

Setting indoor air guidelines in Austria

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ABSTRACT

Public health services are increasingly confronted with inquiries from the public concerning indoor air pollution. But so far no standardized procedures have been applied by authorities and experts in this field. The Austrian Ministry of the Environment (now: Federal Ministry of Agriculture, Forestry, Environment and Water Management) established a Working Group in order to create indoor air quality guidelines.

The task of the multidisciplinary Working Group, composed of health professionals, toxicologists, chemists, technicians and lawyers, is to define harmonized procedures for the assessment and evaluation of indoor air quality. Based on toxicological considerations (No-Adverse-Effect-Level, safety factors) indoor air guideline values for selected air pollutants are derived. The recommendations, published by the ministry as a loose-leaf edition, are considered as an informative reference book for experts in Austria.

In 2003 the first sections, 'Indoor Air Evaluation—General Part', 'Volatile Organic Compounds (VOC)—General Part' and 'Volatile Organic Compounds (VOC)—Tetrachlorethene (TCE)' were published.

INDEX TERMS

Indoor air; Air pollution; Guideline; Working Group

INTRODUCTION

In the Federal Ministry of Agriculture, Forestry, Environment and Water Management, in 1999, an interdisciplinary Work Group was established with the objective to create guidelines for the evaluation of indoor air quality in collaboration with the Academy of Sciences.

In Austria, outdoor air pollutants are legally regulated to protect human health. In this respect the general public is guaranteed the greatest possible extent of safety regarding both low-level long-term exposure and short time peak episodes ('in case of emergency'). However, humans spend more than 80% of their time indoors, which—with the exception of industrial workplaces—in general, is not regulated concerning air pollutants at all.

Now for the first time a *standardized assessment and evaluation of the most relevant indoors air pollutants* will be obtained with the help of guideline values in Austria. The most relevant objective is to develop a generally applicable and harmonic procedure. This is supposed to aid experts who are familiar with the evaluation of a specific situation and furthermore to guarantee the reliability for often far-reaching decisions.

The guideline serves as a basis for conducting measurements and the evaluation of air pollutants indoors. It leaves enough leeway for the expert to conduct the appropriate measurements in individual cases based on his/her experience and expertise. This implies a general procedure in accordance with these guidelines. Derivations are to be presented in a comprehensible way and additionally they shall be accounted for. In a given case the evaluation of the mostly complex emission situation or respectively of possible effects on

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health caused by air pollution cannot be solely based upon comparisons with guideline values. Moreover, the medical expert has to evaluate the specific effects on health by taking into account the affected person's susceptibility and previous diseases as well as all concomitants.

Commencing with the evaluation, proceeding to planning and conducting of measurements and the evaluation of the emission the procedure can be perfectly included into the pattern that has been well established in Austria for outdoor air for years. Thus, a *medically founded derivation of guideline values* is performed for selected air pollutants. It is therefore based on threshold-levels of subtle health effects or—in the case of carcinogenic substances—on the 'acceptable risk' concept.

The present guideline is designed for different measurement objectives; however, it is focusing on those cases that are encountered most often in everyday work, that is, the clarification of possible causes of 'unspecific ailments'.

STRUCTURE OF THE GUIDELINE

The guideline is composed of several parts. The basis is formed by a *general part*, including an introduction, an overview of legal aspects, relevant specifications concerning the derivation of guideline values, as well as a description of basic measurement and evaluation procedures.

The *specific parts* that are gradually elaborated will provide a detailed description of the individual compounds. They include chapters on the chemical properties, the occurrence and sources, as well as the health relevant effects. Whenever it is possible and reasonable, guideline values are obtained. These parts are supplemented with detailed practical hints for obtaining measurements, the measuring strategy and the subsequent analysis. However, the guideline does not include remedial actions, even though indications can be found in individual cases.

WHY IS THE REGULATION OF INDOOR AIR OF SUCH IMPORTANCE?

In our culture people preferably stay indoors to a large extent. Particularly for toddlers, sick or otherwise more sensitive persons, the quality of the indoor air is relevant due to their prolonged stay in certain indoor environments.

For pollutants that are not emitted indoors, indoor levels are similar to those outdoors. However, in case of indoor sources of pollutants, their concentration can exceed the outdoor levels by far. Building materials and furniture are important indoor sources, as well as certain human activities (e.g. smoking cigarettes, cleaning or burning processes).

Indoor exposures until recently were not considered systematically in Austria. Only selected issues like passive smoking, radon, air-conditioning and gas stoves as well as the wide field of industrial workplaces were regulated or at least investigated. However, the whole problem of indoor pollution only became relevant within the past years. This was partly due to the fact that studies proved that the negative effects caused by air pollutants in non-commercially used interiors can indeed be relevant.

In addition to toxicological factors, perceived indoor air quality is essential for quality of life. That is the reason why in the case of indoor air pollution, harmful or inconveniencing influences on well-being also has to be considered (e.g. unpleasant smells). Furthermore, the function of the living environment as a place for recreation e.g. from stress encountered at the workplace, shall be taken into consideration.

In addition, it shall be noted that diseases, ailments and symptoms caused by indoor air pollutants generally cannot be classified to a certain type of air pollution. Thus, a certain pathology encountered with the habitants is usually not indicative for a special pollutant, not

even a pollutant group. Many symptoms are also unspecific inasmuch as they are not only caused by indoor pollution, but by a multitude of other factors as well.

BASIC PRINCIPLES FOR THE CONCEPTION OF A GUIDELINE

Experiences of other countries with the regulation of non-commercially utilized interiors served on one hand, as the point of origin for the creation of the guideline (e.g. the work conducted by the German ad hoc Indoor Air Working Group, 1996), on the other hand comprehensive Austrian experiences with the elaboration of air quality criteria and normative and legal regulations for outdoor air as well.

The principle of determination of guideline values are according to WHO Air Quality Guidelines. However, the latter do not distinguish between outdoor and indoor air. The Austrian (IG-L, BGBl. 115/97) and European legislation (1996/62/EG, 1999/30/EC) concerning ambient air quality are also based on WHO recommendations.

For the determination of threshold values concerning carcinogenic pollutants, the European Commission reckons an additional risk of 1:1 000 000 to be 'acceptable'.

In the 'general section' about the Austrian guideline the determination of guideline values shall be presented in detail.

SPECIFICATIONS FOR MEASURING INDOOR AIR QUALITY

The present guideline serves three measuring objectives:

1. Determination concerning suspected pollution (complaints on part of the habitants of the interiors).
2. Determination of exposure to concrete components.
3. Evaluation of the compliance with stipulated guideline values.

The guideline includes a detailed description of the preliminary investigation, the measuring strategy, as well as the analysis and the documentation of the data.

The term 'measurement' refers to sampling on the spot, and the analysis, which is performed usually in the laboratory. An interpretation of the measured values based on a guideline value is only reasonable when considering all conditions at the same time. Thus, in order to guarantee a maximum level of reliability the procedures for sampling and analysing has also to be described.

In 2003, the first sections, 'Indoor Air Evaluation—General Part', 'Volatile Organic Compounds (VOC)—General Part' and 'Volatile Organic Compounds (VOC)—Tetrachlorethene (TCE)' were published (Arbeitskreis Innenraumluft 2003, www.lebensministerium.at/publikationen). The guideline values for styrene and toluene will be published soon.

ACKNOWLEDGEMENTS

This work was supported by the Federal Ministry of Agriculture, Forestry, Environment and Water Management.

REFERENCES

- Ambient air quality law BGBl. 115/1997. 115. Bundesgesetz zum Schutz vor Immissionen durch Luftschadstoffe, (Immissionsschutzgesetz - Luft).
- Ad-hoc-Arbeitsgruppe aus Mitgliedern der Innenraumluftthygiene-Kommission (IRK) des Umweltbundesamtes und des Ausschusses für Umwelthygiene der AGLMB (1996) Richtwerte für die Innenraumluft: Basisschema. Bundesgesundhbl **39**, 491–495.

Arbeitskreis Innenraumluft: Richtlinie zur Bewertung der Innenraumluft , eds:
Österreichische Akademie der Wissenschaften—Kommission für Reinhaltung der Luft im
Auftrag des BMLFUW, 2003.
Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide,
nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air.
Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and
management.