

SCHEDULE 4

Regulations 9(3), (5), (12)

LOCATION OF SAMPLING POINTS FOR THE MEASUREMENT OF RELEVANT POLLUTANTS AND OZONE IN AMBIENT AIR

The following considerations will apply to fixed measurement.

PART I

*Macroscale Siting*

**Protection of human health**

- a) Sampling points directed at the protection of human health should be sited:
  - (i) to provide data on the areas within zones where the highest concentrations occur to which the population is likely to be directly or indirectly exposed for a period which is significant in relation to the averaging period of the limit value;
  - (ii) to provide data on levels in other areas within the zones which are representative of the exposure of the general population.

Sampling points should in general be sited to avoid measuring very small micro-environments in their immediate vicinity. As a guideline, a sampling point should be sited to be representative of air quality in a surrounding area of no less than 200 m<sup>2</sup> at traffic-orientated sites and of several square kilometres at urban-background sites.

Sampling points should also, where possible, be representative of similar locations not in their immediate vicinity.

Account should be taken of the need to locate sampling points on islands, where that is necessary for the protection of human health.

**Protection of ecosystems and vegetation**

- b) Sampling points targeted at the protection of ecosystems or vegetation should be sited more than 20 km from agglomerations or more than 5 km from other built-up areas, industrial installations or motorways. As a guideline, a sampling point should be sited to be representative of air quality in a surrounding area of at least 1000 km<sup>2</sup>. A sampling point may be sited at a lesser distance or to be representative of air quality in a less extended area, taking account of geographical conditions.

Account should be taken of the need to assess air quality on islands.

PART II

*Macroscale Siting: Ozone*

<i>Type of station</i>	<i>Objective of measurement</i>	<i>Representativeness<sup>(a)</sup></i>	<i>Macroscale siting criteria</i>
Urban	Protection of human health: To assess	A few km <sup>2</sup>	Away from the influence of local

(a) Sampling points should also, where possible, be representative of similar locations not in their immediate vicinity. For rural and background stations, consideration should be given, where appropriate, to co-ordination with the monitoring requirements of Commission Regulation 1091/941 concerning protection of the Community's forests against atmospheric pollution.

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<i>Type of station</i>	<i>Objective of measurement</i>	<i>Representativeness<sup>(a)</sup></i>	<i>Macroscale siting criteria</i>
	the exposure of the urban population to ozone, i.e. where the population density and ozone concentration are relatively high and representative of the exposure of the general population		emissions such as traffic, petrol stations etc.;  Vented locations where well mixed levels can be measured; Locations such as residential and commercial areas of cities, parks (away from the trees), big streets or squares with very little or no traffic, open areas characteristic of education, sports or recreation facilities
Suburban	Protection of human health and vegetation:  To assess the exposure of the population and vegetation located in the outskirts of the agglomeration, where the highest ozone levels, to which the population and vegetation is likely to be directly or indirectly exposed, occur	Some tens of km <sup>2</sup>	At a certain distance from the area of maximum emissions, downwind following the main wind direction during conditions favourable to ozone formation;  Where population, sensitive crops or natural ecosystems located in the outer fringe of an agglomeration are exposed to high ozone levels;  Where appropriate, some suburban stations also upwind of the area of maximum emissions, in order to determine the regional background levels of ozone.
Rural	Protection of human health and vegetation:	Sub-regional levels (a few km <sup>2</sup> )	Stations can be located in small settlements

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<i>Type of station</i>	<i>Objective of measurement</i>	<i>Representativeness<sup>(a)</sup></i>	<i>Macroscale siting criteria</i>
	To assess the exposure of population, crops and natural ecosystems to sub-regional scale ozone concentrations		and/or areas with natural ecosystems, forests or crops;  Representative for ozone away from the influence of immediate local emissions such as industrial installations and roads;  At open area sites, but not on higher mountain-tops.
Rural background	Protection of vegetation and human health:  To assess the exposure of crops and natural ecosystems to regional-scale ozone concentrations as well as exposure of the populations	Regional/national/continental levels (1,000 to 10,000 km <sup>2</sup> )	Station located in areas with lower population density, e.g. with natural ecosystems, forests, far removed from urban and industrial areas and away from local emissions;  Avoid locations which are subject to locally enhanced formation of near-ground inversion conditions, also summits of higher mountains;  Coastal sites with pronounced diurnal wind cycles of local character are not recommended.

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### PART III

#### *Microscale siting*

The following guidelines should be met as far as practicable:

- the flow around the inlet sampling probe should be unrestricted, (and, for ozone sampling, free in an arc of at least 270°) without any obstructions affecting the airflow in the vicinity of the sampler (normally some metres away from buildings, balconies, trees and other obstacles by

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- more than twice the height the obstacle protrudes above the sampler and at least 0.5 m from the nearest building in the case of sampling points representing air quality at the building line);
- in general, the inlet sampling point should be between 1.5 m (the breathing zone) and 4 m above the ground. Higher positions (up to 8 m) may be necessary in some circumstances and in wooded areas. Higher siting may also be appropriate if the station is representative of a large area;
- the inlet probe should not be positioned in the immediate vicinity of sources in order to avoid the direct intake of emissions unmixed with ambient air;
- the sampler's exhaust outlet should be positioned so that recirculation of exhaust air to the sampler inlet is avoided;
- location of traffic-orientated samplers;
  - for all pollutants, such sampling points should be at least 25 m from the edge of major junctions and at least 4 m from the centre of the nearest traffic lane;
  - for nitrogen dioxide and carbon monoxide, inlets should be no more than 5 m from the kerbside;
  - for particulate matter, lead and benzene, inlets should be sited so as to be representative of air quality near to the building line;
- for ozone, the inlet probe should be positioned well away from such sources as furnaces and incineration flues and more than 10m from the nearest road, with distance increasing as a function of traffic intensity.

The following factors may also be taken into account:

- interfering sources;
- security;
- access;
- availability of electrical power and telephone communications;
- visibility of the site in relation to its surroundings;
- safety of public and operators;
- the desirability of co-locating sampling points for different pollutants;
- lanning requirements.

## PART IV

### *Documentation and review of site selection*

The site-selection procedures should be fully documented at the classification stage by such means as compass-point photographs of the surrounding area and a detailed map. Sites should be reviewed at regular intervals with repeated documentation to ensure that selection criteria remain valid over time.

For ozone, this requires screening and monitoring of the monitoring data in the context of the meteorological and photochemical processes affecting the ozone concentrations measured at the respective site.