ERRATA SHEET FOR ASHRAE Guideline 14-2002
Measurement of Energy and Demand Savings
(DOWNLOADED VERSION ONLY)

October 20, 2008

The corrections listed in this errata sheet apply to all copies of ASHRAE Guideline 14-2002 that were downloaded from the ASHRAE Online Bookstore in PDF format and are identified on the outside back cover as "86825 PC 9/02". This errata sheet does not apply to hard copies of Guideline 14-2002.

Page	Erratum
75-90	**Table of Site Specific Measurement Methods.** The last column in each of the tables on pages 75-90 is missing data. The column heading is "Total Amortized Cost per Measurement Point ($)." Please see the attached tables for missing values.

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized Cost per Measurement Point ($)	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase			Maintenance			
Application	DAS	Tech.	(4)		(5)		(6)		(7)		Install &	(9)			
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Measurement Type: Electric Consumption															
Spot Measurement															
Whole Building or Service															
Existing Energy Meter	1	1	0	0	28	28	0	0	0	0	0	0	0	28	28
Existing Demand Meter	1	2	0	0	28	28	0	0	0	0	0	0	0	28	28
Component, Device, or Appliance															
Portable Watt Meter	1	3	440	11,000	28	28	0	2	0	0	0	0	0	32	139
Demand Meter	1	4	500	1,000	0	0	0	0	0	0	0	0	0	5	10
Short-Term, Shared Equipment															
Whole Building or Service															
IR Pulse Detector	2	5	83	83	110	110	2	2	880	2,200	440	8	12	306	392
	3	5	83	83	110	110	2	2	1,650	4,400	660	8	14	306	435
	4	5	83	83	110	110	2	2	2,950	3,600	880	6	8	248	306
Whole Bldg or Service - Existing CTs															
Shunted CTs on Secondaries	4	6	275	330	55	55	2	2	2,950	3,600	880	36	69	876	1,583
Whole Bldg or Service - New Meter															
Shunted CTs	4	7	275	660	220	220	4	5	2,950	3,600	880	36	69	1,043	1,834
Component, Device, or Appliance															
Portable Recording Watt Meter	5	8	7,700	11,000	55	55	25	35	0	0	0	0	0	2,005	2,840
Portable Cumulative Run-Time Meter	5	9	150	250	55	55	1	1	0	0	0	0	0	94	119
Portable Time-of-Use Run-Time Meter	5	10	450	600	55	55	2	3	0	0	0	0	0	170	208
Shunted CTs	4	11	250	660	220	220	4	5	2,950	3,600	880	25	69	806	1,834

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized Cost per Measurement Point ($)	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance			
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)			
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Short-Term, Devoted Equipment															
Whole Building or Service															
IR Pulse Detector	2	5	83	83	110	110	2	2	880	2,200	440	17	33	541	888
	3	5	83	83	110	110	2	2	1,650	4,400	660	17	41	541	1,061
	4	5	83	83	110	110	2	2	2,950	3,600	880	14	25	484	715
Whole Bldg or Service - Existing CTs															
Shunted CTs on Secondaries	4	6	275	330	220	220	6	7	2,950	3,600	880	36	69	1,252	2,001
Whole Bldg or Service - New Meter															
Shunted CTs	4	7	275	660	220	220	6	11	2,950	3,600	880	36	69	1,252	2,335
Component, Device, or Appliance															
Portable Cumulative Run-Time Meter	5	9	150	250	55	55	3	4	0	0	0	0	0	208	309
Portable Time-of-Use Run-Time Meter	5	10	450	600	55	55	6	8	0	0	0	0	0	511	663
Shunted CTs	4	11	250	660	220	220	6	11	2,950	3,600	880	25	69	996	2,335
Long-Term, Devoted Equipment															
Whole Building or Service															
IR Pulse Detector	2	5	83	83	110	110	10	10	880	2,200	440	17	33	549	895
	3	5	83	83	110	110	10	10	1,650	4,400	660	17	41	549	1,068
	4	5	83	83	110	110	10	10	2,950	3,600	880	14	25	491	722
Pulse Splitter	2	12	330	550	0	0	17	28	880	2,200	440	17	33	693	1,271
	3	12	330	550	0	0	17	28	1,650	4,400	660	17	41	693	1,444
	4	12	330	550	0	0	17	28	2,950	3,600	880	14	25	635	1,097
Whole Bldg or Service - Existing CTs															
Shunted CTs on Secondaries	4	6	275	330	220	220	25	28	2,950	3,600	880	36	69	1,271	2,021
CTs on Secondaries & Watt Transducer	2	13	600	700	440	880	52	79	880	2,200	440	17	33	1,439	2,352
	3	13	600	700	440	880	52	79	1,650	4,400	660	17	41	1,439	2,525
	4	13	600	700	440	880	52	79	2,950	3,600	880	14	25	1,381	2,179

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized Cost per Measurement Point ($)	
Class of Method / Application / Sensor Type (1)	DAS Type (2)	Tech. Note (3)	Purchase (4)		Install & Remove (5)		Maintenance (6)		Purchase (7)		Install & Remove (8)	Maintenance (9)			
			Low (4.a)	High (4.b)	Low (5.a)	High (5.b)	Low (6.a)	High (6.b)	Low (7.a)	High (7.b)		Low (9.a)	High (9.b)	Low (10)	High (11)
Air in Ducts															
Electronic Temperature Sensor Array	3	34	75	200	220	440	15	32	1,650	4,400	660	17	41	656	1,538
	4	34	75	200	220	440	15	32	2,950	3,600	880	14	25	599	1,192
Measurement Type: Relative Humidity															
Spot Measurement															
Ambient Indoor															
Sling Psychrometer	1	37	75	75	14	14	1	1	0	0	0	0	0	16	16
Portable Electronic RH Meter	1	38	350	800	14	14	5	10	0	0	0	0	0	22	32
Ambient Outdoor															
Sling Psychrometer	1	39	75	75	14	14	1	1	0	0	0	0	0	16	16
Portable Electronic RH Meter	1	40	350	800	14	14	5	10	0	0	0	0	0	22	32
Short-Term, Shared Equipment															
Ambient Indoor															
Electronic RH Sensor	3	41	200	550	110	330	4	11	1,650	4,400	660	8	14	337	782
	4	41	200	550	110	330	4	11	2,950	3,600	880	6	8	279	652
Ambient Outdoor															
Electronic RH Sensor	3	42	350	700	110	330	6	13	1,650	4,400	660	8	14	377	821
	4	42	350	700	110	330	6	13	2,950	3,600	880	6	8	319	691
Short-Term, Devoted Equipment															
Ambient Indoor															
Electronic RH Sensor	3	41	200	550	110	330	4	11	1,650	4,400	660	17	41	660	1,757
	4	41	200	550	110	330	4	11	2,950	3,600	880	14	25	603	1,411
Ambient Outdoor															
Electronic RH Sensor	3	42	350	700	110	330	6	13	1,650	4,400	660	17	41	812	1,909
	4	42	350	700	110	330	6	13	2,950	3,600	880	14	25	755	1,563

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance		Cost per Measure-	
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)		ment Point ($)	
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Short-Term, Shared Equipment															
Whole Building or Service															
Pulse Initiator	2	19	150	450	0	0	2	6	880	2,200	440	8	12	213	378
	3	19	150	450	0	0	2	6	1,650	4,400	660	8	14	213	421
	4	19	150	450	0	0	2	6	2,950	3,600	880	6	8	155	291
Device or Appliance															
New Pulse Meter	2	20	400	800	0	0	5	10	880	2,200	440	8	12	278	470
	3	20	400	800	0	0	5	10	1,650	4,400	660	8	14	278	513
	4	20	400	800	0	0	5	10	2,950	3,600	880	6	8	221	383
Run-Time Sensor	2	21	55	55	220	220	3	3	880	2,200	440	8	12	410	497
	3	21	55	55	220	220	3	3	1,650	4,400	660	8	14	410	540
	4	21	55	55	220	220	3	3	2,950	3,600	880	6	8	353	410
Short-Term, Devoted Equipment															
Whole Building or Service															
Pulse Initiator	2	19	150	450	0	0	2	6	880	2,200	440	17	33	498	1,149
	3	19	150	450	0	0	2	6	1,650	4,400	660	17	41	498	1,322
	4	19	150	450	0	0	2	6	2,950	3,600	880	14	25	441	975
Device or Appliance															
New Pulse Meter	2	20	400	800	0	0	5	10	880	2,200	440	17	33	752	1,503
	3	20	400	800	0	0	5	10	1,650	4,400	660	17	41	752	1,676
	4	20	400	800	0	0	5	10	2,950	3,600	880	14	25	694	1,330
Run-Time Sensor	2	21	55	55	220	220	3	3	880	2,200	440	17	33	625	971
	3	21	55	55	220	220	3	3	1,650	4,400	660	17	41	625	1,145
	4	21	55	55	220	220	3	3	2,950	3,600	880	14	25	567	798

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized
Class of Method			Purchase		Install & Remove		Maintenance		Purchase			Maintenance		Cost per Measure-
Application	DAS	Tech.	(4)		(5)		(6)		(7)		Install &	(9)		ment Point ($)
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Long-Term, Devoted Equipment															
Whole Building or Service															
Pulse Initiator	2	19	150	450	0	0	8	23	880	2,200	440	17	33	504	1,166
	3	19	150	450	0	0	8	23	1,650	4,400	660	17	41	504	1,339
	4	19	150	450	0	0	8	23	2,950	3,600	880	14	25	446	992
Device or Appliance															
New Pulse Meter	2	20	400	800	0	0	20	40	880	2,200	440	17	33	767	1,533
	3	20	400	800	0	0	20	40	1,650	4,400	660	17	41	767	1,706
	4	20	400	800	0	0	20	40	2,950	3,600	880	14	25	709	1,360
Run-Time Sensor	2	21	55	55	220	220	14	14	880	2,200	440	17	33	635	982
	3	21	55	55	220	220	14	14	1,650	4,400	660	17	41	635	1,155
	4	21	55	55	220	220	14	14	2,950	3,600	880	14	25	578	809
Measurement Type: Temperature															
Spot Measurement															
Ambient Indoor															
Portable Electronic Thermometer	1	22	150	220	14	14	2	3	0	0	0	0	0	17	19
Ambient Outdoor															
Portable Electronic Thermometer	1	23	165	350	14	14	2	5	0	0	0	0	0	18	22
Domestic Water															
Portable Electronic Thermometer	1	24	165	350	14	14	2	5	0	0	0	0	0	18	22
Air in Ducts															
Portable Electronic Thermometer	1	25	250	500	28	28	3	7	0	0	0	0	0	33	39

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance		Cost per Measure-	
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)		ment Point ($)	
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Short-Term, Shared Equipment															
Ambient Indoor															
Portable Recording Elec. Thermometer	5	26	400	1,000	110	110	6	14	0	0	0	0	0	216	374
Electronic Temperature Sensor	2	27	25	250	110	110	2	5	880	2,200	440	8	12	291	437
	3	27	25	250	110	110	2	5	1,650	4,400	660	8	14	291	480
	4	27	25	250	110	110	2	5	2,950	3,600	880	6	8	233	350
Ambient Outdoor															
Portable Recording Elec. Thermometer	5	28	425	1,000	110	110	7	14	0	0	0	0	0	223	374
Electronic Temperature Sensor	3	29	50	250	110	110	2	5	1,650	4,400	660	8	14	298	480
	4	29	50	250	110	110	2	5	2,950	3,600	880	6	8	240	350
Domestic Water															
Surface-Mounted Elec. Temp. Sensor	3	30	50	100	110	220	2	4	1,650	4,400	660	8	14	298	552
	4	30	50	100	110	220	2	4	2,950	3,600	880	6	8	240	422
Electronic Temp. Sensor & Thermowell	3	31	100	200	220	220	4	5	1,650	4,400	660	8	14	422	578
	4	31	100	200	220	220	4	5	2,950	3,600	880	6	8	365	449
HVAC Water in Pipe															
Surface-Mounted Elec. Temp. Sensor	3	32	75	300	110	220	2	7	1,650	4,400	660	8	14	304	605
	4	32	75	300	110	220	2	7	2,950	3,600	880	6	8	247	475
Refrigerant in Pipe															
Surface-Mounted Elec. Temp. Sensor	3	33	75	300	110	220	2	7	1,650	4,400	660	8	14	304	605
	4	33	75	300	110	220	2	7	2,950	3,600	880	6	8	247	475
Air in Ducts															
Electronic Temperature Sensor Array	3	34	75	200	220	440	4	8	1,650	4,400	660	8	14	416	801
	4	34	75	200	220	440	4	8	2,950	3,600	880	6	8	358	671

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized Cost per Measurement Point ($)	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance			
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)			
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Short-Term, Devoted Equipment															
Ambient Indoor															
Portable Recording Elect. Thermometer	5	26	400	1,000	110	110	6	14	0	0	0	0	0	516	1,124
Electronic Temperature Sensor	2	27	25	250	110	110	2	5	880	2,200	440	17	33	483	1,058
	3	27	25	250	110	110	2	5	1,650	4,400	660	17	41	483	1,231
	4	27	25	250	110	110	2	5	2,950	3,600	880	14	25	425	884
Ambient Outdoor															
Portable Recording Elec. Thermometer	5	28	425	1,000	110	110	7	14	0	0	0	0	0	542	1,124
Electronic Temperature Sensor	3	29	50	250	110	110	2	5	1,650	4,400	660	17	41	509	1,231
	4	29	50	250	110	110	2	5	2,950	3,600	880	14	25	451	884
Domestic Water															
Surface-Mounted Elec. Temp. Sensor	3	30	50	100	110	220	2	4	1,650	4,400	660	17	41	509	1,190
	4	30	50	100	110	220	2	4	2,950	3,600	880	14	25	451	844
Electronic Temp. Sensor & Thermowell	3	31	100	200	220	220	4	5	1,650	4,400	660	17	41	671	1,292
	4	31	100	200	220	220	4	5	2,950	3,600	880	14	25	613	945
HVAC Water in Pipe															
Surface-Mounted Elec. Temp. Sensor	3	32	75	300	110	220	2	7	1,650	4,400	660	17	41	534	1,393
	4	32	75	300	110	220	2	7	2,950	3,600	880	14	25	476	1,046
Refrigerant in Pipe															
Surface-Mounted Elec. Temp. Sensor	3	33	75	300	110	220	2	7	1,650	4,400	660	17	41	534	1,393
	4	33	75	300	110	220	2	7	2,950	3,600	880	14	25	476	1,046
Air in Ducts															
Electronic Temperature Sensor Array	3	34	75	200	220	440	4	8	1,650	4,400	660	17	41	645	1,514
	4	34	75	200	220	440	4	8	2,950	3,600	880	14	25	587	1,168

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance		Cost per Measure-	
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)		ment Point ($)	
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Long-Term, Devoted Equipment															
Ambient Indoor															
Electronic Temperature Sensor	2	27	25	250	110	110	7	18	880	2,200	440	17	33	488	1,071
	3	27	25	250	110	110	7	18	1,650	4,400	660	17	41	488	1,244
	4	27	25	250	110	110	7	18	2,950	3,600	880	14	25	431	898
Ambient Outdoor															
Electronic Temperature Sensor	3	29	50	250	110	110	8	18	1,650	4,400	660	17	41	515	1,244
	4	29	50	250	110	110	8	18	2,950	3,600	880	14	25	457	898
Domestic Water															
Surface-Mounted Elec. Temp. Sensor	3	30	50	100	110	220	8	16	1,650	4,400	660	17	41	515	1,202
	4	30	50	100	110	220	8	16	2,950	3,600	880	14	25	457	856
Electronic Temp. Sensor & Thermowell	3	31	100	200	220	220	16	21	1,650	4,400	660	17	41	683	1,307
	4	31	100	200	220	220	16	21	2,950	3,600	880	14	25	625	961
HVAC Water in Pipe															
Surface-Mounted Elec. Temp. Sensor	3	32	75	300	110	220	9	26	1,650	4,400	660	17	41	541	1,412
	4	32	75	300	110	220	9	26	2,950	3,600	880	14	25	483	1,066
Electronic Temp. Sensor & Thermowell	3	35	275	500	220	220	25	36	1,650	4,400	660	17	41	866	1,622
	4	35	275	500	220	220	25	36	2,950	3,600	880	14	25	809	1,276
Refrigerant in Pipe															
Surface-Mounted Elec. Temp. Sensor	3	33	75	300	110	220	9	26	1,650	4,400	660	17	41	541	1,412
	4	33	75	300	110	220	9	26	2,950	3,600	880	14	25	483	1,066
Electronic Temp. Sensor & Thermowell	3	36	275	550	440	440	36	50	1,650	4,400	660	17	41	1,097	1,906
	4	36	275	550	440	440	36	50	2,950	3,600	880	14	25	1,040	1,559

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance		Cost per Measure-
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)		ment Point ($)
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Air in Ducts															
Electronic Temperature Sensor Array	3	34	75	200	220	440	15	32	1,650	4,400	660	17	41	656	1,538
	4	34	75	200	220	440	15	32	2,950	3,600	880	14	25	599	1,192
Measurement Type: Relative Humidity															
Spot Measurement															
Ambient Indoor															
Sling Psychrometer	1	37	75	75	14	14	1	1	0	0	0	0	0	16	16
Portable Electronic RH Meter	1	38	350	800	14	14	5	10	0	0	0	0	0	22	32
Ambient Outdoor															
Sling Psychrometer	1	39	75	75	14	14	1	1	0	0	0	0	0	16	16
Portable Electronic RH Meter	1	40	350	800	14	14	5	10	0	0	0	0	0	22	32
Short-Term, Shared Equipment															
Ambient Indoor															
Electronic RH Sensor	3	41	200	550	110	330	4	11	1,650	4,400	660	8	14	337	782
	4	41	200	550	110	330	4	11	2,950	3,600	880	6	8	279	652
Ambient Outdoor															
Electronic RH Sensor	3	42	350	700	110	330	6	13	1,650	4,400	660	8	14	377	821
	4	42	350	700	110	330	6	13	2,950	3,600	880	6	8	319	691
Short-Term, Devoted Equipment															
Ambient Indoor															
Electronic RH Sensor	3	41	200	550	110	330	4	11	1,650	4,400	660	17	41	660	1,757
	4	41	200	550	110	330	4	11	2,950	3,600	880	14	25	603	1,411
Ambient Outdoor															
Electronic RH Sensor	3	42	350	700	110	330	6	13	1,650	4,400	660	17	41	812	1,909
	4	42	350	700	110	330	6	13	2,950	3,600	880	14	25	755	1,563

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance		Cost per Measure-	
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)		ment Point ($)	
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Long-Term, Devoted Equipment															
Ambient Indoor															
Electronic RH Sensor	3	41	200	550	110	330	16	44	1,650	4,400	660	17	41	672	1,790
	4	41	200	550	110	330	16	44	2,950	3,600	880	14	25	614	1,444
Ambient Outdoor															
Electronic RH Sensor	3	42	350	700	110	330	23	52	1,650	4,400	660	17	41	830	1,948
	4	42	350	700	110	330	23	52	2,950	3,600	880	14	25	772	1,601
Electronic Dew Point Sensor	3	43	1,000	1,500	220	440	61	97	1,650	4,400	660	660	660	2,271	3,522
	4	43	1,000	1,500	220	440	61	97	2,950	3,600	880	660	660	2,216	3,192
Measurement Type: Flow Rate															
Spot Measurement															
Domestic Water															
Bucket/Stopwatch	1	44	50	100	28	28	1	2	0	0	0	0	0	29	30
Domestic Hot Water															
Bucket/Stopwatch	1	45	50	100	28	28	1	2	0	0	0	0	0	29	30
HVAC Hydronic Fluids															
Portable Ultrasonic Flow Meter	1	46	5,000	12,000	55	55	63	151	0	0	0	0	0	168	326
Refrigerant Liquid															
Portable Ultrasonic Flow Meter	1	47	5,000	12,000	55	55	63	151	0	0	0	0	0	168	326
Air in Ducts															
Portable Flow Measurement Probe	1	48	350	1,100	28	28	5	14	0	0	0	0	0	36	53
Flow Hood	1	49	1,400	2,200	28	28	18	28	0	0	0	0	0	59	77
Pressurization/Depressurization Test	5	50	1,200	1,600	110	110	16	21	0	0	0	0	0	138	147

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance		Cost per Measure-	
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)		ment Point ($)	
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Short-Term, Shared Equipment															
Domestic Water															
Portable Flow Meter	2	51	100	100	28	28	2	2	0	0	440	0	0	54	54
Domestic Hot Water															
Portable Flow Meter	1	51	100	100	28	28	2	2	0	0	0	0	0	54	54
Short-Term, Devoted Equipment															
Domestic Water															
Portable Flow Meter	3	51	100	100	28	28	2	2	0	0	660	0	0	129	129
Domestic Hot Water															
Portable Flow Meter	1	51	100	100	28	28	2	2	0	0	0	0	0	129	129
Long-Term, Devoted Equipment															
Domestic Water															
Portable Flow Meter	4	51	100	100	28	28	6	6	0	0	880	0	0	134	134
Accumulating Flow Meter	1	52	150	250	110	110	13	18	0	0	0	0	0	273	378
Pulse Flow Meter	2	53	175	300	220	220	20	26	880	2,200	440	17	33	761	1,239
	3	53	175	300	220	220	20	26	1,650	4,400	660	17	41	761	1,412
	4	53	175	300	220	220	20	26	2,950	3,600	880	14	25	704	1,066
Domestic Hot Water															
Portable Flow Meter	1	51	100	100	28	28	6	6	0	0	0	0	0	134	134
Accumulating Flow Meter	1	54	150	250	110	110	13	18	0	0	0	0	0	273	378
Pulse Flow Meter	2	55	175	300	220	220	20	26	880	2,200	440	17	33	761	1,239
	3	55	175	300	220	220	20	26	1,650	4,400	660	17	41	761	1,412
	4	55	175	300	220	220	20	26	2,950	3,600	880	14	25	704	1,066

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized
Class of Method			Purchase		Install & Remove		Maintenance		Purchase			Maintenance		Cost per Measure-
Application	DAS	Tech.	(4)		(5)		(6)		(7)		Install &	(9)		ment Point ($)
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
HVAC Hydronic Fluids															
In-line or Insertion Flow Meter	2	56	1,000	2,500	440	440	72	147	880	2,200	440	33	66	1,875	3,813
	3	56	1,000	2,500	440	440	72	147	1,650	4,400	660	33	83	1,875	3,995
	4	56	1,000	2,500	440	440	72	147	2,950	3,600	880	28	50	1,815	3,632
Refrigerant Liquid															
In-line or Insertion Flow Meter	2	57	1,000	2,500	440	660	72	158	880	2,200	440	17	33	1,859	4,011
	3	57	1,000	2,500	440	660	72	158	1,650	4,400	660	17	41	1,859	4,184
	4	57	1,000	2,500	440	660	72	158	2,950	3,600	880	14	25	1,801	3,838
Air in Ducts															
Flow Measurement Array	3	58	1,550	2,000	440	660	100	133	1,650	4,400	660	33	83	2,453	3,701
	4	58	1,550	2,000	440	660	100	133	2,950	3,600	880	28	50	2,392	3,338
Refrigerant Vapor															
Flow Measurement Array	3	59	2,000	3,500	440	660	122	208	1,650	4,400	660	33	83	2,925	5,276
	4	59	2,000	3,500	440	660	122	208	2,950	3,600	880	28	50	2,865	4,913
Measurement Type: BTU Metering															
Long-Term, Devoted Equipment															
All Applications															
Electronic BTU Meter	2	60	600	2,000	220	220	41	111	880	2,200	440	17	33	1,208	3,024
	3	60	600	2,000	220	220	41	111	1,650	4,400	660	17	41	1,208	3,197
	4	60	600	2,000	220	220	41	111	2,950	3,600	880	14	25	1,150	2,851
Data Logger - Real-Time Math	3	61	0	0	220	440	11	22	1,650	4,400	660	17	41	578	1,328
	4	61	0	0	220	440	11	22	2,950	3,600	880	14	25	520	982

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized Cost per Measurement Point ($)	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase			Maintenance			
Application	DAS	Tech.	(4)		(5)		(6)		(7)		Install &	(9)			
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Measurement Type: Non-Mechanical Ventilation															
Spot Measurement															
Instantaneous Ventilation Rate															
SF6	1	62	200	400	165	165	5	7	0	0	0	0	0	172	176
Average Ventilation Rate															
PFT	1	63	200	200	110	110	4	4	0	0	0	0	0	116	116
Inferred Infiltration Rate															
Blower Door	1	64	1,500	2,750	110	110	20	36	0	0	0	0	0	145	173
Measurement Type: Pressure															
Long-Term, Devoted Equipment															
Air in Ducts															
Pressure Transmitter	3	65	150	700	220	440	19	57	1,650	4,400	660	17	41	735	2,063
	4	65	150	700	220	440	19	57	2,950	3,600	880	14	25	677	1,717
Refrigerant Vapor															
Pressure Transmitter	3	66	350	900	220	440	29	67	1,650	4,400	660	17	41	945	2,273
	4	66	350	900	220	440	29	67	2,950	3,600	880	14	25	887	1,927
Liquid in Pipe															
Pressure Transducer	3	67	600	1,200	220	440	41	82	1,650	4,400	660	17	41	1,208	2,588
	4	67	600	1,200	220	440	41	82	2,950	3,600	880	14	25	1,150	2,242
Measurement Type: Solar Radiation															
Short-Term, Shared Equipment															
Direct Solar Radiation															
Pyrheliometer	3	68	9,000	10,500	440	440	118	137	1,650	4,400	660	17	29	2,990	3,519
	4	68	9,000	10,500	440	440	118	137	2,950	3,600	880	11	17	2,929	3,383

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized
Class of Method			Purchase		Install & Remove		Maintenance		Purchase		Install &	Maintenance		Cost per Measure-
Application	DAS	Tech.	(4)		(5)		(6)		(7)			(9)		ment Point ($)
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Global Radiation															
Pyranometer	3	69	200	1,000	220	220	5	15	1,650	4,400	660	17	29	457	803
	4	69	200	1,000	220	220	5	15	2,950	3,600	880	11	17	396	667
Short-Term, Devoted Equipment															
Direct Solar Radiation															
Pyrheliometer	3	68	9,000	10,500	440	440	118	137	1,650	4,400	660	33	83	9,921	11,984
	4	68	9,000	10,500	440	440	118	137	2,950	3,600	880	28	50	9,861	11,621
Global Radiation															
Pyranometer	3	69	200	1,000	220	220	5	15	1,650	4,400	660	33	83	788	2,143
	4	69	200	1,000	220	220	5	15	2,950	3,600	880	28	50	728	1,780
Long-Term, Devoted Equipment															
Direct Solar Radiation															
Pyrheliometer	3	68	9,000	10,500	440	440	472	547	1,650	4,400	660	33	83	10,275	12,395
	4	68	9,000	10,500	440	440	472	547	2,950	3,600	880	28	50	10,215	12,032
Global Radiation															
Pyranometer	3	69	200	1,000	220	220	21	61	1,650	4,400	660	33	83	804	2,189
	4	69	200	1,000	220	220	21	61	2,950	3,600	880	28	50	744	1,826
Measurement Type: Door Position															
Long-Term, Devoted Equipment															
All Applications															
Contact Closure	2	70	75	75	110	220	9	15	880	2,200	440	17	33	541	1,003
	3	70	75	75	110	220	9	15	1,650	4,400	660	17	41	541	1,176
	4	70	75	75	110	220	9	15	2,950	3,600	880	14	25	483	830
Measurement Type: Production Rate															
Note: Requires Site Specific Measurement Design															

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized Cost per Measurement Point ($)	
Class of Method			Purchase (4)		Install & Remove (5)		Maintenance (6)		Purchase (7)		Install &	Maintenance (9)			
Application	DAS	Tech.													
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Measurement Type: RPM															
Spot Measurement															
All Applications															
Portable Tachometer/Stroboscope	1	71	250	400	28	28	3	5	0	0	0	0	0	33	37
Long-Term, Devoted Equip.															
All Applications															
Electronic RPM Sensor	3	72	300	600	220	440	26	52	1,650	4,400	660	17	41	893	1,958
	4	72	300	600	220	440	26	52	2,950	3,600	880	14	25	835	1,612
Measurement Type: "On Time"															
Short-Term, Shared Equipment															
Device or Appliance															
Status Sensor	2	73	55	55	220	220	3	3	880	2,200	440	8	12	410	497
	3	73	55	55	220	220	3	3	1,650	4,400	660	8	14	410	540
	4	73	55	55	220	220	3	3	2,950	3,600	880	6	8	353	410
Short-Term, Devoted Equipment															
Device or Appliance															
Status Sensor	2	73	55	55	220	220	3	3	880	2,200	440	17	33	625	971
	3	73	55	55	220	220	3	3	1,650	4,400	660	17	41	625	1,145
	4	73	55	55	220	220	3	3	2,950	3,600	880	14	25	567	798
Long-Term, Devoted Equipment															
Device or Appliance															
Status Sensor	2	73	55	55	220	220	14	14	880	2,200	440	17	33	635	982
	3	73	55	55	220	220	14	14	1,650	4,400	660	17	41	635	1,155
	4	73	55	55	220	220	14	14	2,950	3,600	880	14	25	578	809

Table of Site Specific Measurement Methods

Measurement Methods			Sensor Cost ($)						Data Acquisition System Cost ($)					Total Amortized	
Class of Method			Purchase		Install & Remove		Maintenance		Purchase			Maintenance		Cost per Measure-	
Application	DAS	Tech.	(4)		(5)		(6)		(7)		Install &	(9)		ment Point ($)	
Sensor Type	Type	Note	Low	High	Low	High	Low	High	Low	High	Remove	Low	High	Low	High
(1)	(2)	(3)	(4.a)	(4.b)	(5.a)	(5.b)	(6.a)	(6.b)	(7.a)	(7.b)	(8)	(9.a)	(9.b)	(10)	(11)
Measurement Type: Wind Speed															
Spot Measurement															
All Applications															
Hand Held Anemometer	1	74	60	60	14	14	1	1	0	0	0	0	0	15	15
Short-Term, Shared Equipment															
All Applications															
Recording Anemometer	3	75	350	500	220	440	7	12	1,650	4,400	660	17	29	496	894
	4	75	350	500	220	440	7	12	2,950	3,600	880	11	17	436	758
Short-Term, Devoted Equipment															
All Applications															
Recording Anemometer	3	75	350	500	220	440	7	12	1,650	4,400	660	33	83	940	1,859
	4	75	350	500	220	440	7	12	2,950	3,600	880	28	50	880	1,496
Long-Term, Devoted Equipment															
All Applications															
Recording Anemometer	3	75	350	500	220	440	29	47	1,650	4,400	660	33	83	962	1,895
	4	75	350	500	220	440	29	47	2,950	3,600	880	28	50	901	1,532
Meteorological Grade Recording Anemometer	3	76	1,500	2,500	440	880	97	169	1,650	4,400	660	33	83	2,400	4,457
	4	76	1,500	2,500	440	880	97	169	2,950	3,600	880	28	50	2,340	4,094