

Role of diffusion tubes in the European Union

Council Directive 96/62/EC

The Framework Directive on „Ambient Air Quality Assessment and Management“ was adopted 1996 and has four objectives:

- To define and establish objectives for ambient air pollution in the community designed to avoid, prevent and reduce harmful effects on human health and the environment as a whole
- To assess ambient air quality in Member States on the basis of common methods and criteria
- To obtain adequate information on ambient air quality and to ensure that it is made available to the public
- To maintain ambient air quality where it is good and improve in other cases

Two targets are identified: the human health and the ecosystems

Limit values

In Council Directive 1999/30/EC limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen are promulgated.

Member states shall draw up action plans indicating the measures to be taken in the short term, where there is a risk of the limit values being exceeded.

Pollutant	Protection of Health			Ecosystems
	annual mean	daily mean	short term	
Nitrogen dioxide	40		200	30 (NOx)
Sulfure dioxide	20	125	350	
Ozone		120 (8h)	180/240	40
Benzene	5			
Particles	30	50		

Table 1: Limit values of the European directives

The limit values underlined with red colour are to be assessed by diffusion tubes.

Implementation Procedure

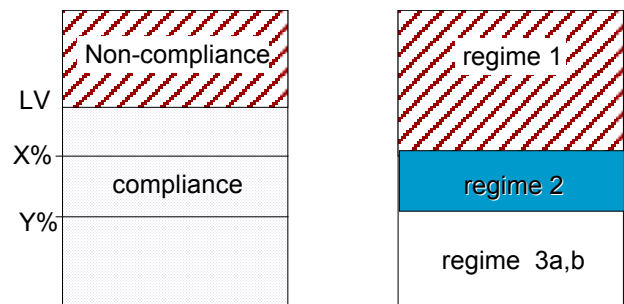
The concentrations of these pollutants have to be assessed over the whole area of the Member states. Two types of areas are distinguished:

Agglomerations: a zone with a population of more than 250'000 inhabitants. Measurements are mandatory

Zones: these are divided into exceedance areas and two levels below the limit value. Different measuring regimes are applied, depending on the proximity to the limit value.

Measurement Regimes

Exceedance of the limit value determines whether the air quality in a zone is in compliance or not and does not differentiate between the assessment regimes. Conversely, exceedance of upper assessment threshold [X%] or lower assessment threshold [Y%] determines which assessment regime is prescribed.



Four types of assessment regimes are defined

Regime	Area	Assessment regime
1	Levels > X%	Continuous measurements required
2	Levels > Y%	Combination of continuous measurement supplemented by modelling
3a	Levels < Y% in agglomeration zones	At least one continuous measuring site per agglomeration, combined with modelling, objective estimation and indicative measurements
3b	Levels < Y% in non-agglomeration zones	Modelling, objective estimation, indicative measurements

Assessment regime from the strictest (top) to the mildest (bottom) requirements

The upper assessment threshold is set at 80% for NO₂ and 60% for SO₂. The lower threshold at 65% and 40% respectively.

Data Quality

Diffusive samplers play a major role in air quality assessment. The following EU standards are currently at the voting stage:

Ambient Air Quality - Diffusive samplers for the determination of gases or vapours - Requirements and Test Methods:

Part 1: General requirements

Part 2: Specific requirements and test methods

Part 3: Guide for selection, use and maintenance

The following data quality objectives are laid down to guide quality assurance programmes.

Assessment method	Accuracy	data capture
Continuous measurement	15	90%
indicative measurement	25	90%
modelling annual means	30	-

Overall uncertainty of passam tubes

The following overall uncertainties of passam's products are obtained according to part 3:

Pollutants	Mean	Range of concentration	Overall uncertainty
NO ₂	24 hours	120	19%
	annual	< 40	18%
		> 40	16%
SO ₂	24 hours	120	20%
	annual	< 40	19%
		> 40	17%
O ₃	seasonal	60	14%
	8-hours	120	23%

These figures depends on laboratory performance and are reviewed each year.

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Use of Diffusive sampler in the EU Framework

In order not to implicate a great and expensive measuring demand, alternative or indicative measuring methods are promoted.

Council Directive states : "Whereas, to allow for the use of other technique of estimation of ambient air quality besides direct measurements, it is necessary to define the criteria for use and required accuracy of the technique"

The following monitoring objectives are can be treated by diffusion tubes:

- Tool for siting of network stations
- Preliminary assessment of ambient air quality
- Air quality monitoring in areas not exceeding limit values
- Classification of zones
- Monitoring for protection of vegetation
- Validation of urban air pollution models

Available samplers

The following samplers are available:



Nitrogen dioxide, sulfure dioxide, benzene and ozone (form left to right)

Further Information

This information sheet is a short summary of European Directives, position papers and working documents. Detailed information are available at passam ag on request.