

FIELD PROCEDURE. INSTALLATION OF SOIL VAPOR PROBES

1. APPLICABILITY

This document describes the standard field procedures used to install soil vapor probes in the subsurface.

2. OBJECTIVE

The key objective of installing soil vapor probes is the collection of vapor samples at one or different depths, in order to determine vapors and other gases concentrations and profiles, while minimizing outdoor influx and the possibility of communicating soil levels.

3. PREVIOUS INFORMATION

Reviewing the information previously collected at the site allows a correct selection of the location and number of probes needed for the characterization of the vapors in the subsoil. The required information is:

- Number of potential source zones, indicating the presence of non-aqueous phase.
- Local lithology, water table depth and historical evolution.
- Distribution and evolution of the contamination in the subsoil.
- Location of infrastructures or facilities.
- Objective of the vapor probe samples (i.e., what will be the use of the information collected)

4. CONSTRUCTIVE CHARACTERISTICS OF SOIL VAPOR PROBES

4.1. Pre-drilling operations

Several steps must be followed before installing the vapor probes in order not to affect the infrastructure of the site. These steps are the following:

- Collection of layouts and blueprints of the site.
- Inspection of manholes to confirm the information of the layouts or to discover unregistered infrastructures
- Inspection with CAT (*Cable avoidance tool*) to identify buried infrastructure with electricity or metal elements.
- Manual drilling at least until 2 m below ground surface (bgs).

4.2. Installation and types of vapor probes.

The main objective of soil vapor probes is to obtain representative samples of the contaminants in the subsurface. Depending on the lithology of the site, two drilling methods can be used.

- Soft soils. The drilling method can be manual such as hand auger. The drilling diameter will be between 76 and 101 mm depending on the needs. Frequently, this method is considered as semi-mechanical since it has two phases:
 - Drilling of the pavement with mechanical means.
 - Once the pavement has been removed, hand augering until the desire depth.

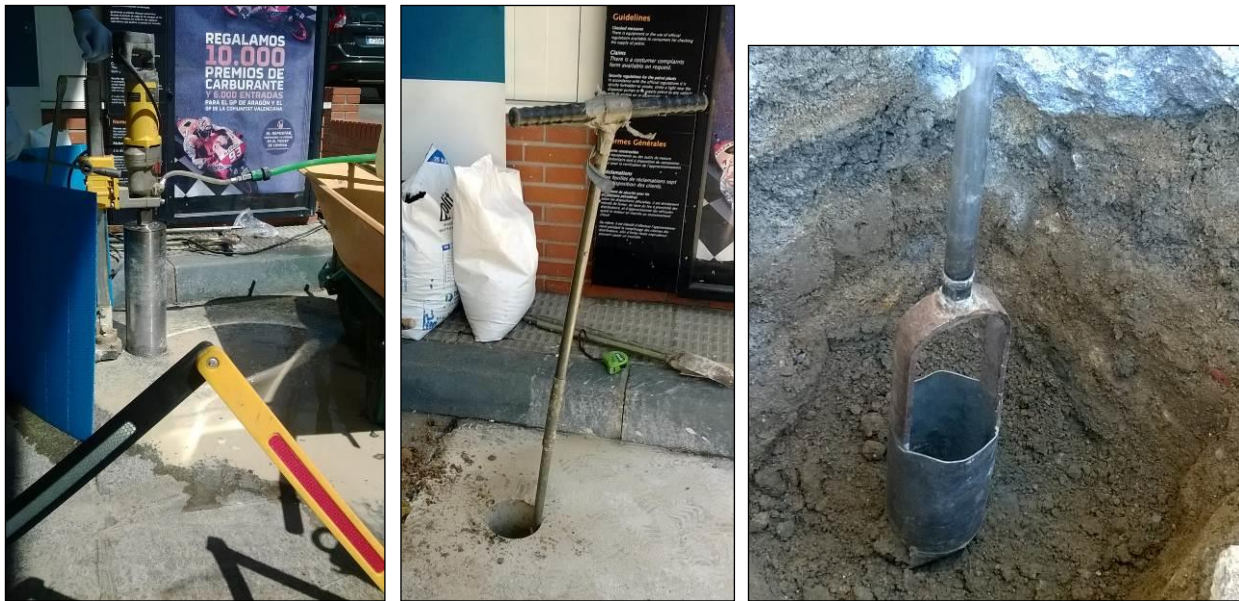


Figure 1. Drilling details of manual or semi-mechanical drilling methods.

- Hard soils. If manual techniques are not feasible due to the characteristics of the soil, mechanical methods will be used as in a regular borehole. The drilling diameter will be between 76 and 101 mm, as a standard measurement.

During the drilling, the field technician registers the conditions and lithology of extracted material. In addition, organoleptic indications of affection will be registered.

The installation depth will never reach the water table in order not to saturate the probes. Seasonal changes in the water table must be considered.

Once the perforation is completed, the probes have to be installed.

Probe tips

It is a device with a stainless steel tip perforated to capture the vapors. It is connected through a teflon pipe to the head with a valve on the surface. The head will be safely located in a manhole. The annular of the borehole will be filled with bentonite except for the section where the probes

are placed, that it will be filled with gravels (15-30 cm). Between the bentonite and the gravels there will be a thin layer (10 cm) of sand, to avoid the contact between them, especially important while the bentonite is still wet since water must never reach the probe. For the same reason, bentonite must be moistened on the surface; water must never be introduced directly in the borehole.

Figure 2. shows the installation scheme of lost vapor tips. Each probe is connected to the surface with a fine pipe of Teflon. This pipe is used for sampling of vapors.

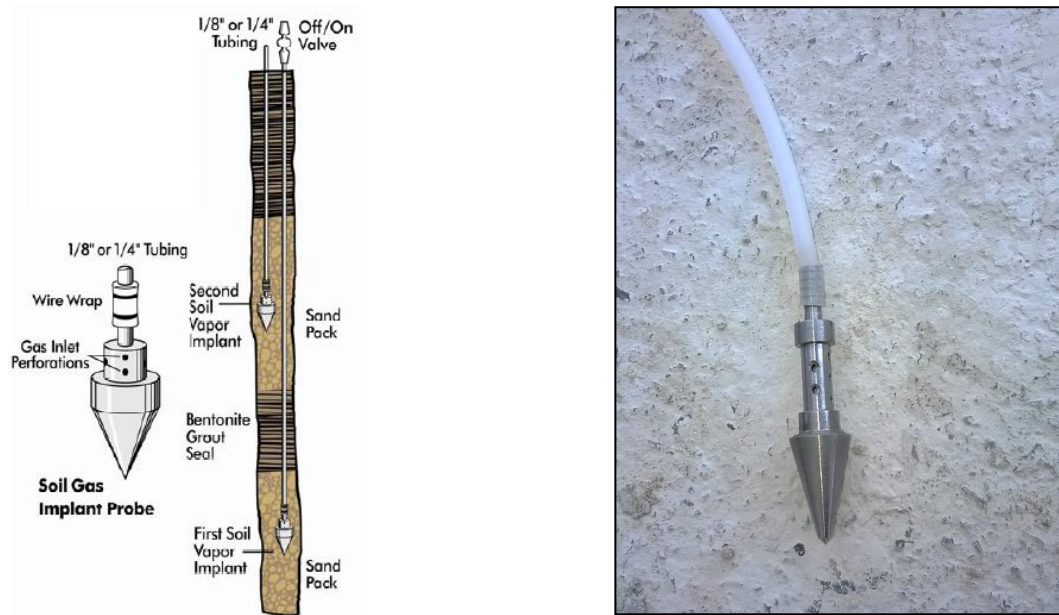


Figure 2. Installation scheme of probe tips.