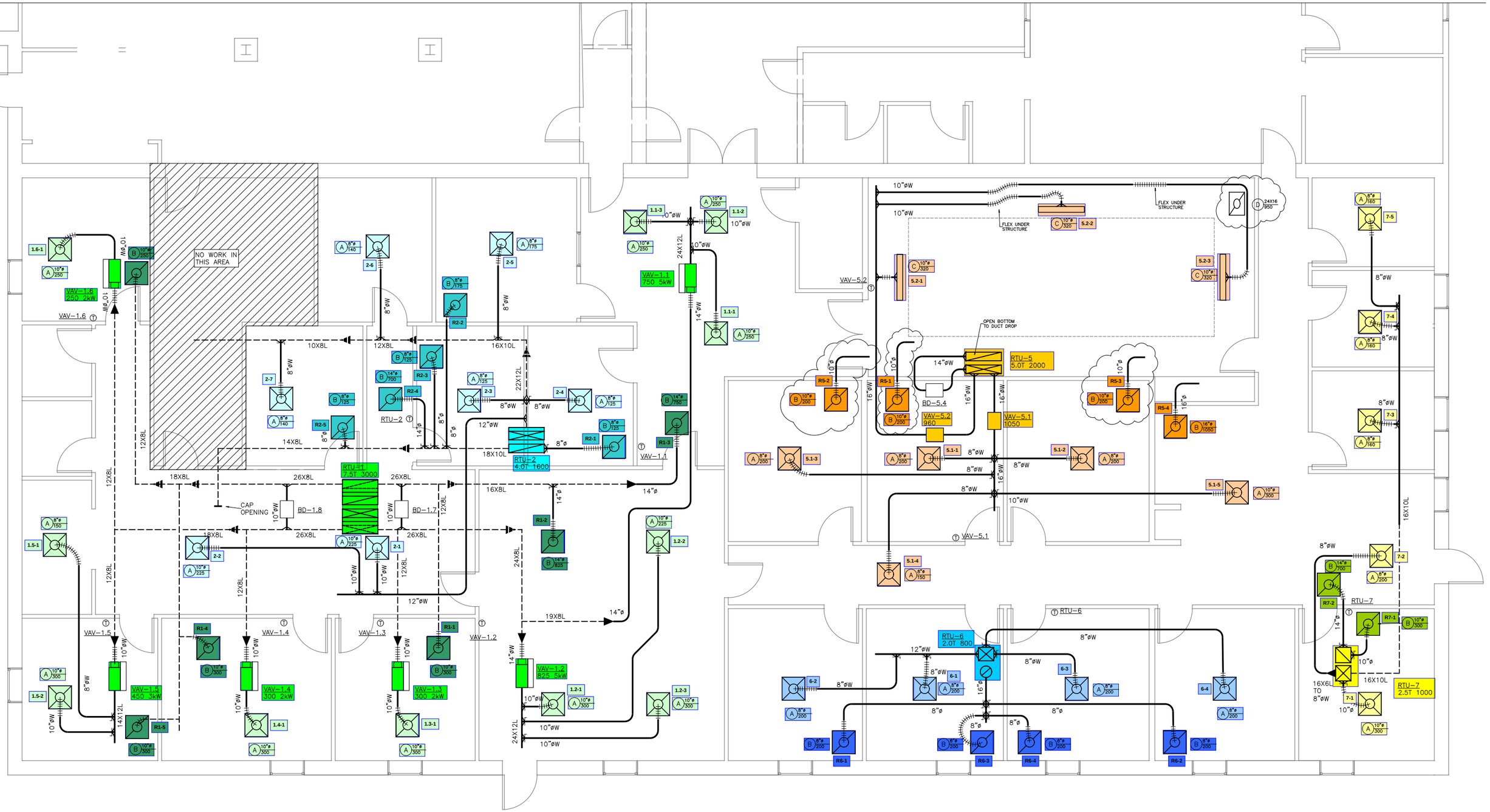
Submitted and Certified by:

NEBB TAB FIRM: National TAB-Southeast
TAB PROFESSIONAL: J. Scott Springer
SIGNATURE:
REGISTRATION NO: 3755 (NTAB) / 23312
CERTIFICATION EXP: 12/31/2023

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	Shortridge ADM 880C - S/N M05066	9/28/2022	9/28/2023
	AIR VELOCITY INSTRUMENT	50 fpm to 3900 fpm	+/- 5 % +/- 7 fpm	Shortridge ADM 880C - S/N M05066	9/28/2022	9/28/2023
	DIRECT HOOD READING	100 cfm to 2000 cfm	+/- 3 % +/- 7 cfm	Shortridge ADM 880C - S/N M05066	9/28/2022	9/28/2023
TEMPERATURE	AIR METER	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - SRH77A S/N 081820093	10/12/2022	10/12/2023
	AIR PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - PD1388 7-6 S/N 5028	10/12/2022	10/12/2023
	IMMERSION METER	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - SRH77A S/N 081820093	10/12/2022	10/12/2023
	IMMERSION PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - PD1388 7-6 S/N 1075	10/12/2022	10/12/2023
	CONTACT METER	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - SRH77A S/N 081820093	10/12/2022	10/12/2023
	CONTACT PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper ATKINS - PD1388 7-6 S/N 4011	10/12/2022	10/12/2023
HUMIDITY	HUMIDITY PROBE	10 % RH to 90 % RH	3% of reading	Cooper ATKINS - SRH77A S/N 090315046	10/12/2022	10/12/2023
ELECTRICAL	VOLTAGE MEASUREMENT	0 VAC to 600 VAC	2 % reading +/- 5 digits	Dwyer CM-1 - S/N 190800099	10/12/2022	10/12/2023
	AMPERAGE MEASUREMENT	0 Amperers to 100 Amperes	2 % reading +/- 5 digits	Dwyer CM-1 - S/N 190800099	10/12/2022	10/12/2023
ROTATION	ROTATION MEASUREMENT	60 rpm to 5000 rpm	2 % reading 2 rpm	Dwyer TAC-L - S/N S1100123	10/12/2022	10/12/2023
HYDRONIC	PRESSURE MEASUREMENT	-30 in Hg to 200 psi	±2% of reading +/- 1 psi	Dwyer 490W-6 - S/N 01L6NK	6/29/2022	6/29/2023
	DIFFERENTIAL PRESSURE MEASUREMENT	0 psi - 80 psi	±2% of reading +/- 1 psi	Dwyer 490W-6 - S/N 01L6NK	6/29/2022	6/29/2023

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
CO2 = 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



MECHANICAL NEW PLAN

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-1 **Area: OFFICE**

Unit Data	
Manufacturer	CARRIER
Model Num	50TM-008-P-501---
Serial Num	2403630411
Configuration	VERTICAL
Num PreFilter	4
PreFilter Size	20X16X2

Test Data		
	Design	**Actual**
SF CFM	2875	2312
SF RPM		908
RL VOLTAGE	208	206/208.4/208.2
RL AMPERAGE	5.2	4.9/4.9/4.9

Motor Data	
Motor MFG	MARATHON
Frame	56Y
Horsepower	NL
Motor RPM	1725
Phase	3
Rated Voltage	208
Rated Amperage	5.2
Service Factor	1.15

Performance Data		
	Design	**Actual**
Fan Suction SP		-1.02"
Fan Discharge SP		0.9"
Fan Total SP		1.92"
CX Coil PD		0.20" *
Pre Filter PD		* combined
Total ESP		1.78"

Drive Data	
Motor Sheave Size / Bore	1VL44/0.625"
Fan Sheave Size / Bore	AM74/1"
Belt CL Distance	17.75"
No. Belts / Size	1/AX51

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: AHU-1 ZD's

Asset	Area Served	Type	Size	Design Max CFM	Actual Max CFM	Design Min [1] CFM	Actual Min CFM
ZD-1.1	LOBBY	A	24X12	750	599	150	144
ZD-1.2	LOBBY	A	24X12	825	650	165	171
ZD-1.3	OFFICE	A	10	300	247	60	57
ZD-1.4	OFFICE	A	10	300	239	60	59
ZD-1.5	OFFICE	A	14X12	450	375	90	96
ZD-1.6	OFFICE	A	10	250	202	50	51

NOTES: [1] DESIGN MIN CFM IS 20% OF DESIGN MAX CFM

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: AHU-1 SGRD's

Asset	Area Served	Type	Size	DESIGN CFM	Prelim CFM	FINAL CFM	% to design
1.1-1	LOBBY	A	10	250	159	202	0.81
1.1-2	LOBBY	A	10	250	0	201	0.80
1.1-3	LOBBY	A	10	250	155	196	0.78
ZD-1.1				**750**		**599**	**0.80**
1.2-1	LOBBY	A	10	300	231	240	0.80
1.2-2	LOBBY	A	10	225	201	174	0.77
1.2-3	LOBBY	A	10	300	188	236	0.79
ZD-1.2				**825**		**650**	**0.79**
1.3-1	OFFICE	A	10	300	315	247	0.82
ZD-1.3				**300**		**247**	**0.82**
1.4-1	OFFICE	A	10	300	366	239	0.80
ZD-1.4				**300**		**239**	**0.80**
1.5-1	DATA ROOM	A	8	150	154	135	0.90
1.5-2	OFFICE	A	10	300	218	240	0.80
ZD-1.5				**450**		**375**	**0.83**
1.6-1	OFFICE	A	10	250	277	202	0.81
ZD-1.6				**250**		**202**	**0.81**

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-2 **Area: OFFICE**

Unit Data	
Manufacturer	CARRIER
Model Num	50TFF005-A-511--
Serial Num	1903G20127
Configuration	VERTICAL
Num PreFilter	2
PreFilter Size	16X25X2

Test Data		
	Design	**Actual**
SF CFM	1600	1139
SF RPM		1024
RL VOLTAGE	208	208.4
RL AMPERAGE	4.9	2.4

Motor Data	
Motor MFG	GE MOTORS
Frame	NL
Horsepower	1
Motor RPM	1620
Phase	1
Rated Voltage	208
Rated Amperage	4.9
Service Factor	1

Performance Data		
	Design	**Actual**
Fan Suction SP		-0.5"
Fan Discharge SP		0.25"
Fan Total SP		0.75"
CX Coil PD		0.15"
Pre Filter PD		* combined
Total ESP		0.60"

Drive Data	
Motor Sheave Size / Bore	1VL34 / 0.5"
Fan Sheave Size / Bore	4.375"/0.625"
Belt CL Distance	13.375"
No. Belts / Size	1/A36

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-2 SGRD's

Asset	Area Served	Type	Size	DESIGN CFM	Prelim CFM	FINAL CFM	% to design
2-1	RECEPTION	A	10	225	227	225	1.00
2-2	RECEPTION	A	10	225	214	246	1.09
2-3	OFFICE	A	8	125	201	119	0.95
2-4	OFFICE	A	8	125	206	125	1.00
2-5	OFFICE	A	8	175	170	186	1.06
2-6	OFFICE	A	8	140	118	132	0.94
2-7	OFFICE	A	8	140	96	103	0.74
RTU-2 [1]				**1155**		**1136**	**0.98**

NOTES: [1] SUPPLY DUCT CONTINUES INTO A "NO WORK" AREA. ASSUME ADDITIONAL SGRD's.

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-5 **Area: OFFICE & CONFERENCE**

Unit Data	
Manufacturer	CARRIER
Model Num	50TJ-006---501
Serial Num	3598G21685
Configuration	VERTICAL
Num PreFilter	2
PreFilter Size	15.5X25X2

Test Data		
	Design	**Actual**
SF CFM	2010	1240
SF RPM		DD
RL VOLTAGE	208	207.4
RL AMPERAGE	5.9	4.2

Motor Data	
Motor MFG	NA
Frame	NL
Horsepower	1
Motor RPM	1040
Phase	1
Rated Voltage	208
Rated Amperage	5.9
Service Factor	1

Performance Data		
	Design	**Actual**
Fan Suction SP		-0.82"
Fan Discharge SP		0.29"
Fan Total SP		1.11"
CX Coil PD		0.40" *
Pre Filter PD		* combined
Total ESP		0.71"

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: AHU-5 ZD's

Asset	Area Served	Type	Size	Design Max CFM	Actual Max CFM	Design Min [1] CFM	Actual Min CFM
ZD-5.1	OFFICE	A	16	1050	636	210	217
ZD-5.2	CONF RM	LD	16	960	604	192	187

NOTES: [1] DESIGN MIN CFM IS 20% OF DESIGN MAX CFM

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-5 SGRD's

Asset	Area Served	Type	Size	DESIGN CFM	Prelim CFM	FINAL CFM	% to design
5.1-1	OFFICE	A	8	200	173	120	0.60
5.1-2	OFFICE	A	8	200	125	123	0.62
5.1-3	OFFICE	A	8	200	179	119	0.60
5.1-4	HALLWAY	A	8	150	161	88	0.59
5.1-5	RECEPTION	A	10	300	185	186	0.62
ZD-5.1				**1050**		**636**	**0.61**
5.2-1		C	10	320	160	215	0.67
5.2-2		C	10	320	130	192	0.60
5.2-3		C	10	320	129	197	0.62
ZD-5.2				**960**		**604**	**0.63**

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-6 **Area: OFFICE**

Unit Data	
Manufacturer	CARRIER
Model Num	50GS-024---301
Serial Num	1803011853
Configuration	HORIZONTAL
Num PreFilter	NA
PreFilter Size	NA

Test Data		
	Design	**Actual**
SF CFM	800	688
SF RPM		DD
RL VOLTAGE	208	207.7
RL AMPERAGE	2	1.8

Motor Data	
Motor MFG	NA
Frame	NA
Horsepower	NA
Motor RPM	NA
Phase	1
Rated Voltage	208
Rated Amperage	2
Service Factor	1

Performance Data		
	Design	**Actual**
Fan Suction SP		-0.51"
Fan Discharge SP		0.19"
Fan Total SP		0.7"
CX Coil PD		00.25" *
Pre Filter PD		* combined
Total ESP		0.45"

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-6 SGRD's

Asset	Area Served	Type	Size	DESIGN CFM	Prelim CFM	FINAL CFM	% to design
6-1	OFFICE	A	8	200	165	165	0.83
6-2	OFFICE	A	8	200	171	171	0.86
6-3	OFFICE	A	8	200	179	179	0.90
6-4	OFFICE	A	8	200	173	173	0.87
RTU-6				**800**		**688**	**0.86**

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-7 **Area: OFFICES**

UNIT DATA	
Manufacturer	CARRIER
Model Num	50JS-030---301
Serial Num	3213G11529
Configuration	HORIZONTAL
Num PreFilter	2
PreFilter Size	19.5X25X2
PreFilter Size 2	19.5X9.5X2

Test Data		
	Design	**Actual**
SF CFM	1000	855
SF RPM		DD
RL VOLTAGE	208	207.3
RL AMPERAGE	2	1.7

Motor Data	
Motor MFG	NA
Frame	NA
Horsepower	NA
Motor RPM	NA
Phase	1
Rated Voltage	208
Rated Amperage	2
Service Factor	1

Performance Data		
	Design	**Actual**
Fan Suction SP		-0.34
Fan Discharge SP		0.15"
Fan Total SP		0.49"
CX Coil PD		0.27" *
Pre Filter PD		* combined
Total ESP		0.22"

National TAB

Project: Starr Electric

Address: 1808 Norland Road Charlotte, NC

Asset: RTU-7 SGRD's

Asset	Area Served	Type	Size	DESIGN CFM	Prelim CFM	FINAL CFM	% to design
7-1	OFFICE	A	10	300	204	204	0.68
7-2 [1]	RECEPTION	A	8	200	235	235	1.18
7-3	OFFICE	A	8	160	136	136	0.85
7-4	OFFICE	A	8	160	130	130	0.81
7-5	OFFICE	A	8	160	150	150	0.94
RTU-7				**980**		**855**	**0.87**

NOTES: [1] UNABLE TO REACH DAMPER FOR 7-2