8.6

EPA/600/X-85/332b

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

REPORT

CHARACTERIZATION OF INHALABLE PARTICULATE MATTER EMISSIONS FROM A DRY PROCESS CEMENT PLANT

FINAL REPORT

February 24, 1983

Volume II

APPENDICES

EPA Contract No. 68-02-3158, Technical Directive No. 16
MRI Project No. 4892-L(64)

For

Industrial Environmental Research Laboratory
Environmental Protection Agency
5555 Ridge Avenue
Cincinnati, Ohio 45268

Attn: Charles H. Darvin

CHARACTERIZATION OF INHALABLE PARTICULATE MATTER EMISSIONS FROM A DRY PROCESS CEMENT PLANT

by

Mark D. Hansen
John S. Kinsey

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APPENDIX A

FIELD TEST PERIOD NO. 5 KILN OPERATIONS LOG

KILN NO. 5 OPERATIONS LOG

DATE 11-11-81

	PREHEATER OPERATION DATA												KILN OPERATION DATA									COOLER DATA						REMARKS
	TEMPERATURES					FREE LIME	DRAFT READINGS															AIR PRESS COMPARTMENT						
	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.		BAG HSE IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	KILN SPD.	BURN ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW C.F.H.	I.D. FAN AMP	1	2	3	4	BAG HSE. IN. TEMP.	CLR. SPD SPM	
7A	570	680	1090	1400	1550		9.5	17.5	11.5	9.4	50	1	110		811903	52			982927	3.1	90	10.4	9.4	5.4	4.8	310°	5.4	Temp Less 100°
8A	570	680	1080	1400	1550		9.5	17.5	11.5	9.4	50	1	110			52			20162010	3.1	90	10.4	9.6	4.2	3.8	350°	5.0	RPM - 1090
9A	560	680	1080	1375	1550		9.5	180	11.5	9.6	50	.1	110			52				3.2	90	10.4	9.4	4.0	3.6	350	5.0	
10A	560	680	1080	1375	1550		9.5	180	115	9.4	50	.1	110			52				3.0	90	10.0	9.6	4.6	4.0	340	6.0	
11A	560	680	1080	1375	1550	.77	9.5	180	11.0	9.0	48	.2	110			52				3.1	90	10.0	9.4	4.4	4.0	330	5.0	
12N	560	700	1100	1400	1550		9.5	17.0	11.0	9.2	46	.2	106			50				3.2	90	10.0	10.0	5.2	4.6	340	6.4	
1P	560	690	1090	1400	1550		9.5	17.0	115	9.6	46	.2	108			52				3.1	90	10.6	10.0	6.0	4.6	350	8.0	
2P	560	690	1090	1400	1550		9.5	17.0	11.5	9.0	48	.2	108			52				3.1	90	10.0	9.8	4.6	3.8	330	5.0	
3P	560	680	1080	1375	1550		9.5	17.0	11.0	9.0	46	.2	108			52			982933	3.0	90	11.0	9.4	4.6	4.0	370	6.0	
4P	560	680	1070	1375	1550		9.5	175	11.5	9.6	50	2	108		811420	52			20189740	3.0	90	11.0	9.6	4.6	3.6	340	6.0	
5P	560	680	1080	1375	1550		10.0	170	11.0	9.4	46	—	108			57				3.0	92	10.6	9.6	5.6	4.6	320°	4.0	
6P	560	680	1070	1375	1530		10.0	170	11.0	9.4	48	—	105			57				3.0	92	10.6	9.8	5.6	5.0	310°	5.0	
7P	560	680	1070	1375	1550	51	9.5	175	11.0	9.4	48	—	108			57				3.0	90	10.0	9.8	5.6	4.6	330°	5.2	
8P	560	690	1090	1400	1550		9.5	175	11.0	9.0	46	.5	100			46.5				3.0	92	10.2	9.4	6.0	5.0	330°	3.0	1090 RPM - less than 100°
9P	560	690	1090	1375	1550		10.0	170	11.0	9.2	46	.4	104			49				3.0	90	10.6	9.8	6.0	5.0	330°	5.0	
10P	560	680	1080	1400	1550		10.0	175	11.5	9.6	50	.3	107			50.5				3.0	90	10.0	9.6	6.0	5.0	370°	6.0	
11P	550	680	1080	1375	1525		9.5	175	11.0	9.4	50	.4	108			57			685 982940	3.0	90	10.6	9.8	5.0	4.4	330°	4.2	
12M	550	680	1080	1375	1550		10.0	170	11.0	9.2	48	.5	108		820465	57			20171350	3.0	94	10.6	9.6	5.6	4.8	330°	4.2	
1A	550	680	1080	1375	1550		10.0	170	11.0	9.2	48	5	108			51				3.0	90	10.6	9.6	6.0	5.0	330°	5.0	1080 - 100°
2A	550	680	1080	1375	1550		10.0	17.0	11.5	9.4	50	.8	108			51				3.0	90	10.6	9.8	5.6	4.2	350°	5.0	
3A	560	680	1080	1375	1550	.97	10.0	17.0	11.5	9.0	5.0	8	108			51				3.0	90	10.6	9.6	5.6	4.6	350°	5.0	
4A	560	680	1080	1375	1550		10.0	17.0	11.5	9.4	50	8	108			51				3.0	90	10.6	10.0	5.6	4.6	340°	4.0	
5A	560	680	1080	1375	1550		10.0	175	11.5	9.6	52	.7	108			51				3.0	90	10.6	10.0	6.0	5.2	330°	6.0	
6A	560	680	1090	1375	1550		10.0	175	11.5	9.4	52	.7	108			51			982947	3.1	90	10.0	9.8	5.6	4.6	350°	5.0	
7A	560	680	1090	1375	1550		10.0	175	11.5	9.4	52	7	108		824002	51			20135050	3.1	90	10.0	9.8	5.0	4.0	330°	6.4	

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KILN NO. 5 OPERATIONS LOG

DATE 11-13-8[illegible]

	PREHEATER OPERATION DATA												KILN OPERATION DATA									COOLER DATA						REMARKS
	TEMPERATURES					FREE LIME	DRAFT READINGS															AIR PRESS COMPARTMENT						ID FAN TEMP 100°F SPEED 1090RPM @ 3100RPM
	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	KILN SPD.	BURN. ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW CFH.	I.D. FAN AMP.	1	2	3	4	BAG HSE. IN. TEMP.	CLR SPD. SPM	
7A	570	680	1080	1400	1550		9.0	17.5	11.5	9.6	5	4	110		836152	55			Gas 923097 Coal 20309830	3.1	90	10.6	9.8	6.6	5.0	360°	6.4	
8A	670	680	1080	1400	1550		9.0	17.5	11.5	9.6	5	4	110			50				3.1	96	10.6	9.4	6.0	5.0	350°	4.4	
9A	570	680	1080	1375	1550		9.0	17.5	11.5	9.2	5.0	.5	106			53				3.15	92	10.6	10.0	5.8	4.6	340°	6.6	
10A	570	680	1080	1400	1550		9.0	18.0	12.0	10.0	5.2	.5	108			54				3.2	90	10.6	9.6	5.4	4.4	340°	7.0	
11A	570	680	1080	1390	1550	1.33	9.5	18.0	12.0	10.2	5.6	.5	108			54				3.25	92	10.6	9.4	4.8	4.0	360°	6.0	
12N	570	670	1070	1360	1540		9.5	18.0	12.0	9.6	5.2	.3	110			55				3.1	90	10.4	9.2	4.4	3.6	320°	5.6	
1P	570	660	1060	1350	1525		9.5	18.0	12.0	10.2	5.2	.4	110			55				3.1	90	10.6	9.4	4.8	4.2	350°	4.6	
2P	570	670	1070	1375	1550		9.0	17.5	11.5	10.0	5.0	.3	110			55				3.1	90	10.8	9.8	4.4	4.0	360°	5.8	
3P	560	670	1070	1375	1550		9.0	17.5	11.5	10.0	5.0	.3	110			55				3.1	92	10.8	9.8	4.4	3.6	340°	6.8	
4P	560	670	1060	1375	1550		9.0	18.0	12.0	11.0	5.4	.6	110		840877	55			20337050	3.1	90	10.6	9.6	4.8	4.0	320°	6.6	
5P	570	660	1060	1375	1550		8.5	18.0	12.0	10.0	5.4	.8	110			55			30	3.1	90	10.6	9.6	4.4	3.8	360	6.0	
6P	570	670	1060	1375	1550	3.26	8.5	18.0	12.0	10.0	5.2	.5	110			55				3.1	90	10.0	9.6	4.2	3.8	330°	6.0	
7P	570	680	1070	1375	1550		8.5	18.0	12.0	10.2	5.4	.6	110			55				3.1	90	10.0	9.0	5.0	4.0	320°	5.4	
8P	570	660	1060	1375	1550		8.5	18.0	12.0	10.2	5.4	.5	110			55				3.1	90	10.0	9.6	5.6	4.6	360	5.4	
9P	570	670	1070	1375	1550		8.5	18.0	12.0	10.2	5.4	.6	110			55				3.1	90	10.6	10.0	5.4	4.6	360	5.4	
10P	570	680	1070	1375	1550		8.0	17.5	12.0	10.0	5.2	.5	110			55				3.1	90	10.4	9.2	4.8	4.0	360	2.0	
11P	570	660	1070	1375	1550		8.0	18.5	12.5	10.4	5.6	.5	110			55				3.1	92	10.4	9.8	5.8	4.6	330	6.6	
12M	570	670	1070	1375	1550		8.0	18.5	12.0	10.2	5.4	.5	110		845070	55			983160 20861800	3.1	90	10.8	10.0	5.6	5.0	340	5.0	
1A	570	675	1070	1375	1550		8.0	18.5	12.0	10.2	5.4	.5	110			55				3.1	90	10.4	10.0	5.8	4.8	350°	5.6	
2A	570	670	1070	1375	1550		8.0	18.0	12.0	10.0	5.4	.5	110			55				3.1	90	10.4	9.0	5.6	4.4	350°	5.0	
3A	570	670	1070	1375	1550	1.7	[illegible]	18.[illegible]	[illegible]	10.0	5.4	.5	110			55				3.1	90	10.4	9.6	5.2	4.4	350°	5.0	RPM 1080 100°
4A	570	670	1070	1375	1550		8.0	18.0	12.0	10.4	5.4	.5	110			55				3.1	90	10.4	9.4	5.8	4.8	360°	4.6	
5A	570	670	1070	1375	1550		8.0	18.0	12.0	[illegible]	5.4	.5	110			55				3.1	90	10.4	9.5	5.8	4.8	360	5.0	
6A	570	670	1070	1375	1550		8.0	18.0	12.0	10.4	5.4	.5	100			49			9[illegible] 5[illegible]316.6 Coal 20393320	3.1	90	10.4	9.8	6.0	4.8	340°	3.0	
7A	570	670	1080	1375	1550		8.0	18.0	12.0	10.4	5.0	.5	108		848972	53				3.1	90	10.4	9.6	5.6	4.4	350°	5.0	

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KILN NO. 5 OPERATIONS LOG

DATE

	PREHEATER OPERATION DATA												KILN OPERATION DATA									COOLER DATA						REMARKS
	TEMPERATURES					FREE LIME	DRAFT READINGS															AIR PRESS COMPARTMENT						
	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	[redacted]	BAG HSE. IN.	STG. 1 OUT.	STG. 2 OUT.	STG. 3 OUT.	STG. 4 OUT.	KILN EXIT	KILN SPD	BURN. ZONE TEMP.	FEED COUNT.	FEED T.P.H.	CLINK. COUNT.	CLINK T.P.H.	GAS FLOW COUNT.	GAS FLOW C.F.H.	I.D. FAN AMP	1	2	3	4	BAG HSE. IN. TEMP.	CLR SPD SPM	
7A															858				Gas 983220 Coal 204,7220									
8A																												
9A														Main burner lit at 1:50 PM -														
10A														feed on at 3:15 PM														
11A						.82																						
12N																												
1P																												
2P																												
3P																			9,241,80									
4P	560	700	1080	1300	1400		90	135	95	70	32	.6	60		858160	30			204,9220	2000	88	80	40	20	16	100	20	
5P	570	700	1150	1325	1500		90	140	95	78	34	.5	68			35				4000/2000	90	104	88	36	20	350°	30	
6P	570	660	1040	1325	1425		85	180	120	100	56	.6	90			45				4000	88	100	90	40	30	330°	40	
7P	560	670	1080	1375	1500		85	120	115	92	48	.6	88			435				3.2	88	100	86	36	30	280°	36	
8P	570	700	1120	1425	1550		100	155	105	84	40	.5	94			46				3.1	90	106	96	60	46	360°	46	
9P	560	690	1080	1375	1525		90	125	120	98	52	.6	104			50				3.1	86	106	90	54	44	340°	46	
10P	570	680	1100	1400	1530		90	110	115	92	46	.4	104			50				3.1	88	110	100	56	50	350°	60	
11P	570	690	1090	1400	1550		95	165	115	94	50	.7	106			50			LBS 565816 CUFT 20460800	3.1	88	102	94	60	46	330°	40	
12M	570	680	1080	1400	1530		95	165	115	96	48	.8	106		861365	50				3.1	88	106	98	60	48	330°	50	
1A	570	690	1090	1400	1550		90	165	115	94	46	.8	106			50				3.1	88	108	94	48	40	330°	50	
2A	560	660	1100	1400	1550		95	120	115	98	50	.8	106			50				3.1	92	110	94	50	40	330°	56	
3A	570	700	1110	1400	1550	1.33	95	165	115	94	46	.6	106			50				3.1	92	106	92	54	36	350	40	1100 RPM -100°
4A	570	700	1100	1400	1550		95	120	115	94	48	.6	108			51				3.1	92	106	96	58	48	330	44	
5A	570	700	1100	1400	1550		90	165	115	94	46	.8	108			51				3.1	92	106	98	60	50	350	44	
6A	570	700	1100	1400	1550		90	180	120	100	54	.8	108			51				3.1	92	96	96	50	42	370	60	
7A	570	690	1080	1400	1550		100	125	110	96	50	.5	108			51				3.1	92	104	92	56	46	350	44	

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APPENDIX B

CALIBRATION DATA

POSTTEST CALIBRATION CHECKS

(Method 5, Figure 5.1)

Plant Humboldt Calibrated by RCS

Meter box number 6 Date 11-25-81

Dry Gas Meter

Pretest calibration factor, Y 0.994 (within ±2%)
Posttest check, Y* 1.014 (within ±5% of pretest)
Recalibration required? _____ yes ✓ no
If yes, recalibration factor, Y _____ (within ±2%)
Lower calibration factor, Y 0.994 for calculations (pretest or posttest)

Dry Gas Meter Thermometers

Was a pretest temperature correction used? _____ yes ✓ no
If yes, temperature correction _____ (within ±3°C (5.4°F) over range)
Posttest comparison with mercury-in-glass thermometer?* (within ±6°C (10.8°F) at ambient temperature)
Recalibration required? _____ yes ✓ no
Recalibration temperature correction? _____ (within ±3°C (5.4°F) over range)*
If yes, no correction necessary for calculations if meter thermometer temperature is higher; if calibration temperature is higher, add correction to average meter temperature for calculations Ref. Therm. = ASTM 63F # A 06653
Ref. = 62°F In = 62
Out = 62.5

Stack Temperature Sensor

Was a pretest temperature correction used? _____ yes _____ no
If yes, temperature correction _____°C (°F) (within ±1.5% of readings in K (°R) over range)
Average stack temperature of compliance test, T_s _____ K (°R)
Temperature of reference thermometer or solution for recalibration _____ K (°R)* (within ±10% of T_s)
Temperature of stack thermometer for recalibration _____ K (°R)
Difference between reference and stack thermometer temperatures, ΔT_s _____ K (°R)
Do values agree within ±1.5%?* _____ yes _____ no
If yes, no correction necessary for calculations
If no, calculations must be done twice--once with the recorded values and once with the average stack temperature corrected to correspond to the reference temperature differential (ΔT_s); both final result values must be reported since there is no way to determine which is correct

(continued)

POSTTEST CALIBRATION CHECKS

(Method 5, Figure 5.1)

Plant Humboldt Calibrated by RCS

Meter box number 9 Date 11-25-81

Dry Gas Meter

Pretest calibration factor, Y 1.069 (within ±2%)
Posttest check, Y* 1.073 (within ±5% of pretest)
Recalibration required? _____ yes ✓ no
If yes, recalibration factor, Y _____ (within ±2%)
Lower calibration factor, Y 1.069 for calculations (pretest or posttest)

Dry Gas Meter Thermometers

Was a pretest temperature correction used? _____ yes ✓ no
If yes, temperature correction _____ (within ±3°C (5.4°F) over range)
Posttest comparison with mercury-in-glass thermometer?* (within ±6°C (10.8°F) at ambient temperature)
Recalibration required? _____ yes ✓ no
Recalibration temperature correction? _____ (within ±3°C (5.4°F) over range)*
If yes, no correction necessary for calculations if meter thermometer temperature is higher; if calibration temperature is higher, add correction to average meter temperature for calculations Ref. Therm. = ASTM 63F # A 06653
Ref. = 64°F In = 62.5°
OUT = 63.5°

Stack Temperature Sensor

Was a pretest temperature correction used? _____ yes _____ no
If yes, temperature correction _____°C (°F) (within ±1.5% of readings in K (°R) over range)
Average stack temperature of compliance test, T_s _____K (°R)
Temperature of reference thermometer or solution for recalibration _____K (°R)* (within ±10% of T_s)
Temperature of stack thermometer for recalibration _____K (°R)
Difference between reference and stack thermometer temperatures, ΔT_s _____K (°R)
Do values agree within ±1.5%?* _____ yes _____ no
If yes, no correction necessary for calculations
If no, calculations must be done twice--once with the recorded values and once with the average stack temperature corrected to correspond to the reference temperature differential (ΔT_s); both final result values must be reported since there is no way to determine which is correct

(continued)

STACK TEMPERATURE ~~SENSOR~~ Meter CALIBRATION DATA FORM

Date 11-30-81 ~~Thermocouple~~ Pyrometer number 9517

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~	Thermocouple potentiometer temperature, ~~°C~~	Temperature difference,[c] %
	Ice Bath	32°F	32°F	±0
	Ref. Thermometer =		ASTM 63F	SN A 06653
	Boiling H_2O	211°F	211°F	±0
	Ref. Therm. = ASTM		67F SN	579382

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%.$

STACK TEMPERATURE ~~SENSOR~~ Meter CALIBRATION DATA FORM

Date 11-30-81 ~~Thermocouple~~ Pyrometer number 9519

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass See Below

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, ~~°C~~	Thermocouple potentiometer temperature, ~~°C~~	Temperature difference,[c] %
	Ice Bath	32°F	32°F	± 0
	Ref. Therm. = ASTM 63F SN A06653			
	Boiling H_2O	211°F	211°F	± 0
	Ref. Therm. = ASTM 67F SN 579382			

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1$

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Meth 5 Inlet

Date 11-19-81 Thermocouple number 63-1

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	419 °F	417 °F	-0.2 %

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1$

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM
HCSS Inlet

Date 11-19-81 Thermocouple number 12-1

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	oil Bath	499°F	495°F	-0.4%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1$

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Meth. 17 Outlet

Date 11-19-81 Thermocouple number 8-63-1

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
		498°F	497°F	-0.1 %

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%.$

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Meth. 17 Outlet

Date 11-19-81 Thermocouple number 83-2

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	415°F	412°F	-0.3%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%.$

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Short Traverse Pitot

Date 11-19-81 Thermocouple number 6-6

Ambient temperature _____ °C Barometric pressure _____ in. Hg

Calibrator RCS Reference: mercury-in-glass ASTM 69F #2954

other _____

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
	Oil Bath	430°F	430°F	±0%
	" "	500°F	499°F	-0.2%

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c] $\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%.$

15 μM

NOZZLE CALIBRATION Presseparator – Particle Size Tests

Date 11-9 '81 Calibrated by RCS

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
60 - 3.0	.117	.119	.119	.002	.118
60 - 3.5	.137	.138	.137	.001	.137
60 - 4.0	.156	.158	.156	.002	.157
60 - 4.5	.177	.176	.176	.001	.176
60 - 5.0	.197	.194	.195	.003	.195
60 - 6.0	.234	.234	.235	.001	.235
60 - 7.0	.274	.271	.275	.004	.273
60 - 8.5	.335	.332	.333	.003	.333
60 - 10	.392	.394	.394	.002	.393
60 - 12.0	.470	.471	.470	.001	.470
60 - 14.5	.565	.566	.568	.003	.566

where:

$D_{1,2,3}$ = nozzle diameter measured on a different diameter, in.
Tolerance = measure within 0.001 in.

ΔD = maximum difference in any two measurements, in.
Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

Nozzle calibration data.

42 .249