CEMS -THE ULTIMATE TOOL FOR EMISSION REGULATION

THE STATUS IN INDIA, ISSUES & PLANS

Central Pollution Control Board

INITIATION OF CEMS IMPLEMENTATION IN INDIA

SN	Events	Date
01	DIRECTIONS UNDER SECTION 18(1)(b) OF THE WATER (PREVENTION CONTROL OF POLLUTION) ACT, 1974 and THE AIR (PREVENTION Et CONTROL OF POLLUTION) ACT, 1981 IN THE MATTER OF POLLUTION CONTROL IN 17 CATEGORY OF HIGHLY POLLUTING INDUSTRIES , CETPs AND COMMON HAZRDOUS WASTE 8 BIOMEDICAL WASTE INCINERATORSREGARDING SELF MONITORING OF COMPLIANCE	05.02.2014
02	Same as above	02.03.2015

Directions issued under (NGRBA) dated 27.03.2015
Letters to Chairmen of SPCBs dated 29.05.2015
Empanel Web Advertisement dated 22.04.2015
Web/Press Advertisement dated 23.04.2015
Draft Notification on online monitoring protocol dated 19.04.2015
Online Monitoring IT Protocol dated 11.06.2015
Minutes of the Meeting with Industrial Associations dated 16.06.2015
Guidelines on Effluent Monitoring dated 07.11.2014
List of Revised Parameters
List of CPCB Officers for 17 Categories
List of 17 Categories of Industries alongwith Industry Codes (Master List of 3260)
List of Instrument suppliers updated 30.06.2015

CEMS (Continuous Emissions Monitoring System)

The system composed of Equipment, Instrument to draw, condition, analyze the flue gas sample and provide permanent record of emissions or process control parameters continuously at real time basis is called Continuous Emissions Monitoring System (CEMS)

Benefits of CEMS

- Provides real time data.
- Remotely accessible to operator/regulator.
- Greater transparency in monitoring of performance.
- Continuous performance check of Air Pollution Control Devices and optimization of resources used.
- Time series analysis possible with continuous data.
- Reduction in regulatory cost as well as long term monitoring cost.
- Expected better compliance through self regulation by industry hence lower emission.
- Primary requirement for participation in market driven pollution control venture (ETS)

COMPONENTS OF A CEMS

- Sample Collection — sampling device
- Interface – Sample conditioning & transportation wherever required
- Analyzer — Specific to pollutants, generates an output signal proportional to the concentration
- Calibration devices – Analyzer control system, calibration gases, recording etc.
- Data Acquisition – Data logging system record electrical signals in defined number of channels
- Data Handling System— Pick, calculate, record, transfer the data in report form to desired destination
- Additional Devices: Flow Rate (Velocity Monitor, Temperature sensor, Moisture monitoring device, Diluent Gas monitoring Devices

17 Categories of Industry, their emission standards and probable options for CEMS

SN	Industries	Pollutants Emission Limits	Recommended CEMS Options
1	Aluminium Smelting		
	Raw Material Handling	PM – 150	In situ PM CEMS NDIR for CO FTIR for CO and F DOAS for all
	Calcinations	PM – 250 CO – 1% (Max)	
	Green Anode Shop	PM – 150	
	Anode Bake Oven	PM – 50 Total Fluoride – 0.3 Kg/MT of Al	
	Pot room	PM – 150 Total Fluoride – 2.8 Kg/MT of Al for Soderberg Technology Total Fluoride – 0.8 kg/t for Pre-baked Technology	
2	Basic Drugs & Pharmaceuticals	For incinerator PM – 50 SO2 – 200 CO – 100 TOC – 20 PCDDs /F – 0.2ng TEQ/NM^3 (existing) PCDDs /F – 0.1ng TEQ/NM^3 (New commissioned after July 2009) Metals – 1.5	Preferably Extractive PM CEMS NDIR for CO IR GFC, FTIR, DOAS for multi-gas analysis FID for HC (TOC) PCDDs, Metal not possible by CEMS
3	Chlor Alkali (Hg Cell) (H_2 Gas stream) (Hypo tower) (HCl Plant)	Hg – 0.2 Cl_2 – 15 HCl vapour and Mists – 35	FTIR for multi-gas
4	Cement (200TPD and above)	PM – 250	In-situ PM CEMS Preferably Extractive PM CEMS NDIR for CO IR GFC, FTIR, DOAS for multi-gas analysis FID for HC (TOC) PCDDs, Metal not possible by CEMS
	Plant within 5 KM radious of urban agglomeration with more than 5 Lakh population	PM – 100	
	New Cement Plants	PM – 50	
	Cement Plants with Co-incineration	All parameters as CHWI	

17 Categories of Industry, their emission standards and probable options for CEMS

SN	Industries	Pollutants Emission Limits	Recommended CEMS Options
5	Copper Smelting (Old Units) Copper Smelting (New Units)	PM – 100 PM – 75	In-situ PM CEMS
	SO2 recovery units upto 300 T SO2 recovery units above 300 T	SO2 – 1370 (Existing) 1250 (New) Acid Mist and Sulphur Trioxide – 90 (Existing); 70 (New) SO2 – 1250 (Existing); 950 (New) Acid Mist and Sulphur Trioxide – 70 (Existing); 50 (New)	UV Fluorescence, FTIR, DOAS
6	Dyes and Dye Intermediate		
	Process	SO2 – 200 HCl (Mist) – 35 NH3 – 30 Cl2 – 15	In situ PM CEMS IR GFC, FTIR, DOAS TLD, PAS for multi-gas analysis FID for TOC
	Captive Incinerator	PM – 50 SO2 – 200 HCl (Mist) – 50 CO – 100 TOC – 20 PCDDs /F – 0.1ng TEQ/NM^3 Metals – 1.5	PCDDs, Metal not possible by CEMS
7	Fermentation (Distillery)	Boiler Standard	In situ System for PM
8	Fertiliser (Phosphate)	PM – 150 Total Fluoride – 25	In situ System for PM FTIR, DOAS TLD, PAS for F
	Fertiliser (Urea) Old plants Fertiliser (Urea) New plants	PM – 150 or 2Kg/MT product Total Fluoride – 50 or 0.5Kg/MT product	Velocity monitor
9	Integrated Iron & Steel		In situ System for PM
	Sintering plant	PM – 150	NDIR for CO
	Steel making	PM – 150 (Normal Operation); PM – 450 (Oxygen Lancing)	Velocity monitor
	Rolling Mill	PM – 150	
	Coke Oven	PM – 50 CO – 3 Kg/T coke	
	Refractory Material Plant	PM – 150	

17 Categories of Industry, their emission standards and probable options for CEMS

SN	Industries	Pollutants Emission Limits			Recommended CEMS Options
10	Leather Processing Tanneries	Boilers Standard			In situ PM CEMS
11	Oil Refinery				
	Furnace, Boiler and captive power plant	Polutants	Before 2008	After 2008	
	Gas based	SO2	50	50	BAM for PM
		NOX	350	250	IR GFC, FTIR, DOAS TLD, PAS
		PM	10	5	
		CO	150	100	
		Ni + V	5	5	
		H_2S	150	150	
	Furnace, Boiler and captive power plant	SO2	1700	850	
	Liquid Fuel based	NOX	450	350	
		PM	100	50	
		CO	200	150	
		Ni + V	5	5	In situ PM CEMS
		H_2S	150	150	IR GFC, FTIR, DOAS TLD, PAS for multi-gas analysis
	FCC Regenerator		Hydro	Others	or individual technology specific to pollutants
		SO2	500	1700	
		NOX	400	450	
				350 (N)	
		PM	100	100	
				50 (N)	
		CO	400	400	
				300 (N)	
		Ni + V	5	2 (N)	
				2	CEMS Not Applicable for Metals
		% Opac.	30	30	Opacity
	SRU	H_2S	15	10 (N)	IR GFC
		NOX	350	250	
		CO	150	100	

17 Categories of Industry, their emission standards and probable options for CEMS

SN	Industries	Pollutants Emission Limits			Recommended CEMS Options
12	Pesticide	HCl – 20 CL2 – 5 H2S – 5 P2O5 (as H3PO4) - 10 NH3 – 30 PM with Pesticide – 20 CH3Cl – 20 HBr – 5			IR GFC, FTIR, DOAS TLD, PAS P2O5, PM with Pesticide and CH3Cl Are not conventional CEMS parameter
13	Pulp & Paper	PM – 250 H_2S – 10			In situ System for PM IR GFC for H2S
14	Petrochemical	Polutants	Before 2007	After 2007	In situ PM CEMS IR GFC, FTIR, DOAS TLD, PAS for multi-gas analysis or individual technology specific to pollutants
		SO2	1700 (Liquid)	850	
		NOX	350 (Gas)	150	
		PM	400 (Liquid)	250	
		CO	150 (Liquid)	100	
			150	150	
15	Sugar	Boiler Standard			In situ PM CEMS
16	Thermal Power Plants Less than 210 MW More than 210 MW	 PM – 350 PM – 150 In situ PM CEMS			In situ PM CEMS

17 Categories of Industry, their emission standards and probable options for CEMS

SN	Industries	Pollutants Emission Limits	Recommended CEMS Options
17	Zinc Smelting (Old Units) Zinc Smelting (New Units)	PM – 100 PM – 75	In situ PM CEMS
	SO2 recovery units upto 300 T SO2 recovery units above 300 T	SO2 – 1370 (Existing);1250 (New) Acid Mist and Sulphur Trioxide – 90 (Existing); 70 (New) SO2 – 1250 (Existing) ;950 (New) Acid Mist and Sulphur Trioxide – 70 (Existing); 50 (New)	FTIR, DOAS
	Boilers (According to capacity) Less than 2 T / hr 2 – 15 T/hr Above 15 T/hr. Steam Generation less than 2 2 to less than 10 10 to less than 15 15 and above	 Particulate Matter 1600 1200 150 Particulate Matter 1200 800 600 150 All above concentrations are subject to 12 % CO2 correction	 In situ PM CEMS

Notes:

- ❖Wherever load based standards are notified Flow/Velocity Monitor is mandatory
- ❖O2, CO2 monitoring is essential where the standards are to be corrected for.
- ❖CO2 monitoring is a complementary part of monitoring if extractive dilution system is selected.

COMMON HAZARDOUS WASTE INCINERATOR

A. Emission		
	Limiting concentration in mg/Nm^3 unless stated	Sampling Duration in (minutes) unless stated
Particulate Matter	50	30
HCL	50	30
SO_2	200	30
CO	100	30
	50	24 hours
Total Organic Carbon	20	30
HF	4	30
NO_x (NO and NO_2, expressed as NO_2	400	30
Total dioxins and Furans	0.1 ngETQ/Nm^3	8 hours
Cd+Th+their Compounds	0.05	2 hours
Hg and its Compounds	0.05	2 hours
Sb+As+Pb+Co+Cr+Cu+Mn+Ni+ V+ their Compounds	0.50	2 hours

Notes:
i.All monitored values shall be corrected to 11 % oxygen on dry basis.
ii.The CO_2 concentration in tail gas shall not be less than 7%.
iii.In case, halogenated organic waste is less than 1% by weight in input waste, all the facilities in twin chamber incinerators shall be designed to achieve a minimum temperature of 950°C in secondary combustion chamber and with a gas residence time in secondary combustion chamber not less than 2 (two) seconds.
iv.In case halogenated organic waste is more than 1% by weight in input waste, waste shall be incinerated only in twin chamber incinerators and all the facilities shall be designed to achieve a minimum temperature of 1100°C in secondary combustion chamber with a gas residence time in secondary combustion chamber not less than 2 (two seconds).
v.Incineration plants shall be operated (combustion chambers) with such temperature, retention time and turbulence, as to achieve Total Organic Carbon (TOC) content in the slag and bottom ashes less than 3%, or their loss on ignition is less than 5% of the dry weight].

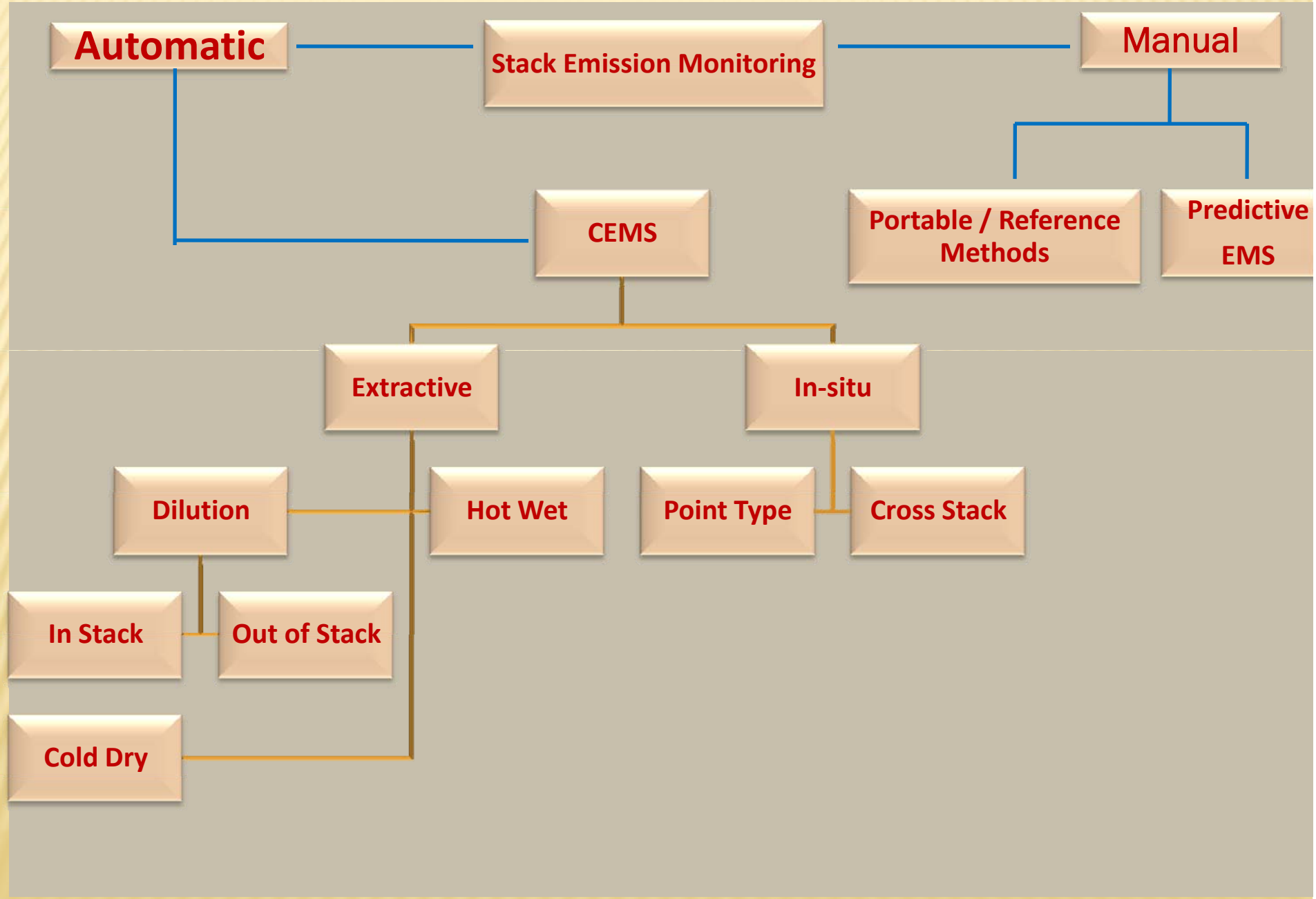
REVISED EMISSION PARAMETERS

PM, NOX, SO_2, CO, HCl. Cl_2, NH_3 and F

ISSUES WITH CEMS IMPLEMENTATION

- Technology Selection
  - ✓ Suitability / Fitness to specific emission
  - ✓ Quality Certification (COP)
- Installation
- Calibration
- Field Performance testing
- Data Acquisition
- Data Handling System
- Data Robustness
- Data Exceedance / Violation
- Compliance

Methods & Options for Source Emission Monitoring



Location of Installation for CEMS

Firstly The location satisfies the minimum siting criteria of Emission Regulation Part III (i.e., the location is greater than or equal to eight stack duct diameters downstream and two diameters upstream from a flow disturbance

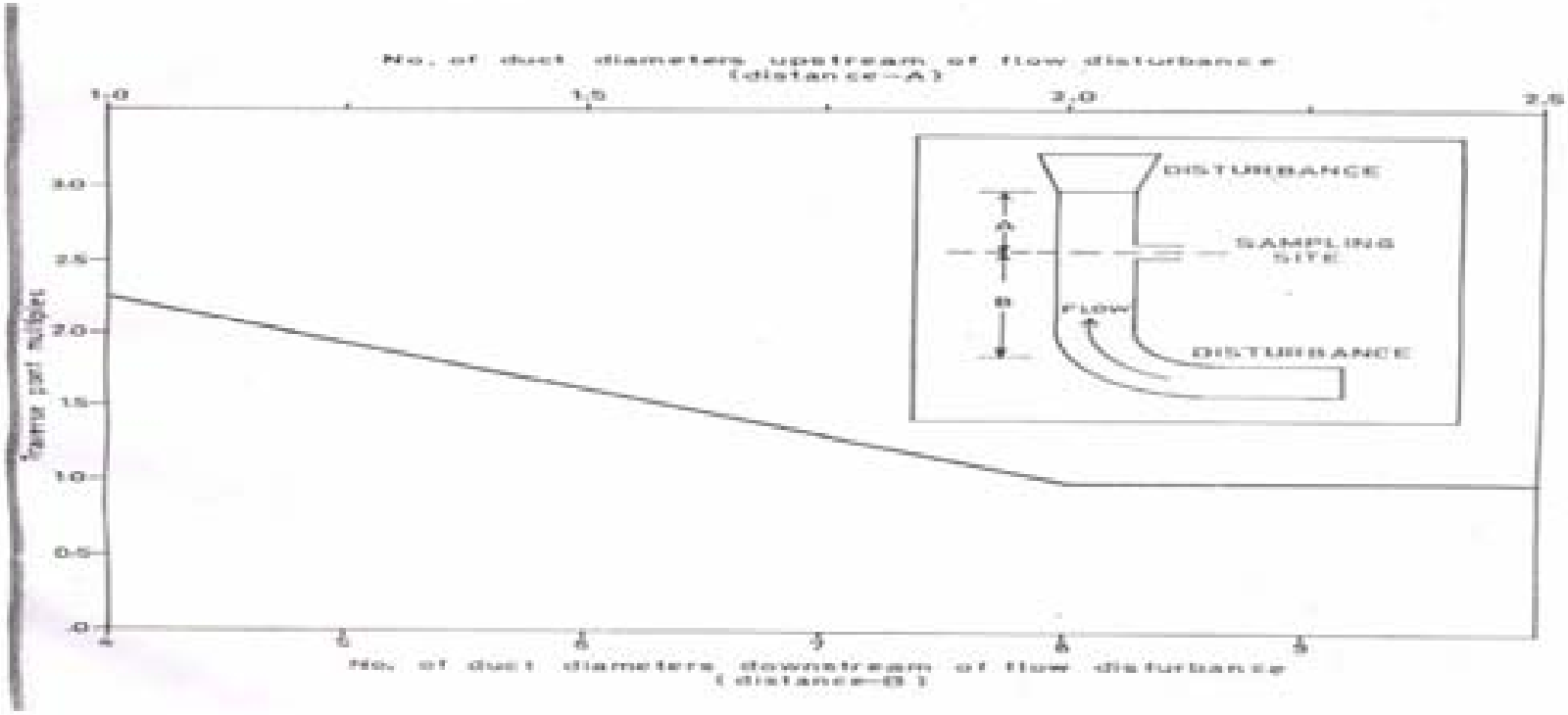
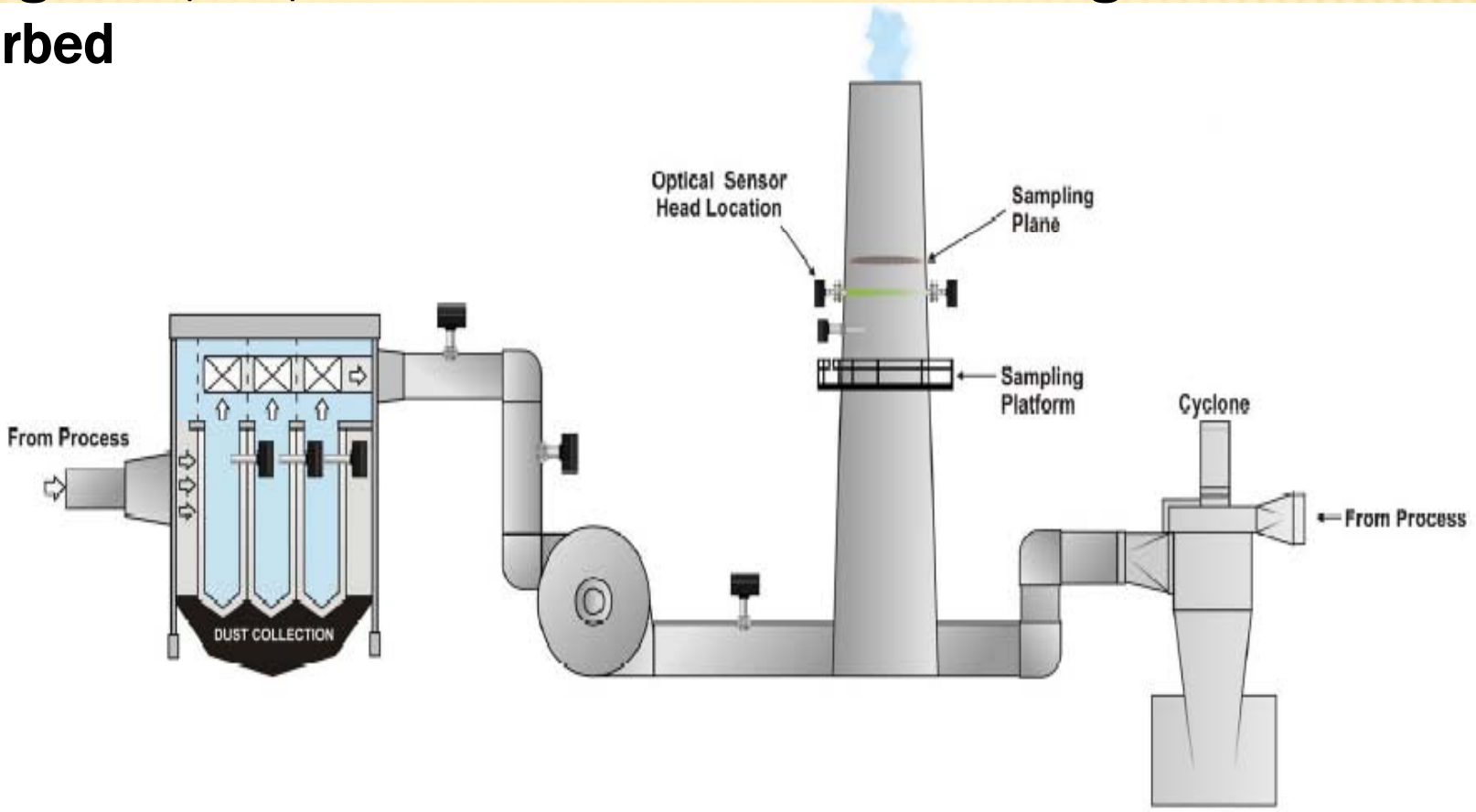


FIGURE 1.3 Travers point multiples to determine minimum number of traverse points requirement when a < 2 dia or b < 8 dia

Secondly It should be at the plane 500 mm above the Isokinetic testing Port, so, that the reference monitoring methods are not disturbed

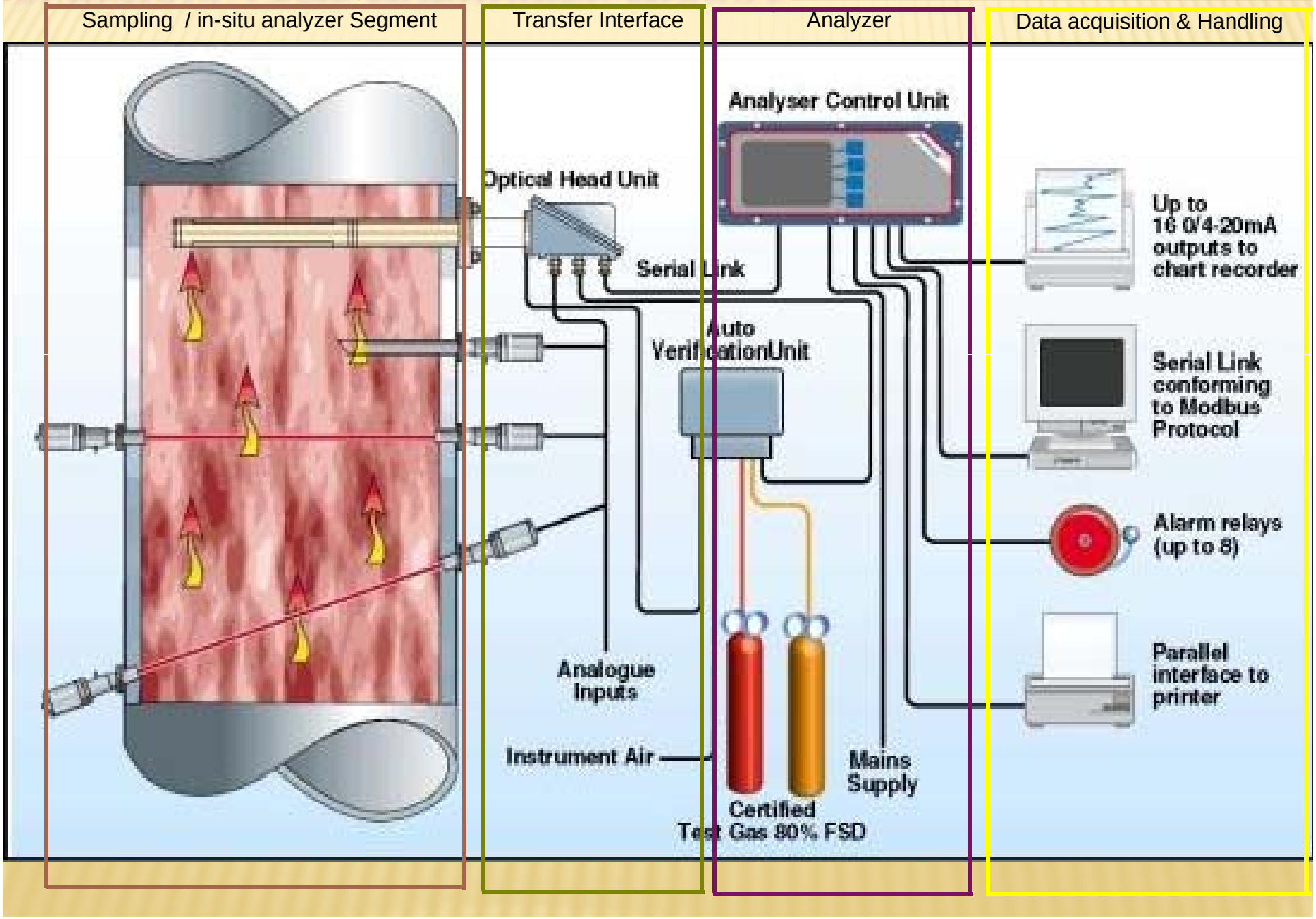


Positions to be considered for installation of Particulate Monitors

The installation should have logistic support like easy approach for calibration, maintenance etc.

In-situ CEMS

SCHEMATIC CEMS MONITORING MODULE

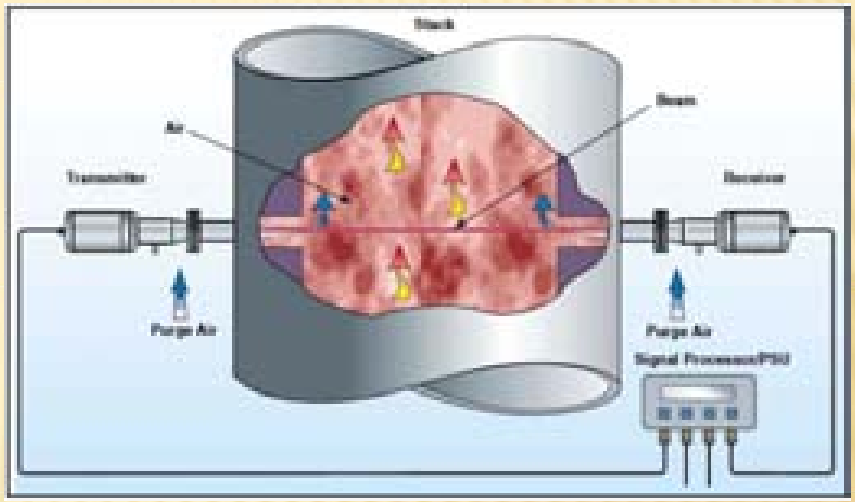


Available Technologies for Non Extractive CEMS for gas and PM

I. In-situ Cross Duct/Stack

Gas is being measured passing by a specific 'line of sight' of the monitor, typically ranging from a few feet, to the full distance across the interior diameter of the stack/ duct

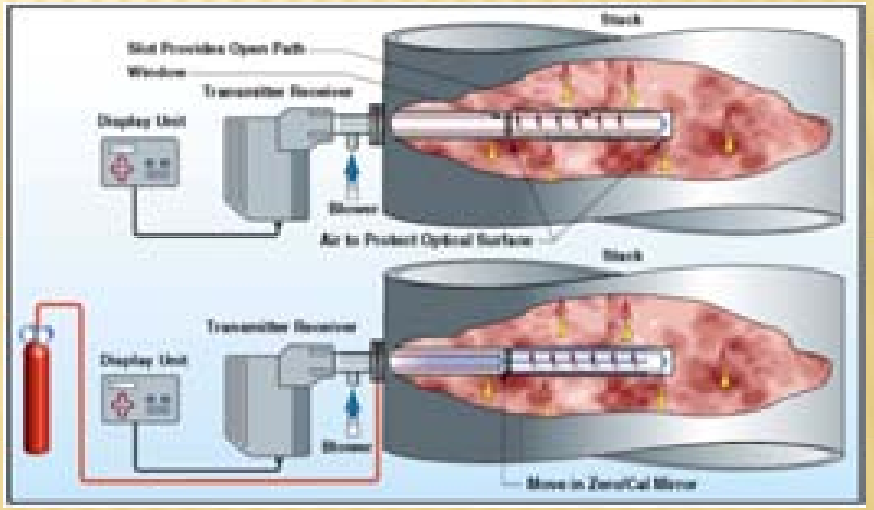
e.g. Opacity, DOAS, FTIR, Optical Scintllation, Light Scattering etc.



II. In-situ Probe Type

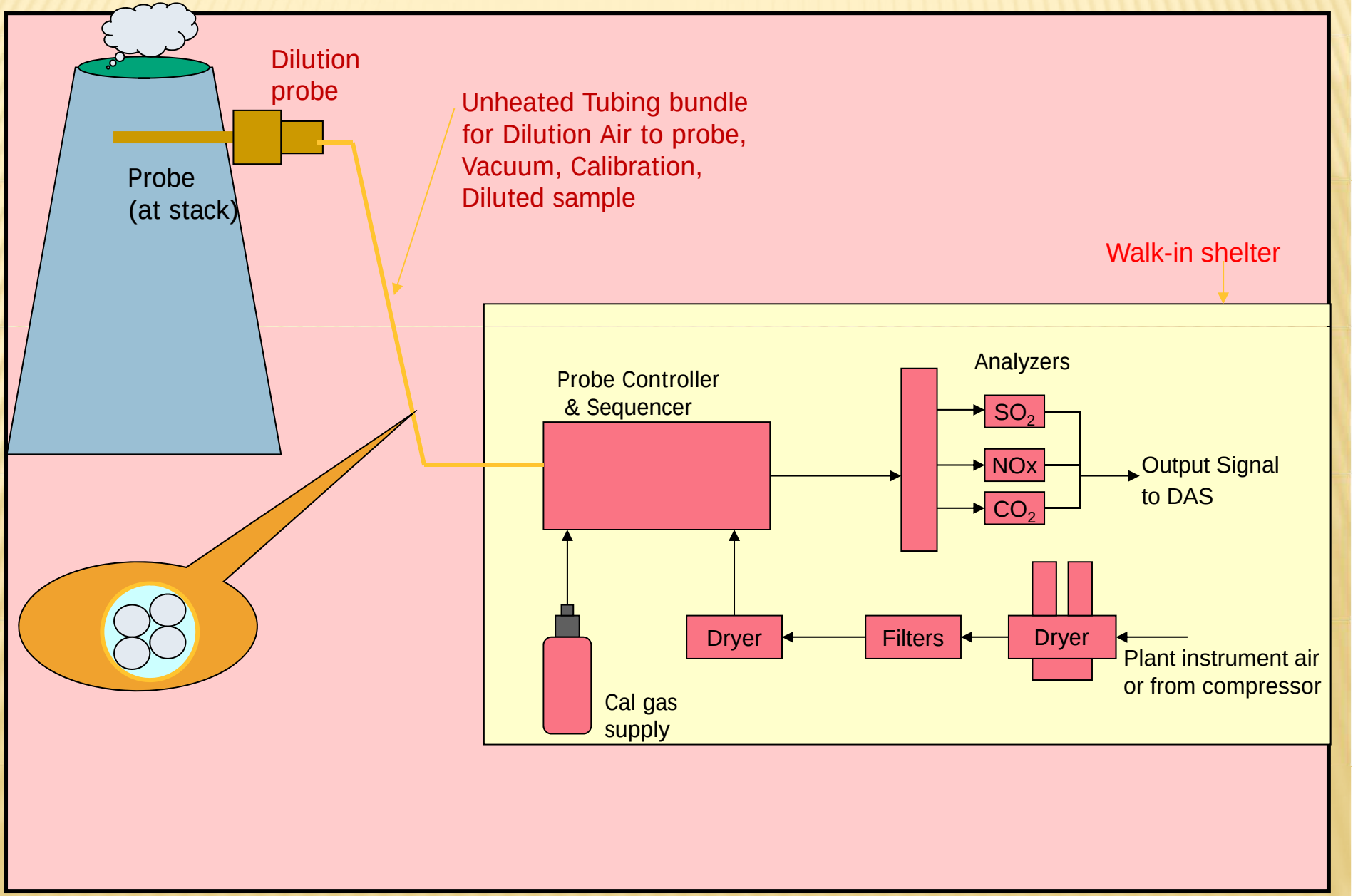
Gas is being measured at one specific point or along a short path in the stack or duct

e.g, Probe Electrification (DC and AC triboelectric)

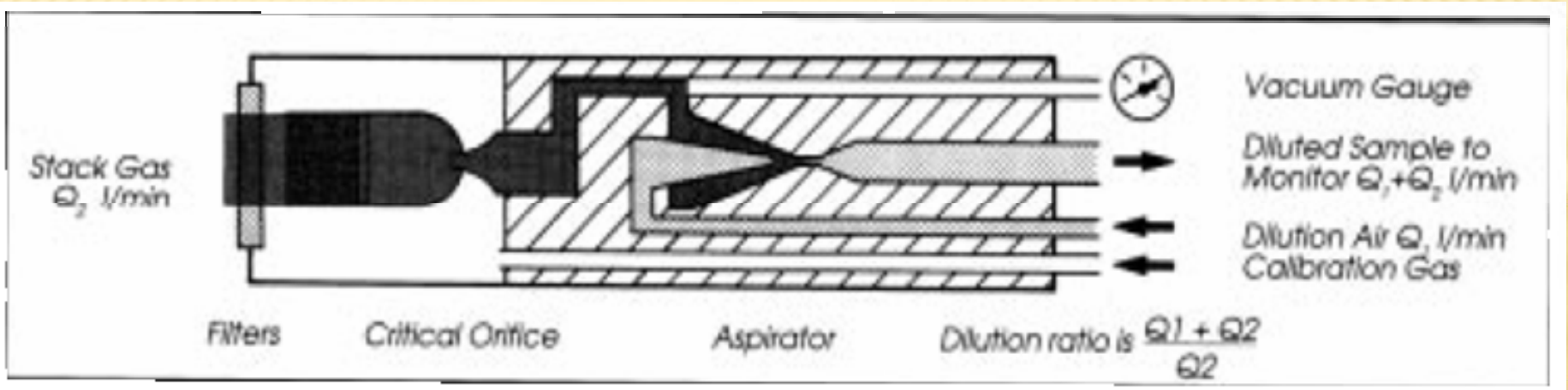


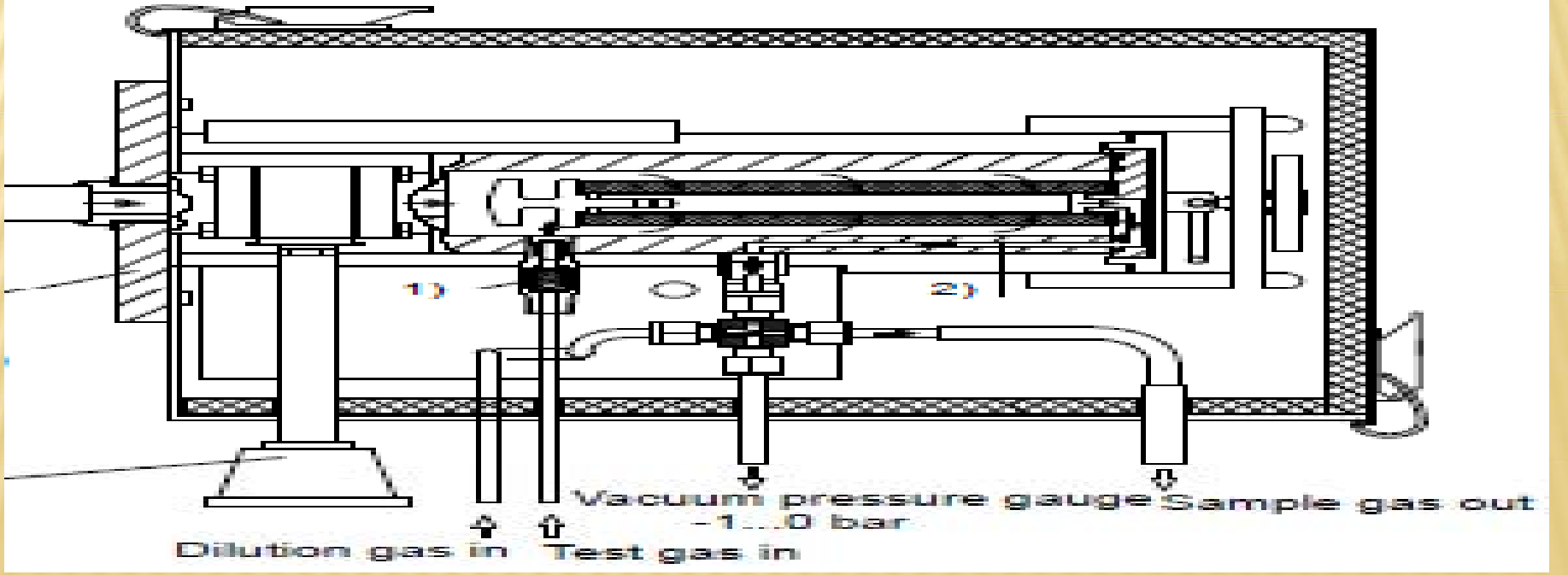
Extractive CEMS

Dilution Extractive System

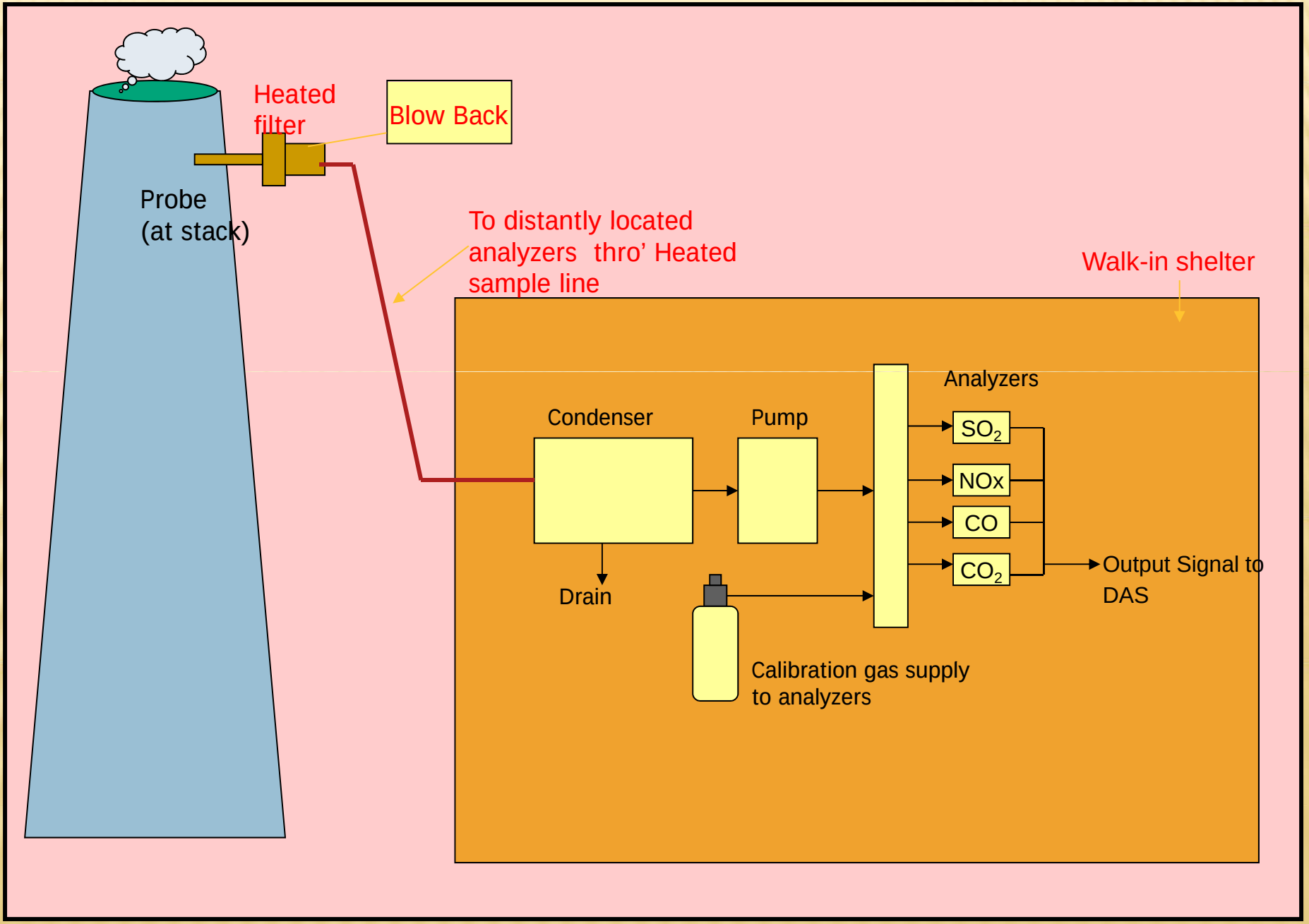


Dilution Probe

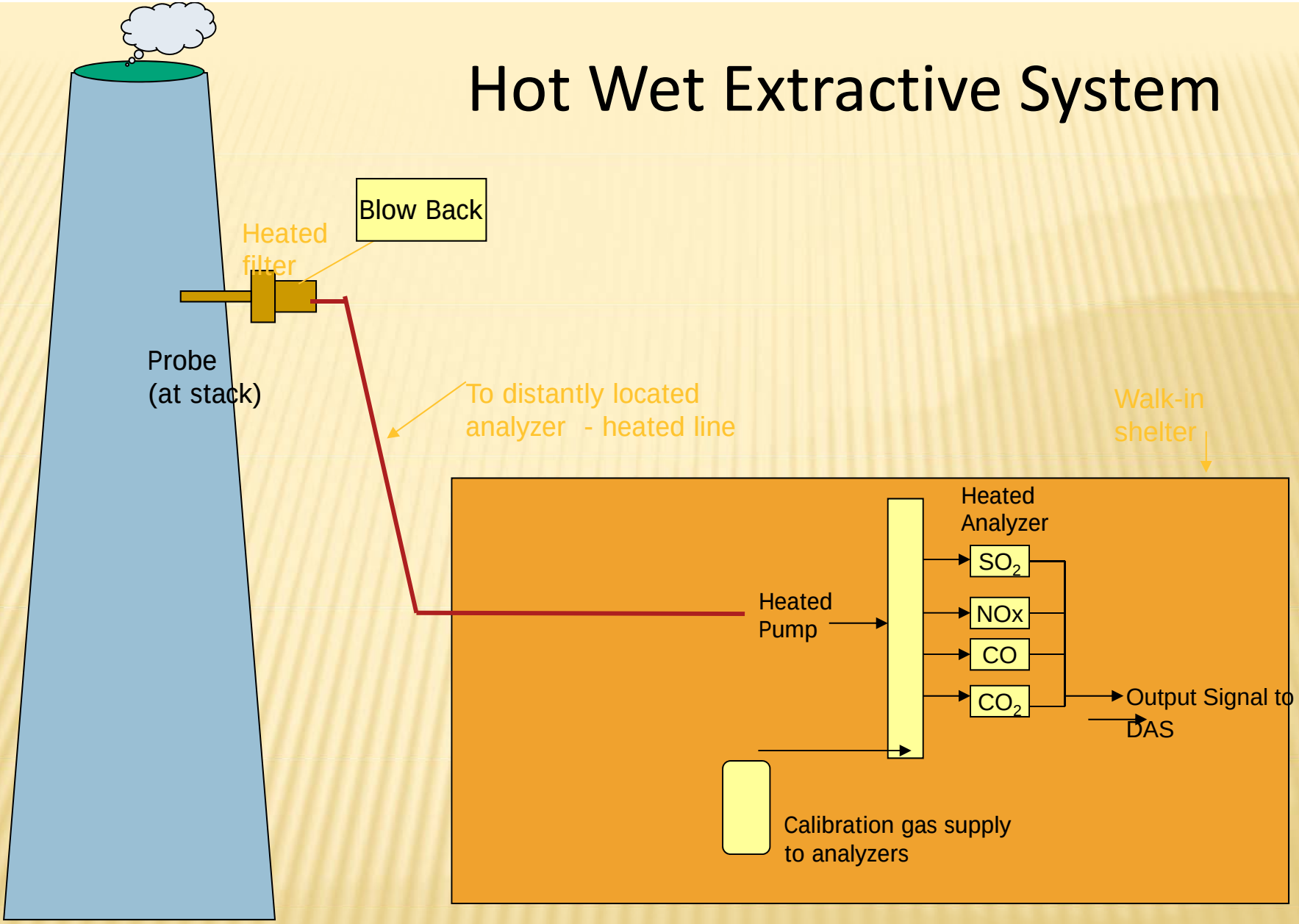




Cold Dry Extractive (without dilution) System



Hot Wet Extractive System



Challenges for Extractive CEMS

- PM Sample has to be drawn from Stack iso-kinetically
- Distance from source and analyzer
- Positive Bias of Secondary PM

Advantages of Extractive CEMS

- Wet Stack emission can be monitored
- Measurement Ranges of analyzer may be maximized
- Size fractionation is possible
- Maintenance is less compared to in-situ system

PM CEMS TECHNOLOGY SELECTION – STACK CHARACTERISTICS MATRIX

Parameter	DC Tribo	AC Tribo	Light Scatter	Opacity	Light Scintillation	Extractive	
						Light Scatter	BAM
Units of Measured Value	**g/s, kg/hr**	**mg/m3, g/s, kg/hr**	**mg/m3**	**mg/m3**	**mg/m3**	**mg/m3**	**mg/m3**
Velocity Monitor Required	X	✓	✓	✓	✓	✓	✓
Duct < 1m Diameter	✓	✓	✓	X	X	✓*	✓*
Duct >1m to 4m Diameter	✓	✓	✓	✓	✓	✓*	✓*
Duct > 4m Diameter	X	X	X	✓	✓	✓*	✓*
Electrostatic Precipitator	X	✓***	✓	✓	✓	✓	✓
Stack Gas Temperature > 500^0C	X	✓***	✓	✓	✓	✓	✓
Wet Scrubber or Water Droplet <70^0C	X	✓***	X	X	X	✓	✓
Large particles > 20um	✓	✓	X	✓	✓	X	✓
Dust> 100 mg/m3	✓	✓	✓****	✓	✓	X	✓
Varying gas velocity	✓	✓***	✓	✓	✓	✓**	✓

*** Primary Wet Stack, ** Worked on slowly varying velocity, *** ESP/Wet scrubber, *** Meas.upto 300 mg/m^3**

Summary of CEMS Technology Options

Technique	Type	Gases Measured	Comments
Chemiluminescence	Extractive	NO, NO_x, NO_2 *	*NO_2 calculated (NO_x – NO)
UV Fluorescence	Extractive	SO_2 (H_2S, TRS)	Gases in brackets can also be measured but not simultaneously
IR Gas Filter Correlation (GFC)	Extractive	CO, CO_2, NO_x, SO_2, N_2O	Multiple gases can be monitored, generally no more than 2-5.
Fourier Transform Infra-red (FTIR)	Extractive / Path	CO, CO_2, SO_2, NO_x, HCl, HF etc.	Multiple gases can be monitored, typically 5+
Differential optical absorption spectroscopy (DOAS)	Path	CO, CO_2, SO_2, HCl, HF, NO, NO_2, NH_3, VOCs, H_2O	Multiple gases can be monitored, typically 5+ NO_2 measured directly. Additional gases can be added at relatively low cost.
Flame Ionization Detector (FID)	Extractive	Total HC	Requires hydrogen carrier gas.
Tunable Laser Diode (TLD)	Path	HCl, HF, NH_3, CH_4, CO, CO_2, H_2O	Cost effective for single component applications.
Zirconia oxide cell	In-situ	O_2	Widely used, maximum temperature generally 500°C
Paramagnetic	Extractive	O_2	
Photo acoustic spectroscopy (PAS)	Extractive	CO, CO_2, SO_2, HCl, HF, NO, NO_2, NH_3, VOCs, H_2O	Can measure virtually any gas that absorbs IR. Detailed analysis of other compounds that may be present other than target gases required.
Transmissometry (Laser Optical Backscatter)	In-situ	Opacity (smoke), & Total PM (dust)	2400Hz intensity controlled LED & Solid State Diode Laser

FEW MANDATORY ADDITIONAL REQUIREMENTS

Flow Monitor / Velocity Monitor

Stack Temperature Monitor

Moisture Monitoring Device

O_2 /CO_2 /CO monitoring as per regulatory requirement

For Extractive Dilution System CO_2 monitor at both source and Analyzer end

Extractive dilution system should have Cal gas injection facility at sampling point to Calibrate the system not only analyzer

International Code of Certification for CEMS

European Union	USA
QAL 1 (EN) (Quality assurance level 1) **QAL 2 & QAL 3 (EN)** **Performance Standard**	**MACT** (Maximum Achievable Control Technology); this is an objective oriented quality certification applicable to US only
TUV (Germany) (Technical watch-over Association) – a Product standard	EPA Technology approval system
MCERTS (UK) (Monitoring Certification Schemes) – a Product standard	**PS-1 to PS 11** (USEPA) It is a performance Standard

REQUIRED MONITORING RANGES

HIGHEST RANGE OF MEASUREMENT RESPECTIVE ANALYSER'S SHALL NOT BE LESS THAN 2.0 TIMES OF NOTIFIED STANDARD IN ANY CASE FOR THE PARAMETERS HAVING CONTROL SYSTEM (APCD for respective parameter); HOWEVER, FOR THE PARAMETERS WITHOUT CONTROL DEVICE THE MAXIMUM RANGE SHOULD NOT BE LESS THAN 3.0 TIMES

LEVEL (I) PERFORMANCE EVALUATION PROCESS

CRITERIA OF INSPECTION AND PERMISSION ON SAMPLING LOCATION FOR ALL SENSORS / SAMPLING DEVICE

VERIFICATION OF FACTORY CALIBRATION CERTIFICATES

DEMONSTRATION AND VERIFICATION OF MANUFACTURERS CLAIM BEFORE INSTALLATION

INSTALLATION (INCLUDING CALIBRATION) AND STABILIZATION OF ALL THE ANALYSER ON DIFFERENT LOAD CONDITION.

PRIMARY DATA COLLECTION AT 100% LOAD FOR 4 WEEKS

LEVEL (II) PERFORMANCE EVALUATION PROCESS

EVALUATION OF DATA DEPENDING ON CRITERIA SET FOR RANGE SELECTION, ZERO SPAN DRIFT, CALIBRATION, LINEARITY

IF IT MEETS THE CRITERIA SET THE OPERATOR IS ALLOWED TO RUN IT FOR NEXT TWO MONTHS AND MAY BE ASKED TO PROVE ACCURACY AND PRECISION BY REPEATABILITY AND REPRODUCIBILTY TESTS AGAINST REFERENCE METHODS

IN CASE OF FAILING TO MEET LEVEL (I) THE OPERATOR / VENDOR IS RESPONSIBLE TO REPEAT THE WHOLE PROCESS / A PART TO COMPLY WITH CRITERIA

ON COMPLIANCE TO THE LEVEL (I) & (II) PERFORMANCE EVALUATION PROCESS THE ACCEPTANCE OF THE SPECIFIC SYSTEM INSTALLED IN RESPECTIVE PLANT MAY BE ISSUED BY REGULATOR

REGULAR PERFORMANCE EVALUATION PROCESS

- Instrument health checking: fixed time (10.00 a.m.) using standard methods and standard reference materials.
- The health of the instruments/analysers shall be assessed on daily basis at fixed time (10.00 a.m.) by checking the zero drift.
- calibration verification shall be done on quarterly basis by empanelled laboratories.
- The instruments/analysers shall be rechecked for zero and span drift every Friday at In case the daily zero drift is more than the acceptable limit as specified in the catalogue/brochure of the instrument/analyser manufacturer and persists continuously for five days, the instrument / analyser shall be recalibrated following procedure laid down at point (ii) above.
- In case the weekly span drift is more than the acceptable limit as specified in the catalogue brochure of the instrument/analyser manufacturer and persists continuously in the succeeding week the instrument/analyser shall be recalibrated following procedure laid down in point (ii) above. (xiii) Data capture rate of more than 85% shall be ensured.the comparison/ verification of data/ calibration shall be done by CPCB empanelled laboratory once in 6 months.

CRITERIA FOR PERFORMANCE EVALUATION

The percentage availability for the system and each analyzer shall be calculated monthly either by the data acquisition system or manually, using the following equation:

$$\% \text{ Availability (System or Analyzer)} = \frac{Ta}{T} \times 100$$

Ta = the time in hours during which the system or analyzer was generating quality assured data during the time the source operated during the month.

T = the total time in hours the source operated during the month and is defined as those hours during which the fuel is burned*

* for combustion sources, the operational time also includes any time period(s) attributable to "cool down" or "purge" modes Time periods necessary for CEMS calibration, quality control checks or back purging shall not be considered as downtime when calculating Ta.

PROPOSED CRITERIA – 85 %

CRITERIA FOR PERFORMANCE EVALUATION

Performance Specifications	Sulphur Dioxide Systems	Oxides of Nitrogen Systems	Carbon Monoxide Systems
Analyzer linearity	≤ ± 2% of span from cal. curve	≤ ± 2% of span from cal. curve	≤ ± 2% of span from cal. curve
Relative accuracy[a]	≤ ± 10% of RM	≤ ± 10% of RM	≤ ± 10% of RM
Zero drift - 24 hr	≤ ± 2% of span	≤ ± 2% of span	≤ ± 2% of span
Span drift - 24 hr	≤ ± 4% of span	≤ ± 4% of span	≤ ± 4% of span

Performance Specifications	Oxygen Monitors	Carbon Dioxide Monitors
Relative accuracy	≤ ± 10% of RM or within 1% of O_2 (whichever is greater)	≤ ± 10% of RM or within 1% CO_2 (whichever is greater)
Analyzer linearity	≤ ± 0.5% O_2	≤ ± 0.5% CO_2
Zero drift - 24 hr	≤ ± 0.5% O_2	≤ ± 0.5% CO_2
Span drift - 24 hr	≤ ± 0.5% O_2	≤ ± 0.5% CO_2

Performance Specifications	In-Stack Opacity Monitors
Zero drift - 24 hr	≤ ± 2% In-Stack Opacity
Span drift - 24 hr	≤ ± 2% In-Stack Opacity

CRITERIA FOR PERFORMANCE EVALUATION

Performance Specifications	Volumetric Flow/Velocity Monitors
System Relative Accuracy for velocity ≥ 3 m/sec	≤ ± 15% of Reference Method
System Relative Accuracy for velocity < 3 m/sec	within 0.5 m/sec of Reference Method
Orientation Sensitivity	≤ ± 4% of span
Zero drift - 24 hr	≤ ± 3% of span
Span drift - 24 hr	≤ ± 3% of span

Performance Specification	Temperature Sensors
System Accuracy	± 10°C of the reference method

ALGORITHM FOR PERFORMANCE EVALUATION

(d) Calculations - Determine the calibration drift, at each concentration, once each day (at 24-hour intervals) for 7 consecutive days according to the following calculation:

$$\text{Calibration Drift (\%)} = \frac{(R - A)}{FS} \times 100$$

where:

R = the true value of the reference standard (ppm or % for gas analyzers, kPa for pressure transducers, °C for temperature transducers, m^3/d or tonnes/d for flow elements).

A = the CEM component value (in same units as R).

FS = the full scale reading of the CEM system component (in the same units as R).

(e) Calculations and Acceptable Results - Determine the linearity, at each concentration, according to the following calculation:

$$\text{Linearity (\%)} = \frac{(R - A)}{FS} \times 100$$

R = the true value of the test gas (% or ppm).

A = the average of the three system response to the low-, mid-, or high-range calibration gas, (% or ppm).

FS = the full scale value of the monitoring system (% or ppm).

THESE ARE ALL EXAMPLES OF CRITERIA FOLLOWED WORLDWIDE

HERE THE PROCESS ARE DESCRIBED ONLY

THE ACCEPTANCE CRITERIA MAY BE SET BY COMMITTEE FOR INDIA

Exceedance in Emission

- ✓ **Any exceedance of values over the prescribed standards or norms shall be considered as violation.**
- ✓ **Instantaneous elevated data i.e. spikes with duration less than one minute shall be dealt separately and not considered for data averaging.**
- ✓ **Continuous exceedance of values upto 10% over the standards/norms for more than half an hour, shall require preventive action from the industry.**
- ✓ **Frequent exceedance of the values i.e. more than 5% of the total data capture in a day of the prescribed standards/norms shall invite action from SPCBs/PCCs**
- ✓ **Any exceedance of the monitored values as against the standards shall invite SMS & email to the industry from SPCBs/PCCs requiring immediate feedback on the corrective action initiated/taken.**
- ✓ **In case the emission exceeds continuously the prescribed norms by 10% over the standards and for a duration of one hour or more, the industry shall inform the SPCBs/PCCs of the action initiated to control the emission**

Exceedance in Emission

- ✓ In case the industry fails to control the emissions/discharges within the norms it shall move towards closure of its operation following the laid down standard operating practices.
- ✓ For any second failure of the industry to keep the emissions within 10% of the norms for period exceeding one hour the industry shall immediately move towards closure of its operation under intimation to SPCBs/PCCs. (viii) The values recorded during calibration or during preventive maintenance shall not be considered for exceedance and assessing the data capture rate. (ix) Plant start-up or batch process starting emissions shall not be considered for averaging for the initial, 30 minutes period in case of batch processes or small furnaces/ boilers not operating continuously.
- ✓ Plant shut down period shall be excluded while calculating data capture rate.

THANK YOU

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