M1 Sampling Assessment - Check sheet of sample facility requirements for plant designers / operators

Characteristic	Requirement	☐
Sample plane location	As far downstream or upstream from any disturbance, which could produce a change in direction of flow (e.g. bends, fans)	Sample point in final vertical pipework section prior to emission
	In a section of duct with constant shape and cross sectional area	Pipe section x3 metres long minmum
	Recommend five hydraulic diameters* upstream and two hydraulic diameters downstream (or five hydraulic diameters from the top of the stack)	n/a
Sample plane orientation	Installation of sample plane in vertical stacks is preferred to horizontal ducts**	Vertical sampling
Exploratory survey	It is advised that an exploratory velocity traverse is carried out before committing to installation	n/a
Flow criteria	Angle of gas flow less than 15° to duct axis	Vertical flow
	No local negative flow	NO negative flow during sampling tests
	Minimum velocity (a differential pressure of 5Pa, which equates to 3 m/s)	Velocity being monitored during samples. Velocity not an issue for TVOC calculation.
	Ratio of the highest to lowest gas velocity less than 3:1	To be determined
Measurement ports	Planned at design stage because retrofitting can be expensive (for example ducts may have protective linings)	1 x 2” and x4” BSP
	Allows access to sample points	Via multiple WAH means
	It is recommended that access ports have a minimum diameter of 125mm. For small stacks (less than 0.7m diameter) a smaller socket (for example 75mm may be necessary)	As per above
	The port socket must not project into the gas stream	Flow not compromised by access port installation
	Additional ports may be required to allow access for measurement of other quantities (for example velocity and water vapour)	multiple ports installed

	Additional ports may be required for CEMs	n/a
	For large ducts four ports may be necessary	n/a
	For rectangular ducts the ports should be installed on the longer side	n/a
	The operator must maintain the ports in good condition and free them up prior to work being undertaken	Maintenance / monitoring undertaken prior to sampling at 6 monthly intervals.

*Hydraulic diameter is defined as: (4 x area of sampling plane) / length of sample plane perimeter

**If a large horizontal duct is used for multiphase sampling, it must be rectangular (circular horizontal ducts, with a diameter of 0.35m or less may be used)

Characteristic	Requirement	☐
Identification	Clearly identified and labelled measurement section	Pipework labelled
Load bearing capacity	Permanent and temporary work platforms must have a load bearing capacity sufficient to fulfil the measurement objective	Temporary WAH access to meet requirement provided
	Some measurement objectives may require platforms that support up to six people plus up to 300 kg weight of equipment	n/a
Position and work area	Sufficient work area to manipulate probe and operate the measuring instruments, without equipment overhanging guardrails	Sufficient area as sample points outside of normal operating areas.
	A sufficient depth of work area is given by the internal diameter or depth of the duct and the wall thickness plus 1.5 m	Sufficient area as sample points outside of normal operating areas
	If two opposite measurement ports are installed for one measurement line, a correspondingly smaller work area is required	n/a
	It is recommended that ports in vertical ducts are 1.2 to 1.5m above the floor of the platform	n/a
	Provision of dual level platform. These are necessary if the selected sample plane is located in a horizontal section of a large rectangular duct, and some of the sample points are positioned above a convenient and safe working height (nominally 1.5m maximum for sample probe handling)	n/a
	Removable chains or self-closing gates at the platform to prevent workers falling through access hatches or ladders	Temporary WAH access to meet requirement provided
	Prevent accumulation of free-standing water and, if necessary, provide drainage	n/a
Fall prevention	Upper hand rails at a minimum of 950mm (910mm allowed for old handrails). Gaps in rail no bigger than 470mm. Toe boards required	Temporary WAH access to meet requirement provided

	Consider installing personal protection systems on vertical ladders	Temporary WAH access to meet requirement provided
Access	Easy and safe access available	Temporary WAH access to meet requirement provided
	Consider installing work restraint systems on vertical ladders	Temporary WAH access to meet requirement provided
Power supply	Single phase 110V electrical power of a suitable current provided by a suitable number of outdoor waterproof sockets at the platform	power provided at locations at 110v and 240v as required.

Characteristic	Requirement	☐
Lifting equipment	Lifting systems for raising and lowering of equipment, where access to the sampling platform is by vertical, or steeply inclined, ladders or stairs	n/a
	Lifting systems (for example, hoists) and attachments (for example, eyes) must be inspected and maintained by a competent person	n/a
	Installation of a support structure for securing portable lifting systems (handrails are not usually suitable for supporting lifting systems)	n/a
Monorails	Consider sampling monorails above the sampling ports to enable certain designs of sampling train to be suspended	n/a
Exposure to gas	Avoid areas of sources which emit unexpectedly, for example rupture discs, overpressure valves and steam discharges	Temporary WAH access to meet requirement provided
Exposure to stack gas	Avoid areas of significant positive pressure	Temporary WAH access to meet requirement provided
Awareness	Consider how stack emission monitoring personnel are informed of operating faults that may endanger them?	Risk Assessment and permit to work prior to sampling.
Indoor location	Consider locating working platform within a building	n/a
Ventilation	Well ventilated	External
Heat and dust	Protection of the working area from heat and dust	External subject to weather
Weather protection	Protective measures (for example, weather protection and heating to ensure conditions are appropriate for personnel and equipment)	Temporary ‘gazebo’ installed to cover sampling monitoring equipment.
Lighting	Artificial lighting or facilities for temporary lighting	Sufficient lighting present.