

CAPILLARY SAMPLING

INTRODUCTION

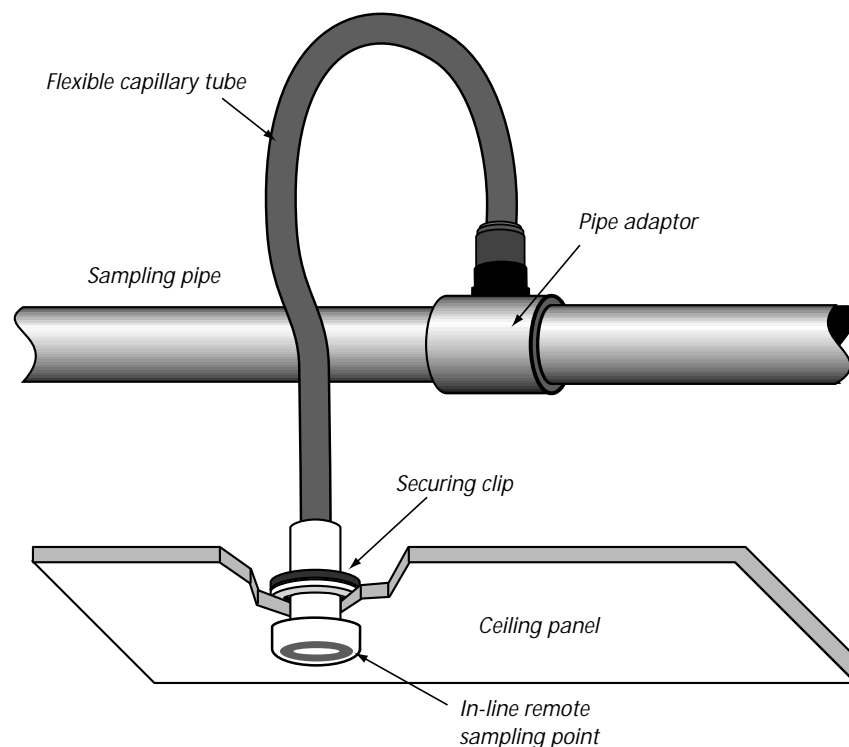
Capillary sampling is a method of locating smoke sampling points remote from the main sampling pipe. This is particularly useful where the main sampling pipe cannot be routed through the area requiring protection for either technical or aesthetic reasons. The actual capillary sampling point assembly may be known as a 'remote sampling point' or 'extended sampling point'.

The technique uses short lengths (up to a maximum of 6 metres) of 10 mm outside diameter flexible tubing that branches off from the main sampling pipe as shown in figure 1. The far end of the flexible tube is fitted with an assembly including a restrictor that needs to be drilled to an appropriate size during commissioning to achieve the desired air flow rate for the application. A range of sampling point assemblies is available to suit different applications

Typical applications for capillary sampling points are for the detection of smoke within poorly ventilated or sealed cabinets, below suspended ceilings, and for the protection of heritage/historic buildings where an unobtrusive installation is essential.

When designing a system using capillary sampling points, consideration must be given to any standards or codes that may be applicable. In particular, care should be taken to place sampling points in the same position that would otherwise be occupied by conventional smoke detectors. In the absence of any other guidance, it is recommended that a minimum of two capillary sampling points are sited in any room. This allows a degree of redundancy should any one hole become obstructed, although experience has shown this is unlikely. Fire standards and codes differ on issues such as the minimum distance smoke detectors or aspirating detection points can be positioned from walls and ceilings and it is stressed that the specific regulatory requirements should be observed wherever possible.

Fig. 1 A typical concealed sampling installation. The capillary (or drop pipe sampling point assembly) places the sampling point in the same position normally occupied by a 'point' type smoke detector.



A variation of capillary sampling is the drop pipe method in which a branch of rigid pipe is taken from the main sampling pipe via a tee or 'Y' coupling and terminated with an end cap that is drilled with a sampling hole of appropriate diameter. This technique is useful as it allows the principle of remote or concealed air sampling detection using standard sampling pipe materials. It also allows the air sampling holes to be extended away from the main pipe run to protect ceiling compartments or lantern lights and also to overcome stratification problems caused by heat barriers. Figure 2 shows the application of a drop pipe.

Drop & stand pipes

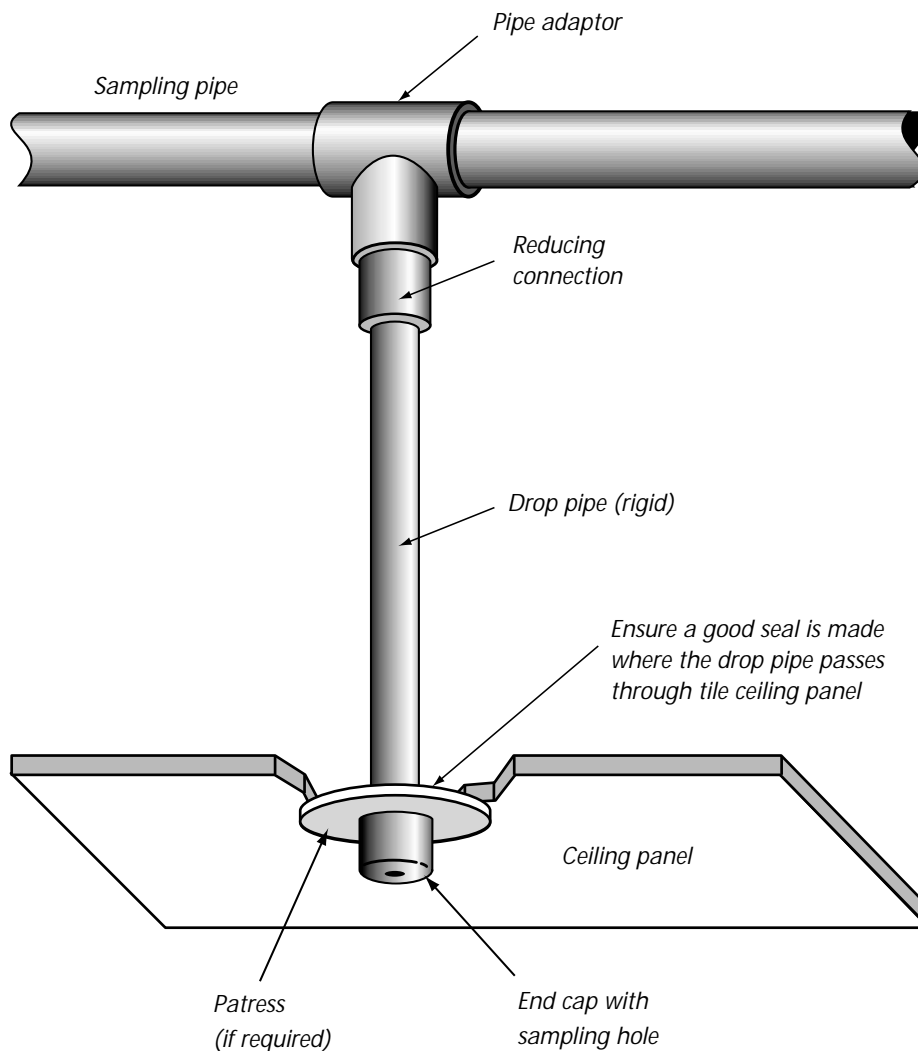


Fig. 2 Application of drop pipe.

Fig. 3 Using a stand pipe to extend sampling into a deep recess

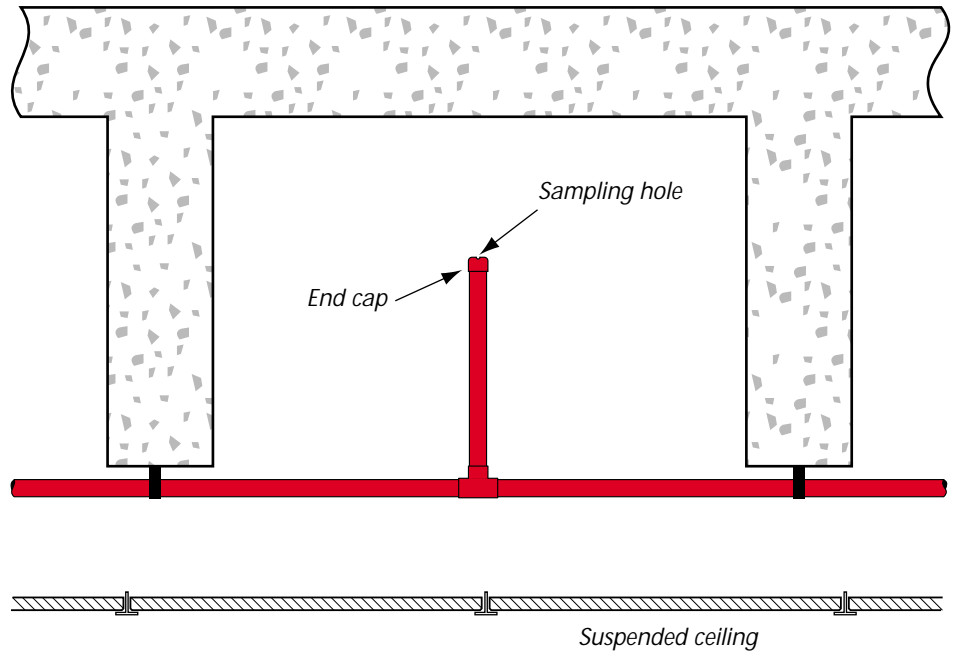
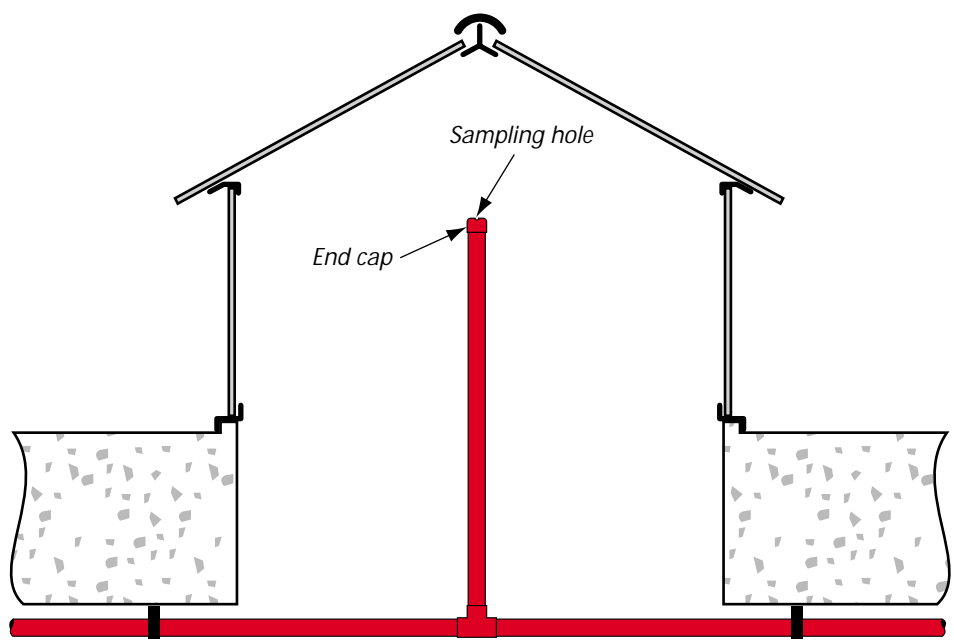


Fig. 4 Using a stand pipe to extend sampling into a lantern light



There are applications where it may be aesthetically unacceptable or potentially hazardous to have a sampling pipe network running below a concrete slab ceiling. By drilling through from above it is possible to use capillary or drop pipe sampling. Care should be taken if the fire integrity of the compartments must be maintained and suitable intumescent seals fitted.

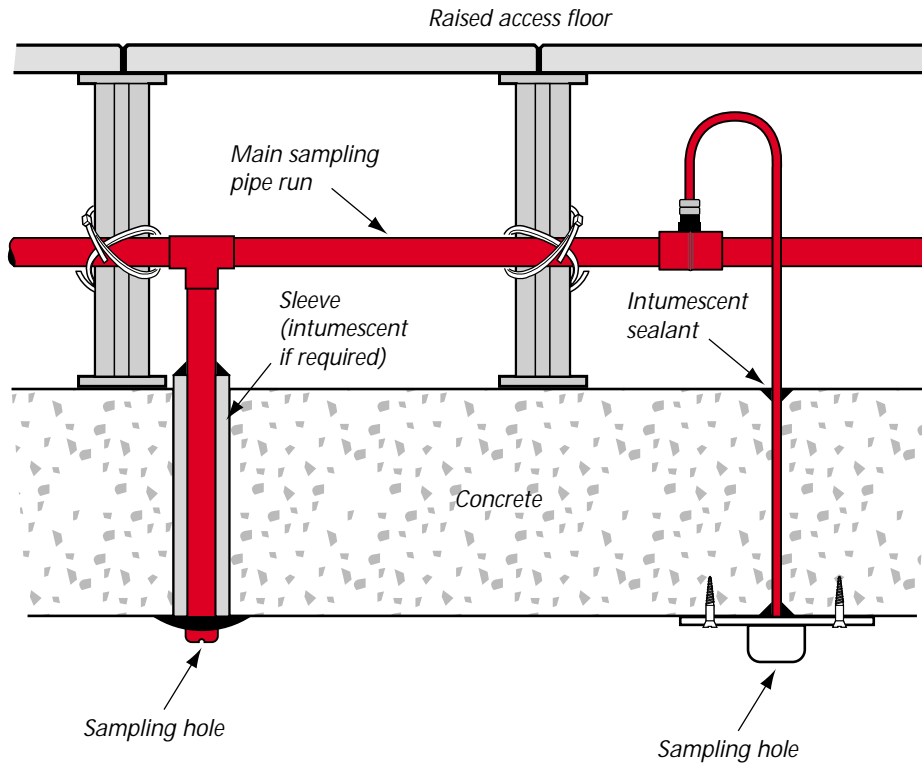


Fig. 5 Sampling through a floor

1. An air sampling pipe network that includes the use of capillaries or drop pipes should follow the recommendations given in the guidelines for standard sampling pipe networks and system design.
2. The minimum internal diameter for the capillary sampling tube should be 7.5mm for lengths up to 6 metres.
3. Drop pipes longer than 1 metre ideally should be reduced in diameter using proprietary fittings to a smaller diameter. This is to reduce the internal volume of the assembly, as a large volume tends to extend response times. The maximum recommended length is 4 metres. All drop pipes should terminate with an end cap drilled with a calibrated sampling hole.
4. Ideally the extended sampling points should be as short as possible and equal in length. This is often impractical and it is important to model the proposed system on PipeCAD® to ensure that the system remains balanced. Longer extended sampling points will cause system response times to increase.
5. It is possible to mix extended and standard sampling points on one branch of sampling pipe but, it is important to model the system using PipeCAD® to calculate the sampling hole diameters. A typical application is where the main sampling pipe run is concealed within a false ceiling void that requires smoke detection along with the room space below.

General guidelines

6. Where the concealed sampling pipe runs through an area that is at a significantly different air pressure to the space being protected, it is important that all the extended sampling holes draw from the same pressure zone. It is also important that where a sampling point or drop pipe passes through into the protected space that a good seal is made around the penetration. This will prevent draughts reducing the efficiency of the sampling hole.

Sampling from cabinets

When protection is required inside equipment enclosures or cabinets, capillary or drop tube sampling can be adapted to give very efficient smoke detection.

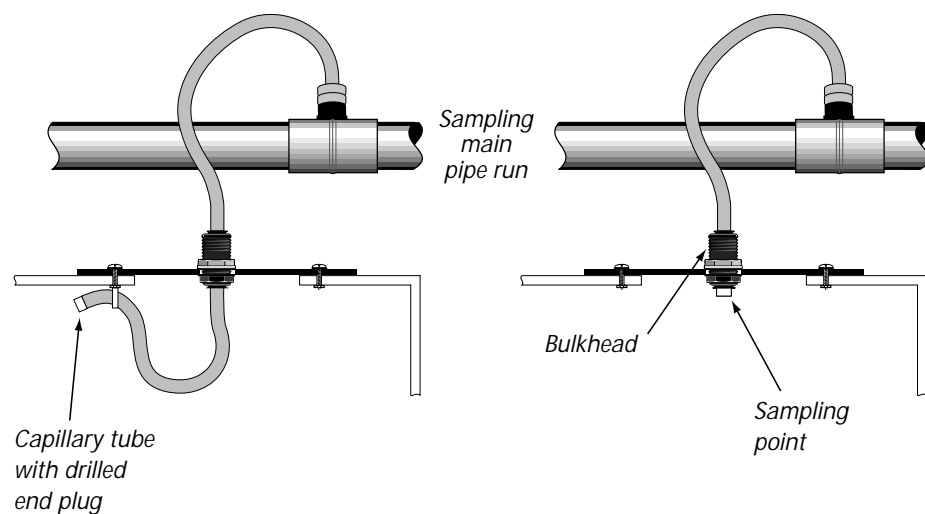
When protecting small sealed volumes, the sensitivity of the system will be high due to the relatively low smoke dilution. It is possible to cover a large number of enclosures using extended sampling points but consideration must be given to limiting the number of enclosures protected to a number that may be readily inspected by staff available if an alarm occurs.


The extended sampling point should be arranged so that the air sampling hole is positioned in the likely path of any smoke generated from an incipient fire scenario.


A system designed for in-cabinet protection should not be expected to provide protection for the environment outside the enclosures. If this is required it is recommended separate Stratos detectors are installed to meet the requirements of the relevant regulations, standards or codes of practice.

Figure 5 shows a typical application that has the main sampling pipe run above the enclosures to be protected. From this pipe, capillary tubes are run down to the top of the enclosures where they pass into the enclosure using either a purpose-made sampling point or a bulkhead connector.

Fig. 5 Sampling from equipment cabinets using capillary or remote sampling pipes



NB  Note It is important that the capillary tube is properly secured where it passes into the enclosure. There must be no risk of the capillary tube being accidentally dislodged and a mechanical joint is strongly recommended.

NB  Note It is essential that the installation of sampling pipe does not impair operation of the equipment

An alternative is to use a 'drop pipe' extended sampling point, either from above or below the cabinet. A typical application is shown in figure (4)

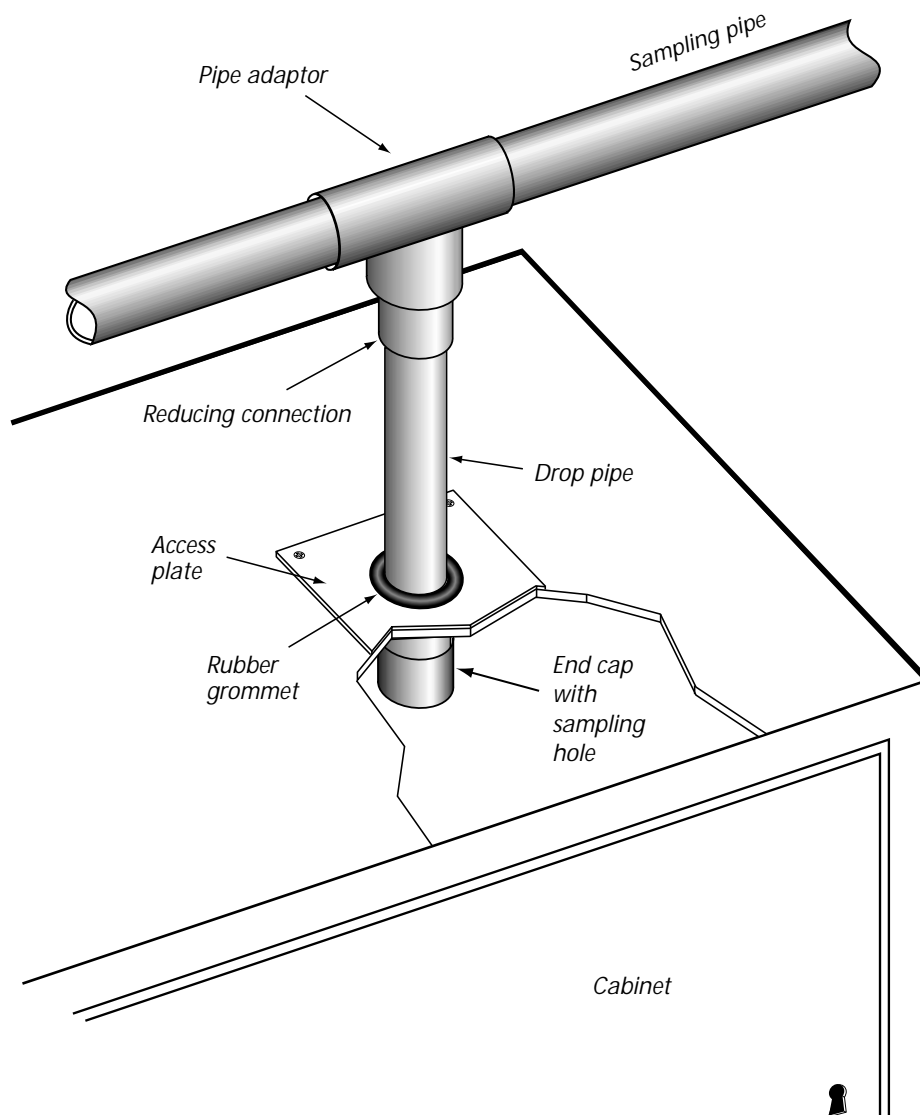
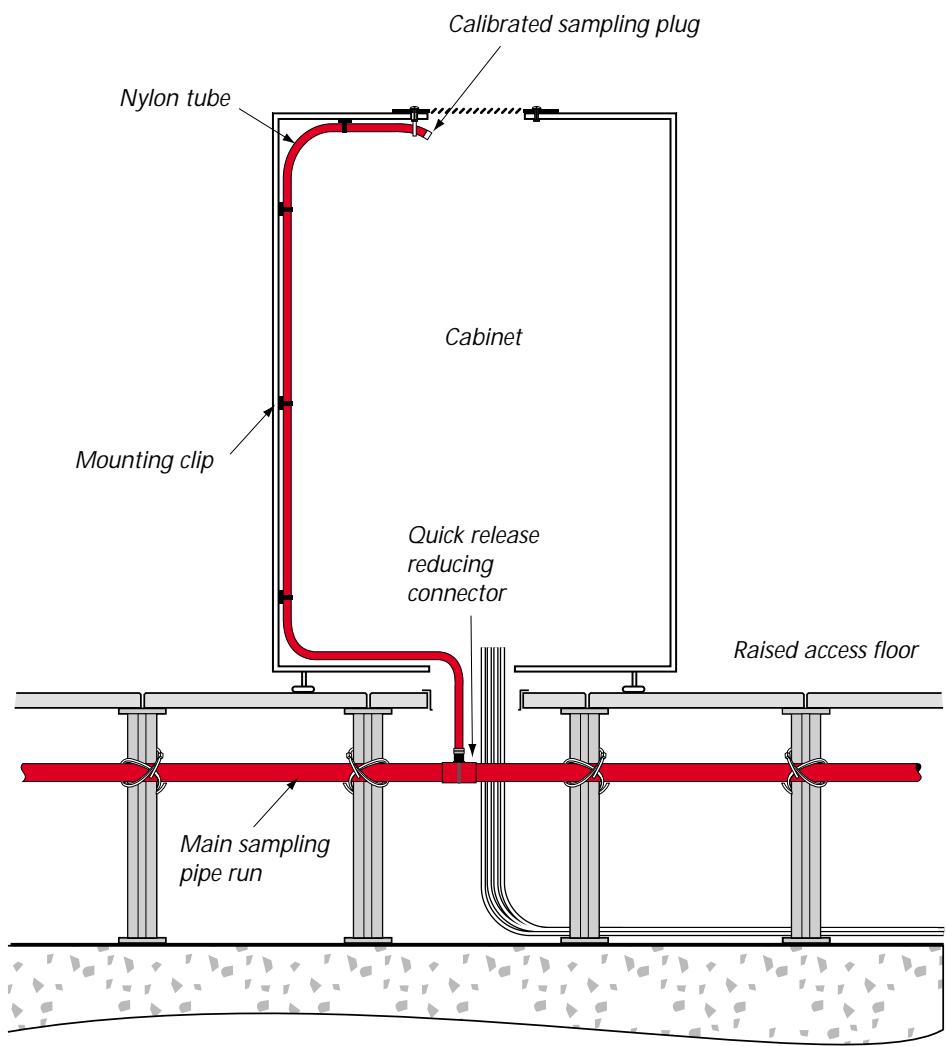


Fig. 6 Sampling from the top of an equipment cabinet using a drop pipe.

Where equipment cabinets without forced ventilation are installed on a raised access floor the main air sampling pipe can be run in the floor void and sampling points brought up through the base of the cabinets via capillary or drop (stand) pipes as shown in figures 5 & 6. The sampling holes should be strategically sited at the top of the enclosure.

Fig. 5 Sampling from equipment cabinets via a floor void using a flexible capillary remote sampling point



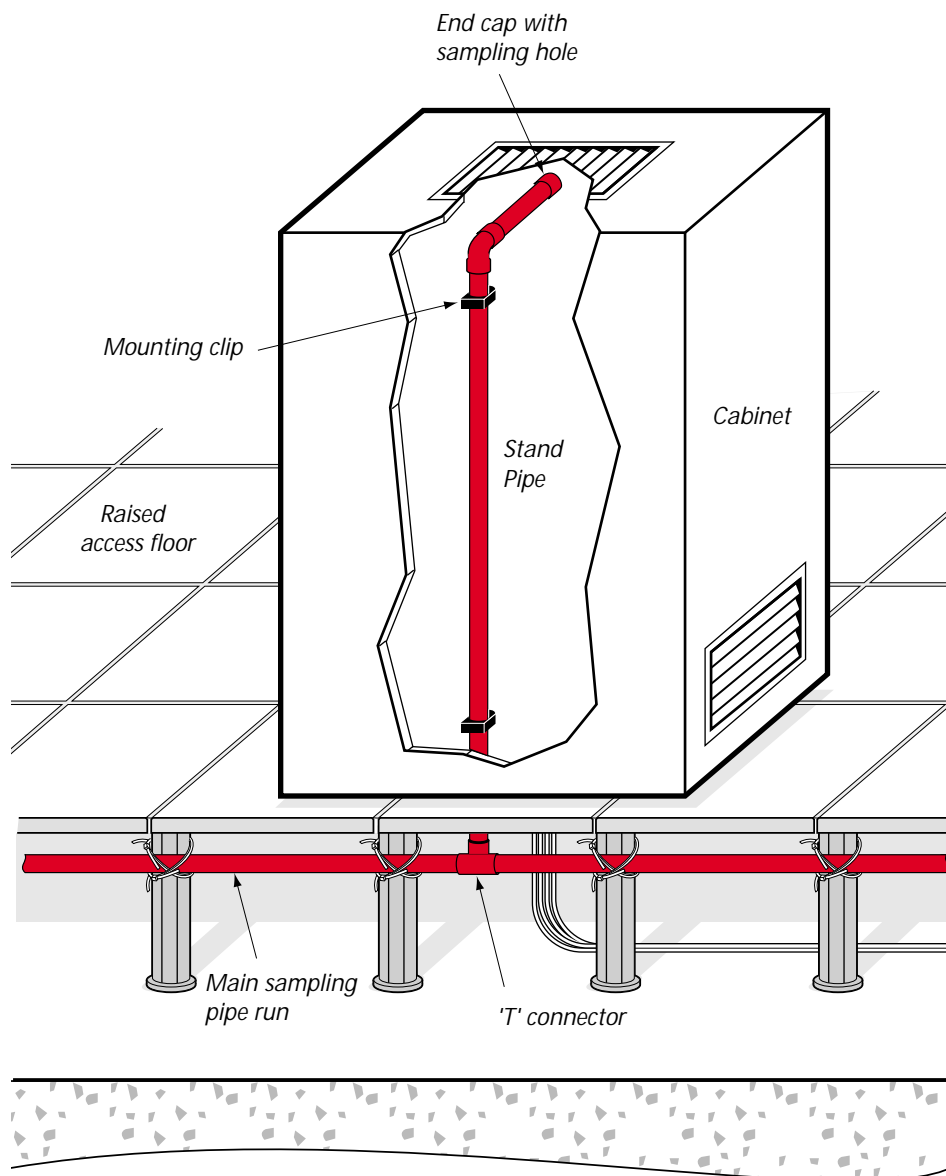


Fig. 6 Sampling from equipment cabinets via a floor void using a rigid stand pipe.