

## SCHEDULE 1

Regulations 2, 4(1), 10(2), (3), 11(1),(3),  
14(12), (13)LIMIT VALUES, MARGINS OF TOLERANCE,  
INFORMATION AND ALERT THRESHOLDSPART I  
SULPHUR DIOXIDE**Limit values for sulphur dioxide****1.1**

	<i>Averaging period</i>	<i>Limit value</i>	<i>Margin of tolerance (a)</i>	<i>Date by which limit value is to be met</i>
<b>1.</b> Hourly limit value for the protection of human health	1 hour	350 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 24 times a calendar year	60 $\mu\text{g}/\text{m}^3$ , reducing to 30 $\mu\text{g}/\text{m}^3$ on 1st January 2004 and to 0 $\mu\text{g}/\text{m}^3$ on 1st January 2005	1st January 2005
<b>2.</b> Daily limit value for the protection of human health	24 hours	125 $\mu\text{g}/\text{m}^3$ , not to be exceeded more than 3 times a calendar year	None	1st January 2005

**Alert threshold for sulphur dioxide**

**1.2** 500  $\mu\text{g}/\text{m}^3$  measured over three consecutive hours at locations representative of air quality over at least 100 km<sup>2</sup> or an entire zone, whichever is the smaller.

**Minimum details to be made available to the public when the alert threshold for sulphur dioxide is exceeded**

**1.3** Details to be made available to the public should include at least–

- (a) the date, hour and place of the occurrence and the reasons for the occurrence, where known;
- (b) any forecasts of–
  - (i) changes in concentration (improvement, stabilisation, or deterioration), together with the reasons for those changes;
  - (ii) the geographical area concerned; and
  - (iii) the duration of the occurrence;
- (c) the type of population potentially sensitive to the occurrence; and
- (d) the precautions to be taken by the sensitive population concerned.

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## PART II

### NITROGEN DIOXIDE (NO<sub>2</sub>) AND OXIDES OF NITROGEN (NO<sub>x</sub>)

#### Limit values for nitrogen dioxide and oxides of nitrogen

##### 2.1

	<i>Averaging period</i>	<i>Limit value</i>	<i>Margin of tolerance</i>	<i>Date by which limit value is to be met</i>
1. Hourly limit value for the protection of human health	1 hour	200 µg/m <sup>3</sup> NO <sub>2</sub> , not to be exceeded more than 18 times a calendar year	70 µg/m <sup>3</sup> , reducing on 1st January 2004 and on 1st January of each following year by equal annual amounts to reach 0 µg/m <sup>3</sup> by 1st January 2010	1st January 2010
2. Annual limit value for the protection of human health	Calendar year	40 µg/m <sup>3</sup> NO <sub>2</sub>	14 µg/m <sup>3</sup> , reducing on 1st January 2004 and on 1st January of each following year by equal annual amounts to reach 0 µg/m <sup>3</sup> by 1st January 2010	1st January 2010

#### Alert threshold for nitrogen dioxide

2.2 400 µg/m<sup>3</sup> measured over three consecutive hours at locations representative of air quality over at least 100 km<sup>2</sup> or an entire zone or agglomeration, whichever is the smaller.

#### Minimum details to be made available to the public when the alert threshold for nitrogen dioxide is exceeded

2.3 Details to be made available to the public should include at least–

- (a) the date, hour and place of the occurrence and the reasons for the occurrence, where known;
- (b) any forecasts of–
  - (i) changes in concentration (improvement, stabilisation, or deterioration), together with the reasons for those changes;
  - (ii) the geographical area concerned; and
  - (iii) the duration of the occurrence;
- (c) the type of population potentially sensitive to the occurrence; and
- (d) the precautions to be taken by the sensitive population concerned.

## PART III

PARTICULATE MATTER (PM<sub>10</sub>)

	<i>Averaging period</i>	<i>Limit value</i>	<i>Margin of tolerance</i>	<i>Date by which limit value is to be met</i>
1. 24-hour limit value for the protection of human health	24 hours	50 µg/m <sup>3</sup> PM <sub>10</sub> , not to be exceeded more than 35 times a calendar year	10 µg/m <sup>3</sup> , reducing on 1st January 2004 to 5 µg/m <sup>3</sup> and on 1st January 2005 to 0 µg/m <sup>3</sup> .	1st January 2005
2. Annual limit value for the protection of human health	Calendar year	40 µg/m <sup>3</sup> PM <sub>10</sub>	3.2 µg/m <sup>3</sup> , reducing on 1st January 2004 to 1.6µg/m <sup>3</sup> and on 1st January 2005 to 0 µg/m <sup>3</sup>	1st January 2005

## PART IV

## LEAD

	<i>Averaging period</i>	<i>Limit value</i>	<i>Margin of tolerance</i>	<i>Date by which limit value is to be met</i>
Annual limit value for the protection of human health	Calendar year	0.5 µg/m <sup>3</sup>	0.2 µg/m <sup>3</sup> , reducing on 1st January 2004 to 0.1µg/m <sup>3</sup> and on 1st January 2005 to 0 µg/m <sup>3</sup>	1st January 2005

## PART V

## BENZENE

	<i>Averaging period</i>	<i>Limit value</i>	<i>Margin of tolerance</i>	<i>Date by which limit value is to be met</i>
Limit value for the protection of human health	Calendar year	5µg/m <sup>3</sup>	5µg/m <sup>3</sup> reducing on 1st January 2006 and every 12 months thereafter by 1	1st January 2010

**Status:** This is the original version (as it was originally made).

<i>Averaging period</i>	<i>Limit value</i>	<i>Margin of tolerance</i>	<i>Date by which limit value is to be met</i>
		$\mu\text{g}/\text{m}^3$ to reach $0 \mu\text{g}/\text{m}^3$ by 1st January 2010	

## PART VI CARBON MONOXIDE

### 6.1

<i>Averaging period</i>	<i>Limit value</i>	<i>Margin of tolerance</i>	<i>Date by which limit value is to be met</i>
Limit value for the protection of human health	Maximum daily 8-hour mean $10\text{mg}/\text{m}^3$	$4 \text{ mg}/\text{m}^3$ reducing on 1st January 2004 to $2 \text{ mg}/\text{m}^3$ , and to $0 \text{ mg}/\text{m}^3$ on 1st January 2005	1st January 2005

**6.2** The maximum daily 8-hour mean concentration shall be selected by examining 8-hour running averages, calculated from hourly data and updated each hour. Each 8-hour average so calculated shall be assigned to the day on which it ends, i.e. the first calculation period for any one day shall be the period from 17:00 on the previous day to 0100 on that day; the last calculation period for any one day shall be the period from 1600 to 2400 on that day.

## PART VII OZONE

### Information and alert thresholds for ozone

#### 7.1.

	<i>Parameter</i>	<i>Threshold</i>
Information threshold	1 hour average	$180\mu\text{g}/\text{m}^3$
Alert threshold	1 hour average <sup>(a)</sup>	$240\mu\text{g}/\text{m}^3$

(a) The exceedance of the threshold is to be measured or predicted for three consecutive hours.

### Minimum details to be supplied to the public when the information or alert threshold is exceeded or exceedance is predicted

**7.2.** Details to be supplied to the public on a sufficiently large scale as soon as possible should include the following.

1. Information on any observed exceedance—
  - (a) the location or area of the exceedance;
  - (b) the type of threshold exceeded (information threshold or alert threshold);
  - (c) the time at which the exceedance began and its duration; and
  - (d) the highest 1-hour and 8-hour mean concentration.
2. Forecast for the following afternoon, day or days—
  - (a) the geographical area of expected exceedances of an information threshold or alert threshold;
  - (b) the expected change in pollution, that is, improvement, stabilisation or deterioration.
3. Information on the type of population concerned, possible health effects and recommended conduct—
  - (a) information on population groups at risk;
  - (b) description of likely symptoms;
  - (c) recommended precautions to be taken by the population concerned; and
  - (d) where to find further information.
4. Information provided under this Schedule shall also include—
  - (a) information on preventive action to reduce pollution or exposure to it;
  - (b) an indication of main source sectors; and
  - (c) recommendations for action to reduce emissions.

## SCHEDULE 2

Regulations 5, 12(2)

### TARGET VALUES AND LONG-TERM OBJECTIVES FOR OZONE CONCENTRATIONS IN AMBIENT AIR

## PART I

### DEFINITIONS AND INTERPRETATION

- 1.1** In this Schedule—
- (a) all values shall be expressed in  $\mu\text{g}/\text{m}^3$ ;
  - (b) the volume shall be standardised at the following conditions of temperature and pressure: 293K and 101,3kPa;
  - (c) the time shall be specified in Central European Time;
  - (d) “AOT40” (expressed in  $(\mu\text{g}/\text{m}^3)$  hours) means the sum of the difference between hourly concentrations greater than 80  $(\text{g}/\text{m}^3)$  (which equals 40 parts per billion) and 80  $(\text{g}/\text{m}^3)$  over a given period using only the 1 hour values measured between 8:00 and 20:00 Central European Time each day;
  - (e) in order to be valid, the annual data on exceedances used to check compliance with the target values and long-term objectives below must meet the criteria set out in Part II of Schedule 10.

**Status:** This is the original version (as it was originally made).

## PART II

### TARGET VALUES FOR OZONE

<i>Parameter</i>	<i>Target value for 2010<sup>(a)</sup></i>
1. Target value for the protection of human health Maximum daily 8-hour mean <sup>(b)</sup>	120 µg/m <sup>3</sup> not to be exceeded on more than 25 days per calendar year averaged over three years <sup>(c)</sup>
2. Target value for the protection of human health AOT 40, calculated from 1H values from May to July	18,000 µg/m <sup>3</sup> .h averaged over five years <sup>(c)</sup>
(a) Compliance with target values will be assessed as of this value. That is, 2010 will be the first year the data for which is used in calculating compliance over three or five years, as appropriate.	
(b) The maximum daily 8-hour mean concentration shall be selected by examining 8 hour running averages, calculated from hourly data and updated each hour. Each 8 hour average so calculated shall be assigned to the day on which it ends, that is, the first calculation period for any one day shall be the period from 1700 on the previous day to 0100 on that day; the last calculation period for any one day will be the period from 1600 to 2400 on the day.	
(c) If the three or five year averages cannot be determined on the basis of a full and consecutive set of annual data, the minimum annual data required for checking compliance with the target values shall be as follows:–	
(i) for the target value for the protection of human health, valid data for one year; and	
(ii) for the target value for the protection of vegetation, valid data for three years.	

## PART III

### LONG-TERM OBJECTIVES FOR OZONE

Parameter	Long-term objective
1. Long-term objective for the protection of human health Maximum daily 8-hour mean within a calendar year	120 µg/m <sup>3</sup>
2. Long-term objective for the protection of vegetation AOT40, calculated from 1 h values from May to July	6,000 µg/m <sup>3</sup> .h

## SCHEDULE 3

Regulations 7(8), 8(1)

### UPPER AND LOWER ASSESSMENT THRESHOLDS AND EXCEEDANCES

## PART I

### UPPER AND LOWER ASSESSMENT THRESHOLDS

1.1 The following upper and lower assessment thresholds will apply:–

#### ***SULPHUR DIOXIDE***

(a)	<i>Health protection</i>	<i>Ecosystem protection</i>
Upper assessment threshold	60% of 24-hour limit value (75 µg/m <sup>3</sup> ), not to be exceeded	60% of winter limit value (12 µg/m <sup>3</sup> )

	<i>Health protection</i>	<i>Ecosystem protection</i>
	more than 3 times in any calendar year	
Lower assessment threshold	40% of 24-hour limit value (50 µg/m <sup>3</sup> ), not to be exceeded more than 3 times in any calendar year	40% of winter limit value (8 µg/m <sup>3</sup> )

### ***NITROGEN DIOXIDE AND OXIDES OF NITROGEN***

(b)	<i>Hourly limit value for the protection of human health (NO<sub>2</sub>)</i>	<i>Annual limit value for the protection of human health (NO<sub>2</sub>)</i>	<i>Annual limit value for the protection of vegetation (NO<sub>x</sub>)</i>
Upper assessment value	70% of limit value (140 µg/m <sup>3</sup> ), not to be exceeded more than 18 times in any calendar year	80% of limit value (32 µg/m <sup>3</sup> )	80% of limit value (24 µg/m <sup>3</sup> )
Lower assessment value	50% of limit value (100 µg/m <sup>3</sup> ), not to be exceeded more than 18 times in any calendar year	65% of limit value (26 µg/m <sup>3</sup> )	65% of limit value (19.5 µg/m <sup>3</sup> )

### ***PARTICULATE MATTER***

(c)	<i>24-hour average</i>	<i>Annual average</i>
Upper assessment threshold	60% of limit value (30 µg/m <sup>3</sup> ), not to be exceeded more than seven times in any calendar year	70% of limit value (14 µg/m <sup>3</sup> )
Lower assessment threshold	40% of limit value (20 µg/m <sup>3</sup> ), not to be exceeded more than seven times in any calendar year	50% of limit value (10 µg/m <sup>3</sup> )

### ***LEAD***

(d)	<i>Annual average</i>
Upper assessment threshold	70% of limit value (0.35 µg/m <sup>3</sup> )
Lower assessment threshold	50% of limit value (0.25 µg/m <sup>3</sup> )

### ***BENZENE***

(e)	<i>Annual Average</i>
Upper assessment threshold	70% of limit value (3.5 µg/m <sup>3</sup> )
Lower assessment threshold	40% of limit value (2 µg/m <sup>3</sup> )

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### **CARBON MONOXIDE**

(f)	<i>Eight-hour average</i>
Upper assessment threshold	70% of limit value (7mg/m <sup>3</sup> )
Lower assessment threshold	50% of limit value (5mg/m <sup>3</sup> )

## **PART II**

### **DETERMINATION OF EXCEEDANCES OF UPPER AND LOWER ASSESSMENT THRESHOLDS**

**2.1** Exceedances of upper and lower assessment thresholds must be determined on the basis of concentrations during the previous five years where sufficient data are available. An assessment threshold will be deemed to have been exceeded if it has been exceeded during at least three separate years out of the previous five years.

**2.2** Where fewer than five years' data are available, measurement campaigns of short duration during the period of the year and at locations likely to be typical of the highest pollution levels may be combined with results obtained from emission inventories and modelling to determine exceedances of the upper and lower assessment thresholds.

#### **SCHEDULE 4**

Regulations 2, 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**

**1.1** Sampling points directed at the protection of human health should be sited—

- (a) 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;
- (b) to provide data on levels in other areas within the zones which are representative of the exposure of the general population;
- (c) 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;
- (d) sampling points should also, where possible, be representative of similar locations not in their immediate vicinity;
- (e) 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**

1.2 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.****1.3****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 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.	A few km <sup>2</sup>	Away from the influence of local 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 educations, 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	Some tens of km <sup>2</sup>	At a certain distance from the area of maximum emissions, downwind following the main wind directions/s during

(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 1091/94(1) concerning protection of the Community's forests against atmospheric pollution.

(1) O.J L 125, 18.5.1994, p.1.

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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 agglomeration, where the highest ozone levels, to which the population and vegetation is likely to be directly or indirectly exposed, occur.		<p>conditions favourable to ozone formation;</p> <p>Where population, sensitive crops or natural ecosystems located in the outer fringe of an agglomeration are exposed to high ozone levels;</p> <p>Where appropriate, some suburban stations also upwind of the area of maximum emissions, on order to determine the regional background levels of ozone.</p>
Rural	<p>Protection of human health and vegetation:</p> <p>To assess the exposure of population, crops and natural ecosystems to sub-regional scale ozone concentrations</p>	Sub-regional levels (a few km <sup>2</sup> )	<p>Stations can be located in small settlements and/or areas with natural ecosystems, forests or crops;</p> <p>Representative for ozone away from the influence of immediate local emissions such as industrial installations and roads;</p> <p>At open area sites, but not on higher mountain-tops.</p>
Rural background	<p>Protection of vegetation and human health:</p> <p>To assess the exposure of crops and natural ecosystems to regional-scale ozone concentrations as well</p>	<p>Regional/national/continental levels</p> <p>(1,000 to 10,000 km<sup>2</sup>)</p>	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;

(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 1091/94(1) concerning protection of the Community's forests against atmospheric pollution.

(1) O.J.L 125, 18.5.1994, p.1.

<i>Type of station</i>	<i>Objective of measurement</i>	<i>Representativeness <sup>(a)</sup></i>	<i>Macroscale siting criteria</i>
	as exposure of the populations		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.

(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 1091/94(1) concerning protection of the Community's forests against atmospheric pollution.

## PART III

### MICROSCALE SITING

3.1 The following guidelines should be met as far as practicable:–

- (a) 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 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);
- (b) 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;
- (c) 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;
- (d) the sampler's exhaust outlet should be positioned so that recirculation of exhaust air to the sampler inlet is avoided;
- (e) in relation to the location of traffic-orientated samplers–
  - (i) 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;
  - (ii) for nitrogen dioxide and carbon MONOXIDE, inlets should be no more than 5 m from the kerbside;
  - (iii) for particulate matter, lead and benzene, inlets should be sited so as to be representative of air quality near to the building line;

(1) O.J.L 125, 18.5.1994, p.1.

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(iv) 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.

**3.2** The following factors may also be taken into account:–

- (a) interfering sources;
- (b) security;
- (c) access;
- (d) availability of electrical power and telephone communications;
- (e) visibility of the site in relation to its surroundings;
- (f) safety of public and operators;
- (g) the desirability of co-locating sampling points for different pollutants;
- (h) planning requirements.

## PART IV

### DOCUMENTATION AND REVIEW OF SITE SELECTION

**4.1** 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.

**4.2** 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.

## SCHEDULE 5

Regulation 9(4), (6), (7), (9), (11)

### CRITERIA FOR DETERMINING MINIMUM NUMBERS OF SAMPLING POINTS FOR FIXED MEASUREMENTS OF CONCENTRATIONS OF RELEVANT POLLUTANTS AND OZONE IN AMBIENT AIR

## PART I

### RELEVANT POLLUTANTS: MINIMUM NUMBER OF SAMPLING POINTS FOR FIXED MEASUREMENT TO ASSESS COMPLIANCE WITH LIMIT VALUES FOR THE PROTECTION OF HUMAN HEALTH AND ALERT THRESHOLDS IN ZONES WHERE FIXED MEASUREMENT IS THE SOLE SOURCE OF INFORMATION

#### **Diffuse sources**

##### **1.1**

<i>Population of zone (thousands)</i>	<i>If concentrations exceed the upper assessment threshold</i>	<i>If maximum concentrations are between the upper and lower assessment thresholds</i>	<i>For SO<sub>2</sub> and NO<sub>2</sub> in agglomerations where maximum concentrations are below the lower assessment thresholds</i>
0 –250	1	1	not applicable
250 –499	2	1	1
500 –749	2	1	1
750 –999	3	1	1
1,000 –1,499	4	2	1
1,500 –1,999	5	2	1
2,000 –2,749	6	3	2
2,750 –3,749	7	3	2
3,750 –4,749	8	4	2
4,750 –5,999	9	4	2
>6,000	10	5	3

For NO<sub>2</sub> and particulate matter: to include at least one urban-background station and one traffic-orientated station – this requirement shall also apply to benzene and carbon MONOXIDE provided that it does not increase the number of sampling points.

### **Point sources**

**1.2** For the assessment of pollution in the vicinity of point sources, the number of sampling points for fixed measurement should be calculated taking into account emission densities, the likely distribution patterns of ambient-air pollution and the potential exposure of the population.

## **PART II**

### **RELEVANT POLLUTANTS: MINIMUM NUMBER OF SAMPLING POINTS FOR FIXED MEASUREMENTS TO ASSESS COMPLIANCE**

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## WITH LIMIT VALUES FOR THE PROTECTION OF ECOSYSTEMS OR VEGETATION IN ZONES OTHER THAN AGGLOMERATIONS

<i>If maximum concentrations exceed the upper assessment threshold</i>	<i>If maximum concentrations are between the upper and lower assessment thresholds</i>
1 station every 20,000 km <sup>2</sup>	1 station every 40,000 km <sup>2</sup>
In island zones the number of sampling points for fixed measurement should be calculated taking into account the likely distribution patterns of ambient-air pollution and the potential exposure of ecosystems or vegetation.	

### PART III

#### OZONE: MINIMUM NUMBER: OF SAMPLING POINTS FOR FIXED CONTINUOUS MEASUREMENT TO ASSESS AIR QUALITY IN VIEW OF COMPLIANCE WITH THE TARGET VALUES, LONG-TERM OBJECTIVES AND INFORMATION AND ALERT THRESHOLDS WHERE CONTINUOUS MEASUREMENT IS THE SOLE SOURCE OF INFORMATION

<i>Population (<math>\times 1,000</math>)</i>	<i>Agglomerations (urban and suburban) <sup>(a)</sup></i>	<i>Other zones (suburban and rural <sup>(b)</sup></i>	<i>Rural background</i>
0–250		1	1 station/50,000 km <sup>2</sup> as an average density over all zones
251–500	1	2	“
501–1,000	2	2	“
1,001–1,500	3	3	“
1,501–2,000	3	4	“
2,001–2,750	4	5	“
2,751–3,750	5	6	“
> 3,750	1 additional station per 2 million inhabitants	1 additional station per 2 million inhabitants	

**(a)** At least 1 station in suburban areas, where the highest exposure of the population is likely to occur. In agglomerations at least 50% of the stations should be located in suburban areas.

**(b)** One station per 25,000 km<sup>2</sup> for complex terrain is recommended.

### PART IV

#### OZONE: MINIMUM NUMBER OF SAMPLING POINTS FOR FIXED MEASUREMENTS FOR ZONES ATTAINING THE LONG-TERM OBJECTIVES

**4.1** The number of sampling points for ozone must, in combination with other means of supplementary assessment such as air quality modelling and co-located nitrogen dioxide measurements, be sufficient to examine the trend of ozone pollution and check compliance with the long-term objectives. The number of stations located in agglomerations and other zones may be

reduced to one-third of the number specified in Part III. Where information from fixed measurement stations is the sole source of information, at least one monitoring station should be kept. If, in zones where there is supplementary assessment, the result of this is that a zone has no remaining station, co-ordination with the number of stations in neighbouring zones must ensure adequate assessment of ozone concentrations against long-term objectives. The number of rural background stations should be 1 per 100,000 km<sup>2</sup>.

## SCHEDULE 6

Regulations 2, 9(15)

### MEASUREMENTS OF OZONE PRECURSOR SUBSTANCES

#### Objectives

**1.1** The main objectives of measurements of ozone precursor substances are to analyse any trend in ozone precursors, to check the efficiency of emission reduction strategies, to check the consistency of emission inventories and to help attribute emission sources to pollution concentration.

An additional aim is to support the understanding of ozone formation and precursor dispersion processes, as well as the application of photochemical models.

#### Substances

**1.2** Measurements of ozone precursor substances must include at least nitrogen oxides, and appropriate volatile organic compounds (VOC). A list of volatile organic compounds recommended for measurement is given below.

<i>Ethane</i>	<i>1-Butene</i>	<i>Isoprene</i>	<i>Ethyl benzene</i>
Ethylene	trans-2-Butene	n-Hexane	M+p-Xylene
Acetylene	cis-2-Butene	i-Hexane	o-Xylene
Propane	1.3-Butadiene	n-Heptane	1,2,4-Trimeth. Benzene
Propene	n-Pentane	n-Octane	1,2,3-Trimeth. Benzene
n-Butane	i-Pentane	i-Octane	1,3,5-Trimeth. Benzene
i-Butane	1-Pentene	Benzene	Formaldehyde
	2-Pentene	Toluene	Total non-methane hydrocarbons

#### Reference methods

**1.3** The reference method for the analysis of oxides of nitrogen shall be ISO 7996:1985, Ambient air – determination of the mass concentrations of nitrogen oxides – chemiluminescence method

**Status:** This is the original version (as it was originally made).

## Siting

1.4 Measurements should be taken in particular in urban and suburban areas at any monitoring site set up in accordance with the requirements of these Regulations and considered appropriate with regard to the monitoring objectives in this Schedule.

## SCHEDULE 7

Regulation 9(5), (9), (16)

### DATA-QUALITY OBJECTIVES AND COMPILATION OF RESULTS OF AIR-QUALITY ASSESSMENT

## PART I

### RELEVANT POLLUTANTS : DATA-QUALITY OBJECTIVES

1.1 The following data-quality objectives for the required accuracy of assessment methods, of minimum time coverage and of data capture of measurement are laid down to guide quality-assurance programmes.

	<i>Sulphur dioxide, nitrogen dioxide and oxides of nitrogen</i>	<i>Particulate matter and lead</i>
Continuous measurement		
Accuracy	15%	25%
Minimum data capture	90%	90%
Indicative measurement		
Accuracy	25%	50%
Minimum data capture	90%	90%
Minimum time coverage	14% (One measurement a week at random, evenly distributed over the year, or eight weeks evenly distributed over the year.)	14% (One measurement a week at random, evenly distributed over the year, or eight weeks evenly distributed over the year.)
Modelling		
Accuracy		
Hourly averages	50%–60%	
Daily averages	50%	
Annual averages	30%	50%
Objective estimation		
Accuracy:	75%	100%



**1.2** The accuracy of the measurement is defined as laid down in the “Guide to the Expression of Uncertainty of Measurements” (ISO 1993)(2) or in ISO 5725-1 “Accuracy (trueness and precision) of measurement methods and results” (ISO 1994)(2). The percentages in the table are given for individual measurements averaged, over the period considered, by the limit value, for a 95% confidence interval (bias + two times the standard deviation). The accuracy for continuous measurements should be interpreted as being applicable in the region of the appropriate limit value.

**1.3** The accuracy for modelling and objective estimation is defined as the maximum deviation of the measured and calculated concentration levels, over the period considered by the limit value, without taking account the timing of the events.

**1.4** The requirements for minimum data capture and time coverage do not include losses of data due to the regular calibration or the normal maintenance of the instrumentation.

**1.5** The Scottish Ministers may allow for random measurements to be made instead of continuous measurements for particulate matter and lead by methods for which accuracy within the 95% confidence interval with respect to continuous monitoring has been demonstrated to be within 10%. Random sampling must be spread evenly over the year.

**1.6** The following data quality objectives, for allowed uncertainty of assessment methods, of minimum time coverage and of data capture of measurement are provided to guide quality assurance programmes.

	<i>Benzene</i>	<i>Carbon monoxide</i>
<b>Fixed measurements</b>		
Uncertainty	25%	15%
Minimum data capture	90%	90%
Minimum time coverage	35% urban background and traffic sites (distributed over the year to be representative of various conditions for climate and traffic) 90% industrial sites	
<b>Indicative measurements</b>		
Uncertainty	30%	25%
Minimum data capture	90%	90%
Minimum time coverage	14% (one day’s measurement a week at random, evenly distributed over the year, or 8 weeks evenly distributed over the year)	14% (one measurement a week at random, evenly distributed over the year, or 8 weeks evenly distributed over the year)
<b>Modelling</b>		
Uncertainty	–	50%

(2) The copies of the International Standards Organisation publications referred to in these Regulations can be purchased from the British Standards Institution “BSI” sales department either by telephone on 0208-996-9001 or by post from the BSI, Standards House, 389 Chiswick High Road, London W4 4AL.

(2) The copies of the International Standards Organisation publications referred to in these Regulations can be purchased from the British Standards Institution “BSI” sales department either by telephone on 0208-996-9001 or by post from the BSI, Standards House, 389 Chiswick High Road, London W4 4AL.

*Status: This is the original version (as it was originally made).*

	<i>Benzene</i>	<i>Carbon monoxide</i>
Eight-hour averages Annual averages	50%	–
Objective estimation		
Uncertainty	100%	75%

**1.7** The uncertainty (on a 95% confidence interval) of the assessment methods shall be evaluated in accordance with the “Guide to the Expression of Uncertainty of Measurements” (ISO 1993) or the methodology of ISO 5725:1994. The percentages for uncertainty in the above table are given for individual measurements averaged over the period considered by the limit value, for a 95% confidence interval. The uncertainty for the fixed measurements should be interpreted as being applicable in the region of the appropriate limit value.

**1.8** The uncertainty for modelling and objective estimation is defined as the maximum deviation of the measured and calculated concentration levels, over the period considered by the limit value, without taking into account the timing of the events.

**1.9** The requirements for minimum data capture and time coverage do not include losses of data due to the regular calibration or the normal maintenance of the instrumentation.

**1.10** The Scottish Ministers may allow for random measurements to be made instead of continuous measurements for benzene if the uncertainty, including the uncertainty due to random sampling, meets the quality objective of 25%. Random sampling must be spread evenly over the year.

## PART II

### RELEVANT POLLUTANTS: RESULTS OF AIR QUALITY ASSESSMENT

**2.1** The following information should be compiled for zones within which sources other than measurement are employed to supplement information from measurement or as the sole means of air quality assessment:–

- (a) a description of assessment activities carried out;
- (b) the specific methods used, with references to descriptions of the method;
- (c) the sources of data and information;
- (d) a description of results, including accuracies and, in particular, the extent of any area or, if relevant, the length of road within the zone over which concentrations exceed limit value or, as may be, the limit values plus applicable margins of tolerance and of any area within which concentrations exceed the upper assessment threshold or the lower assessment threshold;
- (e) for limit values the object of which is the protection of human health, the population potentially exposed to concentrations in excess of the limit value.

**2.2** Where possible maps shall be compiled showing concentration distributions within each zone.

## PART III

### OZONE AND OZONE PRECURSOR SUBSTANCES: DATA QUALITY OBJECTIVES

**3.1** The following data quality objectives, for allowed uncertainty of assessment methods, and of minimum time coverage and of data capture of measurement, are provided to guide quality-assurance programmes.

<i>For ozone, NO and NO<sub>2</sub></i>	
Continuous fixed measurement	
Uncertainty of individual measurements	15%
Minimum data capture	90% during summer 75% during winter
Indicative measurement	
Uncertainty of individual measurements	30%
Minimum data capture	90%
Minimum data coverage	>10% during winter
Modelling	
Uncertainty	50%
1 hour averages (daytime)	50%
8 hours daily maximum	
Objective estimation	
Uncertainty	75%

**3.2** The uncertainty (on a 95% confidence interval) of the measurement methods shall be evaluated in accordance with the principles laid down in the “Guide to the Expression of Uncertainty of Measurements” (ISO 1993) of the methodology in ISO 5725-1 “Accuracy (trueness and precision) of measurement methods and results” (ISO 1994) or equivalent. The percentages for uncertainty in the table are given for individual measurements, averaged over the period for calculating target values and long-term objectives, for a 95% confidence interval. The uncertainty for continuous fixed measurements should be interpreted as being applicable in the region of the concentration used for the appropriate threshold.

**3.3** The uncertainty for modelling and objective estimation means the maximum deviation of the measured and calculated concentration levels, over the period for calculating the appropriate threshold, without taking into account the timing of events.

**3.4** “Time coverage” means the percentage of time considered for settling the threshold value during which the pollutant is measured.

**3.5** “Data capture” means the ratio of the time for which the instrument produces valid data, to the time for which the statistical parameter or aggregated value is to be calculated.

**3.6** The requirements for minimum data capture and time coverage do not include losses of data due to the regular calibration or normal maintenance of the instrumentation.

## PART IV

### OZONE AND OZONE PRECURSOR SUBSTANCES: RESULTS OF AIR QUALITY ASSESSMENT

**4.1** The following information should be compiled for zones within which sources other than measurements are employed to supplement information from measurement:–

- (a) a description of the assessment activities carried out;
- (b) specific methods used, with references to descriptions of the method;
- (c) sources of data and information;
- (d) a description of results, including uncertainties and, in particular, the extent of any area within the zone over which concentrations exceed long-term objectives or target values;
- (e) for long-term objectives or target values whose object is the protection of human health, the population potentially exposed to concentrations in excess of the threshold.

**4.2** The Scottish Ministers shall ensure that maps are compiled showing concentration distributions within each zone.

## SCHEDULE 8

Regulation 9(13)

### REFERENCE METHODS FOR ASSESSMENT OF CONCENTRATIONS OF RELEVANT POLLUTANTS AND OZONE

## PART I

### REFERENCE METHOD FOR THE ANALYSIS OF SULPHUR DIOXIDE

ISO/FDIS 10498 (Standard in draft) Ambient air – determination of sulphur dioxide – ultraviolet fluorescence method.

## PART II

### REFERENCE METHOD FOR THE ANALYSIS OF NITROGEN DIOXIDE AND OXIDES OF NITROGEN

ISO 7996: 1985 Ambient air – determination of the mass concentrations of nitrogen oxides – chemiluminescence method.

## PART IIIA

### REFERENCE METHOD FOR THE SAMPLING OF LEAD

The reference method for the sampling of lead will be that described in the Annex to Directive [82/884/EEC](#)(3) until such time as the limit value in Schedule 1 to these Regulations is to be met, when the reference method will be that for PM<sub>10</sub> specified in Part IV of this Schedule.

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(3) O.J. No. L 378, 31.12.1982, p.15.

## PART IIIB

### REFERENCE METHOD FOR THE ANALYSIS OF LEAD

ISO 9855: 1993 Ambient air – Determination of the particulate lead content of aerosols collected in filters. Atomic absorption spectroscopy method(4).

## PART IV

### REFERENCE METHOD FOR THE SAMPLING AND MEASUREMENT OF PM<sub>10</sub>

The reference method for the sampling and measurement of PM<sub>10</sub> will be that described in EN 12341 “Air Quality – Field Test Procedure to Demonstrate Reference Equivalence of Sampling Methods for the PM<sub>10</sub> fraction of particulate matter”(5). The measurement principle is based on the collection on a filter of the PM<sub>10</sub> fraction of ambient particulate matter and the gravimetric mass determination.

## PART V

### REFERENCE METHOD FOR THE SAMPLING AND ANALYSIS OF BENZENE

The reference method for the measurement of benzene will be a pumped sampling method on a sorbent cartridge followed by gas chromatographic determination.

## PART VI

### REFERENCE METHOD FOR THE ANALYSIS OF CARBON MONOXIDE

The reference method for the measurement of carbon MONOXIDE will be a non-dispersive infrared spectrometric (NDIR) method.

## PART VII

### REFERENCE METHODS FOR THE ANALYSIS OF OZONE AND CALIBRATION OF OZONE INSTRUMENTS

The reference method for analysis of ozone shall be the UV photometric method (ISO FDIS 13964 or equivalent).

The reference method for calibration of ozone instruments shall be the Reference UV photometer method (ISO FDIS 13964, VDI 2468, B1.6 or equivalent).

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(4) European Standards Institute “CEN” publication reference BSEN 12341, obtainable from the British Standards Institution, see note (a) to Part I of Schedule 7 above.

(5) European Standards Institute “CEN” publication reference BSEN 12341, obtainable from the British Standards Institution, as for footnote (a) to Part I of Schedule 7 above.

SCHEDULE 9

Regulations 11(4), 12(5)

INFORMATION TO BE INCLUDED IN THE PLAN OR  
PROGRAMME FOR IMPROVEMENT OF AIR QUALITY

**Localisation of excess pollution**

- (a) (a) region
- (b) city (map)
- (c) measuring station (map, geographical coordinates).

**General information**

- (a) (a) type of zone (city, industrial or rural area)
- (b) estimate of the polluted area (km<sup>2</sup>) and of the population exposed to the pollution
- (c) useful climatic data
- (d) relevant data on topography
- (e) sufficient information on the type of targets requiring protection in the zone.

**Responsible authorities**

**1.3** Names and addresses of persons responsible for the development and implementation of improvement plans.

**Nature and assessment of pollution**

- (a) (a) concentrations observed over previous years (before the implementation of the improvement measures)
- (b) concentrations measured since the beginning of the project
- (c) techniques used for the assessment.

**Origin of pollution**

- (a) (a) list of the main emission sources responsible for pollution (map)
- (b) total quantity of emissions from these sources (tonnes/year)
- (c) information on pollution imported from other regions.

**Analysis of the situation**

- (a) (a) details of those factors responsible for the excess (transport, including cross border transport, formation)
- (b) details of possible measures for improvement of air quality.

**Details of those measures or projects for improvement which existed prior to 21st November 1996**

- (a) (a) local, regional, national, international measures
- (b) observed effects of these measures.

**Details of those measures or projects adopted with a view to reducing pollution following 21st November 1996**

- (a) (a) listing and description of all the measures set out in the project
- (b) timetable for implementation
- (c) estimate of the improvement of air quality planned and of the expected time required to attain these objectives.

**Details of the measures or projects planned or being researched for the long term.**

1.9

**List of the publications, documents, work etc. used to supplement information requested in this Schedule.**

1.10

SCHEDULE 10

Regulation 15(2)

INFORMATION TO BE OBTAINED AND COLLATED ON OZONE CONCENTRATIONS, AND CRITERIA FOR AGGREGATING DATA AND CALCULATING STATISTICAL PARAMETERS

PART I

INFORMATION ON OZONE CONCENTRATIONS

1.1 The following information on ozone concentrations shall be obtained and collated:–

<i>Type of station</i>	<i>Level</i>	<i>Averaging/accumulation time</i>	<i>Provisional data for each month from April to September</i>	<i>Report for each year</i>
Information threshold	Any	180µg/m <sup>3</sup>	1 hour	— for each day with any exceedance: date, total hours of exceedance, maximum 1 hour ozone and related

(a) In this Schedule, “AOT40” has the same meaning as in paragraph (d) of Part I to Schedule 2.

(b) Maximum daily 8 hour mean.

**Status:** This is the original version (as it was originally made).

<i>Type of station</i>	<i>Level</i>	<i>Averaging/accumulation time</i>	<i>Provisional data for each month from April to September</i>	<i>Report for each year</i>
Alert threshold	Any	240µg/m <sup>3</sup>	1 hour	<p>NO<sub>2</sub> values when required</p> <p>— monthly 1 hour maximum ozone</p> <p>— for each day with any exceedance: date, total hours of exceedance, maximum 1 hour ozone and related NO<sub>2</sub> values, when required</p> <p>– for each day with any exceedance: date, total hours of exceedance, maximum 1 hour ozone and related NO<sub>2</sub> values, when required</p> <p>– for each day with any exceedance: date, total hours of exceedance, maximum 1 hour ozone and related NO<sub>2</sub> values, when required</p>
Health protection	Any	120µg/m <sup>3</sup>	8 hours	<p>– or each day with any exceedance: date, 8 hours maximum<sup>(b)</sup></p> <p>– or each day with any exceedance: date, 8 hours maximum<sup>(b)</sup></p>

(a) In this Schedule, “AOT40” has the same meaning as in paragraph (d) of Part I to Schedule 2.

(b) Maximum daily 8 hour mean.



	<i>Type of station</i>	<i>Level</i>	<i>Averaging/accumulation time</i>	<i>Provisional data for each month from April to September</i>	<i>Report for each year</i>
Vegetation protection	Suburban, rural, rural background	AOT40 <sup>(a)</sup> =6,000µg/m <sup>3</sup> .h	1 hour, accumulated from May to June		Value
Forest protection	Suburban, rural, rural background	AOT40 <sup>(b)</sup> =20,000µg/m <sup>3</sup> .h	1 hour, accumulated from April to September		Value
Materials	Any	40µg/m <sup>3</sup>	1 year		Value

(a) In this Schedule, "AOT40" has the same meaning as in paragraph (d) of Part I to Schedule 2.

(b) Maximum daily 8 hour mean.

**1.2** Where they do not do so already, annual reports must also contain–

- (a) for ozone, nitrogen dioxide, oxides of nitrogen and the sums of ozone and nitrogen dioxide (added as parts per billion and expressed in (g/m<sup>3</sup> ozone) the maximum, 99.9th, 98th and 50th percentiles and annual average and number of valid data from hourly series; and
- (b) the maximum, 98th and 50th percentile and annual average from a series of daily 8 hour ozone maxima.

**1.3** Data submitted in monthly reports are considered provisional and shall be updated where necessary in subsequent submissions.

## PART II

### CRITERIA FOR AGGREGATING DATA AND CALCULATING STATISTICAL PARAMETERS

**2.1** In this Part, percentiles are to be calculated using the method specified in Council Decision [97/101/EC](#) establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States(6).

**2.2** The following criteria are to be used for checking validity when aggregating data and calculating statistical parameters:–

(6) O.J. No. L 035, 5.2.97, p.14.

**Status:** This is the original version (as it was originally made).

<i>Parameter</i>	<i>Required proportion of valid data</i>
1 hour values	75% (45 minutes)
8 hour values	75% of values (6 hours)
Maximum daily 8 hours mean from hourly running 8 hours averages	75% of the hourly running 8 hour averages (8 hours per day)
AOT40	90% of the 1 hour values over the time period defined for calculating the AOT40 value <sup>(1)</sup>
Annual mean	75% of the 1 hour values over summer (April to September) and winter (January to March, October to December) seasons separately
Number of exceedances and maximum values per month	90% of the daily maximum 8 hours mean value (27 available daily values per month)
	90% of the 1 hour values between 0800 and 2000 Central European Time
Number of exceedances and maximum values per year	Five out of six summer months over the summer season (April to September)

(1) In cases where all possible measured data are not available, the following factor shall be used to calculate AOT40 values:

$$AOT40(\text{estimate}) = AOT40 \text{ measured} \times \frac{\text{total possible number of hours}^*}{\text{number of measured hourly values}}$$

\*The number of hours within the time period of AOT40 definition (that is, 0800 to 2000 Central European Time from 1 May to 31 July each year, for vegetation protection and from 1 April to 30 September each year for forest protection).