

# Regulatory Aspects in Workplace & Indoor Air





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## Regulatory aspects in workplace and indoor air

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### Workplace and Indoor Air : scope, definitions

- » **Indoor environments** : ISO 16000-1 (2004) – 4 groups
  - » Dwellings with living rooms, bedrooms,...
  - » Workrooms or workplaces not subject to HS inspections (\*) e.g. offices, sales premises
  - » Public buildings : e.g.hospital, school, kindergartens, sports hall, libraries, restaurants, bars, theatres, cinema, other function rooms
  - » Cabins of vehicles
  - » Also EN 13528-4, WHO, VDI 4300-1 (+public transport)
- » **Workplace** : EN 689 (1995)
  - » "defined area or areas in which the work activities are carried out"
  - » can be indoors and outdoors ; = overlap with ambient air is identical to indoor air

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### Regulatory aspects in workplace air : history

- » **FOCUS** : European legislation – chemical agents – history to CAD
- » **80/1107/EC** protection of workers from risks related to chemical, physical, biological agents (control exposure, limiting use of..., engineering controls, personal protection, assess risks : properties, level, duration of exp)
- » **88/642/EC** amending 80/1107/EC : explicit reference to nature and degree of exposure – Limit values + requirement to establish sampling/analysis procedures – reference method or equivalent + [link to CEN – TC 137](#)
- » **89/391/EC** : encourage improvements in H&S at work – all kind of risks, duty of employers (art 16 = individual Directives for specific hazards – one of these is the CAD)
- » **98/24/EC** (CAD) on protection of H&S of workers from risks of chem agents at work ; scope is essentially 80/1107/EC, but only chemical agents

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### Regulatory aspects in workplace air : CAD and OELV

- » **98/24/EC** (CAD) on protection of H&S of workers from risks of chem agents at work
  - » art 1&2 : scope – all chem agents/all hazardous chem agents
  - » art 3 : development of OELV (Commission and national) and development of methods (CEN TC 137)
  - » art 4 : risk assessment ( level, type, duration : employer)
  - » art 5, 6, 7, 8 : prevention measures, accidents, workers info&training
  - » art 10, 11 : health surveillance, workers consultation&particip
- » **2000/39/EC** : first list of IOELV (63)
- » **2006/15/EC** : second list of IOELV (33)



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### Role of diffusive sampling : CEN TC 137 "Hazardous substances in the workplace"

- » Set up to make the technical input for the DIR
- » Approach : minimum performance criteria (instead of prescriptive specification) : any (national) method can be used if criteria are met = series of well established methods e.g. also NIOSH, OSHA
- » **EN 482** (2006) : general requirements for the performance of procedures for workplace measurements
  - » any type of device, general performance requirements
  - » "OU" replaced by expanded uncertainty requirements for measurements for comparison with LV and periodic measurements
  - » Max 50% : ST (0.5-2 LV), LT (0.1-0.5 LV) ; Max 30% : LT (0.5-2 LV)
  - » More detailed acceptance criteria for particular methods
- » **EN 838** (2008) : diffusive samplers for the determination of gases and vapours – requirements and test methods
  - » any design of diffusive sampler (tube, badge,...) ; about key performance parameters such as : UR, DE, effect T-RH, ..

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### Role of diffusive sampling : CEN TC 137 "Hazardous substances in the workplace"

- » **EN 689** (1995) : guidance for the assessment of exposure by inhalation to chemical agents for comparison with LV and measurement strategy
  - » determinants of exposure (who, where, how, amount, frequency, duration e.g. short term ...-8h/shift
- » **EN 14042** (2003) : guide for the application and use of procedures for the assessment of chemical and biological agents
  - » Procedures using diffusive sampling (table) :
  - » Screening measurements (exposure problem)
  - » Measurements for comparison with LV
  - » Periodic measurements (control measures effective)



ISO TC 146 (air quality), SC 2 (also workplace air quality)  
 ISO 16200-2 (2000) Workplace air quality - Sampling and analysis of VOC's by SD/GC Part T Diff Sampl Method ; extensive informative annex with UR for wide range of samplers  
 ISO 16107 (1999) Workplace Atmospheres - Protocol for evaluating the performance of diff sampl  
 The Diffusive Monitor : <http://www.hsl.gov.uk/publications/diffusive-monitor.html>

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# Regulatory Aspects in Workplace & Indoor Air

**Workplace air – regulatory context**  
**Role of diffusive sampling**


- » Practical advantages over other techniques
  - » Cost effective
  - » Simple to use
  - » More acceptable to the worker
- » Like any technique : some drawbacks
  - » Short term monitoring : mostly not suitable
  - » Sampling rate may vary with time, contaminant concentration, air velocity : carefully to be investigated.

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**Regulatory aspects in indoor air : where we are (EU level)**


- » European legislation – diffusive sampling
- » Integrated EU policy IAQ : no DIR ( e.g. as compared to WP or AAQ FD
- » CEC – EHAP 2004-2010 (June 2004)
  - » Action 12 on improving IAQ
  - » ETS : tackle exposure to ETS ; Green paper "Towards a Europe free from ETS : policy options at EU level
  - » To develop networks/guidelines on other factors affecting IAQ by : a) research and b) exchange of current national best practice
- » Parliament resolution
  - » Calls research into impact new CM (construction material) on health
  - » Commission+MS labelling CP (construction products) and CM
  - » Commission to classify ETS
  - » Wide ranging approach : green paper dealing with domestic pollution



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**Regulatory aspects in indoor air : where we are (EU level)**  
**cont'd (2)**


- » Dutch Presidency conference (2004 Egmond aan Zee)
  - » EU initiative IAP : building products/ventilation systems
  - » Smoking bans
  - » Development and harmonisation of testing and labeling CP (people be able to identify low emitting products
  - » Combustion products indoors
- » SCHER (mandate of May 2005) : scientific committee on H&ER
  - » To identify a RA strategy to support policy (vulnerable groups, comb exp)
  - » Adequacy of current info on exposure effect and exposure
  - » To identify potential area's of concern ( chemicals, household, building
  - » Opinion on HR of air fresheners
- » Expert working group (EU level - October 2006)
  - » Follow up of opinions of scher
  - » Fulfill a number of pol actions (concrete actions to be taken)



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**Regulatory aspects in indoor air : where we are (EU level)**  
**cont'd (3)**



- » EU Directives related to IAQ (sector oriented) : explicitly or indirectly
  - » Comm Recommendation 90/143/Euratom (1990) : indoor exp to radon
  - » Comm Recommendation 2001/928/Euratom (2001) : exp to Ra in drinking water supplies
  - » 2002/91/EC : energy performance of buildings ; ventilation standards for private and public spaces – overview AIVC techn note (TN 55 – 2001) www. aivc.org ;
  - » 1990/396/EC + 1992/42/EC : gas and heating appliances ; e.g. avoid dangerous accumulation of unburned gas (special device req)
  - » 89/106/EC : construction products directive – ER nr 3 hygiene, health and the environment (giving off of toxic gases ; presence of dangerous particles or gases in the air – emission standards for building products (e.g AgBB, AFFSET and other schemes see ECA report nr 24 "harmonisation of indoor material emission labeling systems in the EU EUR 21891 EN ..... cosmetics and biocide directive : content regulation



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**Regulatory aspects in indoor air : where we are (EU level)**  
**cont'd (4)**




- » EU Directives related to IAQ (sector oriented) : explicitly or indirectly
  - » 1967/548/EC : dangerous substances directive ; 2001/95/EC : general product safety directive ----- new 2008/1272/EC : classification, labeling and packaging regulation (substances 2010, mixtures 2015) – content of products
  - » 2005/32/EC : eco design directive - - eco labels restrict for example VOC's, formaldehyde,.. -in indoor paints and varnishes, bedding, clothes, indoor textiles,..

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**Monitoring IAQ and standardisation : role of diffusive sampling**  
**(1)**


- » Guidelines/Limit values
  - » ETS, formaldehyde, CO, particles (PM2.5 and PM10), NO2, benzene, naphthalene, moulds and mites, dampness/moisture, CO2 (measure for ventilation) and radon.
    - » INDEX, THADE, SCHER opinion, WHO indoor air working group – halogenated compounds, PAH esp BaP, allergens from house dust and pets),
    - » Consensus on a cross section
- » Selection of national IAQ guidelines in EU MS (cornerstone of policy)

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		Formaldehyde	CO	NO <sub>2</sub>	Naphthalene	Toluene	Styrene	NH <sub>3</sub>	Monoterpane (α-pinene)
		µg/m <sup>3</sup>	mg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Belgium (Flanders) <sup>1</sup>	GL	10	5.7	135		260			
	IV	100 (30-min)	30	200 (1-h)					
Finland <sup>1</sup>	S1	30	2					30	
	S2	50	3					30	
	S3	100	8					40	
Germany <sup>1,2</sup>	GVII		15 (8-h)	60 (1-w)	20	3000 (1-w)	300 (1-w)		2000 (1-w)
	GVII		60 (30-min)						
	GVI		1.5 (8-h)		2	300 (1-w)	30 (1-w)		200 (1-w)
	GVI		6 (30-min)						
Norway <sup>2</sup>		100 (30-min)	10 (8-h)	100 (1-h)					
			25 (1-h)						
Poland <sup>1</sup>	Cat B	100	6		150	250	30	300	
	Cat A	50	3		100	200	20	300	
UK <sup>1</sup>		100 (30-min)	100 (15-min)	300 (1-h)					
			60 (30-min)	40 (1-h)					
			30 (1-h)						
			10 (8-h)						

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### Monitoring IAQ and standardisation : role of diffusive sampling (3)


EU DIR do not mention explicitly an indoor monitoring or control programma ..yet

**Monitoring indoors** : national and project basis + EU projects

- » A lot of diffusive sampling
- » National : GerES (1985.), OQIA (2001), FLIES (2005), Green Ambulance
- » EU level : expolis, macbeth, people, airmex
- » EU initiative on the harmonisation of indoor monitoring methods & strategies (CEC-JRC) : ongoing


**Role of diffusive sampling : standardisation**

- » CEN TC 264 (air quality) WG 11( diffusive samplers for the determination of gases and vapours) -- -- AAQ : NO<sub>2</sub>/NH<sub>3</sub>
- » EN 14412 (2004) : IAQ – Diffusive samplers for the determination of gases and vapours – Guide for selection, use and maintenance ;
- » Factors affecting sampler performance, sampling strategy, types of samplers, UR and other characteristics
- » CEN TC 264 (air quality) WG 13(AAQ - benzene)

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### Monitoring IAQ and standardisation : role of diffusive sampling (4)


- » ISO TC 146 (air quality) SC 6 (indoor air)
  - » 26 standards in the ISO 16000 serie : specific IAQ and Diff sampl
  - » ISO 16000-4 (2004) : indoor air – determination of formaldehyde – diffusive sampling method ; DNPH method
  - » ISO 16017-2 (2003) : indoor, ambient and workplace air – sampling and analysis of VOC's by sorbent tube/TD/GC – part 2 diffusive sampling
  - » Often reference is made to diffusive samplers in the text : e.g.
  - » ISO 16000-1 (2004) : indoor air – general aspects of sampling strategy ; in art 5 sampling procedures "diff samplers,... may be used" – ref ISO 17025 (QA/QC)
  - » ISO 16000-5 (2007) : indoor air – sampling strategy for VOC's ; in art 5 measurement technique – ref is made to ISO 16017-2
  - » ISO 16000-15 (2008) : indoor air – sampling strategy for NO<sub>2</sub> ; art 5.3 long term measurements " sampling with diffusive samplers is preferable"

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### Conclusion

#### Role of diffusive sampling in workplace and indoor air monitoring Regulatory context

- » Diffusive sampling is everywhere, whenever methods exist, reference is made to it and they are widely used.
- » "Workplace directives" refer to monitoring and control tasks and mandates are given to CEN for drawing up methods - - Diffusive sampling takes an important position here.
- » Indoor air : no general reference (directive) at EU level to monitoring and control
- » But in standardisation of indoor air, sampling and analytical methods, again "Diffusive sampling is everywhere"
- » The future looks .....

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