CENTRAL POLLUTION CONTROL BOARD
Parivesh Bhawan, East Arjun Nagar, Delhi 110032
AIR LABORATORY

SOURCE EMISSION MONITORING FIELD DATA SHEET

Part 1 (General Information)

01	Name and Type of Industry	:		
02	Address	:		
03	Stack Attached to	:		
04	Type of Fuel	:		
05	Installed Capacity in terms of fuel use	:	Q / hour	
06	Running Load on day of monitoring	:	Q / hour	
07	Height of the Stack	:	meter	
08	Type of stack at sampling Port	:	(Circular or Rectangular)	
09	Height of Port Hole (from Ground Level) Height /Distance of Port Hole (from last Disturbance)	:	meter meter	
10	Dimension of Stack (Internal Diameter for circular and Internal Length & Width for duct) in meter	:	meter	
11	Number of accessible Port Holes	:		
12	Collar length from inner wall	:	cm	
13	Scheme of Air Pollution Control Devices	:		
14	Position and Capacities of ID and FD Fans	:		
Name & Signature of Representative of Plant		:		
Name & Signature of Representative of CPCB		:		
Date & Time of Monitoring		:		
Sampling Registration No.		:		

Part 2
(Technical Information)

01	Reference of Sampling Plan	:	
02	Sampling Team	:	
03	Stack Monitoring Kit ID No.	:	
	Calibration due date	:	
04	Pitot Constant	:	
05	Calibration Factor for Dry Gas Meter (CF_{DGM})	:	
06	Thimble number		
07	Number of Traverse Points with respect to Stack Diameter or Equivalent Diameter for Rectangular Stack		< 0.3 m = 4 0.3 – 0.6 m = 8 0.6 – 1.2 m = 12 1.2 – 2.4 m = 20 > 2.4 m = 32

08	Traverse distance from inner wall in cm	:	A	B	C	D	E	F	G	H
			H	G	F	E	D	C	B	A
09	Traverse distances with collar in cm		A	B	C	D	E	F	G	H
			H	G	F	E	D	C	B	A

10	Atmospheric Pressure at Platform level mm Hg (P_{bar}); if P_{bar} has been noted at ground level altitude correction has to be done @ 1 mm of Hg less / 10 m	:	
11	Measurement of Flue gas concentration	:	Average CO_2 % = Average O_2 % = Average (CO + N_2) % = {100 – (% CO_2 + % O_2)}
12	Calculation of Dry Molecular Weight (M_d)		CO_2 % x 0.44 (X) = O_2 % x 0.32 (Y) = (CO + N_2) % x 0.28 (Z) = (X) + (Y) + (Z) =
13	a) Determination of Moisture by Condensate Method		

Set 2 – 3 LPM in Gas manifold. Keep 50 ml chilled water in impinger, Keep sufficient ice for condensation. Run pump with Blank or old thimble for at least 30 min for collection of condensate.

Note the readings of : T_m during run and Vacuum Pressure at start (PM_i) and just before putting off the pump (PM_f) Calculate P_m = {(PM_f) – (PM_i)} / 2

Volume of condensate (V_c) = (Total Volume of water in impinger – 50) ml

$$V_v\ (m^3) = \frac{(V_c * 22.4 * T_m * 760)}{\{(1000 * 18 * 273 * (P_{bar} - P_m)\}}$$

Where,

V_v = Equivalent vapour volume of condensate

P_m = Average Vacuum Pressure mm Hg.

P_{bar} = Atmospheric pressure in the stack mm Hg.

Vc = Vol. of condensate (ml)

T_m = Metering temperature (K)

$$\text{Moisture Fraction } (BW_0) = \frac{(V_v)}{(V_v + V)}$$

Moisture % (M%) = $(BW_0) * 100$

Where,

V = Volume of air sampled in m^3

b) Determination of Moisture by Dry and Wet Method (Psychrometric)

Wrap the tip of thermocouple by wet cloth

Put it inside the Stack, Block port hole to prevent air ingress

Observe the temperature readings; primarily it increases steadily then the increment slows down for 30 – 40 seconds and then shoots up rapidly. Note down the average temperature readings in valley region (during that 30 – 40 seconds when it slows down). This is Wet Temperature

Remove wet cloth, insert thermocouple again in stack, Take Dry Temperature readings

Using Wet Temperature, Dry Temperature and Barometric Pressure data calculate % Moisture from excel sheet through Psychrometric formulae

14	Molecular Weight on Wet basis (M_S)	:	$M_S = M_d (1 - BW_0) + 18\ BW_0$

		A	B	C	D	E	F	G	H
15	Stack temperature, T_S= °C + 273 K								
		H	G	F	E	D	C	B	A
16	Differential pressure, ΔP	A	B	C	D	E	F	G	H
		H	G	F	E	D	C	B	A

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			A	B	C	D	E	F	G	H
17	Static Pressure ΔP_S mm H_2O Unplug +ve end of pitot, rotate it at 90 ° take reading of displacement									
18	Average Static Pressure ΔP_S mm H_2O									
19	Absolute stack pressure, P_S mm Hg $Ps = P_{bar} \pm (\Delta P_S / 13.6)$ Negative if it is under suction Positive if it is under forced draught									
	Velocity (V) = $34.94 * Cp \sqrt{\{(\Delta P * Ts) / (P_S * M_S)\}}$ (m/s)									
20	Average Velocity (m/s)									
21	Iso Kinetic discharge Rate at nozzle $(R_S) = 6 * V * A_N = LPM$ Area of Nozzle (A_N) : ($S = 0.3167 * 10^{-4}$, $M = 0.7123 * 10^{-4}$, $L = 1.267 * 10^{-4}$)									
22	Iso Kinetic sampling rate at metering point $(R_M) = R_S[\{(T_M / T_S) * \{P_S / (P_{bar} - P_{M0})\} * (1 - B_{wo})\}]$ LPM P_{M0} is vacuum pressure at start of sampling									
23	Total required sampling time (Minutes) For 1 m^3 sample = $(1000 / R_M)$ Minutes									
24	Sampling duration at each traverses (Min.)									
25	Vol. of flue gas sampled at each traverse in litre									
26	Total vol. of flue gas sampled (V_G) litre									
27	Pressure Drop (P_M) mm of Hg At each sampling point	Initial (P_{Mi})								
		Final (P_{Mf})								
28	Average Pressure Drop $(P_M) = \{(P_{Mf} - P_{Mi})/2\}$ mm of Hg Vacuum at start and end of sampling									
29	T_M (Temperature readings at meter) °C									
30	Average T_M (K) = °C + 273									
31	Vol. of air sampled at normal condition $(V_N) = V_G * \{(P_{bar} - P_M) / 760\} * \{(273 + 25) / (273 + T_m)\}$ Nm^3									
32	Initial Reading of DGM (I_{DGM}) m^3									
33	Final Reading of DGM (F_{DGM}) m^3									
34	Total Dry Volume Passed (V_{DGM})	$V_{DGM} = (F_{DGM} - I_{DGM}) * CF_{DGM}$ m^3								
35	Vol. of air passed through DGM at normal condition									

	$(V_{NDGM}) = (V_{DGM}) *\{(P_{bar} - P_M) / 760\} * \{(273 + 25) / (273 + T_m)\}$ Nm^3	
36	Isokineticity $((V_{NDGM} - V_N) / V_{NDGM} *100$ should be $\leq 10\%$	

Part 2 A
(Technical Information)

01	**Particulars of gaseous sampling**						
	Name of parameter	Name of method	Absorbing solution used	Volume of absorbing solution	Flow rate lpm	Sampling time minutes	Remarks

02	Particulars of NO_X Sampling

Sample No	Initial Readings			Final Readings		
	Atmospheric Pressure (mm Hg)	Vacuum Pressure (mm Hg)	Temperature of Flue gas (K)	Atmospheric Pressure (mm Hg)	Vacuum Pressure (mm Hg)	Temperature of Flue gas (K)

03	Observation during monitoring (if any)	
04	Name & designation of official who indented the monitoring	Name & Signature of Team Leader

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