PM$_{10}$ measurement methods and correction factors in AIRBASE 2004 status report

corrĕ'ction *n.* Correcting (**I speak under ~**, I may be wrong); thing substituted for what is wrong; punishment (*house of correction*); hence ~AL *a.* [ME f. OF, f. L *correctio -onis* (as prec.; see -ION)]

fă'ctor *n.* & *v.* **1.** *n.* Merchant buying and selling on commission, whence ~AGE (4) *n.*; (Sc.) land-agent, steward; agent, deputy. **2.** (Math.) one of the numbers etc. that make up a number or expression by multiplication; (Biol.) gene etc. determining hereditary character; *factor of* SAFETY. **3.** Circumstance, fact, or influence, contributing to a result. **4.** ~ **cost,** cost of product to producer. **5.** *v.t.* Resolve into factors or components. **6.** *v.i.* Buy at discount the debts owed to another, in order to profit by collecting them. [f. F *facteur* or f. L *factor* (as prec.; see -OR)]

partĭ'cūlāte (*or* -*a*t) *a.* & *n.* (Matter) in the form of separate particles. [f. L *particula* PARTICLE + -ATE²]

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Front page picture: lemmas taken from "The Concise Oxford Dictionary", Sixth Edition, Oxford University Press, 1976.

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Many colleagues throughout Europe have provided information on current PM_{10} methodologies in their networks and/or countries. Also, many have commented on earlier versions of this paper. We thank them all for their much appreciated and valuable support.

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Contents

1. Introduction 4

2. Methods 5

3. Results 7

4. Discussion and recommendations 11

References 12

Annex A. PM_{10} measurement methods 14

Annex B Overview of correction factors 16

Annex C. Annual PM_{10} correction factors. 24

1. INTRODUCTION

Within the European Union a procedure to exchange information on air quality has been laid down in Council Decision 97/101/EC (EU, 1997) of 27 January 1997 *establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States* (the "Exchange of Information decision" or shortly EoI decision). Technical details such as pollutants covered, information on stations and networks to be communicated are specified in the annexes of the Decision. These annexes were amended by Commission Decision 2001/752/EC (EU, 2001a). Formally the EoI applies only to the EU Member States, however, upon request of the European Environment Agency (EEA), a large number of non-EU countries provides, on a voluntary basis, information on air quality following the requirements of the EoI Decision. In this way, information on a pan-European scale has become available.

According to the EoI Decision the Commission will call upon the European Environment Agency with regard to the operation and practical implementation of the information system. The European Topic Centre on Air Quality and Climate Change (ETC/ACC), under contract to EEA, manages the database system, AIRBASE. The information submitted under the EoI is stored in AIRBASE[1] and made available to the public on the Internet via the ETC/ACC website[2].

Submission of information on the measurement method is a non-mandatory item. However in case of PM_{10}, intercomparison exercises of different PM_{10} monitoring methods showed large deviations from the European Reference Method (as described in CEN standard EN 12341; see also EU, 2003). It was recognised that results from non-reference methods have to be corrected and enhanced efforts to harmonise the PM-measurements in the EU are needed (EU, 2003; Williams and Bruckmann, 2002). In this respect, actions have been undertaken by the EC (Anonymous, 2005) and by Member States and other countries (see, e.g. Beier *et al.*, 2005; Umweltbundesamt, 2005; Gehrig *et al.*, 2005).

So far no provisions have been made in the EoI to submit information on PM_{10} correction factors which have been applied by countries to the results from automated instruments. For a proper information to AIRBASE users, ETC/ACC has therefore produced a first overview (Buijsman and de Leeuw, 2004) of current practices with respect to the (automated) PM_{10} measurement data which are present in AIRBASE. This paper was based on the information submitted in the 2003 EoI-data exchange cycle and on an enquiry amongst data suppliers of PM_{10} measurement data in the EEA member countries. During the EoI-2004 update cycle (on 2003 data) the ETC/ACC was informed on changes in PM10 reporting procedures by various member countries. The first report by Buijsman and de Leeuw covering the PM10 data for the year 2002 might therefore not longer reflects the current situation in a correct way. In this technical report new information obtained from the data suppliers is combined with information extracted from the questionnaire prepared by EU Member States under the Framework Directive (EU, 2001b, EU, 2004). This report reflects the situation on 2003 monitoring data.

[1] http://airbase.eionet.eu.int/
[2] http://air-climate.eionet.eu.int/

2. Methods

AIRBASE contains a growing number of airborne PM_{10} concentration data[3]. These data have been acquired with different sampling methods. Gravimetry, TEOM (Tapered Element Oscillating Microbalance) and ß ray absorption being the methods most widely used [4], with gravimetry being the reference method. Although this method could by definition be considered as an absolute method, the method has its problems (see Annex A). Alternatively, methods based on surrogate mass determinations are used, like the oscillating microbalance and the ß ray absorption methods. Data determined with the latter methods are often subject to correction procedures to correct for flaws in the sampling and determination. From a user perspective, the analysis and evaluation of PM_{10} data requires therefore supplementary information on methods and, eventually, correction procedures. Networks which use surrogate mass based methods, appear to act differently with respect to the use of correction factors. To be able to cope with these complicating circumstances the ETC/ACC is planning to introduce procedures which will allow data users to better understand and manage PM_{10} air quality data in AIRBASE.

The ETC/ACC intends to introduce the following procedure.

1. Prior to placement in AIRBASE PM_{10} data should been validated by the data suppliers as the EoI requests. Also we assume that data in AIRBASE are identical to the data which are publicly available at the national or local level. It is further assumed that for the stations operational under the Air Quality Framework Directive (FWD; EC, 1996), the EoI-data submitted to AIRBASE is identical to the data used by the Member States to evaluate exceedances of PM10 limit values as required in the FWD-Questionnaire (EU, 2004). The data received from the countries is not modified which means that data are placed in AIRBASE 'as such'. This has been the procedure in the past and so it will be in the future. The quality of the data and a consistent reporting of the data is the prime responsibility of the data suppliers. The ETC/ACC can not and will not on its own initiative change data in AIRBASE.
2. Member countries are asked to provide information on methods and correction factors with respect to PM_{10} measurement results. Member countries should also provide explicit information whether data that have been delivered to AIRBASE in the past, have been subject to any kind of correction. There is also a possibility that methods and/or correction factors have changed throughout the years. This information is also welcomed.
3. The possibility to link PM_{10} data in AIRBASE directly to information on methods and correction factors is currently under investigation. However, the exact way to implement this in AIRBASE is still under discussion. Another solution will be to provide users who extract PM_{10} data from AIRBASE, with an automatically generated information file. This file will contain an overview of methods and correction factors at the network level and, if applicable, also specified in time. However, for the time being, a more simple solution to provide data users with the relevant information in the form of downloadable spreadsheets is chosen.

The implementation of the procedure sketched above depends among others, on the progress made by the European Commission in the revision and streamlining of monitoring and reporting requirements as part of the Thematic Strategy on Air Pollution and industrial emissions.

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[3] A technical reports describing the contents of AIRBASE is produced annually. The most recent versions, on the 2002 (Buijsman *et al.*, 2004) and the 2003 status (Mol and van Hooydonk, 2005, are available from the ETC/ACC web site http://air-climate.eionet.eu.int/reports.

[4] For a short description of the various PM_{10} measurement methods see Annex A.

In preparing this current overview, additional information taken from the questionnaire[5] to report under the Framework Directive (EU, 2001b, 2004) is included. In particular the information for the year 2003 in Form 3 on *"stations and measuring methods used for assessment under 1999/30/EC (annex IX) and 2000/69/EC (Annex VII)"* has been combined with meta information in AIRBASE. Not all reporting countries use the unique EoI station code to identify the monitoring stations. Nevertheless, in a tedious comparison[6] most of the stations used under the first and second daughter directive could be linked to essential meta information stored in AIRBASE. The PM10 measuring method and correction factor taken from Form 3 is compared with available AIRBASE information. Further, the annual mean concentrations reported in Form 11i, *"Exceedance of PM10 limit values plus Margin of Tolerance (stage 1; annual mean)"* is compared with the annual mean concentration stored in AIRBASE.

For the reporting year 2002 a similar action was undertaken on basis on the predecessor of the current questionnaire (EU, 2001b). The 2002 questionnaire has only been submitted by 16 countries (14 old and two new EU-Member States).

Overview tables have been prepared for each reporting countries and have been mailed to the national data suppliers with a request for supplementary information, clarification, correction etc. Finally the collected information is summarized in a spreadsheet where for each station a correction factor is given for each monitoring year, see Annex C for further details. The spreadsheet is available from the AIRBASE web pages.

[5] In the remaining of this paper, this questionnaire will be identified as *Q-FWD* or simply as "*questionnaire*". Reporting on 2003 data was mandatory for the old EU15 Member States and voluntary for the 10 new Member States.

[6] The matching between the stations listed in Q-FWD and in AIRBASE is based on*: i)* a match between the EoI station code and the information in Q-FWD, form 3 under the heading "*EoI station code*"*; ii*) a match between the local station code from AIRBASE with information in Q-FWD, form 3 under the headings "*EoI station code*" or "*local station code*"; *iii)* for stations in Italy an additional match is searched by comparing the station names in both data bases.

3. Results

With respect to the use of correction factors for PM_{10} measurement data, countries act in different ways. A discussion on correction factors covers measurements methods based on the oscillating microbalance and ß ray absorption technique. Gravimetry, by definition, has no correction factor.

Reviewing the information, the following situations are identified:

1. **Correction not applicable.**
   Three countries (Denmark, Ireland and Romania) use exclusively the gravimetric method. No correction is needed in this case[7].
2. **No correction factors**.
   In 12 countries (Bulgaria, Cyprus, Czech Republic, Finland, France, Hungary, Iceland, Italy, Latvia, Poland, Serbia and Montenegro and Spain) various networks and/or stations report measurement data using non-reference measuring methods to AIRBASE 'as such'. No correction factor or a factor of 1.00 has been defined and subsequently no correction of measurement data has been applied.
3. **One uniform correction factor for one measuring method for a network (or for all networks in a country).**
   This refers to networks in Belgium, Estonia, FYR of Macedonia, Greece, Lithuania, the Netherlands, Norway, Slovak Republic, Slovenia and United Kingdom and to parts of the networks in Finland, Italy, and Spain. Note that in a number of cases a correction factor of 1.00 (which will be in most cases *de facto* the same as when no correction factor is defined) is given.
4. **Space dependent correction factors.**
   In practice this means that correction factors are site dependent. This category includes networks that use correction factors in relation to the type of station (urban, rural etc.) It refers to networks in Austria, Germany, Portugal, Spain, and Sweden.
5. **Time and space dependent correction factors.**
   Switzerland is for the moment the only country that utilises a high-resolution time and space dependent correction factors (Gehrig *et al.*, 2005). At some German stations two different factors are applied during 2003. Some countries provide different factor for 2002 and 2003.
6. **No correction on AIRBASE data.**
   Even in those cases where countries state that a correction factor is applicable, this does not necessarily mean that data in AIRBASE have been subjected to this correction factor (see Annex B). The Norwegian and Slovakian data up to and including 2003 has not been corrected; both countries indicated that the data for the year 2004 and onwards will be corrected. For the majority of networks it is not known whether data is corrected or not. Some networks reported that data in AIRBASE have not been corrected. Comparing the information in Q-FWD and AIRBASE shows for a number of stations differences in annual mean concentrations suggesting that correction has not been applied systematically.
7. **No delivery of PM10 data to AIRBASE.**
   So far Luxembourg has not submitted any PM10 data under the EoI decision.

[7] Stating that a gravimetric method is used, does not necessarily mean that one of the reference samplers is used. Also for gravimetry teher are non-reference samplers. So, gravimetric methods may also be subject to equivalence testing, possibly resulting in a correction factor. Here it is assumed that when no correction factor is defined for a gravimetric method, the method is equivalent to the reference method and no correction factor is applied.

A summary of the findings is presented in *Table 1*.

According to the first daughter directive the reference method for the sampling and measurement of PM_{10} is the method for which the measurement principle is based on the collection on a filter of the PM_{10} fraction of ambient particulate matter and the gravimetric mass determination. A small number of reference samplers have been specified. However, member states may use any other filter sampler or method, but the member states have to demonstrate that their method gives results equivalent to the reference method. In short, this is called 'equivalence' which is defined as *"an equivalent method to the standard method for the measurement of a specified air pollutant is a method meeting the data quality objectives for continuous or fixed measurements specified in the relevant air quality directive"* (Anonymous, 2005). The report of the *EC Working group on Guidance for the Demonstration of Equivalence* describes the principles and methodologies to be used for the demonstration of equivalence (Anonymous, 2005). The actions that have been taken by member countries to show equivalence, are shown in *Table 1* under the head 'Reference'.

The EoI requires Member States to include all stations used for reporting under the Framework Directive in their data submission. In the initial comparison between the information from the questionnaire for 2002, for 2003 and from AIRBASE yielded the following inconsistencies:

- in most of the EU Member States the majority of the PM10 stations reporting under the Framework Directive report as well to AIRBASE. Some countries, however, have many stations which report under the FWD but not to AIRBASE;
- a few stations reporting PM10 under the FWD are also reporting to AIRBASE but not for PM10 but only for other pollutants. The reversed situation (PM10 data reported to AIRBASE but the station is not used for PM10 compliance checking) is also observed. A limited number of stations report only to AIRBASE. Table 2 summarises the results;
- conflicting information on measuring method in questionnaire and AIRBASE;
- different measuring methods are reported for 2002 and 2003 in the FWD-questionnaires but not to AIRBASE;
- no information on correction factor when methods based on beta-absorption or oscillation microbalance are used;
- different correction factors reported in 2002 and 2003 while reporting the same measurement method[8];
- large differences between annual mean concentrations reporting under FWD and to AIRBASE.

The national data suppliers have been asked to comment on these findings. In this feedback action data suppliers have also been asked to provide information on correction factors used in the period prior to 2002. After accounting for the comments of the data suppliers a final table with correction factors used in 2003 and - where appropriate – for earlier years for all reporting PM10 stations has been prepared. This table is available from the AIRBASE web site; parts of it are shown in Annex C as example.

[8] formally this may not be an inconsistency. A changed in correction factors is possible when it is underpinned with an equivalence report.

Table 1 PM_{10} measurements configurations for PM_{10} air quality data in AIRBASE. Reference year is 2003

Country	Measurement sites with			Type of correction factor [1]	Reference [2]
	Gravimetry	Beta-absorption	Oscillating micro-balance		
Austria	×	×	×	2, 4	Umweltbundesamt, 2004
Belgium		×	×	1c	VMM, 2003
Bosnia Herzegovina [3]	-	-	-	-	-
Bulgaria	×	×		0	[c]
Cyprus			×	0	No reference given
Czech Republic		×		0	[a]
Denmark	×			-	-
Estonia		×		1a	[b]
Finland	×	×	×	0,1b	Sillanpää *et al.*, 2002
France		×	×	0	[a]
FYR of Macedonia		×		1a	No reference given
Germany	×	×	×	2,3, 4	[a]
Greece		×		1b	No reference given
Hungary		×	×	0	No reference given
Iceland	×	×		0	No reference given
Ireland	×			-	-
Italy	×	×	×	0, 1b	No reference given
Latvia		×		0	No reference given
Lithuania		×		1a	No reference given
Luxembourg[5]			×	1a	No reference given
Netherlands		×		1a	Van Putten *et al.*, 2002
Norway	×	×	×	1c,5	Report in preparation [a]
Poland	×	×	×	0	Currently insufficient experimental data available to derive correction factors [a]
Portugal	×	×		2	Instituto do Ambiente, 2002
Romania	×	-	-	-	-
Serbia and Montenegro		×		0	No reference given
Slovak Republic			×	1a[4],5	Working Group on PM_{10}
Slovenia			×	1a[4]	Research in progress[a]
Spain	×	×	×	0,1b,2,4,5	No reference given
Sweden	×		×	1b,2	No reference given
Switzerland	×	×	×	3	Heldstab and Stampfli, 2001; Gehrig *et al.,* 2005
United Kingdom	×	×	×	1c	Williams and Bruckmann, 2002

1) In case of the oscillating microbalance and the ß ray absorption method as a measurement method. Explanation of symbols:
   - -: not applicable.
   - 0: correction factor not defined for one or more stations/networks (de facto this means that a factor 1.00 is used for non referencemthods).
   - 1a: one uniform correction factor for a country wide network
   - 1b: one uniform correction factor in a network.
   - 1c: one uniform correction factor for each non-reference measuring method in a network
   - 2: correction factor site dependent.
   - 3: time and space dependent correction factor.
   - 4: different factors for 2002 and 2003 at one or more stations.
   - 5: correction factor defined but data deklivered to AIRBASE has not been corrected.
2) In case no arguments are given for the choice of the value of correction factors the statement 'No reference given' is given.
3) No PM_{10} measurements.
4) For 2003 data; no correction factor for data prior to 2003.
5) No PM10 data delivered to AIRBASE.

a) Personal communications, see Buijsman and de Leeuw (2004).

b) Personal communication Toivo Truuts, September 2005.

c) Intercomparison study in progress, personal communication, Valeri Serafimov, October 2005.

Table 2. Number of PM10 stations reported under the FWD Questionnaire and to AIRBASE. Reference year is 2003. Note that for those countries which did not submit the 2003-FWD Questionnaire, only the total number of stations reporting to AIRBASE is given.

	Number of stations reporting in Q-FWD	Number of stations reporting both to Q-FWD and AIRBASE	Total number of stations in AIRBASE:	AIRBASE PM10 stations reporting other pollutants to Q-FWD	Number of stations reporting to AIRBASE but not to Q-FWD
Austria	95	93	95	1	1
Belgium	35	33	33	0	0
Bulgaria			14		
Cyprus			2		
Czech Republic	156	65	65	0	0
Denmark	11	8	8	0	0
Estonia	4	4	4		0
Finland	24	22	33	2	9
France	344	303	323	10	10
FYR of Macedonia			3		3
Germany	377	327	391	17	47
Greece	17	17	17	0	0
Hungary			8		
Iceland	2	2	2		
Ireland	11	8	10	1	1
Italy	202	90	141	13	38
Latvia			2		2
Lithuania	12	12	12		
Luxembourg	2	0	0	0	0
Netherlands	28	19	33	14	0
Norway	6	6	7	0	1
Poland			32		
Portugal	20	20	34	8	6
Romania			6		
Serbia and Montenegro			1		
Slovak Republic	26	21	26	0	5
Slovania	9	7	7	0	0
Spain	235	196	217	12	9
Sweden	10	7	25	6	12
Switzerland			22		
United Kingdom	71	71	72	0	1

4. Discussion and recommendations

The inquiry on PM_{10} measurement methods and the use of correction factors produced valuable information. From the results of the inquiry it became clear that countries act very differently with respect to the handling of PM_{10} measurement data. It is unlikely that these differences are governed by different situations in which the measurements are performed. Thus, for instance, is there a physical explanation that the measurement results can change dramatically just by crossing the border between two countries. Even in cases where the same measurement method is being used? And, why do some countries use different factors for different types of stations while other countries find obviously no support for such a differentiation? Furthermore, it is remarkable that some countries have reported correction factors which deviate form those reported earlier and obtained by comparative experiments (see Williams and Bruckmann, 2002).

As long as no objective information, or even better the results of research, becomes available, comparing PM_{10} measurement results from different countries or networks may lead to incorrect results.

Future improvements include:

1. In those cases countries or networks use correction factors, data that are submitted to AIRBASE should be corrected. In a few cases AIRBASE data have not been corrected, although countries or networks use a correction factor. It is advised to resubmit corrected data.
2. PM_{10} measurements methods and, if applicable, correction factors should be made part of the essential meta information and as such be delivered under de Exchange of Information.
3. For PM10 data prior to 2002 in many cases no information on correction factor is avialble (see Annex C). It is recommended that Member States check, correct and complete – where needed – the information in Annex C
4. Attention should be paid to the handling of $PM_{2.5}$ data in relation to correction factors.

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Annex A. PM_{10} measurement methods

This annex provides a brief introduction to the most common PM10 measurement methods. This information has been taken form the NARSTO Measurement Methods Compendium Particulate Matter Methods website.
See: http://narsto.ornl.gov/Compendium/methods/pm.shtml.

1. Gravimetric methods with exchangeable filters

An air pump draws ambient air at a constant flow rate into a specially shaped inlet where particulate matter is separated into size fractions. Particulate matter is then collected on a filter. Each filter is weighed before and after use, to determine the net mass gain due to collected matter. Weighing is done in a temperature and humidity controlled environment. The total volume of air filtered is known from the constant air flow, and the difference in filter weights is used to calculate the particulate matter concentration in micrograms per cubic meter ($\mu g/m^3$) of air.

Samplers must operate over a -30° to +45°C temperature range.
Known interferences:

- Particulate matter may be lost during filter handling and weighing procedures, especially if filter is exposed to warming.
- Gaseous species may contaminate filters.
- Humidity and absorbed water may be difficult to control both during operations and when handling filters.
- Removing filters and transporting to a lab for analysis may affect results.
- Meteorological conditions may affect flow rate.

2. Beta Attenuator methods (beta-absorption)

Beta particles, *i.e.* electrons with energies in the 0.01 to 0.1 MeV range, are attenuated according to an approximate exponential function when they pass through particulate deposits on a filter tape. Automated samplers (analyzers) use a continuous filter tape, first measuring the attenuation by the unexposed tape, and then measuring the attenuation after the tape has passed through the ambient air flow. The attenuation measurement converts to a measure of the mass on the filter, so that the filters do not require later laboratory analysis for the mass variable.

Samplers must operate over a -30° to +45°C temperature range. Some devices are offered with temperature protection features, which are optional. In newer instruments less or no heating is required and therewith reducing the losses of volatile mass components.

Known interferences:

- Particulate matter may be lost due to filter tape advance and vibration, especially if filter is exposed to warming.
- Gaseous species may contaminate filters.
- Humidity and absorbed water may be difficult to control during operations.
- Meteorological conditions may affect flow rate.
- Although on-site real-time mass measurement offers significant improvements over the filter removal and laboratory analysis process, the beta emission and detection process present additional on-site maintenance requirements.

3. Tapered Element Oscillating Microbalance methods (TEOM)

Air is drawn through a tapered glass element with a filter attached. The element oscillates according to a characteristic frequency, that decreases as mass accumulates on the attached filter. Measurement of the change in frequency converts to measurement of the accumulated mass.

Samplers must operate over a -30° to +45°C temperature range. Some devices are offered with temperature protection features, which are optional.

Known interferences:

- Particulate matter may be lost due to vibration, especially if exposed to warming.
- Gaseous species may contaminate filters.
- Humidity and absorbed water may be difficult to control during operations.
- Meteorological conditions may affect flow rate.
- Although on-site real-time mass measurement offers significant improvements over the filter removal and laboratory analysis process, the TEOM equipment presents additional maintenance requirements.

Instrument improvements resulted in the development of a Filter Dynamics Measurement System (FDMS). The system computes the ambient PM mass concentration using a self-referencing TEOM mass sensor that measures the true mass of particles on a filter while also accounting for the volatility of the collected particles. Intercomparison studies under sampling conditions in which the gravimetric filter method is not subject to volatilization losses, the manual and FDMS methods show excellent agreement.

Annex B Overview of correction factors

Reference year is 2003.

Technique	Network code	Network name	2002 Factor	2002 AIRBASE data corrected	2003 Factor	2003 AIRBASE data corrected
Austria						
beta-absorption	AT001A	Austria [site dependent factors]	**1.18 – 1.3**	**YES**	**1. – 1.3**	**YES**
oscillating microbalance	AT001A	Austria [site dependent factors]	**1.16 – 1.3**	**YES**	**1.1 - 1.3**	**YES**
gravimetry	AT001A	Austria	**NA**	**-**	**NA**	**-**
Belgium						
beta-absorption	BE002A	Interregional cell for the environment (celine-ircel)	**1.37**	**YES**	**1.37**	**YES**
oscillating microbalance	BE002A	Interregional cell for the environment (celine-ircel)	**1.47**	**YES**	**1.47**	**YES**
beta-absorption	BE004A	meetnet van de stations in het vlaams gewest	**1.37**	**YES**	**1.37**	**YES**
oscillating microbalance	BE004A	meetnet van de stations in het vlaams gewest	**1.47**	**YES**	**1.47**	**YES**
Bosnia Herzegovina						
		No PM_{10} measurements				
Bulgaria						
beta-absorption	BG001A	National Air Quality Monitoring Network	**1.00**	**NA**	**1.00**	**NA**
gravimetry	BG001A	National Air Quality Monitoring Network	**NA**	**-**	**NA**	**-**
Cyprus						
oscillating microbalance	CY001A	National Network for Ambient Air Quality Monitoring in Cyprus		**ND**	**1.00**	**NA**
Czech Republic						
beta-absorption	CZ001A	National automated monitoring network - selected stations	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	CZ001A	National automated monitoring network - selected stations	**1.00**	**NA**		**ND**
Denmark						
gravimetry	DK004A	Danish Air Quality Programme	**NA**	**-**	**NA**	**-**
Estonia						
beta-absorption	EE006A	Estonian Air Quality Monitoring Network	**1.15**	**YES**	**1.15**	**YES**
Finland						
oscillating microbalance	FI003A	Tampere	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI004A	Helsinki metropolitan area	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FI004A	Helsinki metropolitan area	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FI013A	Turku district	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI006A	Oulu	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI010A	Valkeakoski	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI011A	Jyväskylä	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI012A	Lahti	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI013A	Turku district	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI016A	Kuopio-Siilinjärvi	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI017A	Mikkeli		**ND**	**1.00**	**NA**
beta-absorption	FI018A	Pori	**1.00**	**NA**		**ND**
beta-absorption	FI020A	Imatra, Joutseno, Lappeenranta	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI021A	Lohja	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FI022A	Kokkola	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI024A	Northern Kymi Valley	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI025A	Kajaani	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI028A	Vaasa	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FI029A	Jakobstad, Larsmo	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FI032A	Joensuu		**ND**	**1.00**	**NA**
France						
beta-absorption (3)	FR001A	Association-AERFOM	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR002A	Association-AIRFOBEP	**1.00**	**NA**	**1.00**	**NA**

Technique	Network code	Network name	2002 Factor	2002 AIRBASE data corrected	2003 Factor	2003 AIRBASE data corrected
oscillating microbalance	FR003A	Association-AIRMARAIX	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR004A	Association-AIRPARIF	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR005A	Association-ALPA	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR006A	Association-ATMO AUVERGNE	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR007A	Association-AIR LANGUEDOC ROUSSILLON	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance (4)	FR008A	Association-ATMO POITOU CHARENTES	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance (4)	FR014A	Association-AREMARTOIS	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR015A	Association-AREMA LILLE METROPOLE	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR016A	Association-OPALAIR	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR016A	Association-OPALAIR	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR017A	Association-ARPAM	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR017A	Association-ARPAM	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR018A	Association-ATMO CHAMPAGNE ARDENNE	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR019A	Association-ASCOPARG	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR020A	Association-ASPA	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance (4)	FR021A	Association-ASQAB	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR022A	Association-ATMO PICARDIE	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance (4)	FR023A	Association-AIR BREIZH	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR023A	Association-AIR BREIZH	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR026A	Association-COPARLY	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR030A	Association-AIRCOM	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR030A	Association-AIRCOM	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR031A	Association-ESPOL	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR031A	Association-ESPOL	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR035A	Association-AIR PAYS DE LA LOIRE	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR038A	Association-ORAMIP	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR042	Association-QUALITAIR	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR043A	Association-REMAPPA	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR044A	Association-ATMOSFAIR BOURGOGNE CENTRE NORD	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR044A	Association-ATMOSFAIR BOURGOGNE CENTRE NORD	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance (3)	FR049A	Association-SUPAIRE	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR052A	Association-AMPASEL	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR052A	Association-AMPASEL	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR053A	Association-AIRLOR	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR054A	Association-ATMOSFAIR BOURGOGNE SUD	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR055A	Association-L AIR de l Ain et des pays de SAVOIE	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR056A	Association-LIMAIR	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR057A	Association-AREMASSE	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance (3)	FR058A	Association-AIRAQ	**1.00**	**NA**	**1.00**	**NA**
beta-absorption (4)	FR058A	Association-AIRAQ	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR059A	Association-ASQUADRA	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR060A	Association-ORA	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	FR061A	Association-LIGAIR	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR061A	Association-LIGAIR	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR062A	Association-MADININAIR	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	FR063A	Association-ORA de GUYANE	**1.00**	**NA**	**1.00**	**NA**
FYR of Macedonia						
beta-absorption	MK005A	State Air Quality Monitoring Network		**ND**	**1.00**	**NA**
Germany						
beta-absorption	DE001A	Immissionsmeßnetz Saar	**1.00**	**NA**	**NR**	**YES**
beta-absorption (4)	DE002A	Lufthygienisches Überwachungsnetz des	**1.20**	**YES**	**1.2**	**YES**

Technique	Network code	Network name	2002 Factor	2002 AIRBASE data corrected	2003 Factor	2003 AIRBASE data corrected
		Landes Schleswig-Holstein				
gravimetry	DE002A	Lufthygienisches Überwachungsnetz des Landes Schleswig-Holstein	**NA**	**-**	**NA**	**-**
beta-absorption	DE004A	Telemetrisches-Echtzeit-Mehrkomponenten-Erfassungs-System (TEMES)	**1.2**	**YES**	**1.11; 1.28 1.5**	**YES**
oscillating microbalance	DE004A	Telemetrisches-Echtzeit-Mehrkomponenten-Erfassungs-System (TEMES)	**1.1**	**YES**	**1.28**	**YES**
gravimetry	DE004A	Telemetrisches-Echtzeit-Mehrkomponenten-Erfassungs-System (TEMES)	**NA**	**-**	**NA**	**-**
gravimetry	DE005A	Automatisches Vielkomponenten Luftmeßnetz Baden-Württemberg (VIKOLUM)	**NA**	**-**	**NA**	**-**
beta-absorption	DE006A	Immissionsmeßnetz des Umweltbundesamtes	**1.00**	**NA**	**NR**	**YES**
gravimetry	DE006A	Immissionsmeßnetz des Umweltbundesamtes	**NA**	**-**	**NA**	**-**
beta-absorption	DE007A	Lufthygienisches Landesüberwachungssystem Bayern	**1.00**	**-**	**1.25**	**YES**
beta-absorption	DE008A	Berliner Luftgüte-Messnetz	**1.15 / 1.2**	**YES**	**1.15 / 1.2**	**YES**
beta-absorption	DE009A	Luftmeßnetz Hessen	**1.30**	**YES**	**1.30 (7)**	**YES**
beta-absorption	DE010A	Lufthygienisches Überwachungssystem Niedersachsen (LÜN)	**1.30**	**YES**	**1.33**	**YES**
beta-absorption	DE011A	Zentrales Immissionsmeßnetz für Rheinland-Pfalz (ZIMEN)	**1.30**	**YES**	**(8)**	**YES**
gravimetry	DE011A	Zentrales Immissionsmeßnetz für Rheinland-Pfalz (ZIMEN)	**NA**	**-**	**NA**	**-**
beta-absorption	DE012A	Luftmeßnetz Hamburg	**1.30**	**YES**	**1.30**	**YES**
gravimetry	DE012A	Luftmeßnetz Hamburg	**NA**	**-**	**NA**	**-**
oscillating microbalance	DE012A	Luftmeßnetz Hamburg	**1.30**	**YES**	**1.30**	**YES**
oscillating microbalance	DE013A	Bremer Luftüberwachungssystem	**1.30**	**YES**	**1.30**	**YES**
beta-absorption	DE014A	Telemetrisches Luftgütemeßnetz Brandenburg	**1.20**	**YES**	**1.20**	**YES**
gravimetry	DE014A	Telemetrisches Luftgütemeßnetz Brandenburg	**NA**	**-**	**NA (9)**	**YES**
oscillating microbalance	DE014A	Telemetrisches Luftgütemeßnetz Brandenburg	**1.12**	**NR**	**1.12**	**YES**
beta-absorption	DE015A	Lufthygienisches Überwachungssystem Sachsen-Anhalt	**1.20**	**YES**	**1.20 1.25**	**YES**
gravimetry	DE015A	Lufthygienisches Überwachungssystem Sachsen-Anhalt	**NA**	**-**	**NA**	**YES**
oscillating microbalance	DE015A	Lufthygienisches Überwachungssystem Sachsen-Anhalt	**1.25**	**YES**	**1.25**	**YES**
gravimetry	DE016A	Immissionsmeßnetz des Freistaates Sachsen	**NA**	**-**	**NA**	**-**
oscillating microbalance (10)	DE016A	Immissionsmeßnetz des Freistaates Sachsen	**-**	**ND**	**1.20**	**YES**
beta-absorption	DE017A	Thüringer Immissions-Meßnetz	**1.30**	**YES**	**(11)**	**YES**
beta-absorption	DE018A	Luftmeßnetz Mecklenburg-Vorpommern	**1.00**	**NR**	**1.10**	**YES**
Greece						
beta-absorption	GR002A	monitoring network of Heraclion	**1.0**	**NA**	**1.0**	**NA**
beta-absorption	GR007A	monitoring network of Central Macedonia Region	**1.0**	**NA**	**1.0**	**NA**
beta-absorption	GR010A	monitoring station of Patra	**1.0**	**NA**	**1.0**	**NA**
beta-absorption	GR016A	monitoring network of Athens	**1.0**	**NA**	**1.0**	**NA**
Hungary						
beta-absorption	HU004A	Urban Air Quality Network of Ministry of Environment and Water	**1.0**	**NA**	**1.0**	**NA**
oscillating microbalance	HU004A	Urban Air Quality Network of Ministry of Environment and Water	**1.0**	**NA**	**1.0**	**NA**
Iceland						
beta-absorption	IS003A	Reykjavik City Environmental Health and Protection Office	**1.0**	**NA**	**1.0**	**NA**
Ireland						
gravimetry	IE009A	Cork City Air Monitoring Network	**NA**	**-**	**NA**	**-**
gravimetry	IE010A	Dublin Air Monitoring Network	**NA**	**-**	**NA**	**-**
gravimetry	IE014A	GalwayCity Smoke and SO2 Monitoring	**NA**	**-**	**NA**	**-**

Technique	Network code	Network name	2002 Factor	2002 AIRBASE data corrected	2003 Factor	2003 AIRBASE data corrected
		Network				
Italy (19)						
beta-absorption	IT001A	Rete provinciale Provincia di Ancona	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT007A	Provincial monitoring network of Reggio Emilia	**NR**	**YES**	**NR**	**YES**
oscillating microbalance	IT0046A	AR - rete provinciale qualita' dell'aria		**ND**	**NR**	**YES**
beta-absorption	IT058A	Provincial monitoring network of Bologna	**NR**	**YES**	**NR**	**YES**
oscillating microbalance	IT058A	Provincial monitoring network of Bologna	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT070A	Provincial monitoring network of Piacenza	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT072A	Provincial monitoring network of Ravenna	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT082A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Milano	**NR**	**YES**	**NR**	**YES**
oscillating microbalance	IT082A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Milano	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT085A	Provincial monitoring network of Bolzano	**NR**	**YES**	**-**	**ND**
beta-absorption	IT088A	Provincial monitoring network of Ferrara	**NR**	**YES**	**NR**	**YES**
oscillating microbalance	IT088A	Provincial monitoring network of Ferrara	**NR**	**YES**	**NR**	**YES**
beta-absorption (12)	IT090A	Trentino urban and region network	**NR**	**YES**	**NR**	**YES**
oscillating microbalance	IT091A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Bergamo	**-**	**ND**	**NR**	**YES**
oscillating microbalance	IT092A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Brescia	**NR**	**YES**	**NR**	**YES**
oscillating microbalance	IT099A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Mantova		**ND**	**NR**	**YES**
oscillating microbalance	IT100A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Pavia		**ND**	**NR**	**YES**
gravimetry	IT101A	Provincia di Genova	**NA**	**-**	**NA**	**-**
beta-absorption	IT102A	Provincial air monitoring network	**NR**	**YES**	**NR**	**??**
beta-absorption	IT103A	Rete monitoraggio automatico inquinamento atmosferico di Parma	**NR**	**YES**	**NR**	**(6)**
beta-absorption	IT104A	Provincial monitoring network of Forlì	**NR**	**YES**	**NR**	**ND**
beta-absorption (13)	IT105A	Udine urban network		**ND**	**NR**	**YES**
oscillating microbalance	IT107A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Lecco		**ND**	**NR**	**YES**
beta-absorption	IT107A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Lecco		**ND**	**NR**	**YES**
oscillating microbalance (14)	IT108A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Como		**ND**	**NR**	**YES**
oscillating microbalance (14)	IT109A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Cremona		**ND**	**NR**	**YES**
oscillating microbalance	IT110A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Varese		**ND**	**NR**	**YES**
beta-absorption	IT110A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Varese		**ND**	**NR**	**YES**
beta-absorption (15)	IT112A	Regione Lazio	**1.00**	**-**	**1.00**	**-**
beta-absorption	IT113A	FI- rete provinciale qualita' dell'aria	**NR**	**YES**	**NR**	**YES**
oscillating microbalance	IT114A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Sondrio	**-**	**ND**	**NR**	**YES**
beta-absorption	IT116A	Monitoraggio ambientale della regione campania a cura dell 'A.R.P.A.C. S.C.I.A.	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT118A	Provincial monitoring network of Prato	**NR**	**YES**	**NR**	**YES**
oscillating microbalance (14)	IT119A	Aosta Valley Air Quality Network		**ND**	**NR**	**YES**
gravimetry	IT123A	PROVINCIA DI LA SPEZIA		**ND**	**NR**	**YES**
beta-absorption	IT124A	Perugia City Network		**ND**	**NR**	**YES**
beta-absorption	IT126A	ARPA Provincial Monitoring Network of Rimini	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT128A	Air Quality Monitoring Network of Palermo		**ND**	**NR**	**YES**
UNKNOWN	IT129A	Rete Provinciale di Rilevamento dell'Inquinamento Atmosferico PORDENONE		**ND**	**NR**	**YES**
beta-absorption	IT130A	Trieste Urban Network	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT133A	monitoring network of regione basilicata		**ND**	**NR**	**YES**

Technique	Network code	Network name	2002 Factor	2002 AIRBASE data corrected	2003 Factor	2003 AIRBASE data corrected
beta-absorption	IT137A	Rete di rilevamento della qualita' dell'aria della citta di Pescara	**NR**	**YES**	**NR**	**YES**
beta-absorption	IT138A	Rete provinciale di Rilevamento Inquinamento Atmosferico - Provincia di Gorizia		**ND**	**NR**	**YES**
beta-absorption	IT143A	rete del dipartimento arpav di rovigo		**ND**	**NR**	**YES**
beta-absorption	IT154A	Rete della Provincia di Cagliari	**NR**	**NR**	**NR**	**YES**
beta-absorption	IT158A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Lodi		**ND**	**NR**	**YES**
oscillating microbalance	IT158A	Rete di Rilevamento della Qualità dell'Aria della Provincia di Lodi		**ND**	**NR**	**YES(6)**
beta-absorption (16)	IT214A	Rete del dipartimento arpav di Venezia	**NR**	**YES**	**NR**	**YES(6)**
beta-absorption (16)	IT215A	Rete del dipartimento arpav di Verona	**NR**	**YES**	**NR**	**YES(6)**
Beta-absorption	IT216A	Rete del dipartimento arpav di Vicenza		**ND**	**NR**	**YES**
gravimetry	IT224A	Piemonte - sistema regionale di rilevamento della qualita' dell'aria	**NA**	**-**	**NA**	**-**
oscillating microbalance	IT224A	Piemonte - sistema regionale di rilevamento della qualita' dell'aria	**1.3**	**YES**	**NR**	**YES**
oscillating microbalance	IT227A	Provincial monitoring network of Modena		**ND**	**NR**	**YES**
Latvia						
beta-absorption	LV002A	Air guality monitoring and information network	**1.00**	**NA**	**1.00**	**NA**
Lithunia						
beta-absorption	LT001A	National Air Quality Monitoring Network		**ND**	**1.30**	**YES**
Luxembourg						
oscillating microbalance	LU001A	National Air Quality Monitoring Network	**1.20**	**ND**	**1.20**	**ND**
Netherlands						
beta-absorption	NL010A	Landelijk Meetnet Luchtkwaliteit	**1.33**	**YES**	**1.33**	**YES**
Norway						
gravimetry	NO001A	Oslo Road Site Monitoring Network	**NA**	**-**	**NA**	**-**
oscillating microbalance	NO001A	Oslo Road Site Monitoring Network	**1.10**	**NO**	**1.10**	**NO**
beta-absorption	NO001A	Oslo Road Site Monitoring Network		**ND**	**1.00**	**NA**
gravimetry	NO003A	Oslo Air Quality Monitoring Network	**NA**	**-**		**ND**
oscillating microbalance	NO005A	Drammen Air Quality Monitoring Network	**1.10**	**NO**	**1.10**	**NO**
oscillating microbalance	N0004A	Bergen Air Quality Monitoring Network	**1.10**	**NO**	**1.10**	**NO**
oscillating microbalance	N0006A	Trondheim Air Quality Monitoring Network		**ND**	**1.10**	**NO**
Poland						
beta-absorption	PL001A	National Network of Basic Stations	**1.00**	**NA**	**1.00**	**NA**
oscillating microbalance	PL001A	National Network of Basic Stations	**1.00**	**NA**	**1.00**	**NA**
gravimetry	PL001A	National Network of Basic Stations	**NA**	**-**	**NA**	**-**
Portugal						
beta-absorption	PT014A	Direcção reginal ambiente centro network	**(17)**	**YES**	**(17)**	**YES**
beta-absorption	PT016A	Rede de medição de qualidade do ar de Lisboa	**(17)**	**YES**	**(17)**	**YES**
beta-absorption	PT017A	Rede de Qualidade do Ar de Lisboa e Vale do Tejo	**(17)**	**YES**	**(17)**	**YES**
beta-absorption	PT019A	Rede de Qualidade do Ar do Centro	**(17)**	**YES**	**(17)**	**YES**
beta-absorption	PT020A	Rede de Qualidade do Ar do Norte	**(17)**	**YES**	**(17)**	**YES**
beta-absorption	PT021A	Rede de Qualidade do Ar do Algarve	**(17)**	**YES**	**(17)**	**YES**
Romania						
gravimetry	RO001A	Giurgiu		**ND**	**NA**	**-**
gravimetry	RO004A	Galati		**ND**	**NA**	**-**
gravimetry	RO007A	Maramures		**ND**	**NA**	**-**
gravimetry	RO008A	Mures		**ND**	**NA**	**-**
gravimetry	RO014A	Calarasi		**ND**	**NA**	**-**
Serbia-Montenegro						
beta-absorption	CS003A	Air Quality Monitoring System of Belgrade		**ND**	**1.00**	**NA**
Slovak Republic						

Technique	Network code	Network name	2002 Factor	2002 AIRBASE data corrected	2003 Factor	2003 AIRBASE data corrected
Oscillating microbalance	SK001A	Urban and Local Air Quality Monitoring Network	**1.30**	**NO**	**1.30**	**NO**
beta-absorption	SK001A	Urban and Local Air Quality Monitoring Network	**1.30**	**NO**	**1.30**	**NO**
Slovenia						
oscillating microbalance	SI002A	National Basic Monitoring Network	**1.30**	**YES**	**1.30**	**YES**
Spain						
beta-absorption	ES013A	Red de vigilancia y control de la contaminación atmosférica de la comunidad Valenciana	**NR**	**??**	**NR**	**??**
gravimetry	ES013A	Red de vigilancia y control de la contaminación atmosférica de la comunidad Valenciana	**NA**	**-**	**NA**	**-**
laser scattering spectrometry	ES013A	Red de vigilancia y control de la contaminación atmosférica de la comunidad Valenciana	**NR / 0.815**	**?? / NO**	**NR / 0.815**	**?? / YES**
oscillating microbalance	ES019A	Central térmica as Pontes	**1.17**	**NO**	**1.17**	**NO**
oscillating microbalance	ES022A	Central térmica Meirama	**1.17**	**NO**	**1.17**	**NO**
beta-absorption	ES023A	Red de inmisiones de atmosféricas de Huelva	**1.13**	**NO**	**0.90**	**NO**
beta-absorption	ES024A	Red de vigilancia y control de la calidad del aire de Andalucía	**1.13**	**NO**	**0.90 / 1.05**	**NO**
beta-absorption	ES025A	Red de control de la calidad del aire de la comunidad autónoma del País Vasco	**1.20**	**NO**	**1.20**	**NO (6)**
oscillating microbalance	ES026A	Red de vigilancia de la contaminación atmosférica del ayuntamiento de Madrid	**1.10**	**NO (6)**	**1.10**	**NO**
beta-absorption	ES032A	Red de inmisión de la central térmica Alcudia ii	**1.04**	**NO**	**1.04**	**NO**
oscillating microbalance	ES034a	Red de la control de Alumina-Aluminio		**ND**	**1.17**	**NO**
oscillating microbalance	ES035a	Red de la central térmica Teruel	**1.10**	**NO**	**1.10**	**NO**
oscillating microbalance	ES037A	Red de la central térmica de Anllares	**1.0**	**NA**	**1.0**	**NA**
beta-absorption	ES040A	Red de medida de la contaminación atmosférica de Castilla y León	**1.00**	**NAO**	**1.0**	**NA**
beta-absorption	ES042A	Red de vigilancia de Tenerife	**1.30**	**NO (6)**	**1.30**	**NO**
beta-absorption	ES044A	Xarxa de vigilància i previsió de la contaminació atmosfèrica de Catalunya	**NR**	**?? (6)**	**NR**	**??**
gravimetry)	ES044A	Xarxa de vigilància i previsió de la contaminació atmosfèrica de Catalunya	**NA**	**- (6)**	**NA**	**- (6)**
beta-absorption	ES045A	red de inmisiones de cádiz y palmones	**1.13**	**NO (6)**	**0.90 - 1.05**	**NO (6)**
beta-absorption	ES048A	red de la central térmica de los barrios	**1.13**	**NO**	**1.05**	**NO (6)**
beta-absorption	ES050A	red de la central térmica litoral de almería	**1.13**	**NO**	**0.90**	**NO**
oscillating microbalance	ES051A	Red automática de Cartagena	**1.04**	**NO**	**1.04**	**NO**
beta-absorption	ES052A	Red de vigilancia de Cadiz		**ND**	**1.05**	**NO**
laser scattering spectrometry	ES053A	Red regional de vigilancia de Murciaz	**1.0**	**NA**	**1.0**	**NA**
beta-absorption	ES055A	Red de vigilancia de las Palmas	**1.30**	**NO (6)**	**1.30**	**NO**
gravimetry	ES058A	Red emep/camp en españa	**NA**	**-**	**NA**	**-**
beta-absorption	ES061A	red de inmisiones atmosféricas de sevilla	**1.13**	**NO (6)**	**0.90**	**NO**
beta-absorption	ES065A	Red de control de la contaminación atmosférica del principado de Asturias	**1.20**	**NO (6)**	**1.20**	**NO (6)**
beta-absorption	ES072A	Red automática de vigilancia y control de la contaminacion atmosférica de la comunidad de Madrid	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	ES074A	Red de control de la contaminación del ayuntamiento de Valladolid	**1.20**	**YES**	**1.20**	**YES**
beta-absorption	ES079A	Red de calidad del aire de Cantabria	**1.00**	**NA**	**1.00**	**NA**
beta-absorption	ES081A	red de inmisiones atmosféricas de granada	**1.13**	**NO**	**0.90**	**NO**
beta-absorption	ES082A	Red automática de control de la contaminación atmosférica del ayuntamiento de Zaragoza	**1.04**	**NO**	**1.04**	**NO**
beta-absorption	ES083A	Red de inmisión de la central térmica de Mahón	**1.04**	**NO**	**1.04**	**NO**

Technique	Network code	Network name	2002 Factor	2002 AIRBASE data corrected	2003 Factor	2003 AIRBASE data corrected
oscillating microbalance	ES084A	Cementos Cosmos	**1.17**	**NO**	**1.17**	**NO**
beta-absorption	ES087A	Red de inmisión de la central térmica de Eivissa	**1.04**	**NO**	**1.04**	**NO**
beta-absorption	ES088A	red de inmisiones atmosféricas de córdoba	**1.13**	**NO (6)**	**0.90**	**NO (6)**
beta-absorption	ES089A	red de inmisiones atmosféricas de Jaen	**1.13**	**NO (6)**	**0.90**	**NO (6)**
beta-absorption	ES090A	red de inmisiones atmosféricas de Malaga	**1.13**	**NO**	**0.90**	**NO**
beta-absorption	ES095A	Red de govern Balear	**1.04**	**NO**	**1.04**	**NO**
beta-absorption	ES096A	Red regional de inmisión de contaminantes atmosféricos en Aragón	**1.04**	**NO**	**1.04**	**NO**
beta-absorption	ES099A	Red de control de la calidad del aire del gobierno de Navarra	**1.20**	**NO**	**1.20**	**NO**
beta-absorption	ES100A	Red de control de la contaminación atmosférica de Castilla - la Mancha	**1.10**	**NO (6)**	**1.10**	**NO (6)**
laser scattering spectrometry	ES102A	Red de vigilancia de la contaminación atmosférica de Extremadura	**1.28**	**NO**	**1.28**	**NO**
beta-absorption	ES103A	red de las centrales térmicas de ciclo combinado de castejón	**-**	**ND**	**1.04**	**NO**
beta-absorption	ES104A	Red de control de la calidad del aire de la Rioja	**1.04**	**NO**	**1.04**	**NO**
Sweden						
gravimetry	SE002A	Urban	**NA**	**-**	**NA**	**-**
oscillating microbalance	SE004A	SLB	**1.20**	**YES**	**1.20**	**YES**
oscillating microbalance	SE005A	Göteborg	**1.20**	**YES**	**1.20**	**YES**
oscillating microbalance	SE006A	Malmö	**1.10**	**YES**	**1.10**	**YES**
oscillating microbalance	SE009A	Umeå		**ND**	**1.30**	**YES**
Switzerland						
gravimetry	CH001A	Kanton Zürich	**NA**	**-**	**NA**	**-**
oscillating microbalance	CH001A	Kanton Zürich	**1.0**	**NA**	**1.0**	**NA**
gravimetry	CH002A	Beide Basel	**NA**	**-**	**NA**	**-**
oscillating microbalance	CH002A	Beide Basel		**ND**	**PER**	**YES**
gravimetry/beta-absorption (20)	CH003A	Nationales Beobachtungsnetz für Luftfremdstoffe	**VAR**	**YES**	**VAR**	**YES**
beta-absorption	CH004A	Stadt Zürich	**REG**	**YES**	**REG**	**YES**
oscillating microbalance	CH005A	Stadt Winterthur	**1.0**	**NA**	**1.0**	**NA**
oscillating microbalance	CH006A	Kanton Sankt Gallen	**1.0**	**NA**	**1.0**	**NA**
gravimetry	CH007A	Stadt Bern	**NA**	**-**	**NA**	**-**
oscillating microbalance	CH008A	Kanton Luzern	**PER**	**YES**	**PER**	**YES**
beta-absorption	CH009A	Kanton Bern	**1.35 (21)**	**YES**	**1.35 (21)**	**YES**
gravimetry	CH010A	Canton du Valais	**NA**	**-**	**NA**	**-**
United Kingdom						
beta-absorption	GB025A	UK automatic monitoring network	**1.0**	**YES**	**1.0**	**YES**
oscillating microbalance	GB025A	UK automatic monitoring network	**1.3**	**YES**	**1.3**	**YES**
gravimetry	GB025A	UK automatic monitoring network	**NA**	**-**	**NA**	**-**

NA Not applicable: in case of gravimetry, this means that no correction factors is needed; in case of Beta-absorption or Oscillating Microbalance it means that no correction of data in AIRBASE is needed as a correction factor of 1.00 is assumed
NC No correction factor (means *de facto* a correction factor of 1.00)
ND No data submitted to AIRBASE
NR No information received
NO No, data in AIRBASE have not been corrected with the correction factor shown in the previous column
YES Yes, data in AIRBASE have been corrected with the correction factor shown in the previous column
VAR site and time dependent correction according to Gehrig et al., 2005
PER correction factor depending on day of the year according to Heldstab and Stampfli, 2001
REG linear regression according to Umwelt- und Gesundheitsschutz Zürich (UGZ), Heldstab and Stampfli, 2001
- a dash (-) means that no correction is needed as the reference method (gravimetry) is used
?? not known whether data data in AIRBASE have been corrected or not

(1) Footnote deleted
(2) Footnote deleted

(3) According to the information submitted to AIRBASE, beta-absorption , according to the information in the questionnaire oscillating microbalance is used at one or more stations in this network
(4) According to the information submitted to AIRBASE, oscillating microbalance, according to the information in the questionnaire beta-absorption is used at one or more stations in this network
(5) Footnote deleted
(6) for one or more stations in this network there is a disagreement between annual mean concentrations given in the Q-FWD and AIRBASE. For the Italian stations, this might be caused by the fact that two different measuring methods (parallel measurements) have been used at the station. The results of one methods are used for reporting under the EoI, the result of the other method for reporting underthe FWD.
(7) at a few station a factor 1.18 has been used during a part of the year
(8) the following site specific correction factors have been used: 1.15; 1.19; 1.22; 1.24; 1.25; 1.28; 1.31; 1.33.
(9) Footnote deleted
(10) in AIRBASE and in the 2002-questionnaire different methods (gravimetry, beta absorption) are given
(11) the following site specific correction factors have been used: 1.05 ; 1.10 ; 1.15 ; 1.20 ; 1.25
(12) According to the information submitted to AIRBASE, nepholometry, according to the information in the questionnaire beta-absorption is used at one or more stations in this network
(13) according to AIRBASE, beta-absorption is used, no methods defined in the questionnaire
(14) According to the information submitted to AIRBASE, gravimetry , according to the information in the questionnaire oscillating microbalance is used in this network
(15) no information on measuring method available in AIRBASE
(16) According to the information submitted to AIRBASE, beta-absorption , according to the information in the questionnaire gravimetry is used at one or more stations in this network
(17) All networks in Portugal use a station type specific correction factor: traffic station: 1.18; background and industrial stations: 1.11
(18) Footnote deleted
(19) Although information on correction factors is largely not available, Italy has confirmed that data stored in AIRBASE is identical to the data stored in the national database (Anna Caricchia, personal communication, 22 October 2005).
(20) A combination of gravimetry with beta-absorption is used in this network.
(21) Seasonally depending factor: 1.35 in winter; 1.0 in summer

ANNEX C. ANNUAL PM_{10} CORRECTION FACTORS.

From the AIRBASE web site a spreadsheet is available containing information on PM10 correction factors for each year a monitoring station has provided information to AIRBASE.

In the spreadsheet the following information is given

- EoI station code,
- PM10 measurement method
- selected meta-information on the station (station name, coordinates, altitude, type of station, type of area, network code, network name, local station code, city)
- for each year in the period 1990-2003 for which the station provided PM10 data:
    - applied correction factor. The cells are labelled according to the following colour code:

no fill: • number • two/three numbers • PER • VAR • REG	 • correction factor has been applied to the data • throughout the year different correction factors are used • correction factor depending on day of the year according to Heldstab and Stampfli, 2001 • site and time dependent correction according to Gehrig et al., 2005 • linear regression according to Umwelt- und Gesundheitsschutz Zürich (UGZ), Heldstab and Stampfli, 2001
	The reported correction factor has NOT been applied to the data
	Correction factor has not been reported but the NRC confirms that the data in the national data base and AIRBASE are similar
	Correction factor has not been reported, no confirmation from NRC that data in the national database and AIRBASE are similar

    - data coverage (%)