

**BPIE Study Indoor Air Quality, Thermal
Comfort and Daylight**
**Analysis of residential building regulations in eight
EU member**

CAF Meeting 25.6.2015

Brigitta Colbert

BPIE Study



BPIE = Buildings Performance Institute Europe

www.bpie.eu

Published in March 2015

The BPIE gets on as an institution who care about an improved energy achievement and the CO₂ reduction by constructions in the living area.

BPIE Study

<http://www.bpie.eu/reports.html#.VYp1oPmsXh4>

Indoor air quality, thermal comfort and daylight - An analysis of residential building regulations in 8 Member States (2015)



This report provides an overview of the regulatory framework for IAQ, thermal comfort and daylight, and highlights the importance of having appropriate requirements for thermal comfort, ventilation and daylight conditions. It provides concluding recommendations for further policy development relevant for indoor climate. The assessment focuses on the respective building codes for new and existing residential buildings in selected MS: Belgium (Brussels Region), Denmark, France, Germany, Italy, Poland, Sweden and the UK (England and Wales).

**DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 19 May 2010
on the energy performance of buildings
(recast)**

The Energy Performance of Buildings Directive (EPBD, 2010/31/EU) clearly states that minimum energy performance requirements “shall take account of general indoor climate conditions, in order to avoid possible negative effects such as inadequate ventilation”

BPIE Study



Aim of the study:

This report about IAQ, thermal comfort and daylight requirements in selected MS addresses a range of topics increasingly important for European buildings and their inhabitants. The overall aim of the report is to provide an overview of the regulatory framework for IAQ, thermal comfort and daylight, and to highlight the importance of having appropriate requirements for thermal comfort, ventilation and daylight conditions.

BPIE Study

Countries which
incorporated in the study



BPIE Study

Country and Standard Reference	Whole Building Ventilation Rates	Living Room	Bedroom	Kitchen	Bathroom + WC	WC only
Brussels (NBN D 50-001)	3.6 m ³ /(h·m ²) floor surface area	Minimum 75 m ³ /h (limited to 150 m ³ /h)	Minimum 25m ³ /h (limited to 72m ³ /h)	Open kitchen Minimum 75 m ³ /h (exhaust)	Minimum 50 m ³ /hour (limited to 75 m ³ /h)	Minimum 25 m ³ /h
Denmark (BR10)	Min. 0.3 l/s·m ² (supply)	Min. 0.3 l/(s·m ²) (supply)		20 l/s (exhaust)	15 l/s (exhaust)	10 l/s (exhaust)
France (Arrêté 24.03.82)	10-135 m ³ /h (depending on room number and ventilation system)			Continuous: 20 – 45 m ³ /h		Minimum 15 m ³ /h
Germany (DIN 1946-6)	15-285 m ³ /h (details see chapter)			45m ³ /h (nominal exhaust flow)	45 m ³ /h (nominal exhaust flow)	25 m ³ /h (nominal exhaust flow)
Italy (Legislative Decree 192/2005, UNI EN 15251)	Naturally ventilated: 0.3 – 0.6 vol/h	0.011 m ³ /s per person for an occupancy level of 0.04 persons/m ²			4 vol/h	
Poland (Art 149 (1) – Journal of Laws 2002 No. 75, item. 690, as amended and PN-B-03430:1983/ Az3:2000)	20 m ³ /h for each permanent occupant should be calculated according to the Polish standard but not less than 20 m ³ /h	20 -30 m ³ /h for each permanent occupant (for public buildings) For flats, it is a summary of flow from all rooms		30 m ³ /h to 70 m ³ /h without windows	50 m ³ /h	30 m ³ /h
Sweden (BFS2014:13 – BBR21)	Supply: min 0.35 l/(s·m ²) floor area					
UK (Approved Document F)	13-29 l/s (depending on bedrooms)			13-60 l/s (extract)	8-15 l/s (extract)	6 l/s (extract)
EN 15251	0.35 – 0.49 l/(s·m ²)	0.6 – 1.4 l/(s·m ²)		14-28 l/s	10-20 l/s	7-14 l/s

■ Requirement
 ■ Recommendation
 ■ European standard

BPIE Study - IAQ



Brussels-Capital Region:

Limit values are fixed for nitrogen dioxide (NO₂); sulfur dioxide (SO₂), toluene, xylene and VOC's (100µg/m³/30 minutes)

Belgian VOC regulation for emissions from construction products

Denmark:

Material and construction products used in the building shall not negatively affect the indoor environment.

Danish Indoor Climate Labelling

- Formaldehyde > Products Class E1
- ban of asbestos
- regulation for nitrogen dioxide (NO₂); Radon



BPIE Studie - IAQ

France:

Ban of asbestos.

Regulation $< 1\mu\text{g}/\text{m}^3$ for trichlorethylene, benzene, phtalates, dibutylphtalates

Carbon dioxide < 1000 ppm

Material and construction products used in the building shall not negatively affect the indoor environment. "Décret n° 2011-321,, since 2011



BPIE Studie - IAQ



Germany:

There is no specific legislation regarding to IAQ.

For building products a „Bauaufsichtliche Zulassung“ is necessary.



Italy:

There is no specific legislation regarding to IAQ.

For new dwellings limit value of radon emission

BPIE Study - IAQ



Poland:

Regulation of the Minister of Health and Social Welfare 12 March 1996.

The substances not allowed in building materials are: acrylamide, acrylonitrile, asbestos, chloramine, carbon tetrachloride, cadmium (as an additive to pigments), lead (as an additive to pigment), ash and slag from coal firing. Additionally, chlorophenol, farbasol, ethylene glycol.

Substances with fix limit values are:

Table 9 - Maximum concentration of selected pollutants in the buildings based In Poland⁸³

	Buildings type A	Buildings type B
Benzene	10 µg/m ³	20 µg/m ³
Trichloroethylene	150 µg/m ³	200 µg/m ³
Toluene	200 µg/m ³	250 µg/m ³
Xylene	100 µg/m ³	150 µg/m ³
Ozone	100 µg/m ³	150 µg/m ³
Carbon monoxide	3000 µg/m ³	6000 µg/m ³
(30 min concentration)	(10000 µg/m³)	10000 µg/m³

BPIE Study - IAQ



Sweden:

Material and construction products used in the building shall not negatively affect the indoor environment.

Regulation regarding gamma radiation.

Buildings and their installations shall be designed so that micro-organisms cannot affect the indoor air.

Carbon dioxide < 1000 ppm

UK (England and Wales)

Limit values regarding to nitrogen dioxide, carbon dioxide

TVOC 300µg/m³/8 hours