

FT# 05-139

Certification

**Woodstock Highway Facility
Route 212 Bearsville
Woodstock, NY 12498**

The data presented in this report is a record of the system performance and was obtained in accordance with the standards and procedures as outlined by the National Environmental Balancing Bureau. And has been balanced to within the physical limits of the systems. Any variances from design quantities which exceed plus or minus ten percent of design, are noted through-out the attached report.

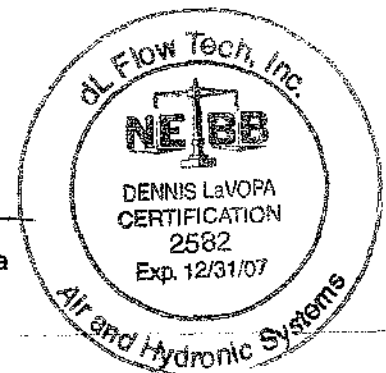
Submitted and Certified By:

dL
Flow Tech, Inc.

Registration # 2582

12/6/2006

Test and Balance Supervisor: Dennis LaVopa



Test and Balance Supervisor: Peter J. Juliano

dL Flow Tech, Instrument Calibration

Function	Minimum Range	Minimum Accuracy	Minimum Resolution	Manuf / Model / Serial #	Cal. Require	Cal. Date
Rotating Measurement	0-500 RPM	± 2%	± 5RPM	Exttech Digital / Tac 461995 / Z047680	12 Months	6/6/2006
Temperature Measurement						
Air	-40 to 240 deg. F	± 1% of Reading	.2 deg. F	Shortridge / ADM 860 / M91587	12 Months	5/26/2006
Immersion	-40 to 240 deg. F	± 1% of Reading	.2 deg. F	Shortridge / ADM 860 / M91587	12 Months	5/26/2006
Water	-40 to 240 deg. F	± 1% of Reading	.2 deg. F	Omega Model / 450 / 692478	12 Months	9/14/2005
Electrical Measurement	0-600 VAC 0-100 AMPS	± 2% of Reading	1 Volt .1 Amps	Westward Clamp Meter / 2604000376	12 Months	6/6/2006
Air Pressure Measurement	0-19" WG	± 5% of Reading	0.01- in wg < 1 in wg	Shortridge / AMD-860 / M1107	12 Months	6/6/2006
Air Velocity Measurement	50-2500 fpm	± 5% of reading	20 fpm	Alnor / RVA+ / 70520442	12 Months	6/2/2006
Humidity Measurement	10 to 90% RH	2% of reading	1%	Checkit Digital Psych/ 622	12 Months	6/6/2006
Air Volume	100 to 200 cfm	± 5% of reading	Digital 1 cfm	Shortridge / AMD 860 / M91587	12 Months	5/26/2006
Tube	18	NA	NA	Dwyer / 160-18 3/16 std pitot	Not required	
	24	NA	NA	Dwyer / 160-24 3/16 std pitot	Not required	
	36	NA	NA	Dwyer / 160-36 3/16 std pitot	Not required	
	60	NA	NA	Dwyer / 160-60 3/16 std pitot	Not required	
Hydronic Pressure Measurement	-30" Hg to 60 psi	± 1% of reading	.5 psi	Alnor Manometer / HM-650 / 460	12 Months	6/2/2006
	0 to 100 psi	± 1% of reading	1 psi	Alnor Manometer / HM-650 / 460	12 Months	6/2/2006
	0 to 200 psi	± 1% of reading	2.5 psi	Alnor Manometer / HM-650 / 460	12 Months	6/2/2006
Hydronic Differential Pressure Measurement	0-100 in. w.g.	± 2% of reading	1 in. w.g.	Alnor Manometer / HM-650 / 460	12 Months	6/2/2006
	0-100 ft. w.g.	± 2% of reading	1 ft. w.g.	Alnor Manometer / HM-650 / 460	12 Months	6/2/2006

*Certificates of calibration are available upon request



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Summary

12/6/06

FT 05-139

Woodstock Highway Facility

The following are the results of testing at the above referenced project. All balancing and testing has been performed as per the standards set forth by the National Environmental Balancing Bureau (NEBB) to within the physical limits of the systems tested. Any recommendations or suggestions noted in this report should be reviewed with your design professional.

Purpose:

Test and balance as per plan and spec.

Findings:

EF-7 and EF-8 motorized backdraft dampers are closed with the units running. These were temporarily opened for balance and then set back as found. Suspect that control wiring is not complete on these units.

CORRECTED 12/12/06 K.F.

dL Flow Tech, Inc.



Code	Remarks
AS Req't'd	Final airflow has been adjusted to suit requests of occupants
ABV CLG	Register (ETC) is located above ceiling line
BKN DPR	Volume Damper (VD), Face Damper (OPD), Splitter Damper (SD) is broken/stuck
CC	Ceiling conflict; kinked flex duct causing low flow
DD	Unit is direct drive; no adjustment can be made without a speed controller.
DD on HI	Direct drive fan set to High, medium (MED) or low (LO)
DT	Duct Traverse
DLF	DL Flow Tech Inc.
FACE	Velocity taken at the balance point
HDW MSG	Volume or splitter damper hardware is missing
Inline	Fan is an inline fan; Actual RPM can not be obtained
Long Flex	Flexible duct configuration and length is probable cause for low flow
Locked	No key available at time of balance
Max Flow	Maximum flow achievable
MAN OPN'D	Temporarily opened manually to set
New outlet	Outlet not shown on contract drawing; no CFM given; CFM assigned by DLF
Noisey	Register (ETC) has been set low to reduce objectionable air noise.
NPA	No provision to adjust; requires installation of volume damper / face damper
NI	Outlet not installed
NW	Device not working
TP	Test point location for duct traverse and/or static pressure
PT	Poor take-off / inlet flex to VAV box causing turbulence / probable cause for low flow
RAW	Raw opening -- Ductwork and collar is installed; register (etc.) is missing; tap is balanced high to compensate.
Set High	set high due to missing register and/or to maintain total room flow (etc).
T'stat REV	The t'stat is reverse or opposite of design
T'stat LOC	T'stat not in area served
VD FO	Volume Dampers are in their maximum open position
VD FC	Volume Dampers are in their full closed position
VAV	Variable air volume box
CAV	Constant Volume Box
FPVAV	Fan powered variable air volume box
Register Types	
CD	Ceiling Diffuser
CR	Ceiling Register
EC	Egg Crate Type register
ER	Exhaust Register
FH	Fume Hood
LD	Linear Diffuser
LT	Light Troffer
WMS	Wire Mesh Screen
TR	Top Register
BR	Bottom Register
RAW	Raw opening

Equipment Summary

Fan #	Service	Required		Actual		% of Design	Remarks
		CFM	GPM	CFM	GPM		
Pumps							
P-1	Ground Loop	120		110		92%	Max obtainable
P-2	Ground Loop	120		110		92%	Max obtainable
P-3	GHP-1	26		28.2		108%	
P-4	GHP-2	26		27.9		107%	
P-5	GHP-3	26		26.6		102%	
P-6	GHP-4	26		25.5		98%	
P-7	I.D.W. Heater	6		*		*	Unable to determine flow
P-8	Heating Loop	37.3		33.6		90%	
P-9	Heating Loop	37.3		34.3		92%	
P-10	FCU's	28.3		14.8		52%	11.8 gpm connected load
P-11	Deleted	*		*		*	
P-12	Bay 4 Radiant Floor	6		5.4		90%	
P-13	Bay 5 Radiant Floor	5.6		5.2		93%	

Fan Number	EF-1	EF-2	EF-3	EF-4	EF-5	EF-6	EF-7	EF-8
Location	Wall Mounted	Wall Mounted	Wall Mounted	Wall Mounted	Wall Mounted	Wall Mounted	Mens Locker Rm.	Mens Locker Rm.
Service	Bay 2	Bay 4	Bay 5	Bay 7	Stor. Rm. 23	MER 21	Mens Locker	Womens Locker
Manufacturer	Penn Vent	Penn Vent	Penn Vent	Penn Vent	Penn Vent	Penn Vent	Penn Vent	Penn Vent
Model/Size		BLL24	BLL24	BHM30B	P12VA	P10VA	REX08Q	REX08Q
Fan Type	Utility	Utility	Utility	Utility	Utility	Utility	Inline	Inline
Motor Manufacturer	Weg	Weg	Marathon	Weg	A.O. Smith	A.O. Smith	Not Available	Not Available
Motor HP	1/2	1/4	1/4	1/3	.275	.08	Not Available	Not Available
Safety Factor	1.25	1.35	1.0	1.35	Thermal	Thermal	Not Available	Not Available
Volts/Phase	115/1	115/1	115/1	115/1	115/1	115/1	115/1	115/1
Rated Amperage	8.5	4.8	3.5	6.25	2.5	1.6	Not Available	Not Available
Actual Amperage	7.1	3.7	3.1	5.6	2.1	1.2	2.8	2.8
Design Fan RPM	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
Actual Fan RPM	424	624	598	536	Pot. Marked	1750	Inline N/A	Inline N/A
Sheave Position	25% Closed	25% Closed	25% Closed	25% Closed	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Required CFM	7600	2400	2000	6200	1050	450	100	100
Actual CFM	7204	2252	2045	6229	995	435	154	146

Sys	Location	Rm #	No	Size	Type	Ak	Design		Final		% of Des	Remarks
							FPM	CFM	FPM	CFM		
EF-1	Bay 1 30		1	40x40	WMS	11.1	685	7600	649	7204	95%	
EF-2	Repair Bay 4 31		1	28x28	WMS	5.44	441	2400	414	2252	94%	
EF-3	Wash Bay 5 32		1	28x28	WMS	5.44	368	2000	376	2045	102%	
EF-4	Bay 7 34		1	38x38	WMS	10.0	618	6200	621	6229	100%	
EF-5	Tire, Oil, Supply 23		1	18x18	WMS	2.25	467	1050	442	995	95%	
EF-6	Mechanical Room 21		1	15x15	Row	1.56	288	450	279	435	97%	
EF-7	Mens Toilet 09			8x8	CR	1	100	100	154	154	154%	direct drive
EF-8	Womens Shower 11			8x8	CR	1	100	100	146	146	146%	direct drive



Pump No	P-1		
Manufacturer	Taco		
Size	2x2x6 series KV2006		
Impeller	Des 5.3"; Actual 4.9"		
Service	Ground Source		
	GPM	FT HD	BHP
Design 5.3" imp	120	95	4.4
Design 4.9" imp	120	79	4.2
Valve Open	110	81	2.9
Discharge	67.6		
Suction	32.5		
dP	35.1	X 2.31 =	81.08
	GPM	FT HD	BHP
Pump Shut-off Head	0	91	2.1
Discharge	46.9		
Suction	7.7		
dP	39.2	X 2.31 =	90.55
System Static Head	38 PSI		
	GPM	FT HD	BHP
Final	110	81	4.0
Discharge	67.6		
Suction	32.5		
dP	35.1	X 2.31 =	81.08
Discharge Valve set @ 60HZ			
VFD set @ Open			
Motor Mfg	Baldor		
Frame	182JM		
HP	5		
RPM	3500		
	Design		Actual
Amps	12.8		10.2
Line Voltage / Phase	200/3		204/3

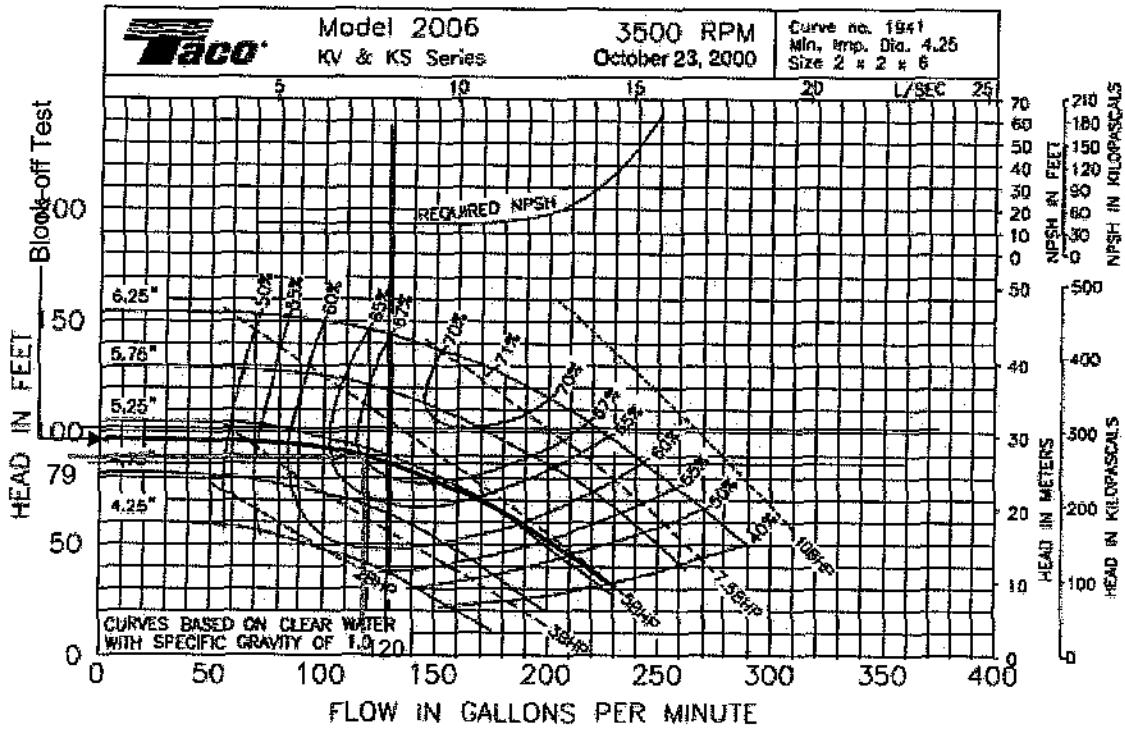
DP Setpoint = 12psi

ump block-off test indicates 4.9" impeller

Pump No	P-2		
Manufacturer	Taco		
Size	2x2x6 series KV2006		
Impeller	Des 5.3"; Actual 4.9"		
Service	Ground Source		
	GPM	FT HD	BHP
Design 5.3" imp	120	95	4.4
Design 4.9" imp	120	79	4.2
Valve Open	110	81	2.9
Discharge	64.2		
Suction	29.3		
dP	34.9	X 2.31 =	80.62
	GPM	FT HD	BHP
Pump Shut-off Head	0	91	2.1
Discharge	47		
Suction	7.7		
dP	39.3	X 2.31 =	90.78
System Static Head	38 PSI		
	GPM	FT HD	BHP
Final	110	81	4.0
Discharge	64.2		
Suction	29.3		
dP	34.9	X 2.31 =	80.62
Discharge Valve set @ 60HZ			
VFD set @ Open			
Motor Mfg	Baldor		
Frame	182JM		
HP	5		
RPM	3500		
	Design		Actual
Amps	12.8		10.2
Line Voltage / Phase	200/3		204/3

DP Setpoint = 12psi

Pump block-off test indicates 4.9" impeller



Pump No.	P-3	P-4	P-5	P-6	P-7	P-8	P-9
Manufacturer	Taco	Taco	Taco	Taco	Taco	Taco	Taco
Model/Size	1400-50	1400-50	1400-50	1400-50	1400-10	KV1506	KV1506
Impeller	Not specified	Not specified	Not specified	Not specified	Not specified	5.9	5.9
Service	GHP-1	GHP-2	GHP-3	GHP-4	I.D.W. Heater	Heating Loop	Heating Loop
Motor MFG.	Emerson	Emerson	Emerson	Emerson	Emerson	Baldor	Baldor
Frame	Not specified	Not specified	Not specified	Not specified	Not specified	143JM	143JM
Horsepower	1/2	1/2	1/2	1/2	1/10	1	1
RPM	3450	3450	3450	3450	3450	1740	1740
Voltage/Phase	115/1	115/1	115/1	115/1	115/1	200/3	200/3
Rated Amps	5	5	5	5	15	3.7	3.7
Actual Amps	3.6	3.6	3.6	3.6	1.2	2.1	2.1
Design GPM	26	26	26	26	6	37.3	37.3
Pump GPM	28.2	27.9	26.6	25.5	*	33.6	34.3
Design FT. HD	37	37	37	37	22	35	35
Actual FT. HD	26.3	27.0	27.5	28.2	*	28.0	28.4
Discharge Pressure	35.8	36.2	36.2	36.4	N/A	52.2	52.6
Suction Pressure	24.4	24.5	24.3	24.2	N/A	40.1	40.3

Pump No.	P-10	P-11	P-12	P-13
Manufacturer	Taco		Taco	Taco
Model/Size	1400-50		1400-10	1400-10
Impeller	Not specified		Not specified	Not specified
Service	Fan Coil Units	Office Rad Flr	Bay 4 Rad Flr	Bay 5 Rad Flr
Motor MFG.	Emerson	Deleted from Project	Emerson	Emerson
Frame	Not specified		Not specified	Not specified
Horsepower	1/2		1/10	1/10
RPM	3450		3450	3450
Voltage/Phase	115/1		115/1	115/1
Rated Amps	5		1.5	1.5
Actual Amps	3.7		1.4	1.4
Design GPM	28.3	9.4	6	5.6
Pump GPM	14.8		5.4	5.2
Design FT. HD	36	21	22	22
Actual FT. HD	7.9		*	*
Discharge Pressure	44.6	Pump	N/A	N/A
Suction Pressure	41.2	Deleted	N/A	N/A



Hot Water

Location	Terminal	No.	Type	Size	Design		Delivered		Dial Setting	Remarks
					GPM	dP Inches	GPM	dP Inches		
Bay 1	UH-1	1	Taco	3/4"	3.6	34	3.3	28.2	Open	
Bay 1-2	UH-2	2	Taco	3/4"	3.0	24	2.8	21.0	Open	
Bay 2-3	UH-3	3	Taco	3/4"	3.0	24	2.9	23.1	Open	
Bay 3	UH-4	4	Taco	3/4"	3.0	24	2.8	21.6	Open	
Storage Rm. 23	UH-5	5	Taco	3/4"	1.5	6	1.4	5.3	30	
Attic	UH-6	6	Taco	3/4"	1.5	6	1.4	5.6	30	
Bay 6	UH-7	7	Taco	3/4"	2.4	15	2.5	16.4	15	
Bay 6-7	UH-8	8	Taco	3/4"	2.4	15	2.3	13.4	15	
Bay 7-8	UH-9	9	Taco	3/4"	2.4	15	2.4	14.7	15	
Bay 8	UH-10	10	Taco	3/4"	2.8	21	2.7	19.2	Open	
	P-11	11	*	*	*	*	*	*	*	Deleted from project
Bay 4	P-12	12	Taco	3/4"	6.0	95	5.4	78.0	Open	
Bay 5	P-13	13	Taco	3/4"	5.6	85	5.2	72.0	Open	
P-8 / P-9 Total					37.2		35.2			
Super. Office 18	FCU-1	1	Taco	3/4"	1.3	4.5	1.4	5.0	15	
File Rm. 20	FCU-2	2	Taco	3/4"	2.4	15	2.5	16.6	Open	
M. Lockers 05	FCU-3	3	Taco	3/4"	2.6	18	2.9	22.6	Open	
Lunch Room 04	FCU-4	4	Taco	3/4"	3.8	37	3.7	35.4	Open	
Entry 02	FCU-5	5	Taco	3/4"	1.1	3	1.2	3.3	30	
Office 24	FCU-6	6	Taco	3/4"	0.6	1	0.7	1.2	45	
P-10 Total					11.8		12.3			
Ground Source	HP-1	1	Taco	2"	25.0	8.0	29.4	11.1	Open	
Ground Source	HP-2	2	Taco	2"	25.0	8.0	25.5	8.3	Open	
Ground Source	HP-3	3	Taco	2"	24.0	8.0	26.8	10.0	Open	
Ground Source	HP-4	4	Taco	2"	24.0	8.0	28.8	11.5	Open	
P-1 & P-2 Total					98		110.5			

