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Repeatability of Differential Pressures

(AFC-3)

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Background

A major eastern pharmaceutical company required the validation of the performance of the air flow system for a new manufacturing building. The pressure relationships between room and corridors were critical due to the cleanliness requirements for the new manufacturing spaces.

Design Goals:

To maintain accurate and repeatable differential pressures in a very clean atmosphere.

These pressure relationships were based on the exhaust valves tracking the supply valves with a fixed differential. Additionally the rooms were alarmed if the supply or exhaust volumes varied by +/- 5%. Also, feedback was built into the control loop.

During the validation process the system was balanced by the balancing contractor and turned over to the control contractor to confirm that the system was operating in accordance with design.

The following is a tabulated list of the design goals, the actual performance and the deviation from design. This data was taken from the monitor for the building automation system, which compared the actual flow from the flow station to the set point for the damper. This data then included all the inherent inaccuracies of the control devices (transmitter, transducers, etc.) as well as the measuring devices. The average deviation was 2.16% (0.0216) or well within the +/- 5% permitted by the room alarm system.

The system was well designed and installed with 5 to 6 straight lengths of duct in the penthouse prior to the air flow stations.

Results

Unit Numbers		Set Point	Actual Performance		
AHU	Flow Station Number	CFM	CFM	Field ± CFM	Readings %
XXX2	X27	330	331	1	.3
	X39	240	245	5	2
	X37	1420	1390	30	2.1
	X38	150	146	4	2.6
	X39	240	245	5	2.1
	X41	1290	1270	20	1.6
	X43	380	392	12	3
	X44	2000	2100	100	5
	X47	520	505	15	2.8
	X48	1560	1500	20	1.3
	X49	2400	2450	50	2
XXX3	X18	242	248	6	2.5
	X19	330	338	8	2.4
	X20	2210	2160	50	2.2
	X21	2930	3005	75	2.6
	X23	200	198	2	1
	X24	290	285	5	1.7
	X25	260	250	10	3.8
	X28	200	202	2	1
	X31	269	266	3	1.2
	X32	100	103	3	3
	X33	100	103	3	3
	X34	720	617	3	3
		650	656	6	1