EQc2.3 Sample Air Speed and Mean Radiant Temperature Report

Instrumentation
Globe Temperature: Metrel Multinorm MI 6201 Pro (range and accuracy compliant with ISO 7726; globe diameter 0.125 ft; globe emissivity 0.95)
Air speed: JEC 700 digital hot wire anemometer (range: 1 m/s; sampling rate: 2 samples / s; calibration reference: <0.02 m/s;

Measurements
Measurements were taken in occupied zones near workstation or seating areas in a representative sample of locations distributed throughout the occupied zone. At least one measurement location was selected for every 20 workstations or seats within a space. Measurements were taken near windows (1 m inward from the center of window), diffuser outlets, corners, entryways, and near the center of the room or zone. Measurements

All zones within the building primarily serve seated occupants. Air speed was measured at 0.1, 0.6 and 1.1 m. Globe temperature readings were taken at 0.6 m, and then used to calculate operative temperature. Air temp and RH in occupied spaces is based on BAS readouts.

Calculations
Radiant Temperature was determined from the black globe temperature, velocity, and air temperature according to Equation 1, converted to Operative Temperature per Equation 2, and the comfort index graphically determined with the RH and Operative temperature using ASHRAE Std 55 Fig. 5.2.1.1.

Equation 1:
MRTg = ((Tg + 459.67)^4 + (4.74 x 10^7 x Va^0.6 x (Tg-Ta)) / (e x D^0.4))^0.25 – 459.67
From ASHRAE Handbook of Fundamentals 2005 EQ. 11, p. 14.29.
Where:
MRTg = mean radiant temp, F, from black globe method
Tg = black globe temp, F
4.74 x 10^7 = conversion factor
Va = air velocity round the black globe, fpm
Ta = air temperature around globe, F
E = emissivity of black globe, 0.95
D = diameter of black globe, ft
459.67 = conversion from F to R

Equation 2:
Operative Temp, F = (Ta + MRT) / 2

From ASHRAE Handbook of Fundamentals 2005 EQ. 28 note, p. 8.5 and ASHRAE Std. 55-2004 5.4.

Where:

Ta = air temperature, F

MRTg = mean radiant temperature, F

Results Summary

Location ID	Position	Globe Temp (F)	Air Temp (F)	RH(%)	Air Speed (fpm)		MRT	Operative Temp (F)	Conforms to ASHRAE 55, Fig. 5.2.1.1?
1 – G12	Open Office, Core, 30' from North Wall	73.2	73.3	20.5%	0.1 m	2	73.1	73.1	Y
					0.6 m	8			
					1.1 m	6			
2 – G78	Private Office, Perimeter, 3.3' from South Window	99.1	82.1	14%	0.1 m	13	118.3	100.2	N*
					0.6 m	27			
					1.1 m	29			
3 – 178	Open Office, Perimeter, 3.3' from West Window	77.4	73.4	18%	0.1 m	12	81.1	77.3	Y
					0.6 m	15			
					1.1 m	19			
4 – 192	Open Office, Core, 40' from West Wall	74.9	75.5	19%	0.1 m	17	74.2	74.8	Y
					0.6 m	23			
					1.1 m	19			
5 – 228	Conference Room, Perimeter, 3.3' from East Window	74.4	74.0	19%	0.1 m	9	74.7	74.4	Y
					0.6 m	11			
					1.1 m	13			
6 – 219	Private Office, Core, 30' from North Wall	73.6	73.5	16.5%	0.1 m	1	73.6	73.6	Y
					0.6 m	2			
					1.1 m	2			

* Shade not drawn. Occupant indicated that blinds are not working properly. Replaced with functional shade.