Council of the
European Union

Brussels, 3 November 2022
(OR. en)

14217/22
ADD 1

Interinstitutional File:
2022/0347(COD)

ENV 1087
ENER 549
IND 437
TRANS 673
ENT 151
SAN 579
AGRI 594
CODEC 1659

PROPOSAL

From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	27 October 2022
To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
No. Cion doc.:	COM(2022) 542 final - ANNEXES 1 to 11
Subject:	ANNEXES to the Proposal for a Directive of the European Parliament and of the Council on ambient air quality and cleaner air for Europe (recast)

Delegations will find attached document COM(2022) 542 final - ANNEXES 1 to 11.

Encl.: COM(2022) 542 final - ANNEXES 1 to 11

EUROPEAN
COMMISSION

Brussels, 26.10.2022
COM(2022) 542 final

ANNEXES 1 to 11

ANNEXES

to the

Proposal for a Directive of the European Parliament and of the Council

on ambient air quality and cleaner air for Europe (recast)

{SEC(2022) 542 final} - {SWD(2022) 345 final} - {SWD(2022) 542 final} - {SWD(2022) 545 final}

⇩ new

ANNEX I

AIR QUALITY STANDARDS

SECTION 1 - LIMIT VALUES FOR THE PROTECTION OF HUMAN HEALTH

Table 1 – Limit values for the protection of human health to be attained by 1 January 2030

Averaging period	**Limit value**	
$PM_{2.5}$		
1 day	25 µg/m³	not to be exceeded more than 18 times per calendar year
Calendar year	10 µg/m³	
PM_{10}		
1 day	45 µg/m³	not to be exceeded more than 18 times per calendar year
Calendar year	20 µg/m³	
Nitrogen dioxide (NO_2)		
1 hour	200 µg/m³	not to be exceeded more than once per calendar year
1 day	50 µg/m³	not to be exceeded more than 18 times per calendar year
Calendar year	20 µg/m³	
Sulphur dioxide (SO_2)		
1 hour	350 µg/m³	not to be exceeded more than once per calendar year
1 day	50 µg/m³	not to be exceeded more than 18 times per calendar year
Calendar year	20 µg/m³	
Benzene		
Calendar year	3,4 µg/m³	
Carbon monoxide (CO)		
maximum daily 8-hour mean (1)	10 mg/m³	
1 day	4 mg/m³	not to be exceeded more than 18 times per calendar year

Lead (Pb)	
Calendar year	0,5 µg/m³
Arsenic (As)	
Calendar year	6,0 ng/m³
Cadmium (Cd)	
Calendar year	5,0 ng/m³
Nickel (Ni)	
Calendar year	20 ng/m³
Benzo(a)pyrene	
Calendar year	1,0 ng/m³

(1) The maximum daily 8-hour mean concentration will be selected by examining 8-hour running averages, calculated from hourly data and updated each hour. Each 8-hour average so calculated will be assigned to the day on which it ends i.e. the first calculation period for any 1 day will be the period from 17.00 on the previous day to 1.00 on that day; the last calculation period for any 1 day will be the period from 16.00 to 24.00 on that day.

Table 2 – Limit values for the protection of human health to be attained by [INSERT TRANSPOSITION DEADLINE]

Averaging period	**Limit value**	
$PM_{2.5}$		
Calendar year	25 µg/m³	
PM_{10}		
1 day	50 µg/m³	not to be exceeded more than 35 times per calendar year
Calendar year	40 µg/m³	
Nitrogen dioxide (NO_2)		
1 hour	200 µg/m³	not to be exceeded more than 18 times per calendar year
Calendar year	40 µg/m³	
Sulphur dioxide (SO_2)		
1 hour	350 µg/m³	not to be exceeded more than 24 times per calendar year
1 day	125 µg/m³	not to be exceeded more than 3 times per calendar year

Benzene	
Calendar year	5 µg/m^3
Carbon monoxide (CO)	
maximum daily 8-hour mean (1)	10 mg/m^3
Lead (Pb)	
Calendar year	0,5 µg/m^3
Arsenic (As)	
Calendar year	6,0 ng/m^3
Cadmium (Cd)	
Calendar year	5,0 ng/m^3
Nickel (Ni)	
Calendar year	20 ng/m^3
Benzo(a)pyrene	
Calendar year	1,0 ng/m^3

(1) The maximum daily 8-hour mean concentration will be selected by examining 8-hour running averages, calculated from hourly data and updated each hour. Each 8-hour average so calculated will be assigned to the day on which it ends i.e. the first calculation period for any 1 day will be the period from 17.00 on the previous day to 1.00 on that day; the last calculation period for any 1 day will be the period from 16.00 to 24.00 on that day.

SECTION 2 - OZONE TARGET VALUES AND ZONE LONG-TERM OBJECTIVES

A. Definitions and criteria

The 'Accumulated Ozone exposure over a Threshold of 40 parts per billion' (AOT40), expressed in '(µg/m^3) × hours', means the sum of the difference between hourly concentrations greater than 80 µg/m^3 (= 40 parts per billion) and 80 µg/m^3 over a given period using only the 1-hour values measured between 8.00 and 20.00 Central European Time (CET) each day.

B. Ozone target values

Objective	**Averaging period**	**Target value**	
Protection of human health	Maximum daily 8-hour mean (1)	120 µg/m^3	not to be exceeded on more than 18 days per calendar year averaged over 3 years (2)
Protection of the environment	May to July	AOT40 (calculated from 1-hour values)	18 000 µg/m^3 × h averaged over 5 years (2)

(1) 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 1 day will be the period from 17.00 on the previous day to 1.00 on that day; the last calculation period for any 1 day will be the period from 16.00 to 24.00 on the day.

(2) If the 3- or 5-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 will be as follows:
- for the target value for the protection of human health: valid data for 1 year,
- for the target value for the protection of vegetation: valid data for 3 years.

C. Long-term objectives for ozone (O_3)

Objective	**Averaging period**	**Long-term objective**	
Protection of human health	Maximum daily 8-hour mean within a calendar year	100 µg/m^3 (1)	
Protection of vegetation	May to July	AOT40 (calculated from 1 h values)	6 000 µg/m^3 × h

(1) 99th percentile (i.e. 3 exceedance days per year).

SECTION 3 - CRITICAL LEVELS FOR THE PROTECTION OF VEGETATION AND NATURAL ECOSYSTEMS

Averaging period	**Critical level**
Sulphur dioxide (SO_2)	
Calendar year and winter (1 October to 31 March)	20 µg/m^3
Oxides of nitrogen (NO_x)	
Calendar year	30 µg/m^3 NO_x

SECTION 4 - ALERT AND INFORMATION THRESHOLDS

A. Alert thresholds for pollutants other than ozone

To be measured over 3 consecutive hours in the case of sulphur dioxide and nitrogen dioxide, and over three consecutive days for PM_{10} and $PM_{2.5}$, at locations representative of air quality over at least 100 km^2 or an entire zone, whichever is the smaller.

Pollutant	**Alert threshold**
Sulphur dioxide (SO_2)	500 µg/m^3
Nitrogen dioxide (NO_2)	400 µg/m^3
$PM_{2.5}$	50 µg/m^3
PM_{10}	90 µg/m^3

B. Information and alert thresholds for ozone

Purpose	**Averaging period**	**Threshold**
Information	1 hour	180 µg/m^3
Alert	1 hour (1)	240 µg/m^3

(1) For the implementation of Article 20, the exceedance of the threshold is to be measured or predicted for 3 consecutive hours.

SECTION 5 - AVERAGE EXPOSURE REDUCTION OBLIGATION FOR $PM_{2.5}$ AND NO_2

A. Average exposure indicator

The Average Exposure Indicator expressed in µg/m^3 (AEI) shall be based upon measurements in urban background locations in territorial units at NUTS 1 level throughout the territory of a Member State. It shall be assessed as a 3-calendar-year running annual mean concentration averaged over all sampling points of the relevant pollutant established pursuant to Point B of Annex III in each NUTS 1 territorial unit. The AEI for a particular year shall be the mean concentration of that same year and the preceding 2 years.

Where Member States identify exceedances attributable to natural sources, contributions from natural sources shall be deducted before calculating the AEI.

The AEI is used for the examination of whether the average exposure reduction obligation is met.

B. Average exposure reduction obligations

As from 2030, the AEI shall not exceed a level that is:

- for $PM_{2.5}$, 25% lower than the AEI was 10 years before, unless it is already no higher than the average exposure concentration objective for $PM_{2.5}$ defined in Section C.
- for NO_2, 25% lower than the AEI was 10 years before, unless it is already no higher than the average exposure concentration objective for NO_2 defined in Section C.

C. Average exposure concentration objectives

The average exposure concentration objective shall be the following level of the AEI.

Pollutant	**Average exposure concentration objective**
$PM_{2.5}$	AEI = 5 µg/m^3
NO_2	AEI = 10 µg/m^3

ANNEX II

ASSESSMENT THRESHOLDS

SECTION 1 - ASSESSMENT THRESHOLDS FOR HEALTH PROTECTION

Pollutant	**Assessment threshold (annual mean, unless specified)**
$PM_{2.5}$	5 µg/m^3
PM_{10}	15 µg/m^3
Nitrogen dioxide (NO_2)	10 µg/m^3
Sulphur dioxide (SO_2)	40 µg/m^3 (24-hour mean)(1)
Benzene	1,7 µg/m^3
Carbon monoxide (CO)	4 mg/m^3 (24-hour mean)(1)
Lead (Pb)	0,25 µg/m^3
Arsenic (As)	3,0 ng/m^3
Cadmium (Cd)	2,5 ng/m^3
Nickel (Ni)	10 ng/m^3
Benzo(a)pyrene	0,12 ng/m^3
Ozone (O_3)	100 µg/m^3 (maximum 8-hour mean)(1)

(1) 99th percentile (i.e. 3 exceedance days per year).

SECTION 2 - ASSESSMENT THRESHOLDS FOR THE PROTECTION OF VEGETATION AND NATURAL ECOSYSTEMS

Pollutant	**Assessment threshold (annual mean, unless specified)**
Sulphur dioxide (SO_2)	8 µg/m^3 (average between 1 October and 31 March)
Oxides of nitrogen (NOx)	19,5 µg/m^3

ANNEX III

MINIMUM NUMBERS OF SAMPLING POINTS FOR FIXED MEASUREMENT

A. Minimum number of sampling points for fixed measurement to assess compliance with limit values for the protection of human health, ozone target values, long-term objectives, information thresholds and alert thresholds

1. Diffuse sources

Table 1 - 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 (for all pollutants except ozone)

Population of zone (thousands)	**Minimum number of sampling points if concentrations exceed the assessment threshold**					
	NO_2, SO_2, CO, benzene	**Sum PM (1)**	**Minimum PM_{10}**	**Minimum $PM_{2.5}$**	**Pb, Cd, As, Ni in PM_{10}**	**Benzo(a) pyrene in PM_{10}**
0 - 249	2	4	2	2	1	1
250 - 499	2	4	2	2	1	1
500 - 749	2	4	2	2	1	1
750 - 999	3	4	2	2	2	2
1 000 - 1 499	4	6	2	2	2	2
1 500 - 1 999	5	7	3	3	2	2
2 000 - 2 749	6	8	3	3	2	3
2 750 - 3 749	7	10	4	4	2	3
3 750 - 4 749	8	11	4	4	3	4
4 750 - 5 999	9	13	5	5	4	5
6 000+	10	15	5	5	5	5

(1) The number of $PM_{2.5}$ and NO_2 sampling points in the urban background locations of urban areas shall meet the requirements set out in Point B.

Table 2 - Minimum number of sampling points for fixed measurement to assess compliance with ozone target values, long-term objectives and information and alert thresholds where such measurements are the sole source of information (for ozone only)

Population (thousands)	**Minimum number of sampling points if the number of sampling points is reduced by up to 50% (1)**
< 250	1
< 500	2
< 1 000	2
< 1 500	3
< 2 000	4
< 2 750	5
< 3 750	6
≥ 3 750	1 additional sampling point per 2 million inhabitants

(1) At least 1 sampling point in areas where exposure of the population to the highest concentrations of ozone is likely to occur. In agglomerations, at least 50 % of the sampling points shall be located in suburban areas.

Table 3 - 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 a 50% reduction of such measurements applies (for all pollutants except ozone)

Population of zone (thousands)	**Minimum number of sampling points if the number of sampling points is reduced by up to 50%**					
	NO_2, SO_2, CO, benzene	**Sum PM (1)**	**Minimum PM_{10}**	**Minimum $PM_{2.5}$**	**Pb, Cd, As, Ni in PM_{10}**	**Benzo(a) pyrene in PM_{10}**
0 - 249	1	2	1	1	1	1
250 - 499	1	2	1	1	1	1
500 - 749	1	2	1	1	1	1
750 - 999	2	2	1	1	1	1
1 000 - 1 499	2	3	1	1	1	1
1 500 - 1 999	3	4	2	2	1	1
2 000 - 2 749	3	4	2	2	1	2
2 750 - 3 749	4	5	2	2	1	2
3 750 - 4 749	4	6	2	2	2	2
4 750 - 5 999	5	7	3	3	2	3
6 000+	5	8	3	3	3	3

(1) The number of $PM_{2.5}$ and NO_2 sampling points in the urban background locations of urban areas shall meet the requirements set out in Point B.

Table 4 - Minimum number of sampling points for fixed measurements to assess compliance with ozone target values, long-term objectives and information and alert thresholds in zones where a 50% reduction of such measurements applies (for ozone only)

Population of zone (thousands)	**Minimum number of sampling points if the number of sampling points is reduced by up to 50% (1)**
< 250	1
< 500	1
< 1 000	1
< 1 500	2
< 2 000	2
< 2 750	3
< 3 750	3
≥ 3 750	1 additional sampling point per 4 million inhabitants

(1) At least 1 sampling point in areas where exposure of the population to the highest concentrations of ozone is likely to occur. In agglomerations, at least 50 % of the sampling points shall be located in suburban areas.

For each zone, the minimum number of sampling points for fixed measurements set out in the tables in this point shall include at least 1 background location sampling point and 1 sampling point in the area with the highest concentrations according to Point B, of Annex IV provided this does not increase the number of sampling points. For nitrogen dioxide, particulate matter, benzene and carbon monoxide, this shall include at least 1 sampling point focused on measuring contribution from transport emissions. However, in the cases where there is only 1 sampling point required, this shall be in the area with the highest concentrations to which the population is likely to be directly or indirectly exposed.

For each zone, for nitrogen dioxide, particulate matter, benzene and carbon monoxide, the total number of urban background location sampling points and the total number of sampling points where the highest concentrations occur required shall not differ by more than a factor of 2. The number of $PM_{2.5}$ and nitrogen dioxide sampling points at urban background locations shall meet the requirements set out in Point B.

2. Point sources

For the assessment of pollution in the vicinity of point sources, the number of sampling points for fixed measurement shall be calculated taking into account emission densities, the likely distribution patterns of ambient-air pollution and the potential exposure of the population. Such sampling points shall be sited such that the application of BAT (Best Available Techniques) as defined by Directive 2010/75/EU can be monitored.

B. Minimum number of sampling points for fixed measurement to assess compliance with the PM_{25} and NO_2 average exposure reduction obligations for the protection of human health

For $PM_{2.5}$ and NO_2 each, one sampling point per NUTS 1 region as described in Regulation (EC) No 1059/2003, and at least 1 sampling point per million inhabitants calculated over urban areas in excess of 100 000 inhabitants shall be operated for this purpose. Those sampling points may coincide with sampling points under Point A.

C. Minimum number of sampling points for fixed measurements to assess compliance with critical levels, and with long-term objectives for ozone

1. Critical levels for the protection of vegetation and natural ecosystems

If maximum concentrations exceed the critical levels	1 sampling point every 20 000 km^2
If maximum concentrations exceed the assessment threshold	1 sampling point every 40 000 km^2

In island zones the number of sampling points for fixed measurement shall be calculated taking into account the likely distribution patterns of ambient air pollution and the potential exposure of vegetation.

2. Long–term objective for the protection of human health and the environment for ozone

For rural background measurement Member States shall ensure at least 1 sampling point per 50 000 km^2 as an average density over all zones per country. For complex terrain 1 sampling point per 25 000 km^2 is recommended.

D. Minimum number of sampling points for fixed measurements of ultrafine particles where high concentrations

Ultrafine particles shall be monitored at selected locations in addition to other air pollutants. Sampling points to monitor ultrafine particles shall coincide, where appropriate, with sampling points for particulate matter or nitrogen dioxide referred to in Point A, and be sited in accordance with Section 3 of Annex VII. For this purpose, at least 1 sampling point per 5 million inhabitants shall be established at a location where high UFP concentrations are likely to occur. Member States that have fewer than 5 million inhabitants shall establish at least 1 fixed sampling point at a location where high UFP concentrations are likely to occur.

Monitoring supersites at urban background or rural background locations established in accordance with Article 10 shall not be included for the purpose of meeting the requirements on the minimum number of sampling points for UFP set here.

ANNEX IV

ASSESSMENT OF AMBIENT AIR QUALITY AND LOCATION OF SAMPLING POINTS

A. General

Ambient air quality shall be assessed in all zones as follows:

1. Ambient air quality shall be assessed at all locations except those listed in paragraph 2.

   Points B and C shall apply to the location of sampling points. The principles established by Points B and C shall also apply in so far as they are relevant in identifying the specific locations in which concentration of the relevant pollutants are established where ambient air quality is assessed through indicative measurements or modelling.

2. Compliance with the limit values directed at the protection of human health shall not be assessed at the following locations:

   (a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;

   (b) in accordance with Article 4(1), on factory premises or at industrial sites to which all relevant provisions concerning health and safety at work apply;

   (c) on the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation.

B. Macroscale siting of sampling points

1. Information

The siting of sampling points shall take into account national gridded data of emissions reported under Directive (EU) 2016/2284 of the European Parliament and of the Council[1] and emission data reported under the European Pollutant Release and Transfer Register.

2. Protection of human health

(a) Sampling points directed at the protection of human health shall be sited in such a way as to provide data on all of the following:

(i) concentration levels in the areas within zones with the highest concentrations 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(s),

(ii) concentration levels in other areas within the zones which are representative of the exposure of the general population, and

(iii) for arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons, the deposition rates representing the indirect exposure of the population through the food chain;

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[1] Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (OJ L 344, 17.12.2016, p. 1).

(b) sampling points shall in general be sited in such a way as to avoid measuring micro-environments in the immediate vicinity of the sampling point, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality for a street segment no less than 100 m in length at locations measuring the contribution of road traffic and at least 250 m × 250 m at locations measuring the contribution from industrial sites or other sources such as ports or airports, where feasible;

(c) urban background locations shall be located so that their pollution level is influenced by the integrated contribution from all sources upwind of the sampling point. The pollution level shall not be dominated by a single source unless such a situation is typical for a larger urban area. Those sampling points shall, as a general rule, be representative for several square kilometres;

(d) where the objective is to measure the contribution of domestic heating, at least one sampling point shall be installed within the main wind direction of these sources;

(e) where the objective is to assess rural background levels, the sampling point shall not be influenced by urban areas or industrial sites in its vicinity, i.e. sites closer than 5 km;

(f) where contributions from industrial sources, ports or airports are to be assessed, at least 1 sampling point shall be installed downwind of the source in the nearest residential area. Where the background concentration is not known, an additional sampling point shall be situated within the main wind direction. The sampling points shall be sited such that the application of BAT can be monitored;

(g) sampling points shall, where possible, also be representative of similar locations not in the immediate vicinity of the sampling points. In the zones where the level of air pollutants is above the assessment threshold, the area which each sampling point is representative of shall be clearly defined. The whole zone shall be covered by the different areas of representativeness defined for each sampling points;

(h) account shall be taken of the need to locate sampling points on islands where that is necessary for the protection of human health;

(i) sampling points measuring arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons shall, where possible, be co-located with sampling points for PM_{10}.

When defining the spatial representativeness area the following associated characteristics shall be considered:

(a) the geographical area may include non-contiguous domains but shall be limited in its extension by the borders of the air quality zone under consideration;

(b) if assessed via modelling, a fit-for-purpose modelling system shall be used and modelled concentrations shall be used at station location to prevent systematic model-measurement biases from distorting the assessment;

(c) other metrics than absolute concentrations can be considered (e.g. percentiles);

(d) the tolerance levels and possible cut-offs for the different pollutants may change depending on the station characteristics;

(e) the annual average of the observed pollutant concentration shall be used as the air quality metric for a specific year.

3. Protection of vegetation and natural ecosystems

Sampling points targeted at the protection of vegetation and natural ecosystems shall be sited more than 20 km away from urban areas or more than 5 km away from other built-up areas, industrial sites or motorways or major roads with traffic counts of more than 50 000 vehicles per day, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality in a surrounding area of at least 1 000 km^2. A Member State may provide for a sampling point to be sited at a lesser distance or to be representative of air quality in a less extended area, taking account of geographical conditions or of the opportunities to protect particularly vulnerable areas.

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

4. Additional criteria for ozone sampling points

The following apply to fixed and indicative measurements:

Type of sampling point	**Objectives of measurement**	**Representativeness (1)**	**Macro-scale siting criteria**
Urban background locations for ozone assessments	Protection of human health: to assess the exposure of the urban population to ozone, i.e. where population density and ozone concentration are relatively high and representative of the exposure of the general population	1 to 10 km^2	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 trees), wide streets or squares with very little or no traffic, open areas characteristic of educational, sports or recreation facilities.
Suburban locations for ozone assessments	Protection of human health and vegetation: to assess the exposure of the population and vegetation located in the outskirts of the urban area, with the highest ozone levels to which the population and vegetation are likely to be directly or indirectly exposed.	10 to 100 km^2	At a certain distance from the area of maximum emissions, downwind following the main wind direction/directions during conditions favourable to ozone formation; where population, sensitive crops or natural ecosystems located in the outer fringe of an urban area are exposed to high ozone levels; where appropriate, some suburban sampling points also upwind of the area of maximum emissions, in order to determine

			the regional background levels of ozone.
Rural locations for ozone assessments	Protection of human health and vegetation: to assess the exposure of population, crops and natural ecosystems to sub-regional scale ozone concentrations.	Sub-regional levels (100 to 1 000 km^2)	Sampling points may be located in small settlements and/or areas with natural ecosystems, forests or crops; representative for ozone away from the influence of immediate local emissions such as industrial sites and roads; at open area sites, but not on summits of higher mountains.
Rural background locations for ozone assessments	Protection of human health and vegetation: to assess the exposure of crops and natural ecosystems to regional-scale ozone concentrations as well as exposure of the population.	Regional/national/continental levels (1 000 to 10 000 km^2)	Sampling points located in areas with lower population density, e.g. with natural ecosystems, forests, at a distance of at least 20 km from urban and industrial areas and away from local emissions; avoid locations which are subject to locally enhanced formation of ground-near inversion conditions, also summits of higher mountains; coastal sites with pronounced diurnal wind cycles of local character are not recommended.

(1) Sampling points shall, where possible, be representative of similar locations not in the immediate vicinity of the sampling points.

The locations of sampling points for rural locations and rural background locations for ozone assessment shall, where appropriate, be coordinated with the monitoring requirements of Commission Regulation (EC) No 1737/2006[2].

C. Micro-scale siting of sampling points

In so far as is practicable, the following shall apply:

(a) the flow around the sampling point inlet shall be unrestricted (in general free in an arc of at least 270°, or, for sampling points at the building line, of at least 180°) without any obstructions affecting the airflow in the vicinity of the inlet (at least 1,5 m away from buildings, balconies, trees and other obstacles, and at least 0,5 m from the

[2] Commission Regulation (EC) No 1737/2006 of 7 November 2006 laying down detailed rules for the implementation of Regulation (EC) No 2152/2003 of the European Parliament and of the Council concerning monitoring of forests and environmental interactions in the Community (OJ L 334, 30.11.2006, p. 1).

nearest building in the case of sampling points representing air quality at the building line);

(b) in general, the sampling point inlet shall be between 0,5 m (the breathing zone) and 4 m above the ground. Higher siting (up to 8m) may be appropriate if the sampling point is representative of a large area (a background location) or in other specific circumstances and any derogations shall be fully documented;

(c) the inlet probe shall not be positioned in the immediate vicinity of sources in order to avoid the direct intake of emissions unmixed with ambient air to which members of the public are unlikely to be exposed;

(d) the sampler's exhaust outlet shall be positioned so that recirculation of exhaust air to the sampler inlet is avoided;

(e) for all pollutants, sampling probes shall be at least 25 m from the edge of major junctions and no more than 10 m from the kerbside; for the purposes of this point, a 'kerbside' means the line that separates motorised traffic from other areas; a 'major junction' means a junction which interrupts the traffic flow and causes different emissions (stop&go) from the rest of the road;

(f) for the deposition measurements in rural background locations, the guidelines and criteria of EMEP shall apply as far as practicable;

(g) for ozone measurement, Member States shall ensure that the sampling point is positioned well away from sources such as furnaces and incineration flues, and more than 10 m from the nearest road, with distance increasing as a function of traffic intensity.

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 the public and operators;

(g) the desirability of co-locating sampling points for different pollutants;

(h) planning requirements.

D. Site selection, its review and documentation

1. The competent authorities responsible for air quality assessment shall for all zones fully document the site-selection procedures and record information to support the network design and choice of location for all monitoring sites. The design of the monitoring network shall be supported at least by either modelling or indicative measurements.

2. The documentation shall include the location of the sampling points through spatial coordinates, detailed maps and shall include information on the spatial representativeness of all sampling points.

3. The documentations shall include any deviation from the micro-scale siting criteria, their underlying reasons and the likely impact on measured levels.
4. Where indicative measurements, modelling or objective estimation, or a combination thereof are used within a zone, the documentation shall include details of these methods and information on how the criteria listed in Article 9(3) are met.
5. Where indicative measurements, modelling or objective estimation are used, competent authorities shall use gridded data reported under Directive (EU) 2016/2284 and emission information reported under Directive 2010/75/EU.
6. For ozone measurements, Member States shall apply proper screening and interpretation of the monitoring data in the context of the meteorological and photochemical processes affecting the ozone concentrations measured at the respective sites.
7. When applicable, the list of ozone precursors substances, the objective sought for measuring them and the methods used to sample and measure them shall be part of the documentation.
8. When applicable, information of the measurement methods used for the measurement of the chemical composition of $PM_{2.5}$ shall also be part of the documentation.
9. At least every 5 years the selection criteria, network design and monitoring site locations, defined by the competent authorities in view of the requirements of this Annex, shall be reviewed to ensure they remain valid and optimal overtime. The review shall be supported at least by either modelling or indicative measurements.
10. The documentation shall be updated following every review and other relevant changes to the monitoring network, and shall be made public through appropriate communication channels

ANNEX V

DATA QUALITY OBJECTIVES

A. Uncertainty of measurements and modelling for ambient air quality assessment

1. Uncertainty for measurement and modelling of long-term mean concentrations (annual mean)

Air pollutant	Maximum uncertainty of fixed measurements		Maximum uncertainty of indicative measurements (1)		Maximum ratio of uncertainty of modelling and objective estimation over uncertainty of fixed measurements
	Absolute value	Relative value	Absolute value	Relative value	Maximum ratio
$PM_{2.5}$	3,0 µg/m^3	30 %	4,0 µg/m^3	40 %	1,7
PM_{10}	4,0 µg/m^3	20 %	6,0 µg/m^3	30 %	1,3
NO_2 / NO_x	6,0 µg/m^3	30 %	8,0 µg/m^3	40 %	1,4
Benzene	0,75 µg/m^3	25 %	1,2 µg/m^3	35 %	1,7
Lead	0,125 µg/m^3	25 %	0,175 µg/m^3	35 %	1,7
Arsenic	2,4 ng/m^3	40 %	3,0 ng/m^3	50 %	1,1
Cadmium	2,0 ng/m^3	40 %	2,5 ng/m^3	50 %	1,1
Nickel	8,0 ng/m^3	40 %	10,0 ng/m^3	50 %	1,1
Benzo(a)pyrene	0,5 ng/m^3	50 %	0,6 ng/m^3	60 %	1,1

(1) When using indicative measurements for other purposes other than compliance assessment, such as, but not only: design or review of the monitoring network, model calibration and validation, the uncertainty may be that established for modelling applications.

2. Uncertainty for measurement and modelling of short-term mean concentrations

Air pollutant	Maximum uncertainty of fixed measurements		Maximum uncertainty of indicative measurements (1)		Maximum ratio of uncertainty of modelling and objective estimation over uncertainty of fixed measurements
	Absolute value	Relative value	Absolute value	Relative value	Maximum ratio
$PM_{2.5}$ (24-hour)	6,3 µg/m³	25 %	8,8 µg/m³	35 %	2,5
PM_{10} (24-hour)	11,3 µg/m³	25 %	22,5 µg/m³	50 %	2,2
NO_2 (daily)	7,5 µg/m³	15 %	12,5 µg/m³	25 %	3,2
NO_2 (hourly)	30 µg/m³	15 %	50 µg/m³	25 %	3,2
SO_2 (daily)	7,5 µg/m³	15 %	12,5 µg/m³	25 %	3,2
SO_2 (hourly)	52,5 µg/m³	15 %	87,5 µg/m³	25 %	3,2
CO (24-hour)	0,6 mg/m³	15 %	1,0 mg/m³	25 %	3,2
CO (8-hour)	1,0 mg/m³	10 %	2,0 mg/m³	20 %	4,9
Ozone (peak season): uncertainty of the 8h values	10,5 µg/m³	15 %	17,5 µg/m³	25 %	1,7
Ozone (8h mean)	18 µg/m³	15 %	30 µg/m³	25 %	2,2

(1) When using indicative measurements for other purposes other than compliance assessment, such as, but not only: design or review of the monitoring network, model calibration and validation, the uncertainty may be that established for modelling applications.

The uncertainty for measurements (expressed at a 95 % confidence level) of the assessment methods shall be calculated in line with the respective EN standard of each pollutant. For methods where no standard is available, the uncertainty of the assessment method shall be evaluated in accordance with the principles of the Joint Committee for Guidance in Metrology (JCGM) 100:2008 'Evaluation of measurement data - Guide to the Expression of Uncertainty in Measurement' and the methodology in Part 5 of ISO 5725:1998. For indicative measurements, uncertainty shall be calculated according to the guidance on the demonstration of equivalence referred to in Point B of Annex VI.

The percentages for uncertainty in the tables in this Section apply for all limit values (and the ozone target value) that are calculated by simple averaging of individual measurements such as hourly mean, daily mean or yearly mean values without considering the additional uncertainty for the calculation of the number of exceedances. The uncertainty shall be interpreted as being applicable in the region of the appropriate

limit values (or ozone target value). The uncertainty calculation does not apply to AOT40 and values that include more than 1 year, more than 1 station (e.g. AEI) or more than 1 component. They are also not applicable for information thresholds, alert thresholds and critical levels for the protection of vegetation and natural ecosystems.

The uncertainty of measurement data used for ambient air quality assessment shall not exceed either the absolute value or the relative value expressed in this Section.

The maximum uncertainty of modelling is set to the uncertainty for fixed measurements multiplied by the applicable maximum ratio. The modelling quality objective (i.e. a modelling quality indicator less or equal to 1) shall be verified at least at 90% of the available monitoring points, over the assessment area and period considered. At a given monitoring point, the modelling quality indicator shall be calculated as the ratio of the root mean square error(s) between modelling results and measurements over the square root of the quadratic sum(s) of the modelling and measurement uncertainties, over an entire assessment period. Note that the sum will reduce to a single value when annual means are considered. All fixed measurements meeting the data quality objectives (i.e. uncertainty of measurement and data coverage of measurement as specified in Sections A and B of this Annex, respectively) located in the modelling assessment area shall be used for the evaluation of uncertainty of modelling. Note that the maximum ratio shall be interpreted as being applicable over the entire concentration range.

For short-term mean concentrations, the maximum uncertainty of measurement data used to assess the modelling quality objective shall be the absolute uncertainty calculated using the relative value expressed in this Section, above the limit value and shall decrease linearly from the absolute value at the limit value, to a threshold at zero concentration[3]. Both the short-term and long-term modelling quality objectives shall be fulfilled.

For modelling of annual mean concentrations of benzene, lead, arsenic, cadmium, nickel and benzo(a)pyrene, the maximum uncertainty of measurement data used for assessing the modelling quality objective shall not exceed the relative value expressed in this Section.

For modelling of annual mean concentrations of $PM_{2.5}$, PM_{10}, and nitrogen dioxide the maximum uncertainty of measurement data used for assessing the modelling quality objective shall not exceed either the absolute value or the relative value expressed in this Section.

Where an air quality model is used for assessment, references to descriptions of the model and information on the calculation of the modelling quality objective shall be compiled.

The uncertainty of objective estimation shall not exceed the uncertainty for indicative measurements by more than the applicable maximum ratio and shall not exceed 85%. The uncertainty for objective estimation is defined as the maximum deviation of the measured and calculated concentration levels, over the period considered, by the limit value (or ozone target value), without taking into account the timing of the events.

[3] The threshold shall be set to 4, 3, 10, 3 and 5 ug/m^3 for PM_{10}, $PM_{2.5}$, O_3, NO_2 and SO_2, respectively and 0.5 mg/m^3 for CO. These values represent the state of knowledge and shall be regularly updated at least every 5 years, to reflect developments in the state-of-art.

B. Data coverage of measurements for ambient air quality assessment

"Data coverage" refers to the proportion of the measurement period for which valid measurement data are available, expressed as a percentage.

Air pollutant	Minimum data coverage			
	Fixed measurements		Indicative measurements	
	Annual means	1-hour, 8-hour or 24-hour means (1)	Annual means	1-hour, 8-hour or 24-hour means (1)
SO_2, NO_2/NOx, CO, O_3	85 % (2)	75% (3)	13 %	50 % (4)
PM_{10}, $PM_{2.5}$	85 %	75%	13 %	50%
Benzene	85 %	-	13 %	-
Benzo(a)pyrene, polycyclic aromatic hydrocarbons (PAH), total gaseous mercury	30 %	-	13 %	-
As, Cd, Ni, Pb	45 %	-	13 %	-
BC, Ammonia (NH_3), UFP, particle size number distribution of UFP	80 %	-	13 %	-
Total Deposition	-	-	30%	-

(1) For O_3 and CO, the calculation of the 'maximum daily 8-hour mean' for any specific day requires a minimum 75% of the hourly running eight-hour averages (i.e. 18 eight-hour averages per day).

(2) For O_3, minimum data coverage requirements are to be met both for the full calendar year, and for the periods of April to September, and October to March, respectively.

Assessment of the AOT40 for ozone minimum data coverage requirements are to be met during the time period defined for calculating the AOT40 value.

(3) For the assessment of annual mean values, Member States may apply random measurements instead of continuous measurements if they can demonstrate to the Commission that the uncertainty, including the uncertainty due to random sampling, meets the quality objectives in the table and the time coverage is still larger than the minimum data coverage for indicative measurements. Random sampling must be evenly distributed over the year in order to avoid skewing of results. The uncertainty due to random sampling may be determined by the procedure laid down in ISO 11222 (2002) 'Air Quality — Determination of the Uncertainty of the Time Average of Air Quality Measurements'.

(4) For O_3, minimum data coverage applies for the period of April to September (no criterium of minimum data coverage is required during the winter period).

Fixed measurements of SO_2, NO_2, CO, O_3, PM_{10}, $PM_{2.5}$ and benzene are to be carried out continuously during the full calendar year.

For the other cases, measurements are to be evenly distributed over the calendar year (or over the April-September period for indicative measurements of O_3). In order to comply with these requirements and to ensure that any potential losses of data do not skew results, the minimum data coverage requirements shall be met for specific periods (quarter, month, weekday) of the whole year depending on the pollutant and measurement method/frequency.

For the assessment of annual mean values via indicative measurements, Member States may apply random measurements instead of continuous measurements if they can demonstrate that the uncertainty, including the uncertainty due to random sampling, meets the required data quality objectives and minimum data coverage for indicative measurements. Such random sampling shall be evenly distributed over the year in order to avoid skewing of results. The uncertainty due to random sampling may be determined by the procedure laid down in ISO 11222 (2002) 'Air Quality — Determination of the Uncertainty of the Time Average of Air Quality Measurements'.

The requirements for minimum data coverage do not include loss(es) of data due to the regular calibration or the normal maintenance of the instrumentation. Such maintenance shall not take place during pollution peak periods.

24-hour sampling is required for the measurement of benzo(a)pyrene and other polycyclic aromatic hydrocarbons. Individual samples taken over a period of up to 1 month may be combined and analysed as a composite sample, provided the method ensures that the samples are stable for that period. The three congeners benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene can be difficult to resolve analytically. In such cases, they can be reported as a sum together. Sampling must be spread evenly over the weekdays and the year. For the measurement of deposition rates monthly, or weekly, samples throughout the year are recommended.

Furthermore, those provisions on individual samples shall also apply to arsenic, cadmium, nickel and total gaseous mercury. Moreover, sub–sampling of PM_{10} filters for metals for subsequent analysis is allowed, providing there is evidence that the sub-sample is representative of the whole and that the detection sensitivity is not compromised when compared with the relevant data quality objectives. As an alternative to daily sampling, weekly sampling for metals in PM_{10} is allowed provided that the collection characteristics are not compromised.

Member States may use wet sampling only, instead of bulk sampling, if they can demonstrate that the difference between them is within 10 %. Deposition rates shall generally be given as $\mu g/m^2$ per day.

C. Methods for assessing compliance and estimating statistical parameters to account for low data coverage or significant data losses

An assessment of compliance with the relevant limit and ozone target value shall be carried out regardless of whether the data quality objectives are achieved, provided the available data allows for a conclusive assessment. In cases relating to the short-term limit and ozone target values, measurements that only cover a fraction of the calendar year, and that have not delivered sufficient valid data as required by Point B, may still constitute non-compliance. Where this is the case, and there are no clear grounds to doubt the quality of the valid data acquired, this shall be considered an exceedance of the limit or target value and be reported as such.

D. Results of air quality assessment

The following information shall be compiled for zones where air quality modelling or objective estimation is used:

(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 uncertainties and, in particular, the extent of any area or, if relevant, the length of road within the zone over which concentrations exceed any limit value, ozone target value or long-term objective, and of any area within which concentrations exceed the assessment threshold,

(e) the population potentially exposed to levels in excess of any limit value for protection of human health.

E. Quality assurance for ambient air quality assessment. Data validation

1. To ensure accuracy of measurements and compliance with the data quality objectives laid down in Point A, the appropriate competent authorities and bodies designated pursuant to Article 5 shall ensure the following:

(a) that all measurements undertaken in relation to the assessment of ambient air quality pursuant to Article 8 are traceable in accordance with the requirements set out in the harmonised standard for testing and calibration laboratories;

(b) that institutions operating networks and individual sampling points have an established quality assurance and quality control system which provides for regular maintenance to assure the continued accuracy of measuring devices. The quality system shall be reviewed as necessary and at least every 5 years by the relevant national reference laboratory;

(c) that a quality assurance/quality control process is established for the process of data collection and reporting and that organisations appointed for this task actively participate in the related Union-wide quality assurance programmes;

(d) that the national reference laboratories are appointed by the appropriate competent authority or body designated pursuant to Article 5 of this Directive and are accredited for the reference methods referred to in Annex VI to this Directive, at least for those pollutants for which concentrations are above the assessment threshold, according to the relevant harmonised standard for testing and calibration laboratories, the reference to which has been published in the *Official Journal of the European Union* pursuant to Article 2(9) of Regulation (EC) No 765/2008 of the European Parliament and of the Council[4] setting out the requirements for accreditation and market surveillance. These laboratories shall also be responsible for the coordination in Member State's territory of the Union-wide quality assurance programmes to be organised by the Commission's Joint Research Centre and shall also be responsible for coordinating,

[4] Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (OJ L 218, 13.8.2008, p. 30).

on the national level, the appropriate use of reference methods, and the demonstration of equivalence of non-reference methods. National reference laboratories organising intercomparison on the national level shall also be accredited according to the relevant harmonised standard for proficiency testing;

(e) that the national reference laboratories take part at least every 3 years in the Union-wide quality assurance programmes organised by the Joint Research Centre for at least those pollutants for which concentrations are above the assessment threshold. Participation for other pollutants is recommended. If this participation produces unsatisfactory results, then the national laboratory shall demonstrate at the next participation in the intercomparison satisfactory remediation measures, and provide a report to the Joint Research Centre on these measures;

(f) that the national reference laboratories support the work done by the European network of National Reference Laboratories set up by the Commission's Joint Research Centre;

(g) that the European network of National Reference Laboratories be responsible for the periodic review, at least every 5 years, of the measurement uncertainties listed in the first two columns of Tables 1 and 2 of this Annex and subsequent proposal of any necessary changes to the Commission.

2. All reported data under Article 23 shall be deemed to be valid except data flagged as provisional.

F. Promotion of harmonised air quality modelling approaches

1. To promote and support the harmonised use of scientifically sound air quality modelling approaches by the competent authorities with an emphasis on model application, the appropriate competent authorities and bodies designated pursuant to Article 5 shall ensure the following:

(a) that the designated reference institutions participate in the European network of air quality modelling set up by the Commission's Joint Research Centre;

(b) that best practices in air quality modelling identified by the network through scientific consensus are adopted in relevant applications of air quality modelling for the purposes of fulfilling legal requirements pursuant to Union legislation, without prejudice to model adaptations necessitated by singular circumstances;

(c) that the quality of relevant applications of air quality modelling is periodically checked and improved through intercomparison exercises organised by the Commission’s Joint Research Centre;

(d) that the European network of air quality modelling be responsible for the periodic review, at least every 5 years, of the ratio of modelling uncertainties listed in the final columns of Tables 1 and 2 of this Annex and subsequent proposal of any necessary changes to the Commission.

ANNEX VI

REFERENCE METHODS FOR ASSESSMENT OF CONCENTRATIONS IN AMBIENT AIR AND DEPOSITION RATES

A. Reference methods for the assessment of concentrations of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2.5}$), lead, benzene, carbon monoxide, arsenic, cadmium, mercury, nickel, polycyclic aromatic hydrocarbons, ozone and other pollutants in ambient air and deposition rates

1. Reference method for the measurement of sulphur dioxide in ambient air

The reference method for the measurement of sulphur dioxide is that described in EN 14212:2012 'Ambient air — Standard method for the measurement of the concentration of sulphur dioxide by ultraviolet fluorescence'.

2. Reference method for the measurement of nitrogen dioxide and oxides of nitrogen in ambient air

The reference method for the measurement of nitrogen dioxide and oxides of nitrogen is that described in EN 14211:2012 'Ambient air — Standard method for the measurement of the concentration of nitrogen dioxide and nitrogen monoxide by chemiluminescence'.

3. Reference method for the sampling and measurement of PM_{10} in ambient air

The reference method for the sampling and measurement of PM_{10} is that described in EN12341:2014 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'.

4. Reference method for the sampling and measurement of $PM_{2.5}$ in ambient air

The reference method for the sampling and measurement of $PM_{2.5}$ is that described in EN12341:2014 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'.

5. Reference method for the sampling and measurement of lead, arsenic, cadmium and nickel in ambient air

The reference method for the sampling of lead, arsenic, cadmium and nickel is that described in EN 12341:2014 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'. The reference method for the measurement of lead, arsenic, cadmium and nickel is that described in EN 14902:2005 'Standard method for measurement of Pb/Cd/As/Ni in the PM_{10} fraction of suspended particulate matter'.

6. Reference method for the sampling and measurement of benzene in ambient air

The reference method for the sampling and measurement of benzene is that described in EN 14662, parts 1 (2005), 2 (2005) and 3 (2016) 'Ambient air quality — Standard method for measurement of benzene concentrations'.

7. Reference method for the measurement of carbon monoxide in ambient air

The reference method for the measurement of carbon monoxide is that described in EN 14626:2012 'Ambient air — Standard method for the measurement of the concentration of carbon monoxide by non-dispersive infrared spectroscopy'.

8. Reference method for the sampling and measurement of polycyclic aromatic hydrocarbons in ambient air

The reference method for the sampling of polycyclic aromatic hydrocarbons in ambient air is described in EN 12341:2014 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'. The reference method for the measurement of benzo(a)pyrene in ambient air is that described in EN 15549:2008 'Air quality — Standard method for the measurement of concentration of benzo[a]pyrene in ambient air'. In the absence of a CEN standard method for the other polycyclic aromatic hydrocarbons referred to in Article 8(6), Member States are allowed to use national standard methods or ISO methods such as ISO standard 12884.

9. Reference method for the sampling and measurement of mercury in ambient air

The reference method for the measurement of total gaseous mercury concentrations in ambient air is that described in EN 15852:2010 'Ambient air quality — Standard method for the determination of total gaseous mercury'.

10. Reference method for the sampling and analysis of the deposition of arsenic, cadmium, nickel, mercury and polycyclic aromatic hydrocarbons

The reference method for the determination of the deposition of arsenic, cadmium, and nickel is that described in EN 15841:2009 'Ambient air quality — Standard method for determination of arsenic, cadmium, lead and nickel in atmospheric deposition'.

The reference method for the determination of the deposition of mercury is that described in EN 15853:2010 'Ambient air quality — Standard method for determination of mercury deposition'.

The reference method for the determination of the deposition of benzo(a)pyrene and the other polycyclic hydrocarbons referred to in Article 8(6) is that described in EN 15980:2011 'Air quality - Determination of the deposition of benz[a]anthracene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene and indeno[1,2,3-cd]pyrene'.

11. Reference method for the measurement of ozone in ambient air

The reference method for the measurement of ozone is that described in EN 14625:2012 'Ambient air — Standard method for the measurement of the concentration of ozone by ultraviolet photometry'.

12. Reference method for the sampling and measurement of volatile organic compounds that are ozone precursor substances in ambient air

In the absence of a European Committee for Standardization (CEN) standard method for sampling and measuring volatile organic compounds that are ozone precursor substances in ambient air other than benzene, Member States may choose the sampling and measuring methods they use, in accordance with Annex V and taking into account the measurement objectives set out in Section 2, Point A, of Annex VII.

13. Reference method for the sampling and measurement of elemental carbon and organic carbon in ambient air

The reference method for the sampling of elemental carbon and organic carbon is that describe in EN 12341:2014 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'. The reference method for the measurement of elemental carbon and organic

carbon in ambient air is that described in EN 16909:2017 'Ambient air - Measurement of elemental carbon (EC) and organic carbon (OC) collected on filters'.

14. Reference method for the sampling and measurement of NO_3^-, SO_4^{2-}, Cl^-, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+} in $PM_{2.5}$ in ambient air

The reference method for the sampling of elemental carbon and organic carbon is that describe in EN 12341:2014 'Ambient Air — Standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2.5}$ mass concentration of suspended particulate matter'. The reference method for the measurement of NO_3^-, SO_4^{2-}, Cl^-, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+} in $PM_{2.5}$ in ambient air is that described in EN 16913:2017 'Ambient air - Standard method for measurement of NO_3^-, SO_4^{2-}, Cl^-, NH_4^+, Na^+, K^+, Mg^{2+}, Ca^{2+} in $PM_{2.5}$ as deposited on filters'.

B. Demonstration of equivalence

1. A Member State may use any other method which it can demonstrate gives results equivalent to any of the reference methods referred to in Point A or, in the case of particulate matter, any other method which the Member State concerned can demonstrate displays a consistent relationship to the reference method. In that event, the results achieved by such other method must be corrected to produce results equivalent to those that would have been achieved by using the reference method.

2. The Commission may require Member States to prepare and submit a report on the demonstration of equivalence in accordance with point 1.

3. When assessing the acceptability of the report mentioned in point 2, the Commission will refer to its guidance on the demonstration of equivalence. Where Member States have been using interim factors to approximate equivalence, approximate equivalence shall be confirmed or amended with reference to that guidance.

4. Member States shall ensure that whenever appropriate, the correction is also applied retroactively to past measurement data in order to achieve better data comparability.

C. Standardisation

For gaseous pollutants, the volume must be standardised at a temperature of 293 K and an atmospheric pressure of 101,3 kPa. For particulate matter and substances to be analysed in particulate matter (including lead, arsenic, cadmium, and benzo(a)pyrene), the sampling volume refers to ambient conditions in terms of temperature and atmospheric pressure at the date of measurements.

When demonstrating that equipment meets the performance requirements of the reference methods listed in Point A, the competent authorities and bodies designated pursuant to Article 5 shall accept test reports issued in other Member States provided that the test laboratories are accredited by the relevant harmonised standard for testing and calibration laboratories.

The detailed test reports and all the results of the tests shall be available to other competent authorities or their designated bodies. Test reports shall demonstrate that the equipment meets all the performance requirements including where some environmental and site conditions are specific to a Member State and are outside the conditions for which the equipment has been already tested and type approved in another Member State.

D. Mutual recognition of data

When demonstrating that equipment meets the performance requirements of the reference methods listed in Point A, the competent authorities and bodies designated pursuant to Article 5 shall accept test reports issued in other Member States provided that the test laboratories are accredited by the relevant harmonised standard for testing and calibration laboratories.

The detailed test reports and all the results of the tests shall be available to other competent authorities or their designated bodies. Test reports shall demonstrate that the equipment meets all the performance requirements including where some environmental and site conditions are specific to a Member State and are outside the conditions for which the equipment has been already tested and type approved in another Member State.

E. Reference air quality modelling applications

In the absence of a CEN standard on modelling quality objectives, Member States may choose the modelling applications they use, in accordance with Annex V, Section F.

ANNEX VII

MONITORING OF MASS CONCENTRATION AND CHEMICAL COMPOSITION OF $PM_{2.5}$, OZONE PRECURSOR SUBSTANCES AND ULTRAFINE PARTICLES

SECTION 1 - MEASUREMENTS OF MASS CONCENTRATION AND CHEMICAL COMPOSITION OF $PM_{2,5}$

A. Objectives

The main objectives of such measurements are to ensure that adequate information is made available on levels in urban background and rural background locations. This information is essential to judge the enhanced levels in more polluted areas (such as urban background, industry related locations, traffic related locations), assess the possible contribution from long-range transport of pollutants, support source apportionment analysis and for the understanding of specific pollutants such as particulate matter. It is also essential for the increased use of modelling also in urban areas.

B. Substances

Measurement of $PM_{2.5}$ must include at least the total mass concentration and concentrations of appropriate compounds to characterise its chemical composition. At least the list of chemical species given below shall be included.

SO_4^{2-}	Na^+	NH_4^+	Ca^{2+}	elemental carbon (EC)
NO_3^-	K^+	Cl^-	Mg^{2+}	organic carbon (OC)

C. Siting

Measurements shall be taken in urban background and rural background locations in accordance with Annex IV.

SECTION 2- MEASUREMENTS OF OZONE PRECURSOR SUBSTANCES

A. Objectives

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, to support the understanding of ozone formation and precursor dispersion processes, as well as the application of photochemical models, and to help attribute emission sources to observed pollution concentrations.

B. Substances

Measurement of ozone precursor substances shall include at least nitrogen oxides (NO and NO_2), and appropriate volatile organic compounds (VOC). The selection of the specific compounds to be measured completed by other compounds of interest will depend on the objective sought.

(a) Member States may use the method which it considers suitable for the objective sought;

(b) the reference method as specified under Annex VI applies for nitrogen dioxide and oxides of nitrogen;

(c) methods that are being standardised by the CEN shall be used once available.

A list of VOC recommended for measurement is given below:

Chemical family	**Substance**			
	Trivial name	**IUPAC name**	**Formula**	**CAS number**
Alcohols	Methanol	Methanol	CH_4O	67-56-1
	Ethanol	Ethanol	C_2H_6O	64-17-5
Aldehyde	Formaldehyde	Methanal	CH_2O	50-00-0
	Acetaldehyde	Ethanal	C_2H_4O	75-07-0
	Methacrolein	2-Methylprop-2-enal	C_4H_6O	78-85-3
Alkynes	Acetylene	Ethyne	C_2H_2	74-86-2
Alkanes	Ethane	Ethane	C_2H_6	74-84-0
	Propane	Propane	C_3H_8	74-98-6
	n-Butane	Butane	C_4H_{10}	106-97-8
	i-Butane	2-Methylpropane	C_4H_{10}	75-28-5
	n-Pentane	Pentane	C_5H_{12}	109-66-0
	i-Pentane	2-Methylbutane	C_5H_{12}	78-78-4
	n-Hexane	Hexane	C_6H_{14}	110-54-3
	i-Hexane	2-Methylpentane	C_6H_{14}	107-83-5
	n-Heptane	Heptane	C_7H_{16}	142-82-5
	n-Octane	Octane	C_8H_{18}	111-65-9
	i-Octane	2,2,4-Trimethylpentane	C_8H_{18}	540-84-1
Alkenes	Ethylene	Ethene	C_2H_4	75-21-8
	Propene / Propylene	Propene	C_3H_6	115-07-1
	1,3-Butadiene	Buta-1,3-diene	C_4H_6	106-99-0
	1-Butene	But-1-ene	C_4H_8	106-98-9

	Trans-2-Butene	(E)-but-2-ene	C_4H_8	624-64-6
	cis-2-Butene	(Z)-but-2-ene	C_4H_8	590-18-1
	1-Pentene	Pent-1-ene	C_5H_{10}	109-67-1
	2-Pentene	(Z)-Pent-2-ene	C_5H_{10}	627-20-3 (cis-2 pentene)
		(E)-Pent-2-ene		646-04-8 (trans-2 pentene)
Aromatic hydrocarbons	Benzene	Benzene	C_6H_6	71-43-2
	Toluene / Methylbenzene	Toluene	C_7H_8	108-88-3
	Ethyl benzene	Ethylbenzene	C_8H_{10}	100-41-4
	m + p-Xylene	1,3-Dimethylbenzene (m-Xylene)	C_8H_{10}	108-38-3 (m-Xylene)
		1,4-Dimethylbenzene (p-Xylene)		106-42-3 (p-Xylene)
	o-Xylene	1,2-Dimethylbenzene (o-Xylene)	C_8H_{10}	95-47-6
	1,2,4-Trimethylebenzene	1,2,4-Trimethylbenzene	C_9H_{12}	95-63-6
	1,2,3-Trimethylebenzene	1,2,3-Trimethylbenzene	C_9H_{12}	526-73-8
	1,3,5-Trimethylebenzene	1,3,5-Trimethylebenzene	C_9H_{12}	108-67-8
Ketones	Acetone	Propan-2-one	C_3H_6O	67-64-1
	Methyl ethyl ketone	Butan-2-one	C_4H_8O	78-93-3
	Methyl vinyl ketone	3-Buten-2-one	C_4H_6O	78-94-4
Terpenes	Isoprene	2-Methylbut-1,3-diene	C_5H_8	78-79-5
	p-Cymene	1-Methyl-4-(1-methylethyl)benzene	$C_{10}H_{14}$	99-87-6
	Limonene	1-methyl-4-(1-methylethenyl)-cyclohexene	$C_{10}H_{16}$	138-86-3
	β-Myrcene	7-Methyl-3-methylene-1,6-octadiene	$C_{10}H_{16}$	123-35-3
	α-Pinene	2,6,6-Trimethyl-bicyclo[3.1.1]hept-2-ene	$C_{10}H_{16}$	80-56-8
	β-Pinene	6,6-Dimethyl-2-methyl-enebicyclo[3.1.1]heptane	$C_{10}H_{16}$	127-91-3

	Camphene	2,2-dimethyl-3-methyl-enebicyclo[2.2.1]heptane	$C_{10}H_{16}$	79-92-5
	Δ^3-Carene	3,7,7-Trimethyl-bicyclo[4.1.0]hept-3-ene	$C_{10}H_{16}$	13466-78-9
	1,8-Cineol	1,3,3 trimethyl 2 oxabicyclo[2,2,2]octane	$C_{10}H_{18}O$	470-82-6

C. Siting

Measurements shall be taken at sampling points set up in accordance with the requirements of this Directive and considered appropriate with regards to the monitoring objectives referred to in Point A of this Section.

SECTION 3- MEASUREMENT OF ULTRAFINE PARTICULES (UFP)

A. Objectives

The objective of such measurements is to ensure that adequate information is available at locations where high concentrations of UFP occur that are mainly influenced by sources from air, water or road transport (such as airports, ports, roads), industrial sites or domestic heating. The information shall be appropriate to judge on enhanced levels of UFP concentrations from those sources.

B. Substances

UFP.

C. Siting

Sampling points shall be established in accordance with Annex IV and V at a location where high UFP concentrations are likely to occur and within the main wind direction.

ANNEX VIII

INFORMATION TO BE INCLUDED IN AIR QUALITY PLANS FOR IMPROVEMENT IN AMBIENT AIR QUALITY

A. Information to be provided under Article 19(5)

1. Localisation of excess pollution

   (a) region;

   (b) city (map);

   (c) sampling point(s) (map, geographical coordinates).

2. General information

   (a) type of zone (urban, industrial or rural area) or characteristics of NUTS 1 territorial unit (including urban, industrial or rural areas);

   (b) estimate of the polluted area (in km^2) and of the population exposed to the pollution;

   (c) concentrations or average exposure indicator of the relevant pollutant observed at least 5 years prior to the exceedance;

3. Responsible authorities

   Names and addresses of the competent authorities responsible for the development and implementation of air quality plans.

4. Origin of pollution taking into account reporting under Directive (EU) 2016/2284 and information provided in the national air pollution control programme

   (a) list of the main emission sources responsible for pollution;

   (b) total quantity of emissions from these sources (in tonnes/year);

   (c) assessment of the level of emissions (e.g. city level, regional level, national level, and transboundary contributions);

   (d) source apportionment according to relevant sectors that contribute to the exceedance in the national air pollution control programme.

5. Expected impact of measures to reach compliance within 3 years after adoption of the air quality plan

   (a) expected quantified concentration reduction (in $\mu g/m^3$) at each sampling point in exceedance of limit values, ozone target value or of the average exposure indicator in case of an exceedance of the average exposure reduction obligation, from the measures referred to in point 6;

   (b) estimated year of compliance per air pollutant covered by the air quality plan taking into account measures referred to in point 6.

6. Annex 1: Details of measures to reduce air pollution under point 5

(a) listing and description of all the measures set out in the air quality plan, including the identification of the competent authority in charge of their implementation;

(b) quantification of emission reduction (in tonnes/year) of each measure under point (a);

(c) timetable for implementation of each measure and responsible actors;

(d) estimate of the concentration reduction as a consequence of each air quality measure, in relation to the exceedance concerned;

(e) list of the information (including modelling and assessment results of measures) to reach the air quality standard concerned in accordance with Annex I.

7. Annex 2: Further background information

(a) climatic data;

(b) data on topography;

(c) information on the type of targets requiring protection in the zone, (if applicable);

(d) listing and description of all additional measures, that unfold their full impact on ambient air pollutant concentrations in 3 years or more.

8. Annex 3: Evaluation of measures (in case of an air quality plan update)

(a) assessment of timetable of measures from the previous air quality plan;

(b) estimate of impact on emission reduction and pollutant concentrations of measures from the previous air quality plan.

B. Indicative list of air pollution abatement measures

1. Information concerning the status of implementation of the Directives referred to in Article 14(3), point (b), of Directive (EU) 2016/2284.

2. Information on all air pollution abatement measures that have been considered at local, regional or national level for implementation in connection with the attainment of air quality objectives, including:

(a) reduction of emissions from stationary sources by ensuring that polluting small and medium-sized stationary combustion sources (including for biomass) are fitted with emission control equipment or replaced, and that the energy efficiency of buildings is improved;

(b) reduction of emissions from vehicles through retrofitting with zero emissions powertrains and emission control equipment. The use of economic incentives to accelerate take-up shall be considered;

(c) procurement by public authorities, in line with the handbook on environmental public procurement, of zero emissions road vehicles, fuels and combustion equipment to reduce emissions;

(d) measures to limit transport emissions through traffic planning and management (including congestion pricing, differentiated parking fees or other economic incentives; establishing urban vehicles access restrictions schemes, including low emission zones);

(e) measures to encourage a shift towards less polluting forms of transport;

(f) measures to encourage a shift towards zero emissions vehicles and non-road machinery for both private and commercial applications;

(g) measure to ensure that low emission fuels are given preference in small-, medium- and large-scale stationary sources and in mobile sources;

(h) measures to reduce air pollution from industrial sources under Directive 2010/75/EU, and through the use of economic instruments such as taxes, charges or emission trading, while taking into account specificities of SMEs;

(i) measures to protect the health of children or other sensitive population groups.

ANNEX IX

PUBLIC INFORMATION

1. Member States shall provide at least the following information:

   (a) hourly up-to-date data per sampling point of sulphur dioxide, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide and ozone. This shall apply to information from all sampling points where up-to-date information is available, and at least to information from the minimum number of sampling points required under Annex III. When available, up-to-date information resulting from modelling shall also be provided;

   (b) measured concentrations of all pollutants presented according to the appropriate periods as laid down in Annex I;

   (c) information on observed exceedance(s) of any limit value, ozone target value, and average exposure reduction obligation, including at least:

      (i) the location or area of the exceedance,

      (ii) the start time and duration of the exceedance,

      (iii) the measured concentration in comparison to the air quality standards, or average exposure indicator in case of an exceedance of the average exposure reduction obligation;

   (d) information regarding on health and vegetation, including at least:

      (i) the health impacts of air pollution on general population,

      (ii) the health impacts of air pollution on vulnerable groups,

      (iii) description of likely symptoms,

      (iv) recommended precautions to be taken,

      (v) where to find further information;

   (e) information on preventive actions to reduce pollution and exposure to it: indication of main source sectors; recommendations for actions to reduce emissions;

   (f) information on measuring campaigns or similar activities and their results where performed.

2. Member States shall ensure that timely information about actual or predicted exceedances of alert thresholds, and any information threshold, is provided to the public. Details supplied shall include at least the following information:

   (a) information on observed exceedance(s):

      – location or area of the exceedance,

      – type of threshold exceeded (information or alert),

      – start time and duration of the exceedance,

      – highest one hour concentration and in addition highest eight hour mean concentration in the case of ozone;

   (b) forecast for the following afternoon/day(s):

– geographical area of expected exceedances of information and/or alert threshold,

– expected changes in pollution (improvement, stabilisation or deterioration), together with the reasons for those changes;

(c) information on the type of population concerned, possible health effects and recommended behaviour:

– information on population groups at risk,

– description of likely symptoms,

– recommended precautions to be taken by the population concerned,

– where to find further information;

(d) information on preventive action to reduce pollution and/or exposure to it: indication of main source sectors; recommendations for action to reduce emissions;

(e) in the case of predicted exceedances, Member State shall take steps to ensure that such details are supplied to the extent practicable.

3. When an exceedance occur or when there is a risk of exceedance of any limit value, ozone target value, average exposure reduction obligation, alert thresholds or information thresholds, Member States shall ensure that the information referred to in this Annex is additionally promoted to the public.

ANNEX X

Part A

Repealed Directives with lists of the successive amendments thereto (referred to in Article 30)

Directive 2004/107/EC of the European Parliament and of the Council (OJ L 23, 26.1.2005, p. 3)	
Regulation (EC) No 219/2009 of the European Parliament and of the Council (OJ L 87, 31.3.2009, p. 109)	only point 3.8 of the Annex
Commission Directive (EU) 2015/1480 (OJ L 226, 29.8.2015, p. 4)	only Article 1
Directive 2008/50/EC of the European Parliament and of the Council (OJ L 152, 11.6.2008, p. 1)	
Commission Directive (EU) 2015/1480 (OJ L 226, 29.8.2015, p. 4)	only Article 2

Part B

Time-limits for transposition into national law (referred to in Article 30)

Directive	Time-limit for transposition
2004/107/EC	15 February 2007
2008/50/EC	11 June 2010
(EU) 2015/1480	31 December 2016

ANNEX XI

CORRELATION TABLE

This Directive	Directive 2008/50/EC	Directive 2004/107/EC
Article 1	–	–
Article 2	Article 1	Article 1
Article 3	Article 32	Article 8
Article 4	Article 2	Article 2
Article 5	Article 3	–
Article 6	Article 4	Article 4(1)
Article 7	Articles 5 and 9(2)	Article 4(2), (3) and (6)
Article 8	Articles 6 and 9(1)	Article 4(1) to (5) and 4(8)and (10)
Article 9	Articles 7 and 10	Article 4(7) and (11)
Article 10	–	Article 4(9)
Article 11	Articles 8 and 11	Article 4(12) and (13)
Article 12	Articles 12, 17(1) and (3) and Article 18	Article 3(2)
Article 13	Articles 13, 15 and 17(1)	Article 3(1) and (3)
Article 14	Article 14	–
Article 15	Article 19	–
Article 16	Article 20	–
Article 17	Article 21	–
Article 18	Article 22	
Article 19	Articles 17(2) and 23	Article 3(3)
Article 20	Article 24	–
Article 21	Article 25	–
Article 22	Article 26	Article 7

Article 23	Article 27	Article 5
Article 24	Article 28	Article 4(15)
Article 25	—	—
Article 26	Article 29	Article 6
Article 27	—	—
Article 28	—	—
Article 29	Article 30	Article 9
Article 30	Article 31	—
Article 31	—	—
Article 32	Article 33	Article 10
Article 33	Article 34	Article 11
Article 34	Article 35	Article 12

↓ 2004/107

~~ANNEX IV~~

~~Data quality objectives and requirements for air quality models~~

~~I. DATA QUALITY OBJECTIVES~~

~~The following data quality objectives are provided as a guide to quality assurance.~~

↓ 2015/1480 Art. 1 and Annex I.1(a)

	~~Benzo(a)pyrene~~	~~Arsenic, cadmium and nickel~~	~~Polycyclic aromatic hydrocarbons other than benzo(a)pyrene, total gaseous mercury~~	~~Total deposition~~
~~— Uncertainty~~				
~~Fixed and indicative measurements~~	~~50 %~~	~~40 %~~	~~50 %~~	~~70 %~~

~~Modelling~~	~~60 %~~	~~60 %~~	~~60 %~~	~~60 %~~
~~— Minimum data capture~~	~~90 %~~	~~90 %~~	~~90 %~~	~~90 %~~
~~— Minimum time coverage~~				
~~Fixed measurements~~[5]	~~33 %~~	~~50 %~~		
~~Indicative measurements~~[6][7]	~~14 %~~	~~14 %~~	~~14 %~~	~~33 %~~

↓ 2004/107/EC
→1 2015/1480 Art. 1 and Annex I.1(b)

~~The uncertainty (expressed at a 95 % confidence level) of the methods used for the assessment of ambient air concentrations will be evaluated in accordance with the principles of the CEN Guide to the expression of uncertainty in measurement (ENV 13005-1999), the methodology of ISO 5725:1994, and the guidance provided in the CEN Report, 'Air quality — Approach to uncertainty estimation for ambient air reference measurement methods' (CR 14377:2002E). The percentages for uncertainty are given for individual measurements, which are averaged over typical sampling times, for a 95 % confidence interval. The uncertainty of the measurements should be interpreted as being applicable in the region of the appropriate target value. Fixed and indicative measurements must be evenly distributed over the year in order to avoid skewing of results.~~

~~The requirements for minimum data capture and time coverage do not include losses of data due to regular calibration or normal maintenance of the instrumentation. Twenty-four-hour sampling is required for the measurement of benzo(a)pyrene and other polycyclic aromatic hydrocarbons. With care, individual samples taken over a period of up to one month can be combined and analysed as a composite sample, provided the method ensures that the samples are stable for that period. The three congeners benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene can be difficult to resolve analytically. In such cases they can be reported as sum.~~→1 --- ← ~~Sampling must be spread evenly over the weekdays and the year. For the measurement of deposition rates monthly, or weekly, samples throughout the year are recommended.~~

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5 ~~Distributed over the year to be representative of various conditions for climate and anthropogenic activities~~

6 ~~Distributed over the year to be representative of various conditions for climate and anthropogenic activities~~

7 ~~Indicative measurement being measurements which are performed at reduced regularity but fulfil the other data quality objectives~~

↓ 2015/1480 Art. 1 and Annex I.1(c)

~~The provisions on individual samples in the previous paragraph apply also to arsenic, cadmium, nickel and total gaseous mercury. Moreover, sub-sampling of PM_{10} filters for metals for subsequent analysis is allowed, providing there is evidence that the sub-sample is representative of the whole and that the detection sensitivity is not compromised when compared with the relevant data quality objectives. As an alternative to daily sampling, weekly sampling for metals in PM_{10} is allowed provided that the collection characteristics are not compromised.~~

↓ 2004/107/EC

~~Member States may use wet-only instead of bulk sampling if they can demonstrate that the difference between them is within 10 %. Deposition rates should generally be given as µg/m² per day.~~

~~Member States may apply a minimum time coverage lower than indicated in the table, but not lower than 14 % for fixed measurements and 6 % for indicative measurements provided that they can demonstrate that the 95 % expanded uncertainty for the annual mean, calculated from the data quality objectives in the table according to ISO 11222:2002 — 'Determination of the uncertainty of the time average of air quality measurements' will be met.~~

~~II. REQUIREMENTS FOR AIR QUALITY MODELS~~

~~Where an air quality model is used for assessment, references to descriptions of the model and information on the uncertainty shall be compiled. The uncertainty for modelling is defined as the maximum deviation of the measured and calculated concentration levels, over a full year, without taking into account the timing of the events.~~

~~III. REQUIREMENTS FOR OBJECTIVE ESTIMATION TECHNIQUES~~

~~Where objective estimation techniques are used, the uncertainty shall not exceed 100 %.~~

~~IV. STANDARDISATION~~

~~For substances to be analysed in the PM_{10} fraction, the sampling volume refers to ambient conditions.~~

↓ 2004/107

~~ANNEX V~~

~~Reference methods for assessment of concentrations in ambient air and deposition rates~~

↓ 2015/1480 Art. 1 and Annex I.2

~~I. *REFERENCE METHOD FOR THE SAMPLING AND ANALYSIS OF ARSENIC, CADMIUM AND NICKEL IN AMBIENT AIR*~~

~~The reference method for the sampling of arsenic, cadmium and nickel in ambient air is described in EN 12341:2014. The reference method for the measurement of arsenic, cadmium and nickel in ambient air is that described in EN 14902:2005 'Ambient air quality — Standard method for the measurement of Pb, Cd, As and Ni in the PM10 fraction of suspended particulate matter'.~~

~~A Member State may also use any other methods which it can demonstrate give results equivalent to the above method.~~

~~II. *REFERENCE METHOD FOR THE SAMPLING AND ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBONS IN AMBIENT AIR*~~

~~The reference method for the sampling of polycyclic aromatic hydrocarbons in ambient air is described in EN 12341:2014. The reference method for the measurement of benzo(a)pyrene in ambient air is that described in EN 15549:2008 'Air quality — Standard method for the measurement of concentration of benzo[a]pyrene in ambient air'. In the absence of a CEN standard method for the other polycyclic aromatic hydrocarbons referred to in Article 4(8), Member States are allowed to use national standards methods or ISO methods such as ISO standard 12884.~~

~~A Member State may also use any other method which it can demonstrate give results equivalent to the above method.~~

~~III. *REFERENCE METHOD FOR THE SAMPLING AND ANALYSIS OF MERCURY IN AMBIENT AIR*~~

~~The reference method for the measurement of total gaseous mercury concentrations in ambient air is that described in EN 15852:2010 'Ambient air quality — Standard method for the determination of total gaseous mercury'.~~

~~A Member State may also use any other method which it can demonstrate give results equivalent to the above method.~~

~~IV. *REFERENCE METHOD FOR THE SAMPLING AND ANALYSIS OF THE DEPOSITION OF ARSENIC, CADMIUM, MERCURY, NICKEL AND POLYCYCLIC AROMATIC HYDROCARBONS*~~

~~The reference method for the determination of the deposition of arsenic, cadmium, and nickel is that described in EN 15841:2009 'Ambient air quality — Standard method for determination of arsenic, cadmium, lead and nickel in atmospheric deposition'.~~

~~The reference method for the determination of the deposition of mercury is that described in EN 15853:2010 'Ambient air quality — Standard method for determination of mercury deposition'.~~

~~The reference method for the determination of the deposition of benzo(a)pyrene and the other polycyclic hydrocarbons referred to in Article 4(8) is that described in EN 15980:2011 'Air quality. Determination of the deposition of benz[a]anthracene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene and indeno[1,2,3-cd]pyrene'.~~

↓ 219/2009 Art. 1 and Annex .3(8)

~~V. REFERENCE AIR QUALITY MODELLING TECHNIQUES~~

~~Reference air quality modelling techniques cannot be specified at present. The Commission may make amendments to adapt this point to scientific and technical progress. Those measures, designed to amend non-essential elements of this Directive, shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 6(3).~~

↓ 2008/50

~~ANNEX I~~

~~DATA QUALITY OBJECTIVES~~

~~A. DATA QUALITY OBJECTIVES FOR AMBIENT AIR QUALITY ASSESSMENT~~

	~~Sulphur dioxide, nitrogen dioxide and oxides of nitrogen and carbon monoxide~~	~~Benzene~~	~~Particulate matter (PM_{10}/$PM_{2,5}$) and lead~~	~~Ozone and related NO and NO_2~~
~~Fixed measurements~~[8]				
~~Uncertainty~~	~~15 %~~	~~25 %~~	~~25 %~~	~~15 %~~
~~Minimum data capture~~	~~90 %~~	~~90 %~~	~~90 %~~	~~90 % during summer~~ ~~75 % during winter~~
~~Minimum time coverage:~~				
~~— urban background and traffic~~	~~—~~	~~35 %~~[9]	~~—~~	~~—~~
~~— industrial sites~~	~~—~~	~~90 %~~	~~—~~	~~—~~
~~Indicative measurements~~				
~~Uncertainty~~	~~25 %~~	~~30 %~~	~~50 %~~	~~30 %~~
~~Minimum data~~	~~90 %~~	~~90 %~~	~~90 %~~	~~90 %~~

~~8 Member States may apply random measurements instead of continuous measurements for benzene, lead and particulate matter if they can demonstrate to the Commission that the uncertainty, including the uncertainty due to random sampling, meets the quality objective of 25 % and the time coverage is still larger than the minimum time coverage for indicative measurements. Random sampling must be evenly distributed over the year in order to avoid skewing of results. The uncertainty due to random sampling may be determined by the procedure laid down in ISO 11222 (2002) 'Air Quality — Determination of the Uncertainty of the Time Average of Air Quality Measurements'. If random measurements are used to assess the requirements of the PM_{10} limit value, the 90,4 percentile (to be lower than or equal to 50 µg/m³) should be evaluated instead of the number of exceedances, which is highly influenced by data coverage.~~

~~9 Distributed over the year to be representative of various conditions for climate and traffic.~~

~~capture~~				
~~Minimum time coverage~~	~~14 %[10]~~	~~14 %[11]~~	~~14 %[12]~~	~~≥ 10 % during summer~~
~~Modelling uncertainty:~~				
~~Hourly~~	~~50 %~~	~~—~~	~~—~~	~~50 %~~
~~Eight-hour averages~~	~~50 %~~	~~—~~	~~—~~	~~50 %~~
~~Daily averages~~	~~50 %~~	~~—~~	~~not yet defined~~	~~—~~
~~Annual averages~~	~~30 %~~	~~50 %~~	~~50 %~~	~~—~~
~~Objective estimation~~				
~~Uncertainty~~	~~75 %~~	~~100 %~~	~~100 %~~	~~75 %~~

~~The uncertainty (expressed at a 95 % confidence level) of the assessment methods will be evaluated in accordance with the principles of the CEN Guide to the Expression of Uncertainty in Measurement (ENV 13005-1999), the methodology of ISO 5725:1994 and the guidance provided in the CEN report 'Air Quality — Approach to Uncertainty Estimation for Ambient Air Reference Measurement Methods' (CR 14377:2002E). The percentages for uncertainty in the above table are given for individual measurements averaged over the period considered by the limit value (or target value in the case of ozone), for a 95 % confidence interval. The uncertainty for the fixed measurements shall be interpreted as being applicable in the region of the appropriate limit value (or target value in the case of ozone).~~

~~The uncertainty for modelling is defined as the maximum deviation of the measured and calculated concentration levels for 90 % of individual monitoring points, over the period considered, by the limit value (or target value in the case of ozone), without taking into account the timing of the events. The uncertainty for modelling shall be interpreted as being applicable in the region of the appropriate limit value (or target value in the case of ozone). The fixed measurements that have to be selected for comparison with modelling results shall be representative of the scale covered by the model.~~

~~The uncertainty for objective estimation is defined as the maximum deviation of the measured and calculated concentration levels, over the period considered, by the limit value (or target value in the case of ozone), without taking into account the timing of the events.~~

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10 ~~One measurement a week at random, evenly distributed over the year, or eight weeks evenly distributed over the year.~~

11 ~~One day's measurement a week at random, evenly distributed over the year, or eight weeks evenly distributed over the year.~~

12 ~~One measurement a week at random, evenly distributed over the year, or eight weeks evenly distributed over the year.~~

~~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.~~

~~**B. RESULTS OF AIR QUALITY ASSESSMENT**~~

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

- ~~a description of assessment activities carried out,~~
- ~~the specific methods used, with references to descriptions of the method,~~
- ~~the sources of data and information,~~
- ~~a description of results, including uncertainties and, in particular, the extent of any area or, if relevant, the length of road within the zone or agglomeration over which concentrations exceed any limit value, target value or long-term objective plus margin of tolerance, if applicable, and of any area within which concentrations exceed the upper assessment threshold or the lower assessment threshold,~~
- ~~the population potentially exposed to levels in excess of any limit value for protection of human health.~~

↓ 2015/1480 Art. 2 and Annex II.1

~~**C. QUALITY ASSURANCE FOR AMBIENT AIR QUALITY ASSESSMENT. DATA VALIDATION**~~

~~1. To ensure accuracy of measurements and compliance with the data quality objectives laid down in Section A, the appropriate competent authorities and bodies designated pursuant to Article 3 shall ensure the following:~~

~~(i) that all measurements undertaken in relation to the assessment of ambient air quality pursuant to Articles 6 and 9 are traceable in accordance with the requirements set out in the harmonised standard for testing and calibration laboratories,~~

~~(ii) that institutions operating networks and individual stations have an established quality assurance and quality control system which provides for regular maintenance to assure the continued accuracy of measuring devices. The quality system shall be reviewed as necessary and at least every five years by the relevant National Reference Laboratory~~

~~(iii) that a quality assurance/quality control process is established for the process of data collection and reporting and that institutions appointed for this task actively participate, in the related Union-wide quality assurance programmes,~~

~~(iv) that the National Reference Laboratories are appointed by the appropriate competent authority or body designated pursuant to Article 3 and are accredited for the reference methods referred to in Annex VI, at least for those pollutants for which concentrations are above the lower assessment threshold, according to the relevant harmonised standard for testing and calibration laboratories, the reference to which has been published in the *Official Journal of the European Union* pursuant to Article 2(9) of Regulation (EC) No 765/2008 setting out the requirements for accreditation and market surveillance. These laboratories shall also be responsible for the~~

~~coordination in Member State's territory of the Union-wide quality assurance programmes to be organised by the Commission's Joint Research Centre and shall also be responsible for coordinating, on the national level, the appropriate use of reference methods, and the demonstration of equivalence of non-reference methods. National Reference Laboratories organising intercomparison on the national level should also be accredited according to the relevant harmonised standard for proficiency testing.~~

~~(v) that the National Reference Laboratories, take part at least every three years in the Union-wide quality assurance programmes organized by the Commission's Joint Research Centre. If this participation produces unsatisfactory results then the national laboratory should demonstrate at the next participation in the intercomparison satisfactory remediation measures, and provide a report to the Joint Research Centre on these.~~

~~(vi) that the national reference laboratories support the work done by the European network of National Reference Laboratories set up by the Commission.~~

~~2. All reported data under Article 27 shall be deemed to be valid except data flagged as provisional.~~

↓ 2008/50/EC

~~ANNEX II~~

~~Determination of requirements for assessment of concentrations of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2,5}$), lead, benzene and carbon monoxide in ambient air within a zone or agglomeration~~

~~A. UPPER AND LOWER ASSESSMENT THRESHOLDS~~

~~The following upper and lower assessment thresholds will apply:~~

~~1. Sulphur dioxide~~

	~~Health protection~~	~~Vegetation protection~~
~~Upper assessment threshold~~	~~60 % of 24-hour limit value (75 µg/m³, not to be exceeded more than 3 times in any calendar year)~~	~~60 % of winter critical level (12 µg/m³)~~
~~Lower assessment threshold~~	~~40 % of 24-hour limit value (50 µg/m³, not to be exceeded more than three times in any calendar year)~~	~~40 % of winter critical level (8 µg/m³)~~

~~2. Nitrogen dioxide and oxides of nitrogen~~

	~~Hourly limit value for the protection of human health (NO_2)~~	~~Annual limit value for the protection of human health (NO_2)~~	~~Annual critical level for the protection of vegetation and natural ecosystems (NO_x)~~
~~Upper assessment threshold~~	~~70 % of limit value (140 µg/m³, not to be exceeded more than 18 times in any calendar year)~~	~~80 % of limit value (32 µg/m³)~~	~~80 % of critical level (24 µg/m³)~~
~~Lower assessment threshold~~	~~50 % of limit value (100 µg/m³, not to be exceeded more than 18 times in any calendar year)~~	~~65 % of limit value (26 µg/m³)~~	~~65 % of critical level (19,5 µg/m³)~~

~~3. Particulate matter (PM_{10}/$PM_{2,5}$)~~

	~~24-hour average PM_{10}~~	~~Annual average PM_{10}~~	~~Annual average $PM_{2,5}$[13]~~
~~Upper assessment threshold~~	~~70 % of limit value (35 µg/m³, not to be exceeded more than 35 times in any calendar year)~~	~~70 % of limit value (28 µg/m³)~~	~~70 % of limit value (17 µg/m³)~~
~~Lower assessment threshold~~	~~50 % of limit value (25 µg/m³, not to be exceeded more than 35 times in any calendar year)~~	~~50 % of limit value (20 µg/m³)~~	~~50 % of limit value (12 µg/m³)~~

~~4. Lead~~

	~~Annual average~~
~~Upper assessment threshold~~	~~70 % of limit value (0,35 µg/m³)~~
~~Lower assessment threshold~~	~~50 % of limit value (0,25 µg/m³)~~

~~5. Benzene~~

	~~Annual average~~
~~Upper assessment threshold~~	~~70 % of limit value (3,5 µg/m³)~~
~~Lower assessment threshold~~	~~40 % of limit value (2 µg/m³)~~

~~6. Carbon monoxide~~

	~~Eight-hour average~~
~~Upper assessment threshold~~	~~70 % of limit value (7 mg/m³)~~
~~Lower assessment threshold~~	~~50 % of limit value (5 mg/m³)~~

[13] ~~The upper assessment threshold and the lower assessment threshold for $PM_{2,5}$ do not apply to the measurements to assess compliance with the $PM_{2,5}$ exposure reduction target for the protection of human health.~~

↓ 2008/50/EC

~~ANNEX III~~

~~Assessment of ambient air quality and location of sampling points for the measurement of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2,5}$), lead, benzene and carbon monoxide in ambient air~~

~~A. GENERAL~~

~~Ambient air quality shall be assessed in all zones and agglomerations in accordance with the following criteria:~~

~~1. Ambient air quality shall be assessed at all locations except those listed in paragraph 2, in accordance with the criteria established by Sections B and C for the location of sampling points for fixed measurement. The principles established by Sections B and C shall also apply in so far as they are relevant in identifying the specific locations in which concentration of the relevant pollutants are established where ambient air quality is assessed by indicative measurement or modelling.~~

~~2. Compliance with the limit values directed at the protection of human health shall not be assessed at the following locations:~~

~~(a) any locations situated within areas where members of the public do not have access and there is no fixed habitation;~~

~~(b) in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply;~~

~~(c) on the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation.~~

~~B. MACROSCALE SITING OF SAMPLING POINTS~~

~~1. Protection of human health~~

~~(a) Sampling points directed at the protection of human health shall be sited in such a way as to provide data on the following:~~

~~– the areas within zones and agglomerations 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(s),~~

~~– levels in other areas within the zones and agglomerations which are representative of the exposure of the general population,~~

~~(b) Sampling points shall in general be sited in such a way as to avoid measuring very small micro-environments in their immediate vicinity, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality for a street segment no less than 100 m length at traffic-orientated sites and at least 250 m × 250 m at industrial sites, where feasible;~~

~~(c) Urban background locations shall be located so that their pollution level is influenced by the integrated contribution from all sources upwind of the station. The pollution level should not be dominated by a single source unless such a situation is~~

~~typical for a larger urban area. Those sampling points shall, as a general rule, be representative for several square kilometres;~~

~~(d) Where the objective is to assess rural background levels, the sampling point shall not be influenced by agglomerations or industrial sites in its vicinity, i.e. sites closer than five kilometres;~~

~~(e) Where contributions from industrial sources are to be assessed, at least one sampling point shall be installed downwind of the source in the nearest residential area. Where the background concentration is not known, an additional sampling point shall be situated within the main wind direction;~~

~~(f) Sampling points shall, where possible, also be representative of similar locations not in their immediate vicinity;~~

~~(g) Account shall be taken of the need to locate sampling points on islands where that is necessary for the protection of human health.~~

~~2. Protection of vegetation and natural ecosystems~~

~~Sampling points targeted at the protection of vegetation and natural ecosystems shall be sited more than 20 km away from agglomerations or more than 5 km away from other built-up areas, industrial installations or motorways or major roads with traffic counts of more than 50000 vehicles per day, which means that a sampling point must be sited in such a way that the air sampled is representative of air quality in a surrounding area of at least 1000 km^2. A Member State may provide for a sampling point to be sited at a lesser distance or to be representative of air quality in a less extended area, taking account of geographical conditions or of the opportunities to protect particularly vulnerable areas.~~

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

~~C. MICROSCALE SITING OF SAMPLING POINTS~~

~~In so far as is practicable, the following shall apply:~~

↓ 2015/1480 Art. 2 and Annex II.2(a)

- ~~the flow around the inlet sampling probe shall be unrestricted (in general free in an arc of at least 270° or 180° for sampling points at the building line) without any obstructions affecting the airflow in the vicinity of the inlet (normally some metres away from buildings, balconies, trees and other obstacles 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 shall be between 1,5 m (the breathing zone) and 4 m above the ground. Higher siting may also be appropriate if the station is representative of a large area and any derogations should be fully documented;~~

↓ 2008/50/EC

- ~~the inlet probe shall 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 shall be positioned so that recirculation of exhaust air to the sampler inlet is avoided,

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↓ 2015/1480 Art. 2 and Annex II.2(a)

– for all pollutants, traffic-orientated sampling probes shall be at least 25 m from the edge of major junctions and no more than 10 m from the kerbside. A 'major junction' to be considered here is a junction which interrupts the traffic flow and causes different emissions (stop&go) from the rest of the road.,

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↓ 2008/50/EC

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 the public and operators,

– the desirability of co-locating sampling points for different pollutants,

– planning requirements.,

↓ 2015/1480 Art. 2 and Annex II.2(a)

Any deviation from the criteria listed in this Section shall be fully documented through the procedures described in Section D.

↓ 2015/1480 Art. 2 and Annex II.2(b)

D. DOCUMENTATION AND REVIEW OF SITE SELECTION

The competent authorities responsible for air quality assessment shall for all zones and agglomerations fully document the site-selection procedures and record information to support the network design and choice of location for all monitoring sites. The documentation shall include compass-point photographs of the area surrounding monitoring sites and detailed maps. Where supplementary methods are used within a zone or agglomeration, the documentation shall include details of these methods and information on how the criteria listed in Article 7(3) are met. The documentation shall be updated as necessary and reviewed at least every 5 years, to ensure that selection criteria, network design and monitoring site locations remain valid and optimal over time. The documentation shall be provided to the Commission within 3 months of being requested.

~~ANNEX IV~~

~~MEASUREMENTS AT RURAL BACKGROUND LOCATIONS IRRESPECTIVE OF CONCENTRATION~~

~~A. Objectives~~

~~The main objectives of such measurements are to ensure that adequate information is made available on levels in the background. This information is essential to judge the enhanced levels in more polluted areas (such as urban background, industry related locations, traffic related locations), assess the possible contribution from long-range transport of air pollutants, support source apportionment analysis and for the understanding of specific pollutants such as particulate matter. It is also essential for the increased use of modelling also in urban areas.~~

~~B. Substances~~

~~Measurement of $PM_{2.5}$ must include at least the total mass concentration and concentrations of appropriate compounds to characterise its chemical composition. At least the list of chemical species given below shall be included.~~

~~SO_4^{2-}~~	~~Na^+~~	~~NH_4^+~~	~~Ca^{2+}~~	~~elemental carbon (EC)~~
~~NO_3^-~~	~~K^+~~	~~Cl^-~~	~~Mg^{2+}~~	~~organic carbon (OC)~~

~~C. Siting~~

~~Measurements should be taken in urban background and rural background areas in accordance with parts A, B and C of Annex III.~~

~~ANNEX V~~

~~Criteria for determining minimum numbers of sampling points for fixed measurement of concentrations of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10}, $PM_{2,5}$), lead, benzene and carbon monoxide in ambient air~~

~~A. 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 and agglomerations where fixed measurement is the sole source of information~~

~~1. Diffuse sources~~

~~Population of agglomeration or zone (thousands)~~	~~If maximum concentrations exceed the upper assessment threshold[14]~~		~~If maximum concentrations are between the upper and lower assessment thresholds~~	
	~~Pollutants except PM~~	~~PM[15] (sum of PM_{10} and $PM_{2,5}$)~~	~~Pollutants except PM~~	~~PM[16] (sum of PM_{10} and $PM_{2,5}$)~~
~~0-249~~	~~1~~	~~2~~	~~1~~	~~1~~
~~250-499~~	~~2~~	~~3~~	~~1~~	~~2~~
~~500-749~~	~~2~~	~~3~~	~~1~~	~~2~~
~~750-999~~	~~3~~	~~4~~	~~1~~	~~2~~
~~1000-1499~~	~~4~~	~~6~~	~~2~~	~~3~~
~~1500-1999~~	~~5~~	~~7~~	~~2~~	~~3~~
~~2000-2749~~	~~6~~	~~8~~	~~3~~	~~4~~

~~14 For nitrogen dioxide, particulate matter, benzene and carbon monoxide: to include at least one urban background monitoring station and one traffic-orientated station provided this does not increase the number of sampling points. For these pollutants, the total number of urban background stations and the total number of traffic-oriented stations in a Member State required under Section A(1) shall not differ by more than a factor of 2. Sampling points with exceedances of the limit value for PM_{10} within the last three years shall be maintained, unless a relocation is necessary owing to special circumstances, in particular spatial development.~~

~~15 Where $PM_{2,5}$ and PM_{10} are measured in accordance with Article 8 at the same monitoring station, these shall count as two separate sampling points. The total number of $PM_{2,5}$ and PM_{10} sampling points in a Member State required under Section A(1) shall not differ by more than a factor of 2, and the number of $PM_{2,5}$ sampling points in the urban background of agglomerations and urban areas shall meet the requirements under Section B of Annex V.~~

~~16 Where $PM_{2,5}$ and PM_{10} are measured in accordance with Article 8 at the same monitoring station, these shall count as two separate sampling points. The total number of $PM_{2,5}$ and PM_{10} sampling points in a Member State required under Section A(1) shall not differ by more than a factor of 2, and the number of $PM_{2,5}$ sampling points in the urban background of agglomerations and urban areas shall meet the requirements under Section B of Annex V.~~

~~2750-3749~~	~~7~~	~~10~~	~~3~~	~~4~~
~~3750-4749~~	~~8~~	~~11~~	~~3~~	~~6~~
~~4750-5999~~	~~9~~	~~13~~	~~4~~	~~6~~
~~≥ 6000~~	~~10~~	~~15~~	~~4~~	~~7~~

~~**2. Point sources**~~

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

~~B. Minimum number of sampling points for fixed measurement to assess compliance with the $PM_{2,5}$ exposure reduction target for the protection of human health~~

~~One sampling point per million inhabitants summed over agglomerations and additional urban areas in excess of 100000 inhabitants shall be operated for this purpose. Those sampling points may coincide with sampling points under Section A.~~

~~C. Minimum number of sampling points for fixed measurements to assess compliance with critical levels for the protection of vegetation in zones other than agglomerations~~

~~If maximum concentrations exceed the upper assessment threshold~~	~~If maximum concentrations are between upper and lower assessment threshold~~
~~1 station every 20000 km²~~	~~1 station every 40000 km²~~

~~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 vegetation.~~

↓ 2008/50/EC

~~ANNEX VI~~

~~Reference methods for assessment of concentrations of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter (PM_{10} and $PM_{2,5}$), lead, benzene, carbon monoxide, and ozone~~

↓ 2015/1480 Art. 2 and Annex II.3(a)

~~A. REFERENCE METHODS FOR THE ASSESSMENT OF CONCENTRATIONS OF SULPHUR DIOXIDE, NITROGEN DIOXIDE AND OXIDES OF NITROGEN, PARTICULATE MATTER (PM_{10} AND $PM_{2,5}$), LEAD, BENZENE, CARBON MONOXIDE AND OZONE~~

~~1. Reference method for the measurement of sulphur dioxide~~

~~The reference method for the measurement of sulphur dioxide is that described in EN 14212:2012 'Ambient air — Standard method for the measurement of the concentration of sulphur dioxide by ultraviolet fluorescence'.~~

~~2. Reference method for the measurement of nitrogen dioxide and oxides of nitrogen~~

~~The reference method for the measurement of nitrogen dioxide and oxides of nitrogen is that described in EN 14211:2012 'Ambient air — Standard method for the measurement of the concentration of nitrogen dioxide and nitrogen monoxide by chemiluminescence'.~~

↓ 2015/1480 Art. 2 and Annex II.3(a) amended by Corrigendum, OJ L 072, 14.3.2019, p. 141

~~3. Reference method for the sampling and measurement of lead~~

~~The reference method for the sampling of lead is that described in Section A(4) of this Annex. The reference method for the measurement of lead is that described in EN 14902:2005 'Standard method for measurement of Pb/Cd/As/Ni in the PM_{10} fraction of suspended particulate matter'.~~

↓ 2015/1480 Art. 2 and Annex II.3(a)

~~4. Reference method for the sampling and measurement of PM_{10}~~

~~The reference method for the sampling and measurement of PM_{10} is that described in EN12341:2014 'Ambient Air — standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2,5}$ mass concentration of suspended particulate matter'.~~

~~5. Reference method for the sampling and measurement of $PM_{2,5}$~~

~~The reference method for the sampling and measurement of $PM_{2,5}$ is that described in EN12341:2014 'Ambient Air — standard gravimetric measurement method for the determination of the PM_{10} or $PM_{2,5}$ mass concentration of suspended particulate matter'~~

↓ 2015/1480 Art. 2 and Annex II.3(a) amended by Corrigendum, OJ L 072, 14.3.2019, p. 141

~~**6. Reference method for the sampling and measurement of benzene**~~

~~The reference method for the measurement of benzene is that described in EN 14662:2005, parts 1, 2 and 3 'Ambient air quality — Standard method for measurement of benzene concentrations'.~~

↓ 2015/1480 Art. 2 and Annex II.3(a)

~~**7. Reference method for the measurement of carbon monoxide**~~

~~The reference method for the measurement of carbon monoxide is that described in EN 14626:2012 'Ambient air — Standard method for the measurement of the concentration of carbon monoxide by non-dispersive infrared spectroscopy'.~~

~~**8. Reference method for measurement of ozone**~~

~~The reference method for the measurement of ozone is that described in EN 14625:2012 'Ambient air — Standard method for the measurement of the concentration of ozone by ultraviolet photometry'.~~

↓ 2008/50/EC

~~**B. DEMONSTRATION OF EQUIVALENCE**~~

~~1. A Member State may use any other method which it can demonstrate gives results equivalent to any of the methods referred to in Section A or, in the case of particulate matter, any other method which the Member State concerned can demonstrate displays a consistent relationship to the reference method. In that event the results achieved by that method must be corrected to produce results equivalent to those that would have been achieved by using the reference method.~~

~~2. The Commission may require the Member States to prepare and submit a report on the demonstration of equivalence in accordance with paragraph 1.~~

~~3. When assessing the acceptability of the report mentioned in paragraph 2, the Commission will make reference to its guidance on the demonstration of equivalence (to be published). Where Member States have been using interim factors to approximate equivalence, the latter shall be confirmed and/or amended with reference to the Commission's guidance.~~

~~4. Member States should ensure that whenever appropriate, the correction is also applied retroactively to past measurement data in order to achieve better data comparability.~~

~~**C. STANDARDISATION**~~

~~For gaseous pollutants the volume must be standardised at a temperature of 293 K and an atmospheric pressure of 101,3 kPa. For particulate matter and substances to be analysed in~~

~~particulate matter (e.g. lead) the sampling volume refers to ambient conditions in terms of temperature and atmospheric pressure at the date of measurements.~~

~~E. MUTUAL RECOGNITION OF DATA~~

↓ 2015/1480 Art. 2 and Annex II.3(c)

~~When demonstrating that equipment meets the performance requirements of the reference methods listed in Section A of this Annex, the competent authorities and bodies designated pursuant to Article 3 shall accept test reports issued in other Member States provided that the test laboratories are accredited to the relevant harmonised standard for testing and calibration laboratories.~~

~~The detailed test reports and all the results of the tests shall be available to other competent authorities or their designated bodies. Test reports shall demonstrate that the equipment meets all the performance requirements including where some environmental and site conditions are specific to a Member State and are outside the conditions for which the equipment has been already tested and type approved in another Member State.~~

↓ 2008/50/EC

~~ANNEX VII~~

~~OZONE TARGET VALUES AND LONG-TERM OBJECTIVES~~

~~A. DEFINITIONS AND CRITERIA~~

~~1. Definitions~~

~~AOT40 (expressed in (µg/m³) · hours) means the sum of the difference between hourly concentrations greater than 80 µg/m³ (= 40 parts per billion) and 80 µg/m³ over a given period using only the one-hour values measured between 8.00 and 20.00 Central European Time (CET) each day.~~

~~2. Criteria~~

~~The following criteria shall be used for checking validity when aggregating data and calculating statistical parameters:~~

~~Parameter~~	~~Required proportion of valid data~~
~~One hour values~~	~~75 % (i.e. 45 minutes)~~
~~Eight hours values~~	~~75 % of values (i.e. six hours)~~
~~Maximum daily 8 hours mean from hourly running 8 hours~~	~~75 % of the hourly running eight hours averages (i.e. 18 eight-hourly averages per day)~~
~~AOT40~~	~~90 % of the one hour values over the time period defined for calculating the AOT40 value~~[17]
~~Annual mean~~	~~75 % of the one hour values over summer (April to September) and 75 % over winter (January to March, October to December) seasons separately~~
~~Number of exceedances and maximum values per month~~	~~90 % of the daily maximum eight hours mean values (27 available daily values per month)~~ ~~90 % of the one hour values between 8.00 and 20.00 CET~~
~~Number of exceedances and~~	~~five out of six months over the summer season (April~~

[17] ~~In cases where all possible measured data are not available, the following factor shall be used to calculate AOT40 values:~~

~~$AOT40_{estimate} = AOT40_{measured} \times$~~	~~total possible number of hours (*)~~
	~~number of measured hourly values~~

~~(*) being the number of hours within the time period of AOT40 definition, (i.e. 08:00 to 20:00 CET from 1 May to 31 July each year, for vegetation protection and from 1 April to 30 September each year for forest protection).~~

~~maximum values per year~~	~~to September)~~

~~B. TARGET VALUES~~

~~Objective~~	~~Averaging period~~	~~Target value~~	~~Date by which target value should be met~~[18]
~~Protection of human health~~	~~Maximum daily eight-hour mean~~[19]	~~120 µg/m³ not to be exceeded on more than 25 days per calendar year averaged over three years~~[20]	~~1.1.2010~~
~~Protection of vegetation~~	~~May to July~~	~~AOT40 (calculated from 1 h values)~~ ~~18000 µg/m³ · h averaged over five years~~[21]	~~1.1.2010~~

~~C. LONG-TERM OBJECTIVES~~

~~Objective~~	~~Averaging period~~	~~Longterm objective~~	~~Date by which the longterm objective should be met~~
~~Protection of~~	~~Maximum daily eight-~~	~~120 µg/m³~~	~~not defined~~

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18 ~~Compliance with target values will be assessed as of this date. That is, 2010 will be the first year the data for which is used in calculating compliance over the following three or five years, as appropriate.~~

19 ~~The maximum daily eight-hour mean concentration shall be selected by examining eight-hour running averages, calculated from hourly data and updated each hour. Each eight-hour average so calculated shall be assigned to the day on which it ends, i.e. the first calculation period for any one day will be the period from 17:00 on the previous day to 01:00 on that day; the last calculation period for any one day will be the period from 16:00 to 24:00 on the day.~~

20 ~~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 will be as follows:~~

~~– for the target value for the protection of human health: valid data for one year,~~

~~– for the target value for the protection of vegetation: valid data for three years.~~

–

21 ~~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 will be as follows:~~

~~– for the target value for the protection of human health: valid data for one year,~~

~~– for the target value for the protection of vegetation: valid data for three years.~~

–

~~human health~~	~~hour mean within a calendar year~~		
~~Protection of vegetation~~	~~May to July~~	~~AOT40 (calculated from 1 h values) 6000 µg/m³ · h~~	~~not defined~~

↓ 2008/50

~~ANNEX VIII~~

~~Criteria for classifying and locating sampling points for assessments of ozone concentrations~~

~~The following apply to fixed measurements:~~

~~A. MACROSCALE SITING~~

~~Type of station~~	~~Objectives of measurement~~	~~Representativeness~~[22]	~~Macroscale siting criteria~~
~~Urban~~	~~Protection of human health:~~ ~~to assess the exposure of the urban population to ozone, i.e. where population density and ozone concentration are relatively high and representative of the exposure of the general population~~	~~A few km²~~	~~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 educational, 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 are~~	~~Some tens of km²~~	~~At a certain distance from the area of maximum emissions, downwind following the main wind direction/directions during conditions favourable to ozone formation;~~ ~~where population, sensitive crops or natural ecosystems located in the outer fringe of an agglomeration are~~

[22] ~~Sampling points should, where possible, be representative of similar locations not in their immediate vicinity.~~

	~~likely to be directly or indirectly exposed occur~~		~~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:~~ ~~to assess the exposure of population, crops and natural ecosystems to sub-regional scale ozone concentrations~~	~~Sub-regional levels~~ ~~(some hundreds of km²)~~	~~Stations can be located in small settlements 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 summits of higher mountains~~
~~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 population~~	~~Regional/national/continental levels~~ ~~(1000 to 10000 km²)~~	~~Station located in areas with lower population density, e.g. with natural ecosystems, forests, at a distance of at least 20 km from urban and industrial areas and away from local emissions;~~ ~~avoid locations which are subject to locally enhanced formation of ground-near inversion conditions, also summits of higher mountains;~~ ~~coastal sites with pronounced diurnal wind cycles of local character are not recommended.~~

~~For rural and rural background stations the location shall, where appropriate, be coordinated with the monitoring requirements of Commission Regulation (EC) No 1737/2006 of 7 November 2006 laying down detailed rules for the implementation of Regulation (EC)~~

~~No 2152/2003 of the European Parliament and of the Council concerning monitoring of forests and environmental interactions in the Community[23].~~

~~**B. MICROSCALE SITING**~~

~~In so far as is practicable the procedure on microscale siting in Section C of Annex III shall be followed, ensuring also that the inlet probe is positioned well away from such sources as furnaces and incineration flues and more than 10 m from the nearest road, with distance increasing as a function of traffic intensity.~~

~~**C. DOCUMENTATION AND REVIEW OF SITE SELECTION**~~

~~The procedures in Section D of Annex III shall be followed, applying proper screening and interpretation of the monitoring data in the context of the meteorological and photochemical processes affecting the ozone concentrations measured at the respective sites.~~

[23] ~~OJ L 334, 30.11.2006, p. 1.~~

↓ 2008/50/EC

~~ANNEX IX~~

~~Criteria for determining the minimum number of sampling points for fixed measurement of concentrations of ozone~~

↓ 2015/1480 Art. 2 and Annex II.4

~~A. MINIMUM NUMBER OF SAMPLING POINTS FOR FIXED MEASUREMENTS OF CONCENTRATIONS OF OZONE~~

~~Minimum number of sampling points for fixed continuous measurements to assess compliance with target values, long — term objectives and information and alert thresholds where such measurements are the sole source of information.~~

~~Population (× 1000)~~	~~Agglomeration[24]~~	~~Other zones[25]~~	~~Rural background~~
~~< 250~~		~~1~~	~~1 station/50000 km² as an average density over all zones per country[26]~~
~~< 500~~	~~1~~	~~2~~	
~~< 1000~~	~~2~~	~~2~~	
~~< 1500~~	~~3~~	~~3~~	
~~< 2000~~	~~3~~	~~4~~	
~~< 2750~~	~~4~~	~~5~~	
~~< 3750~~	~~5~~	~~6~~	
~~> 3750~~	~~One additional station per 2 million inhabitants~~	~~One additional station per 2 million inhabitants~~	

[24] ~~At least 1 station in areas where exposure of the population to the highest concentrations of ozone is likely to occur. In agglomerations, at least 50 % of the stations shall be located in suburban areas.~~

[25] ~~At least 1 station in areas where exposure of the population to the highest concentrations of ozone is likely to occur. In agglomerations, at least 50 % of the stations shall be located in suburban areas.~~

[26] ~~1 station per 25000 km² for complex terrain is recommended.~~

↓ 2008/50/EC

~~**B. MINIMUM NUMBER OF SAMPLING POINTS FOR FIXED MEASUREMENTS FOR ZONES AND AGGLOMERATIONS ATTAINING THE LONG-TERM OBJECTIVES**~~

~~The number of sampling points for ozone shall, in combination with other means of supplementary assessment such as air quality modelling and collocated 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 Section A. Where information from fixed measurement stations is the sole source of information, at least one monitoring station shall be kept. If, in zones where there is supplementary assessment, the result of this is that a zone has no remaining station, coordination with the number of stations in neighbouring zones shall ensure adequate assessment of ozone concentrations against long-term objectives. The number of rural background stations shall be one per 100000 km²~~.

↓ 2008/50

~~ANNEX X~~

~~MEASUREMENTS OF OZONE PRECURSOR SUBSTANCES~~

~~A. OBJECTIVES~~

~~The main objectives of such measurements 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 observed pollution concentrations.~~

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

~~B. SUBSTANCES~~

~~Measurement of ozone precursor substances shall include at least nitrogen oxides (NO and NO_2), and appropriate volatile organic compounds (VOC). A list of volatile organic compounds recommended for measurement is given below:~~

	~~1-Butene~~	~~Isoprene~~	~~Ethyl benzene~~
~~Ethane~~	~~Trans-2-Butene~~	~~n-Hexane~~	~~m + p-Xylene~~
~~Ethylene~~	~~cis-2-Butene~~	~~i-Hexane~~	~~o-Xylene~~
~~Acetylene~~	~~1,3-Butadiene~~	~~n-Heptane~~	~~1,2,4-Trimethylebenzene~~
~~Propane~~	~~n-Pentane~~	~~n-Octane~~	~~1,2,3-Trimethylebenzene~~
~~Propene~~	~~i-Pentane~~	~~i-Octane~~	~~1,3,5-Trimethylebenzene~~
~~n-Butane~~	~~1-Pentene~~	~~Benzene~~	~~Formaldehyde~~
~~i-Butane~~	~~2-Pentene~~	~~Toluene~~	~~Total non-methane hydrocarbons~~

~~C. SITING~~

~~Measurements shall be taken in particular in urban or suburban areas at any monitoring site set up in accordance with the requirements of this Directive and considered appropriate with regard to the monitoring objectives referred to in Section A.~~

↓ 2008/50

~~ANNEX XI~~

~~LIMIT VALUES FOR THE PROTECTION OF HUMAN HEALTH~~

~~A. CRITERIA~~

~~Without prejudice to Annex I, the following criteria shall be used for checking validity when aggregating data and calculating statistical parameters:~~

~~Parameter~~	~~Required proportion of valid data~~
~~One hour values~~	~~75 % (i.e. 45 minutes)~~
~~Eight hours values~~	~~75 % of values (i.e. 6 hours)~~
~~Maximum daily 8-hour mean~~	~~75 % of the hourly running eight hour averages (i.e. 18 eight hour averages per day)~~
~~24-hour values~~	~~75 % of the hourly averages (i.e. at least 18 hour values)~~
~~Annual mean~~	~~90 %[27] of the one hour values or (if not available) 24-hour values over the year~~

~~B. LIMIT VALUES~~

~~Averaging Period~~	~~Limit value~~	~~Margin of tolerance~~	~~Date by which limit value is to be met~~
~~Sulphur dioxide~~			
~~One hour~~	~~350 µg/m³, not to be exceeded more than 24 times a calendar year~~	~~150 µg/m³ (43 %)~~	~~—[28]~~
~~One day~~	~~125 µg/m³, not to be exceeded more than 3 times a calendar year~~	~~None~~	~~—[29]~~

[27] ~~The requirements for the calculation of annual mean do not include losses of data due to the regular calibration or the normal maintenance of the instrumentation.~~

[28] ~~Already in force since 1 January 2005~~

[29] ~~Already in force since 1 January 2005~~

~~Nitrogen dioxide~~			
~~One hour~~	~~200 µg/m³, not to be exceeded more than 18 times a calendar year~~	~~50 % on 19 July 1999, decreasing on 1 January 2001 and every 12 months thereafter by equal annual percentages to reach 0 % by 1 January 2010~~	~~1 January 2010~~
~~Calendar year~~	~~40 µg/m³~~	~~50 % on 19 July 1999, decreasing on 1 January 2001 and every 12 months thereafter by equal annual percentages to reach 0 % by 1 January 2010~~	~~1 January 2010~~
~~Benzene~~			
~~Calendar year~~	~~5 µg/m³~~	~~5 µg/m³ (100 %) on 13 December 2000, decreasing on 1 January 2006 and every 12 months thereafter by 1 µg/m³ to reach 0 % by 1 January 2010~~	~~1 January 2010~~
~~Carbon monoxide~~			
~~maximum daily eight hour mean[30]~~	~~10 mg/m³~~	~~60 %~~	~~—[31]~~
~~Lead~~			
~~Calendar year~~	~~0,5 µg/m³[32]~~	~~100 %~~	~~—[33]~~
~~PM_{10}~~			
~~One day~~	~~50 µg/m³, not to be~~	~~50 %~~	~~—[34]~~

30 ~~The maximum daily eight hour mean concentration will be selected by examining eight hour running averages, calculated from hourly data and updated each hour. Each eight hour average so calculated will be assigned to the day on which it ends i.e. the first calculation period for any one day will be the period from 17:00 on the previous day to 01:00 on that day; the last calculation period for any one day will be the period from 16:00 to 24:00 on that day.~~

31 ~~Already in force since 1 January 2005~~

32 ~~Already in force since 1 January 2005. Limit value to be met only by 1 January 2010 in the immediate vicinity of the specific industrial sources situated on sites contaminated by decades of industrial activities. In such cases, the limit value until 1 January 2010 will be 1,0 µg/m³. The area in which higher limit values apply must not extend further than 1000 m from such specific sources.~~

33 ~~Already in force since 1 January 2005. Limit value to be met only by 1 January 2010 in the immediate vicinity of the specific industrial sources situated on sites contaminated by decades of industrial activities. In such cases, the limit value until 1 January 2010 will be 1,0 µg/m³. The area in which higher limit values apply must not extend further than 1000 m from such specific sources.~~

	~~exceeded more than 35 times a calendar year~~		
~~Calendar year~~	~~40 µg/m³~~	~~20 %~~	~~—~~[35]

[34] ~~Already in force since 1 January 2005~~

[35] ~~Already in force since 1 January 2005~~

↓ 2008/50/EC

~~ANNEX XII~~

~~INFORMATION AND ALERT THRESHOLDS~~

~~A. ALERT THRESHOLDS FOR POLLUTANTS OTHER THAN OZONE~~

~~To be measured over three consecutive hours at locations representative of air quality over at least 100 km² or an entire zone or agglomeration, whichever is the smaller.~~

~~Pollutant~~	~~Alert threshold~~
~~Sulphur dioxide~~	~~500 µg/m³~~
~~Nitrogen dioxide~~	~~400 µg/m³~~

~~B. INFORMATION AND ALERT THRESHOLDS FOR OZONE~~

~~Purpose~~	~~Averaging period~~	~~Threshold~~
~~Information~~	~~1 hour~~	~~180 µg/m³~~
~~Alert~~	~~1 hour[36]~~	~~240 µg/m³~~

[36] ~~For the implementation of Article 24, the exceedance of the threshold is to be measured or predicted for three consecutive hours.~~

↓ 2008/50

~~ANNEX XIII~~

~~CRITICAL LEVELS FOR THE PROTECTION OF VEGETATION~~

~~Averaging period~~	~~Critical level~~	~~Margin of tolerance~~
~~Sulphur dioxide~~		
~~Calendar year and winter (1 October to 31 March)~~	~~20 µg/m³~~	~~None~~
~~Oxides of nitrogen~~		
~~Calendar year~~	~~30 µg/m³ NO_x~~	~~None~~

↓ 2008/50/EC

~~ANNEX XIV~~

~~NATIONAL EXPOSURE REDUCTION TARGET, TARGET VALUE AND LIMIT VALUE FOR $PM_{2,5}$~~

~~A. AVERAGE EXPOSURE INDICATOR~~

~~The Average Exposure Indicator expressed in µg/m³ (AEI) shall be based upon measurements in urban background locations in zones and agglomerations throughout the territory of a Member State. It should be assessed as a three-calendar year running annual mean concentration averaged over all sampling points established pursuant to Section B of Annex V. The AEI for the reference year 2010 shall be the mean concentration of the years 2008, 2009 and 2010.~~

~~However, where data are not available for 2008, Member States may use the mean concentration of the years 2009 and 2010 or the mean concentration of the years 2009, 2010 and 2011. Member States making use of these possibilities shall communicate their decisions to the Commission by 11 September 2008.~~

~~The AEI for the year 2020 shall be the three-year running mean concentration averaged over all those sampling points for the years 2018, 2019 and 2020. The AEI is used for the examination whether the national exposure reduction target is met.~~

~~The AEI for the year 2015 shall be the three-year running mean concentration averaged over all those sampling points for the years 2013, 2014 and 2015. The AEI is used for the examination whether the exposure concentration obligation is met.~~

~~B. NATIONAL EXPOSURE REDUCTION TARGET~~

~~Exposure reduction target relative to the AEI in 2010~~		~~Year by which the exposure reduction target should be met~~
~~Initial concentration in µg/m³~~	~~Reduction target in percent~~	~~2020~~
~~< 8,5 = 8,5~~	~~0 %~~	
~~≥ 8,5 — < 13~~	~~10 %~~	
~~= 13 — < 18~~	~~15 %~~	
~~= 18 — < 22~~	~~20 %~~	
~~≥ 22~~	~~All appropriate measures to achieve 18 µg/m³~~	

~~Where the AEI in the reference year is 8,5 µg/m³ or less the exposure reduction target shall be zero. The reduction target shall be zero also in cases where the AEI reaches the level of~~

~~8,5 µg/m³ at any point of time during the period from 2010 to 2020 and is maintained at or below that level.~~

~~C. EXPOSURE CONCENTRATION OBLIGATION~~

~~Exposure concentration obligation~~	~~Year by which the obligation value is to be met~~
~~20 µg/m³~~	~~2015~~

~~D. TARGET VALUE~~

~~Averaging period~~	~~Target value~~	~~Date by which target value should be met~~
~~Calendar year~~	~~25 µg/m³~~	~~1 January 2010~~

~~E. LIMIT VALUE~~

~~Averaging period~~	~~Limit value~~	~~Margin of tolerance~~	~~Date by which limit value is to be met~~
~~STAGE 1~~			
~~Calendar year~~	~~25 µg/m³~~	~~20 % on 11 June 2008, decreasing on the next 1 January and every 12 months thereafter by equal annual percentages to reach 0 % by 1 January 2015~~	~~1 January 2015~~
~~STAGE 2[37]~~			
~~Calendar year~~	~~20 µg/m³~~		~~1 January 2020~~

[37] ~~Stage 2 — indicative limit value to be reviewed by the Commission in 2013 in the light of further information on health and environmental effects, technical feasibility and experience of the target value in Member States.~~

↓ 2008/50

~~ANNEX XV~~

~~Information to be included in the local, regional or national air quality plans for improvement in ambient air quality~~

~~A. INFORMATION TO BE PROVIDED UNDER ARTICLE 23 (AIR QUALITY PLANS)~~

~~1. Localisation of excess pollution~~

~~(a) region;~~

~~(b) city (map);~~

~~(c) measuring station (map, geographical coordinates).~~

~~2. General information~~

~~(a) type of zone (city, industrial or rural area);~~

~~(b) estimate of the polluted area (km²) 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.~~

~~3. Responsible authorities~~

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

~~4. Nature and assessment of pollution~~

~~(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.~~

~~5. Origin of pollution~~

~~(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.~~

~~6. Analysis of the situation~~

~~(a) details of those factors responsible for the exceedance (e.g. transport, including cross-border transport, formation of secondary pollutants in the atmosphere);~~

~~(b) details of possible measures for the improvement of air quality.~~

~~7. Details of those measures or projects for improvement which existed prior to 11 June 2008, i.e:~~

~~(a) local, regional, national, international measures;~~

~~(b) observed effects of these measures.~~

8. Details of those measures or projects adopted with a view to reducing pollution following the entry into force of this Directive:

(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.

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

10. List of the publications, documents, work, etc., used to supplement information required under this Annex.

B. INFORMATION TO BE PROVIDED UNDER ARTICLE 22(1)

1. All information as laid down in Section A.

2. Information concerning the status of implementation of the following Directives:

1. Council Directive 70/220/EEC of 20 March 1970 on the approximation of the laws of the Member States on measures to be taken against air pollution by emissions from motor vehicles[38];

2. Directive 94/63/EC of the European Parliament and of the Council of 20 December 1994 on the control of volatile organic compound (VOC) emissions resulting from the storage of petrol and its distribution from terminals to service stations[39];

3. Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control[40];

4. Directive 97/68/EC of the European Parliament and of the Council of 16 December 1997 on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery[41];

5. Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels[42];

6. Council Directive 1999/13/EC of 11 March 1999 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations[43];

7. Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels[44];

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38 OJ L 76, 6.4.1970, p. 1. Directive as last amended by Directive 2006/96/EC (OJ L 363, 20.12.2006, p. 81).

39 OJ L 365, 31.12.1994, p. 24. Directive as amended by Regulation (EC) No 1882/2003 (OJ L 284, 31.10.2003, p. 1).

40 OJ L 24, 29.1.2008, p. 8.

41 OJ L 59, 27.2.1998, p. 1. Directive as last amended by Directive 2006/105/EC.

42 OJ L 350, 28.12.1998, p. 58. Directive as amended by Regulation (EC) No 1882/2003.

43 OJ L 85, 29.3.1999, p. 1. Directive as last amended by Directive 2004/42/EC of the European Parliament and of the Council (OJ L 143, 30.4.2004, p. 87).

8. Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste[45];

9. Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants;

10. Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants;

11. Directive 2004/42/EC of the European Parliament and of the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products[46];

12. Directive 2005/33/EC of the European Parliament and of the Council of 6 July 2005 amending Directive 1999/32/EC as regards the sulphur content of marine fuels[47];

13. Directive 2005/55/EC of the European Parliament and of the Council of 28 September 2005 on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous and particulate pollutants from compression-ignition engines for use in vehicles, and the emission of gaseous pollutants from positive-ignition engines fuelled with natural gas or liquefied petroleum gas for use in vehicles[48];

14. Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services[49].

3. Information on all air pollution abatement measures that have been considered at appropriate local, regional or national level for implementation in connection with the attainment of air quality objectives, including:

(a) reduction of emissions from stationary sources by ensuring that polluting small and medium sized stationary combustion sources (including for biomass) are fitted with emission control equipment or replaced;

(b) reduction of emissions from vehicles through retrofitting with emission control equipment. The use of economic incentives to accelerate take-up should be considered;

(c) procurement by public authorities, in line with the handbook on environmental public procurement, of road vehicles, fuels and combustion equipment to reduce emissions, including the purchase of:

– new vehicles, including low emission vehicles,

– cleaner vehicle transport services,

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44 OJ L 121, 11.5.1999, p. 13. Directive as last amended by Directive 2005/33/EC of the European Parliament and of the Council (OJ L 191, 22.7.2005, p. 59).

45 OJ L 332, 28.12.2000, p. 91.

46 OJ L 143, 30.4.2004, p. 87.

47 OJ L 191, 22.7.2005, p. 59.

48 OJ L 275, 20.10.2005, p. 1. Directive as last amended by Regulation (EC) No 715/2007 (OJ L 171, 29.6.2007, p. 1).

49 OJ L 114, 27.4.2006, p. 64.

~~– low emission stationary combustion sources,~~

~~– low emission fuels for stationary and mobile sources,~~

~~(d) measures to limit transport emissions through traffic planning and management (including congestion pricing, differentiated parking fees or other economic incentives; establishing low emission zones);~~

~~(e) measures to encourage a shift of transport towards less polluting modes;~~

~~(f) ensuring that low emission fuels are used in small, medium and large scale stationary sources and in mobile sources;~~

~~(g) measures to reduce air pollution through the permit system under Directive 2008/1/EC, the national plans under Directive 2001/80/EC, and through the use of economic instruments such as taxes, charges or emission trading.~~

~~(h) where appropriate, measures to protect the health of children or other sensitive groups.~~

~~ANNEX XVI~~

~~PUBLIC INFORMATION~~

~~1. Member States shall ensure that up-to-date information on ambient concentrations of the pollutants covered by this Directive is routinely made available to the public.~~

~~2. Ambient concentrations provided shall be presented as average values according to the appropriate averaging period as laid down in Annex VII and Annexes XI to XIV. The information shall at least indicate any levels exceeding air quality objectives including limit values, target values, alert thresholds, information thresholds or long-term objectives of the regulated pollutant. It shall also provide a short assessment in relation to the air quality objectives and appropriate information regarding effects on health, or, where appropriate, vegetation.~~

~~3. Information on ambient concentrations of sulphur dioxide, nitrogen dioxide, particulate matter (at least PM_{10}), ozone and carbon monoxide shall be updated on at least a daily basis, and, wherever practicable, information shall be updated on an hourly basis. Information on ambient concentrations of lead and benzene, presented as an average value for the last 12 months, shall be updated on a three-monthly basis, and on a monthly basis, wherever practicable.~~

~~4. Member States shall ensure that timely information about actual or predicted exceedances of alert thresholds, and any information threshold is provided to the public. Details supplied shall include at least the following information:~~

~~(a) information on observed exceedance(s):~~

- ~~location or area of the exceedance,~~
- ~~type of threshold exceeded (information or alert),~~
- ~~start time and duration of the exceedance,~~
- ~~highest one hour concentration and in addition highest eight hour mean concentration in the case of ozone;~~

~~(b) forecast for the following afternoon/day(s):~~

- ~~geographical area of expected exceedances of information and/or alert threshold,~~
- ~~expected changes in pollution (improvement, stabilisation or deterioration), together with the reasons for those changes;~~

~~(c) information on the type of population concerned, possible health effects and recommended behaviour:~~

- ~~information on population groups at risk,~~
- ~~description of likely symptoms,~~
- ~~recommended precautions to be taken by the population concerned,~~
- ~~where to find further information;~~

~~(d) information on preventive action to reduce pollution and/or exposure to it: indication of main source sectors; recommendations for action to reduce emissions;~~

~~(c) in the case of predicted exceedances, Member State shall take steps to ensure that such details are supplied to the extent practicable.~~

↓ 2008/50 (adapted)

~~ANNEX XVII~~

~~CORRELATION TABLE~~

~~This Directive~~	~~Directive 96/62/EC~~	~~Directive 1999/30/EC~~	~~Directive 2000/69/EC~~	~~Directive 2002/3/EC~~
~~Article 1~~	~~Article 1~~	~~Article 1~~	~~Article 1~~	~~Article 1~~
~~Article 2(1) to (5)~~	~~Article 2(1) to (5)~~	—	—	—
~~Article 2(6) and (7)~~	—	—	—	—
~~Article 2(8)~~	~~Article 2(8)~~	~~Article 2(7)~~	—	—
~~Article 2(9)~~	~~Article 2(6)~~	—	—	~~Article 2(9)~~
~~Article 2(10)~~	~~Article 2(7)~~	~~Article 2(6)~~	—	~~Article 2(11)~~
~~Article 2(11)~~	—	—	—	~~Article 2(12)~~
~~Article 2(12) and (13)~~	—	~~Article 2(13) and (14)~~	~~Article 2(a) and (b)~~	—
~~Article 2(14)~~	—	—	—	~~Article 2(10)~~
~~Article 2(15) and (16)~~	~~Article 2(9) and (10)~~	~~Article 2(8) and (9)~~	—	~~Article 2(7) and (8)~~
~~Article 2(17) and (18)~~	—	~~Article 2(11) and (12)~~	—	—
~~Article 2(19), (20), (21), (22) and (23)~~	—	—	—	—
~~Article 2(24)~~	—	~~Article 2(10)~~	—	—
~~Article 2(25) and (26)~~	~~Article 6(5)~~	—	—	—
~~Article 2(27)~~	—	—	—	~~Article 2(13)~~
~~Article 2(28)~~	—	—	—	~~Article 2(3)~~
~~Article 3, with the exception of paragraph (1)(f)~~	~~Article 3~~	—	—	—
~~Article 3(1)(f)~~	—	—	—	—

~~Article 4~~	~~Article 2(9) and (10), Article 6(1)~~	—	—	—
~~Article 5~~	—	~~Article 7(1)~~	~~Article 5(1)~~	—
~~Article 6(1) to (4)~~	~~Article 6(1) to (4)~~	—	—	—
~~Article 6(5)~~	—	—	—	—
~~Article 7~~	—	~~Article 7(2) and (3) with amendments~~	~~Article 5(2) and (3) with amendments~~	—
~~Article 8~~	—	~~Article 7(5)~~	~~Article 5(5)~~	—
~~Article 9~~	—	—	—	~~Article 9(1) first and second subparagraphs~~
~~Article 10~~	—	—	—	~~Article 9(1) to (3) with amendments~~
~~Article 11(1)~~	—	—	—	~~Article 9(4)~~
~~Article 11(2)~~	—	—	—	—
~~Article 12~~	~~Article 9~~	—	—	—
~~Article 13(1)~~	—	~~Articles 3(1), 4(1), 5(1) and 6~~	~~Articles 3(1) and 4~~	—
~~Article 13(2)~~	—	~~Articles 3(2) and 4(2)~~	—	—
~~Article 13(3)~~	—	~~Article 5(5)~~	—	—
~~Article 14~~	—	~~Articles 3(1) and 4(1) with amendments~~	—	—
~~Article 15~~	—	—	—	—
~~Article 16~~	—	—	—	—
~~Article 17(1)~~	—	—	—	~~Articles 3(1) and 4(1)~~
~~Article 17(2)~~	—	—	—	~~Article 3(2)~~

				~~and (3)~~
~~Article 17(3)~~	—	—	—	~~Article 4(2)~~
~~Article 18~~	—	—	—	~~Article 5~~
~~Article 19~~	~~Article 10 with amendments~~	~~Article 8(3)~~	—	~~Article 6 with amendments~~
~~Article 20~~	—	~~Articles 3(4) and 5(4) with amendments~~	—	—
~~Article 21~~	—	—	—	—
~~Article 22~~	—	—	—	—
~~Article 23~~	~~Article 8(1) to (4) with amendments~~	—	—	—
~~Article 24~~	~~Article 7(3) with amendments~~	—	—	~~Article 7 with amendments~~
~~Article 25~~	~~Article 8(5) with amendments~~	—	—	~~Article 8 with amendments~~
~~Article 26~~	—	~~Article 8 with amendments~~	~~Article 7 with amendments~~	~~Article 6 with amendments~~
~~Article 27~~	~~Article 11 with amendments~~	~~Article 5(2) second subparagraph~~	—	~~Article 10 with amendments~~
~~Article 28(1)~~	~~Article 12(1) with amendments~~	—	—	—
~~Article 28(2)~~	~~Article 11 with amendments~~	—	—	—
~~Article 28(3)~~	—	—	—	—
~~Article 28(4)~~	—	~~Annex IX with amendments~~	—	—
~~Article 29~~	~~Article 12(2)~~	—	—	—
~~Article 30~~	—	~~Article 11~~	~~Article 9~~	~~Article 14~~

~~Article 31~~	—	—	—	—
~~Article 32~~	—	—	—	—
~~Article 33~~	~~Article 13~~	~~Article 12~~	~~Article 10~~	~~Article 15~~
~~Article 34~~	~~Article 14~~	~~Article 13~~	~~Article 11~~	~~Article 17~~
~~Article 35~~	~~Article 15~~	~~Article 14~~	~~Article 12~~	~~Article 18~~
~~Annex I~~	—	~~Annex VIII with amendments~~	~~Annex VI~~	~~Annex VII~~
~~Annex II~~	—	~~Annex V with amendments~~	~~Annex III~~	—
~~Annex III~~	—	~~Annex VI~~	~~Annex IV~~	—
~~Annex IV~~	—	—	—	—
~~Annex V~~	—	~~Annex VII with amendments~~	~~Annex V~~	—
~~Annex VI~~	—	~~Annex IX with amendments~~	~~Annex VII~~	~~Annex VIII~~
~~Annex VII~~	—	—	—	~~Annex I, Annex III section II~~
~~Annex VIII~~	—	—	—	~~Annex IV~~
~~Annex IX~~	—	—	—	~~Annex V~~
~~Annex X~~	—	—	—	~~Annex VI~~
~~Annex XI~~	—	~~Annex I, section I, Annex II, section I and Annex III (with amendments); Annex IV (unchanged)~~	~~Annex I, Annex II~~	—
~~Annex XII~~	—	~~Annex I, section II, Annex II, section II,~~	—	~~Annex II, section I~~
~~Annex XIII~~	—	~~Annex I, section I,~~	—	—

		~~Annex II, section I~~		
~~Annex XIV~~	~~—~~	~~—~~	~~—~~	~~—~~
~~Annex XV Section A~~	~~Annex IV~~	~~—~~	~~—~~	~~—~~
~~Annex XV Section B~~	~~—~~	~~—~~	~~—~~	~~—~~
~~Annex XVI~~	~~—~~	~~Article 8~~	~~Article 7~~	~~Article 6 with amendments~~