

### 12.4.5 Mercury in compact fluorescent lamps (energy-saving light bulbs) and fluorescent tubes

Compact fluorescent lamps (energy-saving lamps) and fluorescent tubes contain small amounts of mercury, which is required for the illumination process in these lighting products. Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment [15] restricts the quantity of mercury that can be used in lamps in the European Union and requires manufacturers to reduce the levels further. Since January 2012, manufacturers have had to mark the mercury content on the packaging of the lamps.

No mercury is emitted from lamps when they are used as intended. However, when energy-saving lamps or fluorescent tubes are replaced or otherwise handled (when being collected for recycling, for example), there is a risk that they might be damaged. If they break, mercury vapours can be released [16].

Measurements conducted by the UBA on new energy-saving lamps on the market have shown that there are no significant concentrations of mercury following lamp breakages when the broken lamp is disposed of completely and the room immediately aired [17]. It can therefore be assumed that mercury does not pose any health risks.

To minimise the risk of mercury exposure, any new lamps purchased should contain as little mercury as possible. Faulty lamps should not be replaced while still hot because hot lamps give off more mercury vapours when broken than cold ones do. Spent lamps must be disposed of at appropriate collection centres (e.g. recycling centres or retailers), not along with household waste, and breakage should be kept to a minimum.

### 12.4.6 Dust

Up to 50% of the dust that occurs indoors originates in the outdoor air. Other sources of dust in the rooms used include dust attached to room users' shoes and clothes, sedimented particles being raised or disturbed mechanically (e.g. when vacuum cleaners are used or paper is handled) and work equipment. The concentration and composition of indoor dust varies significantly depending on how the room in question is used [18]. For instance, large deposits of dust in rooms that are otherwise cleaned normally or situations in which large quantities of paper are handled, e.g. archives and during copy processes are an indication that the dust levels in the ambient air will be high.

Bar a few exceptions, dusts do not have harmful or unwanted effects provided the concentration in the indoor air is roughly equivalent to that in the outdoor air. It should, however, be borne in mind that semi-volatile organic compounds (SVOCs), biocides, polycyclic aromatic hydrocarbons, and plasticisers, among other things, may accumulate on the dust particles thereby potentially causing unwanted, irritating or harmful effects [19].

The potential health hazards posed by exposure to dust are assessed on the basis of dust fractions, which depend on the particle size. The fractions commonly used in the field of occupational safety and health are "respirable dust" and "alveolar

dust". These are not identical to the fractions commonly used in the area of environmental protection, PM<sub>10</sub> (particulate matter) and PM<sub>2.5</sub>, which provide a first approximation of the total of all airborne dust particles with a diameter of up to 10 and up to 2.5 µm respectively [20].

The recommended practice for assessing dust exposure in indoor workplaces is to use the PM<sub>2.5</sub> and PM<sub>10</sub> fractions defined for environmental protection purposes since the indoor concentration levels are mainly influenced by the outdoor air, for which assessment values are available. The Committee on Indoor Guide Values suggests that, where there are no combustion processes (e.g. tobacco smoke), the 25 µg/m<sup>3</sup> daily value defined by the WHO be used as the assessment value for the PM<sub>2.5</sub> fraction [18].

The working group does not propose an assessment value for the PM<sub>10</sub> fraction, however, citing the fact that the concentration levels for this fraction are considerably higher indoors than they are outdoors. This means that the main sources of this particle fraction are to be found outdoors. A conclusive assessment is not possible because there are no further details available on the composition of this fraction [18].

In general, it should be ensured that the PM<sub>10</sub> fraction concentration does not exceed the EU dust limit for tropospheric air of 50 µg/m<sup>3</sup> [6].

The Committee on Indoor Guide Values recommends that rooms be sufficiently ventilated in order to reduce indoor dust exposure. In addition, every effort should be made to find and minimise known sources of particulate matter [18].

#### *Fibrous dust*

The effects of fibrous dust are such that it requires a separate assessment. The main indoor sources are textile fibres, e.g. interior textiles or clothing, and natural and man-made mineral fibres, e.g. in thermal insulating materials. Asbestos fibres are no longer of relevance indoors, provided the Asbestos Directive's [21] requirements concerning assessment of the urgency of clean-up measures are complied with as well as the criteria set out in TRGS 519 "Hazardous Substances" [22] regarding the protection of employees and third parties in connection with clean-up measures.

Fibrous dust is considered harmful to health if it can be inhaled and is "bio-persistent". According to a WHO definition, fibres can be inhaled if they have a length of > 5 µm, a diameter of < 3 µm and a length-to-diameter ratio of > 3 : 1 (these are known as "WHO fibres"). The level of bio-persistence depends on the fibre material. Since 1998, man-made mineral fibres (MMMFs), as used in mineral-wool insulating materials, have only been allowed to be sold if their bio-solubility half-life (breakdown by endogenous substances) is less than 40 days.

Mineral-wool insulating materials can cause fibrous dust exposure if they come into direct contact with the ambient air (as in open applications such as sound-absorbing panels in louvre systems) and, in particular, if they are subjected to vibrations or