

# Health and environment-friendly construction products

**Dr.-Ing. Doris Kirchner**

1. Introduction
2. Health aspects of construction products
3. Environmental aspects of construction products
4. Conclusion

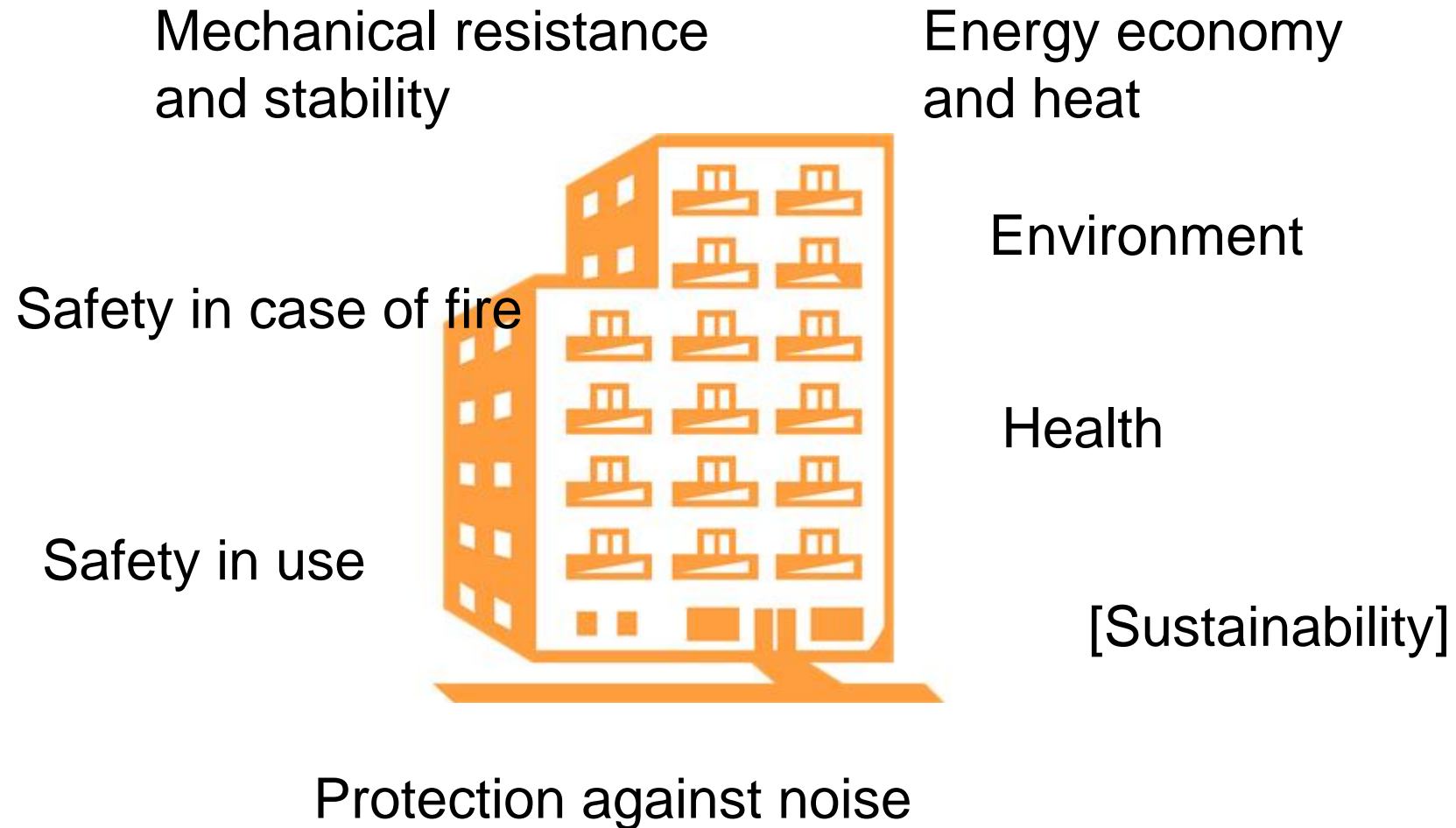
## 1. Introduction

# DIBt – Centre of competence for civil engineering in Germany and Europe

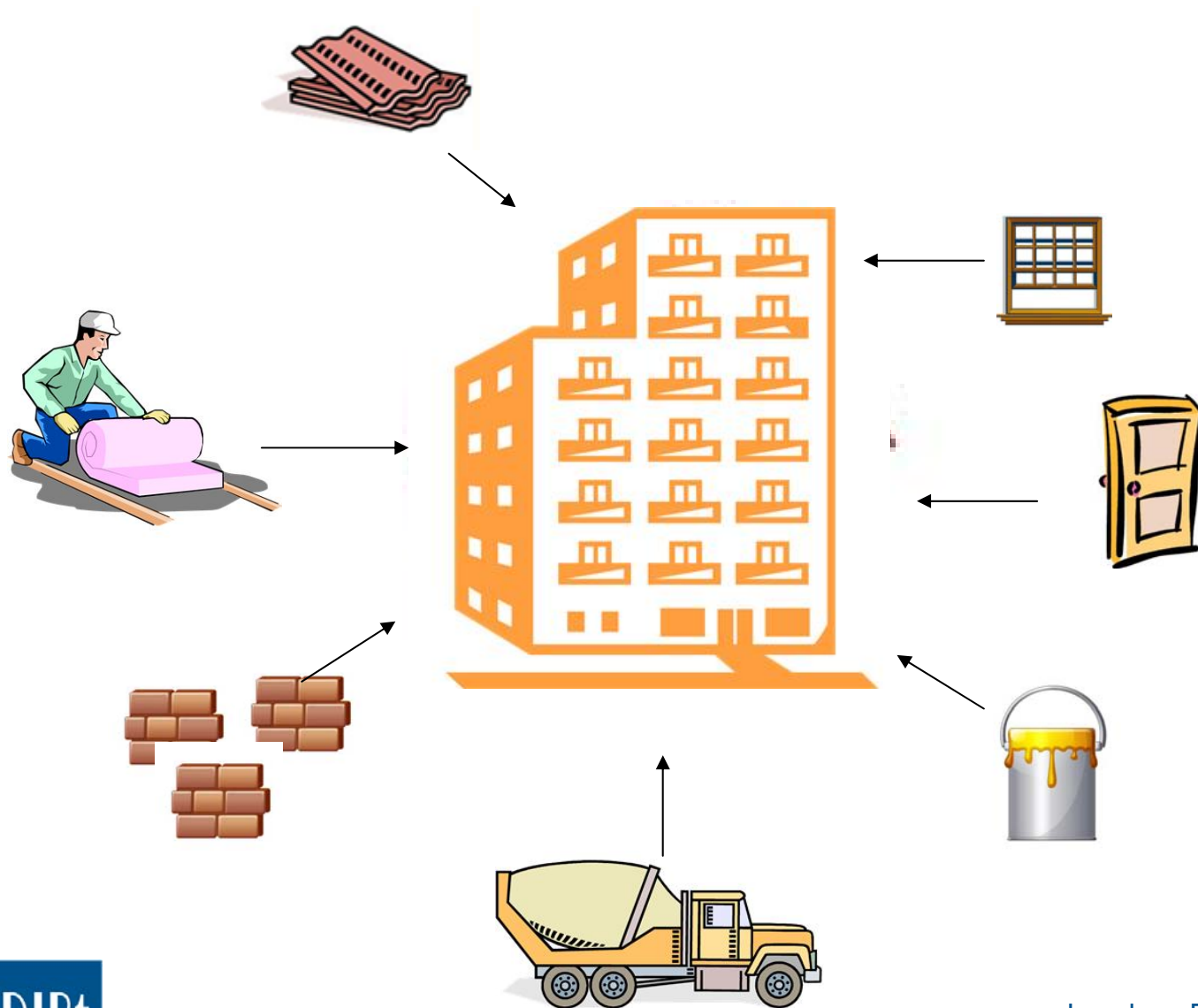
- Technical authority of the Federal Republic of Germany and its states
- Approval body for construction products
- 200 employees (of which 2/3 are engineers) and 600 external experts



# 1. Introduction



# 1. Introduction



1. Introduction
- 2. Health aspects of construction products**
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## 2. Health aspects of construction products



**Asbestos**

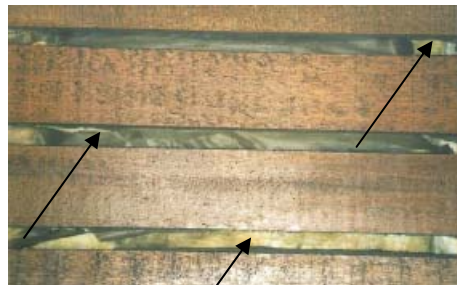
### Problems in former times



**PAK**



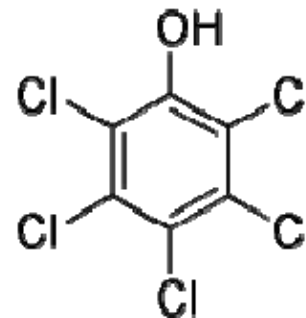
**Phenolic compounds**



**Mineral fibres**  
produced before 1995



**PCB**



**PCP**



**Formaldehyde**

## 2. Health aspects of construction products

- The substances have excellent characteristics and qualities for construction products (not flammable, electrical isolation, toxic for insects.....)
- But all these substances are hazardous to the health of the user of the building. Some of them are carcinogens, mutagens or toxic to reproduction.
- Expensive remediation of the buildings



## 2. Health aspects of construction products

- High requirements of work safety
- High costs with respect to the waste disposal
- The production and use of most of these substances are forbidden or restricted today



Source: GfÖB, Berlin

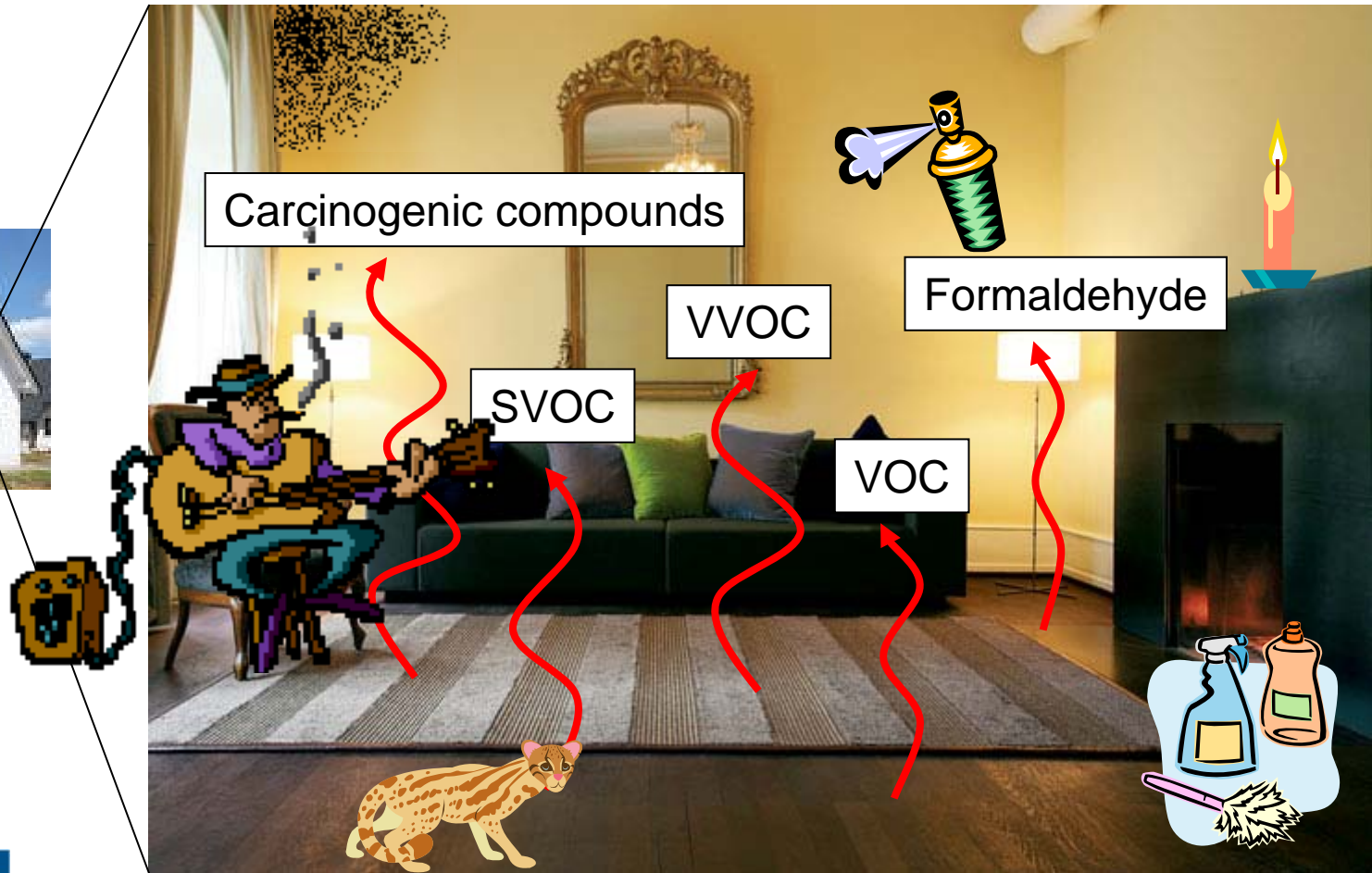
## 2. Health aspects of construction products

### Chemical law\*

- Ban of production and use for:
  - Clause 1: DDT
  - Clause 2: Asbestos
  - Clause 13: PCB
  - Clause 15: PCP
  
- Restrictions of use for:
  - Clause 3: Formaldehyde
  - Clause 17: Tar oils
  - Clause 23: Fibres .....



## 2. Health aspects of construction products



## 2. Health aspects of construction products

### Indoor air pollution leads to health consequences

- Asthma and allergies
- Respiratory disease
- Irritation
- Reproductive defects
- Neurological disease
- Cardiovascular disease
- .....

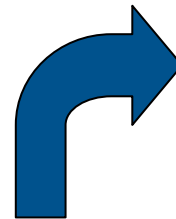
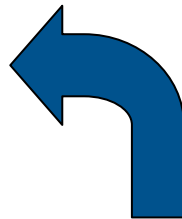


Photo: A healthier home – but how? Brochure of the “Umweltbundesamt”, Berlin 2005

## 2. Health aspects of construction products



Source: Frank Kuebart, eco, Köln



### Dimensions:

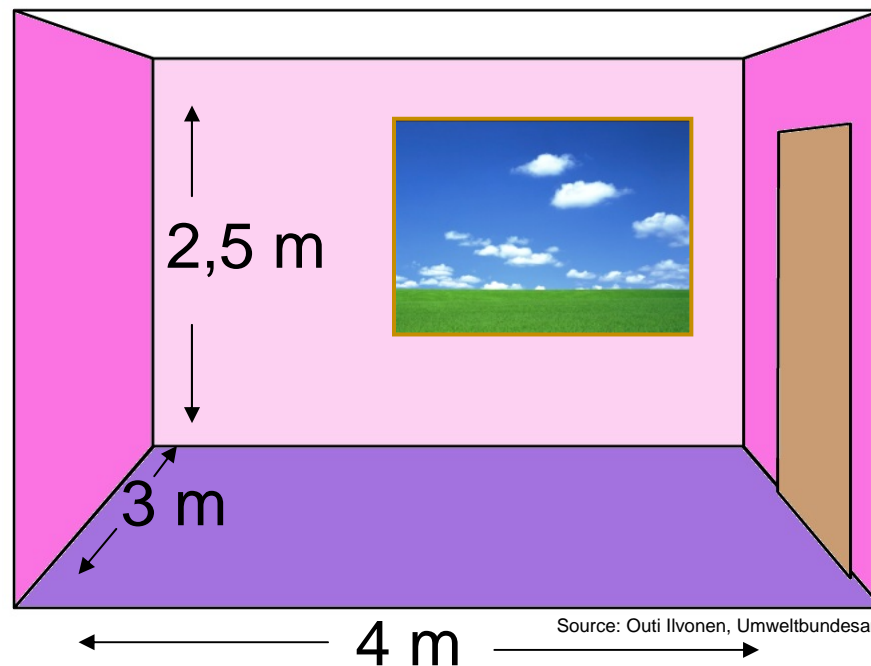
floor: 12 m<sup>2</sup>

ceiling: 12 m<sup>2</sup>

walls: 31,4 m<sup>2</sup>

1 door – 1,6 m<sup>2</sup>

1 window – 2 m<sup>2</sup>



### Volume:

30 m<sup>3</sup>

### Ventilation rate:

0,5 h<sup>-1</sup>

### Temperature:

23° C

### Humidity:

50%

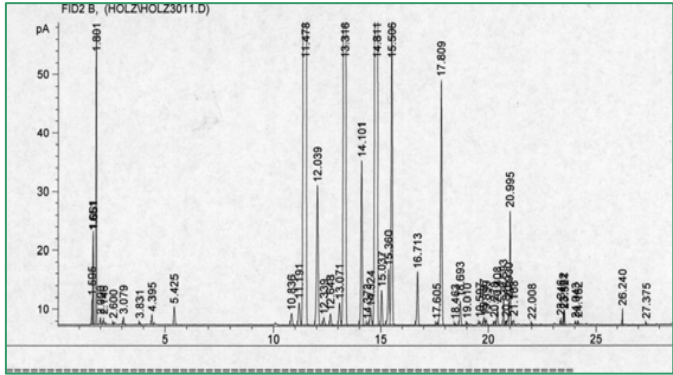
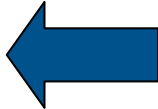


Carcinogenic compounds

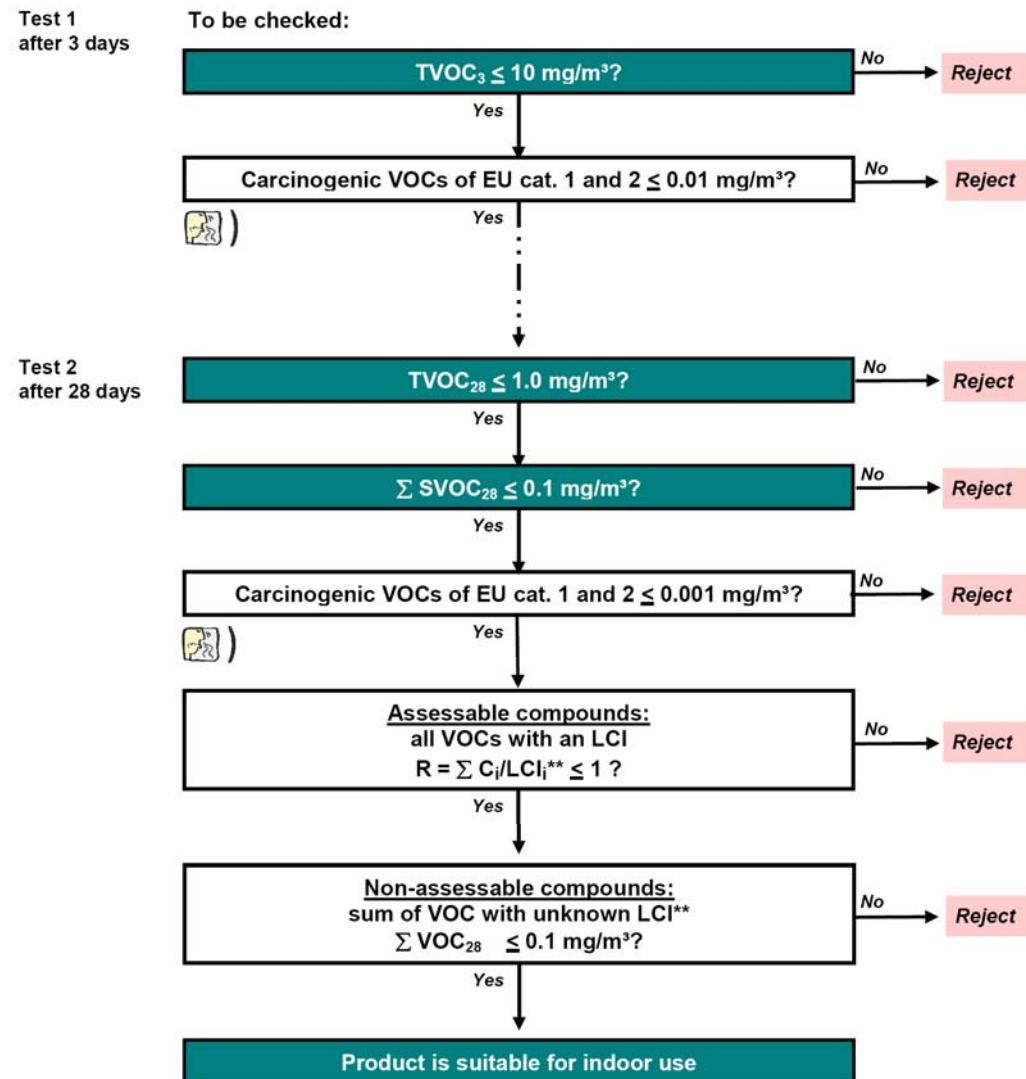
Formaldehyde VVOC SVOC  
VOC



Assessment



## 2. Health aspects of construction products



## 2. Health aspects of construction products

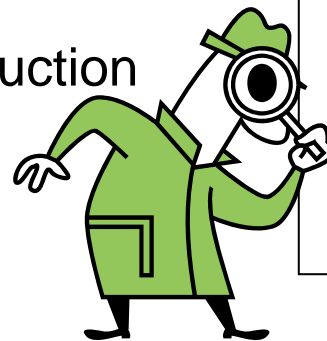
### **Principles of the health assessment of construction products used in interiors - issued by DIBt ([www.dibt.de](http://www.dibt.de))**

- Part 1: Assessment concept for special construction products: **General part**
- Part 2: Assessment concept for special construction products: **Floor coverings and adhesives**
- Part 3: Assessment concept for special construction products: **Coatings for Parquets and wooden floorings**
- Part 4: Assessment concept for special construction products: **Sport areas**  
(in preparation)



## 2. Health aspects of construction products

- If a construction product is tested and assessed according to the “Principles”, the manufacturer will receive the technical approval.
- Valid for 5 years
- Installation of a factory production control
- In some cases he has to commission a surveillance body.
- If the product and production site comply with the technical approval he has to mark his product with an Ü (=Übereinstimmung = compliance).
- From now on, the construction product can be applied in a building.



Deutsches Institut für Bautechnik **DIBt**

Zulassungsstelle für Bauprodukte und Bauarten  
Bautechnisches Prüfamt  
Eine vom Bund und den Ländern  
gemeinsam getragene Anstalt des öffentlichen Rechts  
Mitglied der EOTA, der UEAtc und der WFTAO

Datum: 11. Januar 2013 Geschäftszeichen: 42-1.156.807-999/12

**Allgemeine bauaufsichtliche Zulassung**

**Safe and fit for use**

Zulassungsgegenstand: Parkette und Holzdielen "Tolle Dielen"

Diese Zulassung ist die Verwendbarkeit der unter dem Zulassungsgegenstand bezeichneten Produkte in Übereinstimmung mit der harmonisierten Norm DIN EN 14342 für die Verwendung in Außenräumen unter Berücksichtigung des Einbausverhaltens.

Der oben genannte Zulassungsgegenstand wird hiermit allgemein zugelassen.  
Diese allgemeine bauaufsichtliche Zulassung umfasst sechs Seiten und vier Seiten.

Deutsches Institut für Bautechnik

**DIBt**

DIBt | Kolonnenstraße 30 B | D-10829 Berlin | Tel.: +49 30 78730-0 | Fax: +49 30 78730-320 | E-Mail: dibt@dibt.de | www.dibt.de

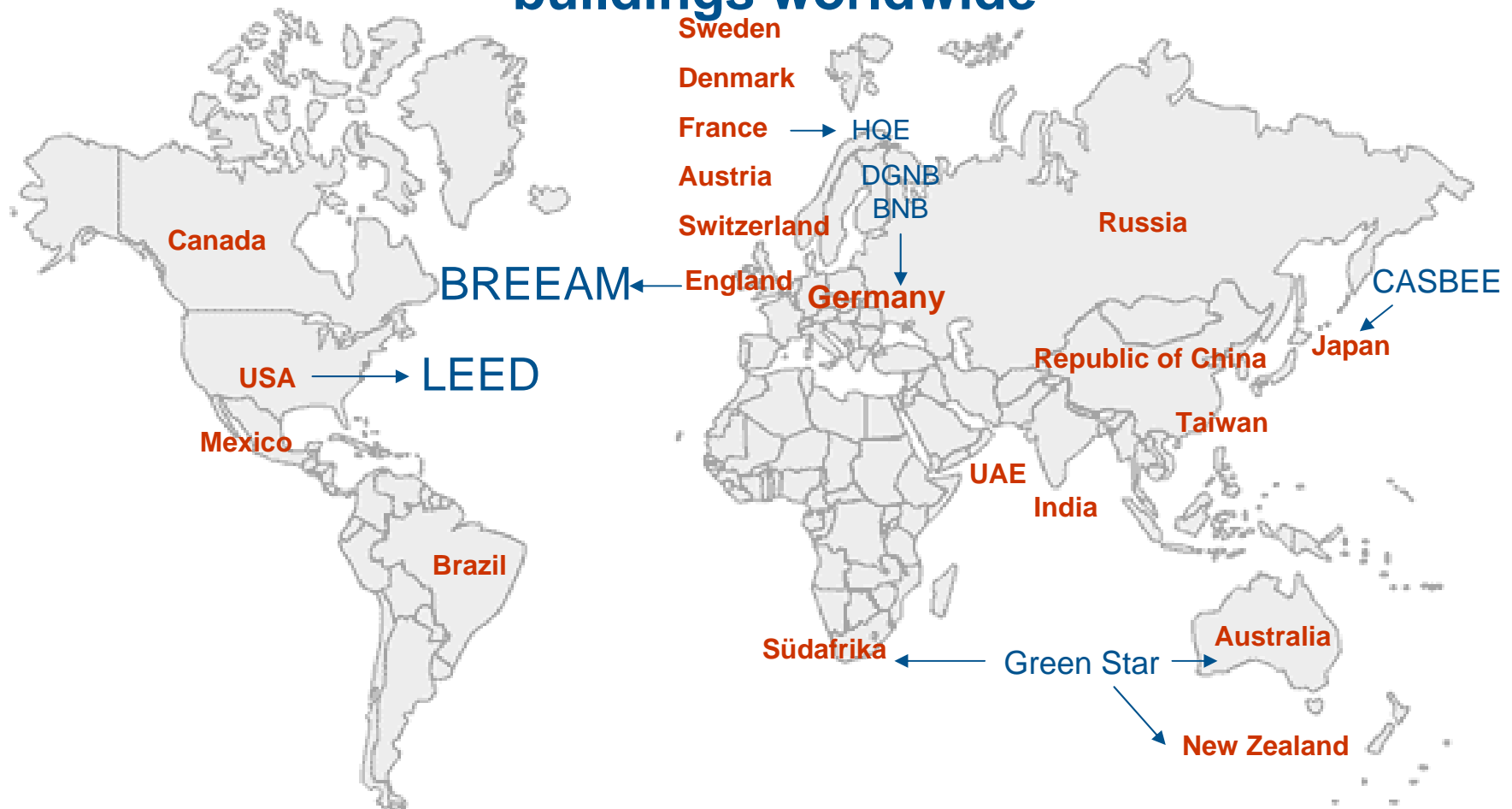
## 2. Health aspects of construction products

### Different approaches regarding VOC emissions in Europe

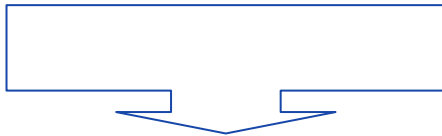
DIBt – Principles of health assessment of construction products in indoor environments	The manufacturer has to apply for a <b>technical approval</b> . If the product fulfil all criteria, the manufacturer will receive the approval.  The products has to be marked with an “Ü”.
French Regulation on VOC emission from construction products	The law has to be noticed. The products have to be marked with a special label.
Belgian Regulation on VOC emission from construction products	Not in force yet.

## 2. Health aspects of construction products

### Assessment and certification systems for sustainable buildings worldwide



## 2. Health aspects of construction products



Nachhaltiges  
Bauen

only for governmental buildings

[www.nachhaltigesbauen.de](http://www.nachhaltigesbauen.de)

Deutsches  
Institut  
für  
Bautechnik

DIBt

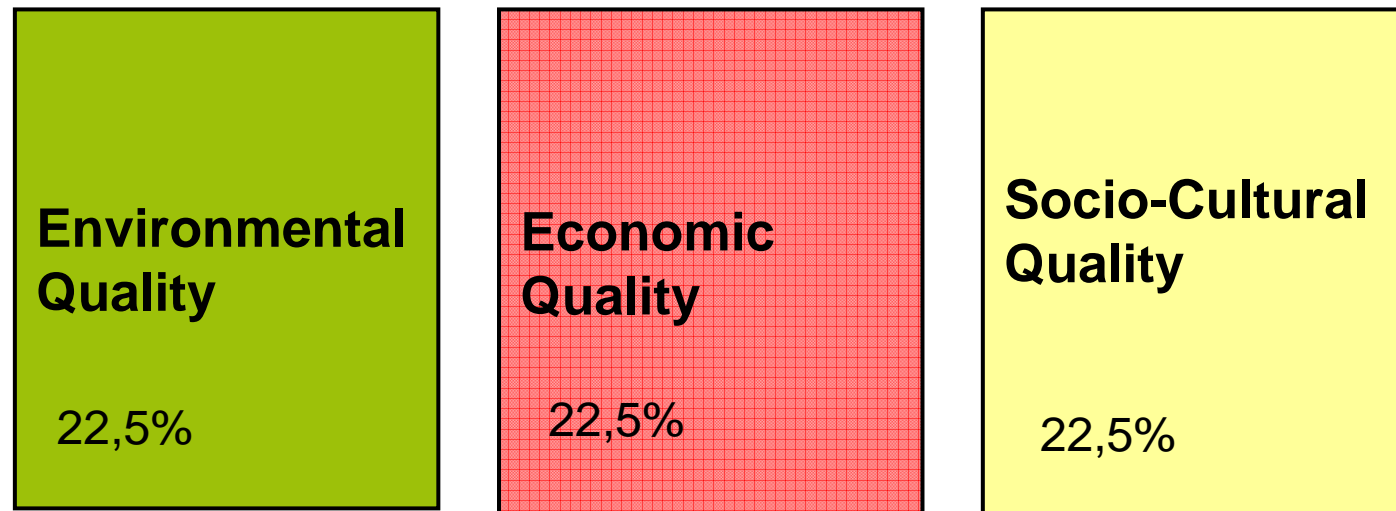


for all buildings

[www.dgnb.de](http://www.dgnb.de)

## 2. Health aspects of construction products

### Principles of the certification system:



**Technical quality** 22,5%

**Process quality** 10,0%

**Location**

## 2. Health aspects of construction products

### Criteria documents:

- Environmental Quality: 11
- Economic Quality: 2
- Social Quality: 15
- Technical Quality: 6
- Process Quality: 5
- Location: 6
- In total: **46\***

Good indoor  
air quality!

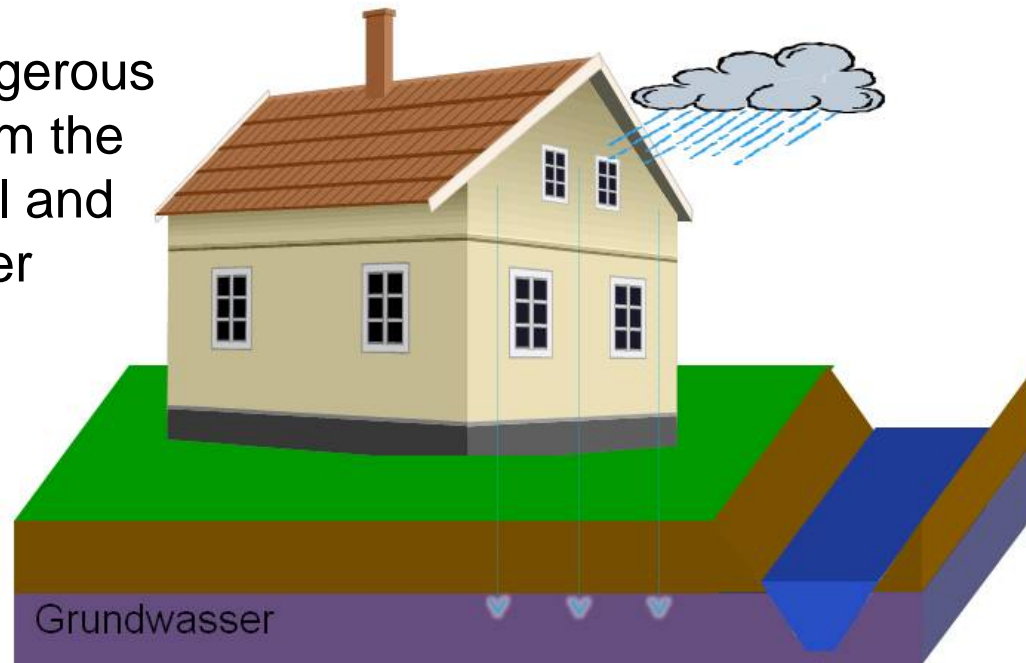
Emission tests of  
the construction  
products, e.g. acc.  
to the „Principles“  
of DIBt



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### 3. Environmental aspects of construction products

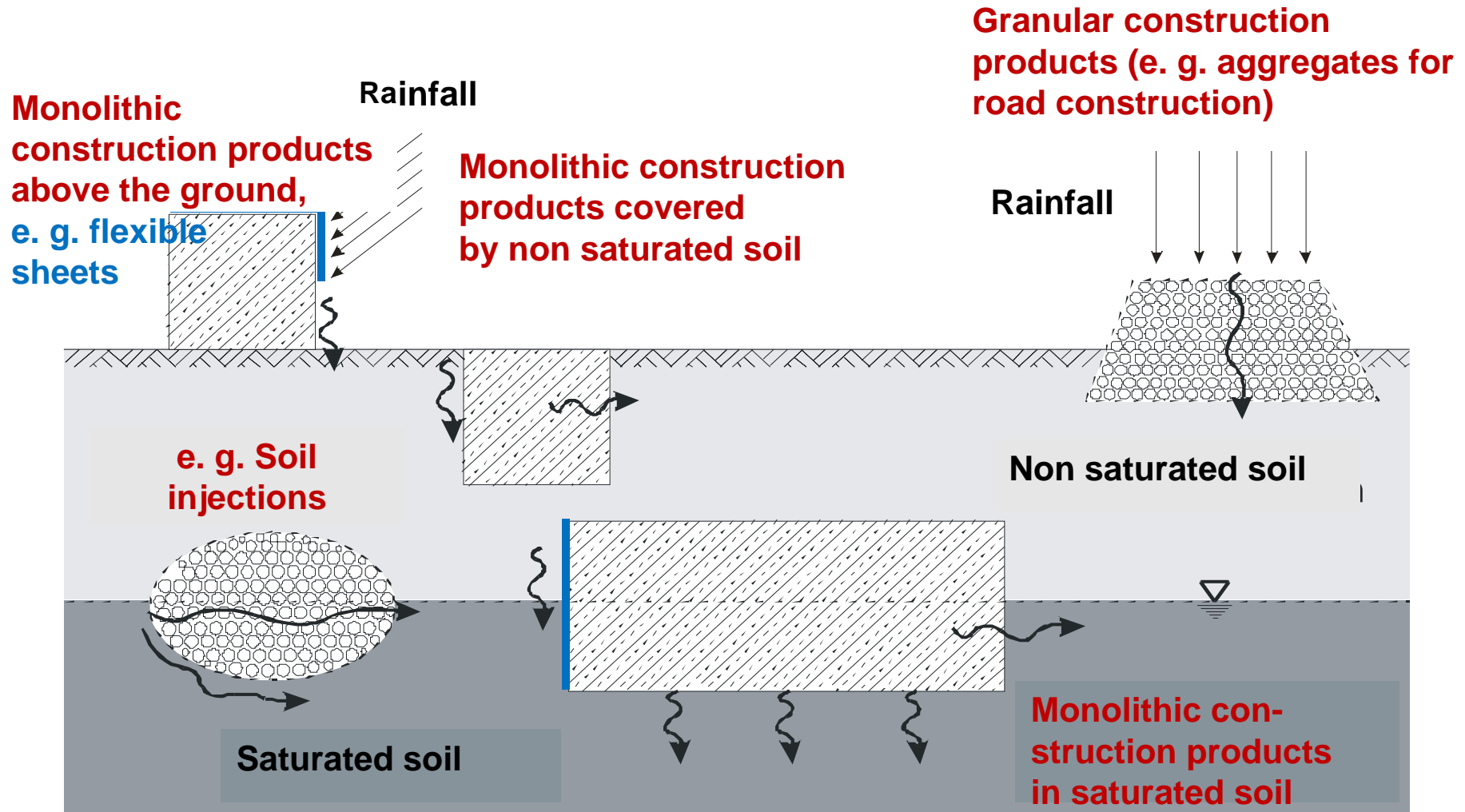
Rainfall  
↓  
Leaching of dangerous substances from the facade into soil and groundwater



Source: Outi Ilvonen, Umweltbundesamt



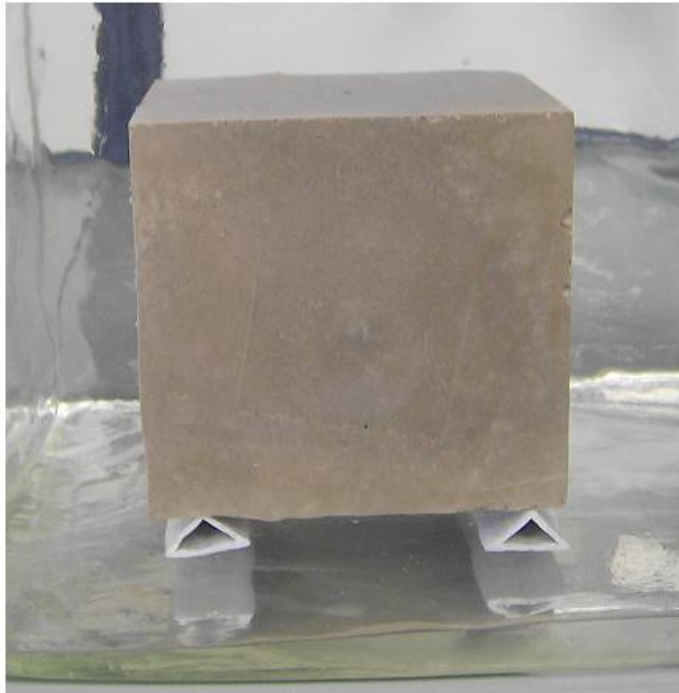
### 3. Environment aspects of construction products



Source: Udo Wiens, DAfStB, Berlin

### 3. Environment aspects of construction products

#### Tank test



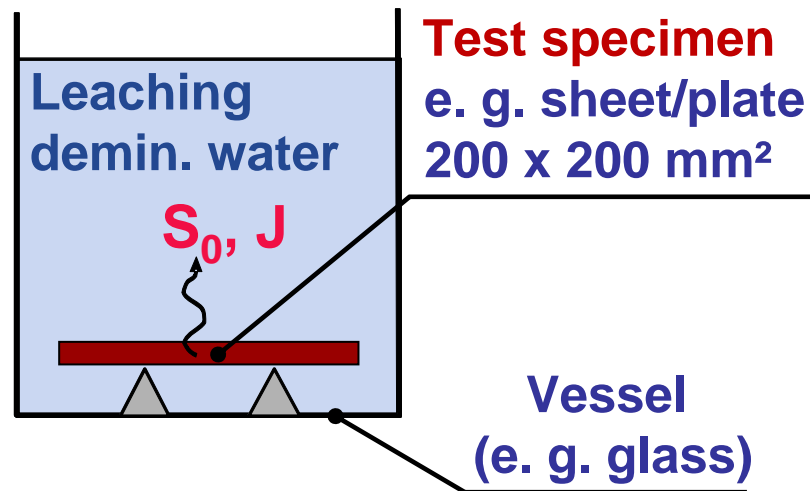
#### Column test



Source: Udo Wiens, DAfStB, Berlin

### 3. Environment aspects of construction products

#### Monolithic construction products



Source: Udo Wiens, DAfStB, Berlin

#### Test principle (standard conditions)

- Tank leaching test
- Sample collection and preparation
- Size: > 40 mm, > 100 cm<sup>2</sup> (plates, sheets)
- Water volume / test specimen surface = 80 l/m<sup>2</sup> (20 l/m<sup>2</sup>: sheets/plates)
- Water renewal scheme: 6 hrs, 1d, 2.25d, 9d, 16d, 28d, 36d, 64d
- Temperature: 22 ± 3 °C
- Analysis of eluates (Sulphate, chloride, fluoride, bromide, Ca, Mg, Si, Na, K, Al, P, Fe, Mn, As, Ba, Cd, Co, Cr, Cu, Mo, Ni, Pb, Sb, Se, Sn, Sr, V, Zn,..)

### 3. Environment aspects of construction products

- Two types of test methods
- The circulated water or eluated water has to be examined on a huge amount of organic and inorganic substances.
- Pass and fail criteria
- Stated in the „Principles for assessing the effects of construction products on soil and groundwater“ of DIBt

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## 4. Conclusion

- VOC test of construction products are vital.
- A good air quality is guaranteed.
- VOC emission tests are legally required for a lot of construction products in Germany.
- Same situation in France and in future in Belgium
- The VOC emission tests can be used for the assessment scheme for sustainable buildings
- A similar procedure exists for construction products which form the outer shell and which are in contact with soil and groundwater.

Thank you very much  
for your attention!



Dr.-Ing. Doris Kirchner

**DIBt Deutsches Institut für Bautechnik**

Kolonnenstraße 30 B

D-10829 Berlin

Tel.: +49 30 78730-339

Fax: +49 30 78730-11339

E-Mail: [dki@dibt.de](mailto:dki@dibt.de)

**[www.dibt.de](http://www.dibt.de)**