

Guidelines for Construction of Particulate

Sampling and Testing Facilities

Introduction

Selection of a proper sampling site is vital to assure representative measurement of pollutant emissions and accurate volumetric flow rate from a stationary source is obtained. Safety and accessibility are essential considerations of site selection. Clearance for sampling equipment, access to electrical power, exposure of personnel to weather, process heat, and presence of hazardous gases must also be considered in construction of sampling facilities.

Regulatory Basis

The Bay Area Air Quality Management District (BAAQMD) Regulation 1, Section 501, states; "Sampling Facilities: A person responsible for the emission of air contaminants for which emission limits have been established by these regulations shall, upon the request of the Air Pollution Control Officer (APCO), provide such sampling and testing facilities, exclusive of instruments and sensing devices, as may be necessary for the determination of the nature and quantity of such air contaminants."

Construction requirements for permanent, safe, and accessible sampling facilities acceptable to the Air Pollution Control Officer are described in the following guidelines.

Sampling Ports

The ideal sample location would have flow characteristics such that the gas flows in a linear pattern parallel to the axis of the stack or duct, have a uniform velocity profile and not flow in a cyclonic or swirling pattern. The following port location directions are provided to guide you in selecting a stack sampling location close to ideal.

Port Location - Ports should be located at least eight stack or duct diameters downstream and two diameters upstream from any flow disturbance such as a bend, expansion, or contraction in the stack, or from a visible flame. Approval must be granted by the Manager of Source test for any sampling site not meeting the “eight and two” criteria. For a rectangular stack or duct utilize an equivalent diameter to determine distances from flow disturbances. Calculate the equivalent diameter as follows:

$$\text{Equivalent Diameter} = \frac{2(\text{Length})(\text{Width})}{(\text{Length}) + (\text{Width})}$$

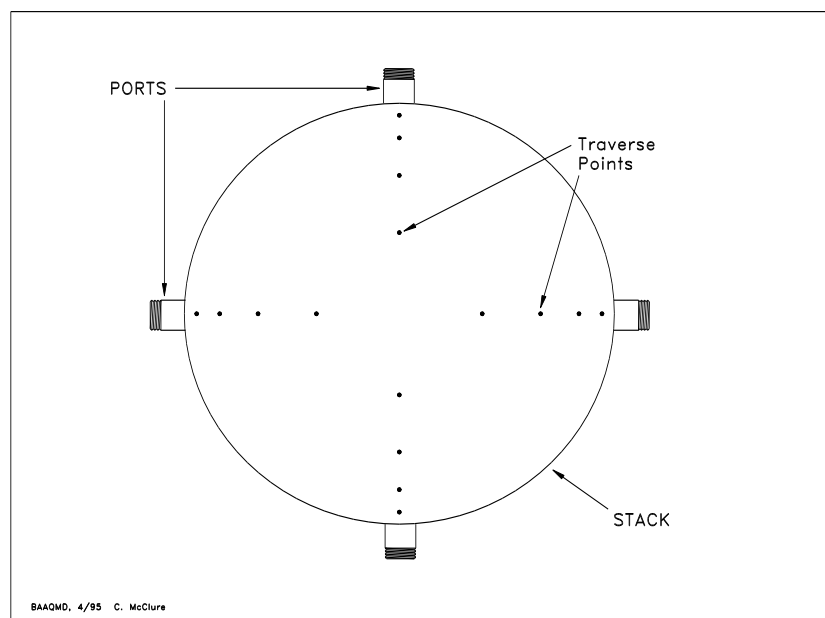
Port Type - A sampling port should be a welded pipe nipple with screw cap or a pipe with flange. A gate valve should be used for stacks handling hazardous gases or gases over 200°F under positive pressure. Stacks or ducts having a thin wall may be provided with ports consisting of appropriately sized surface holes with plugs. For determination of Total Suspended Particulate (TSP) emissions, the sampling ports must be at least 3.5” I. D. (Inside Diameter) pipe nipple. Particulate sampling to determine the PM10 or PM2.5 (Particulate Matter less than 10 or 2.5 microns) fraction of the TSP emissions requires sampling ports be 6.0” I. D. pipe nipples.

Port Installation - Ports must be flush with the interior stack wall and extend outward from the exterior wall at least 2 inches and not more than 6 inches. Ports must be located at least 4 feet and not more than 5 feet above the work platform floor and meet clearance zone requirements described below. The ports must be located parallel and in a plane perpendicular to longitudinal axis of the stack.

Number of Ports - For circular stacks, if the sum of the stack inside diameter plus the port length is 5 1/2 feet or less, two ports must be installed 90 degrees apart. If this sum is over 5 1/2 feet, four ports must be installed 90 degrees apart. See Figure 1.

Figure 1

Example of port location for a round stack requiring four ports



In the case of rectangular stacks, an equivalent diameter will be calculated, and a cross section layout (matrix layout) applied. The cross section layout is specified in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 1 (EPA Method 1-Sample and Velocity Traverses for Stationary Sources). Locate the number of ports required by the cross section layout on the widest of the two stack sides. The Manager of Source

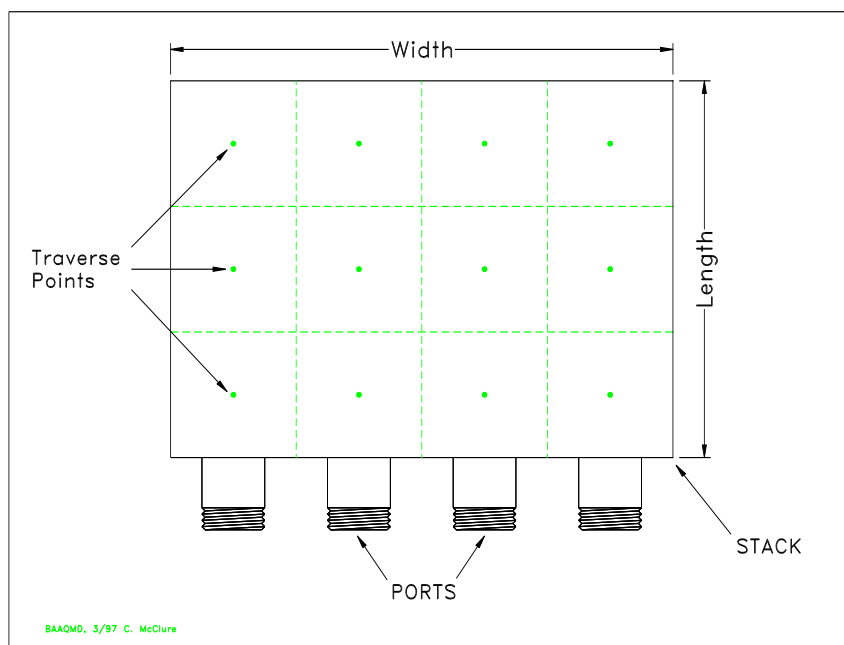
Test can be contacted to provide assistance in determining the correct cross section layout (matrix layout) for rectangular port placement. See Figure 2.

Work Platform

Size - For a round stack with two-port installation the platform must serve that quarter of the stack and extend at least 3 feet beyond each port. It must be at least 4 feet wide. For a circular stack with four-port installation the platform must serve the full circumference of the stack and be at least 5 feet wide. For a rectangular stack the platform must serve the side containing the ports. It must be at least 4 feet wide and extend across the full width of the stack.

Figure 2

Example of port location for a rectangular stack with a 4X3 traverse point matrix



Construction - Safe and easy access to the work platform must be provided by stairway, caged ladder, or other suitable means. The platform must have a guardrail and toe-board. It must be able to support 1000 pounds live load. All construction must conform

to the General Industry Safety Orders of the State of California. Platforms more than 70 feet high require a swinging arm and pulley to assist the lifting of test apparatus. Contact the Manager of Source test for site-specific guidance.

Clearances - Insertion of a long stack sampling probe with filter assembly on its end is a difficult task. See Figure 3 for a diagram of the sampling probe and equipment. There must be a clearance zone, with no obstructions, around each port extending one foot above, two feet below, and two feet on each side of the probe. The zone must extend outward from the end of the port at least one stack diameter plus three feet. Guardrails that enter the clearance zone must be equipped with removable sections or chains.

Conducting PM₁₀ or PM_{2.5} sampling requires site-specific clearances and probe support devices, i.e. a support rail system/bracket. See Figure 4. Contact the Manager of Source test for site-specific guidance.

Figure 3

Particulate Sampling Probe and Equipment

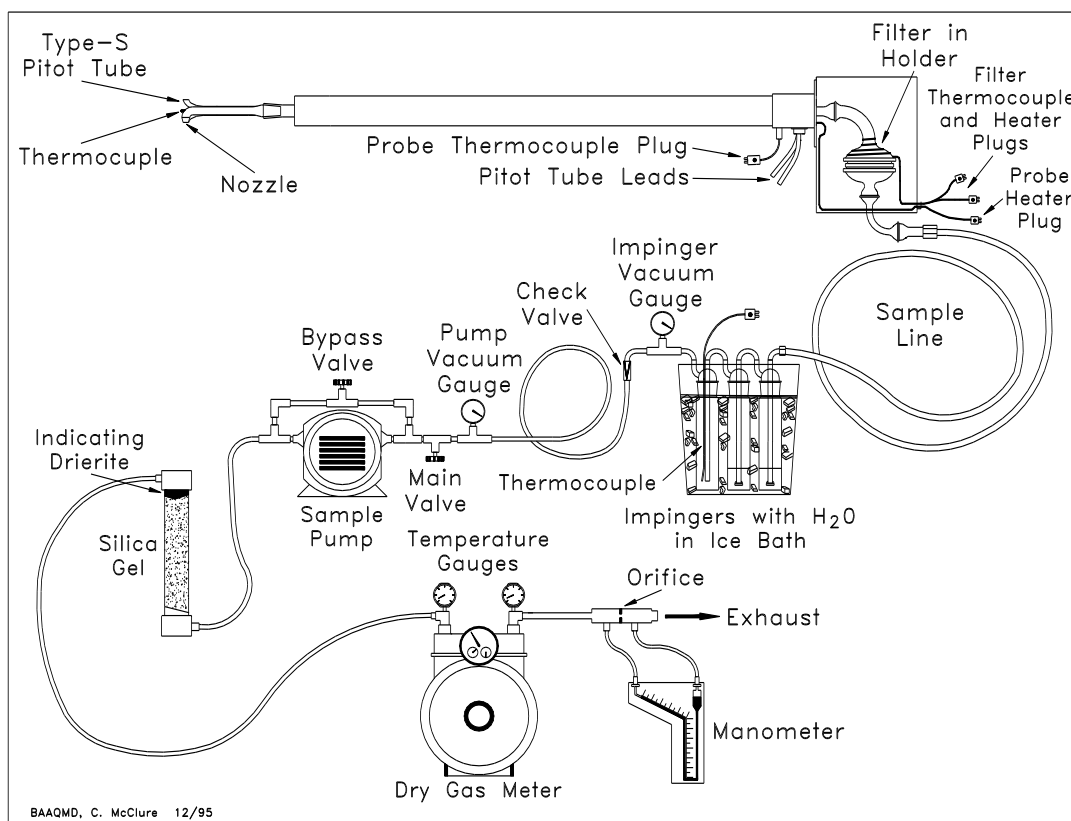
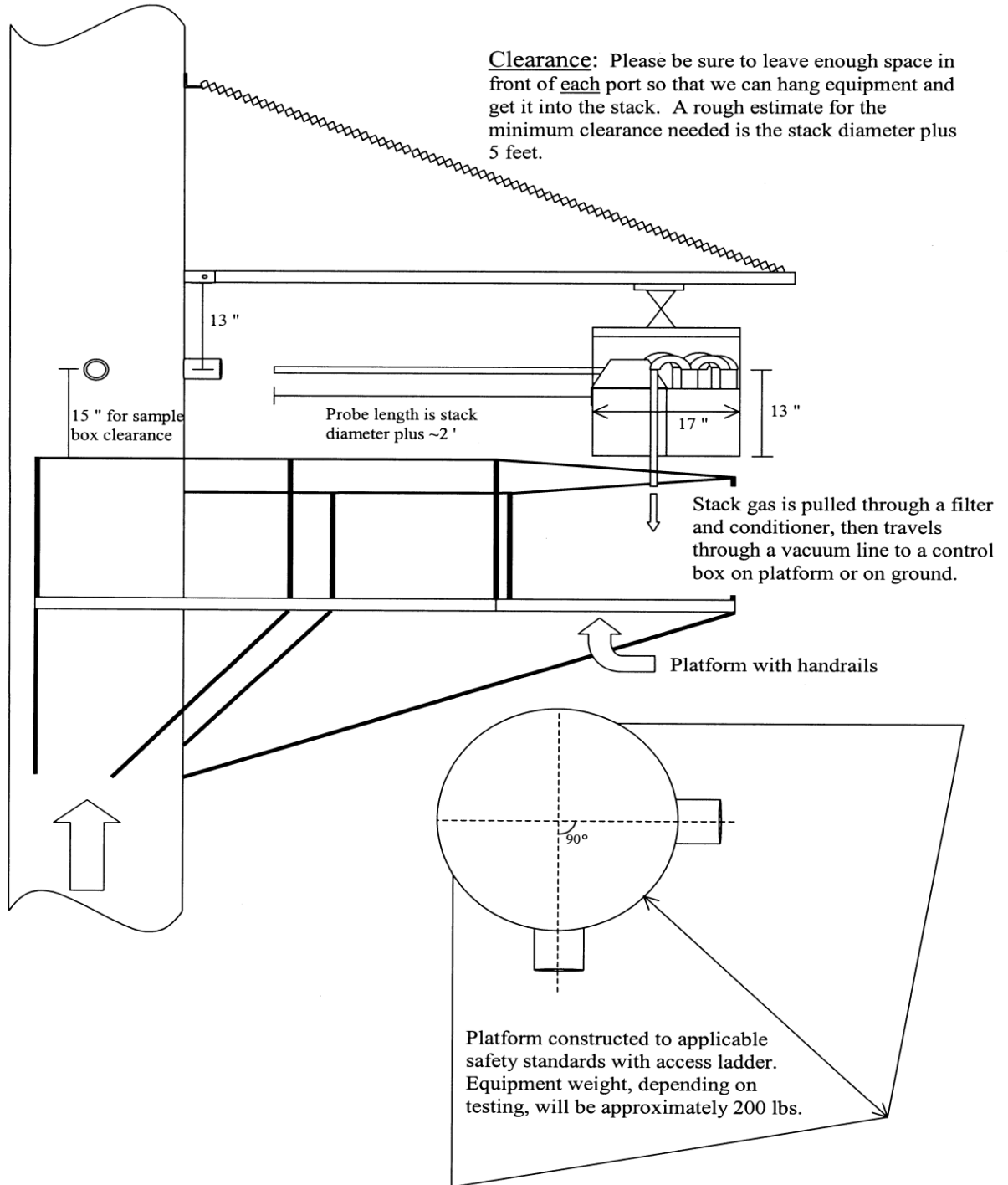


Figure 4

Typical Stack Sampling Access Requirements



Power Supply

Sampling platforms over 70 feet high require two electrical outlets, each capable of supplying 115-volt, 15-ampere, 60 cycle AC. Sampling platforms less than 70 feet high require that two electrical outlets, each capable of supplying 115-volt, 15-ampere, 60 cycle AC be located within 50 feet of the sampling site.

Additional Requirements

Additional requirements may be specified for situations with special needs such as flow pattern adjustment, hoist equipment, or variations in the number and location of sampling ports. Cases involving variants are subject to approval by the Air Pollution Control Officer's authorized representative (Manager of Source Test).

Overall Guidance

These guidelines generally follow the directions provided in Code of Federal Regulations, Title 40, Part 60, Appendix A and BAAQMD's Manual of Procedures Volume IV, Part 1. For specific detailed instructions you should consult these documents.

f:\aawork\documents\la-method\ports\port platform and sampling site guidance 130318_bk_ver01.docx