

Guidelines for indoor air in Norway – A practical approach

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Introduction

The Norwegian Department of Health and Welfare gave the National Institute of Public Health (NIPH) the task to revise the existing guidelines for indoor air quality. The revised guidelines were recently published by NIPH as "Recommended Guidelines for Indoor Air Quality" [1, 2]. Whereas the former guideline report contained traditional health risk assessment for a number of well-known indoor air pollutants, the revised guideline document also includes a more practical approach on how to handle problems related to the indoor environment. In accordance with current experience, the new guidelines also express a change in focus regarding the significance of different indoor air pollutants, exemplified by more weight on problems related to moisture and microbiological contamination.

Some Legal Aspects

The three most important regulatory bodies regarding responsibility for the indoor air quality in Norway are the health authorities, the labour inspection and the building authorities. The task of these authorities is anchored in the municipal health law, the labour environment law and the building laws, respectively. The intention of the indoor air guidelines is to be an important tool for the municipal health authorities in their indoor air related work, including the fulfilment of the municipal health law. This law has recommendations related to indoor air quality in different types of buildings, including kindergartens and schools. Based on these recommendations together with the revised indoor air guidelines and conclusions primarily from inspections, the municipal

health authorities can require improvements or even close a building if the conditions are considered to represent a risk to health.

Practical Field Work - a Preventive Approach

A common problem when elucidating various perceptions, comfort and health problems with a possible relation to indoor air, is that the symptoms often are diffuse and with a widespread occurrence in the population. It is rare to find a clear causal relationship between reported complaints and exposures in the indoor environment, even if measurements of indoor air pollutants are undertaken. However, although our knowledge often is incomplete, it is important to underline the impact of good indoor air quality in a health- and comfort-related perspective. With our current knowledge, most of today's indoor air problems can be solved. Although much remains unknown regarding causal relationships, mechanisms and effects of the indoor environment, there is broad agreement on some basic principles for preventive and health-improving measures. These measures are mostly based upon avoiding established risk situations.

The Initial Investigations

A stepwise procedure is recommended to elucidate the cause of indoor air quality-related problems. The first measure is to investigate if the symptoms and their variations support a building-related cause and to explicate the extent of the problem. If possible, other medical causes should be excluded. Proper maintenance and administration of the building is an important preventive measure against indoor air problems. Poor indoor air quality often seems to be related to defective or inadequate ventilation- and/or heating systems. Thus, inspect the building with special emphasis on the ventilation system without disregarding other possible problems. Other important and common checkpoints are

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smoking, moisture problems/microbiological growth, temperature, carpets, special sources of pollution, poor cleaning procedures and dust, unfavourable materials and products used indoors, as well as noise and illumination. One should also check that, pets are not brought into buildings where allergic children are likely to be present. In this early phase, it is relevant to carry out simple measurements of thermal parameters and CO₂. This will cover most of the requirements for first line survey of indoor air problems and if properly performed, will give a good indication about the indoor air quality. One should inform the inhabitants about the findings and any measures taken to improve the indoor air quality. If the problems are not solved by these measures, more extensive ones could be undertaken. Only at this point, as a background for choosing measures, will it be relevant to perform a more thorough analytical survey of possible indoor air pollutants. These types of measurements require more extensive procedures including laboratory analysis. However, as measurements of single indoor air pollutants only rarely can be directly related to indoor air-related complaints, such measurements should be restricted to defined problems where the results will influence the choice of actions. It is important to note that several risk factors such as smoking, unpleasant smell, mould and dust are easier to identify upon inspection, than by measurements.

Health-based Guidelines for Selected Indoor Air Parameters

For a number of relevant indoor air parameters including noise, recommended guidelines are given either as concentrations that should not be exceeded or the guideline is stated as the specific pollutant or specific risk situations should not occur. For each parameter risk situations and preventive measures are given. Here we briefly refer to some of the parameters and their guidelines.

Tobacco Smoke

Overall guideline: Based on well known serious health risks and irritation at very low exposure levels, smoking in indoor environments should not occur.

Practical guideline: The Norwegian government has through regulations determined which public areas should be smoke free and where smoking is permitted. In this context, *two practical guidelines* have been established. These are as follows:

1. Valid for indoor areas that are supposed to be smoke free: Nicotine should not be present in indoor air at concentrations exceeding 1.0 µg/m³.
2. Valid for non-smoking areas in restaurants where smoking is allowed in designated areas: Nicotine should not be present in indoor air at concentrations exceeding 10 µg/m³.

Dampness and Microbiological Contamination

Proposed guideline for dampness: Excessive or prolonged dampness should not occur.

Proposed guideline for mould: Visible mould damage or odour of mould should not occur.

Proposed guideline for bacteria: No fixed guideline can be set for bacteria in common indoor environments.

Proposed guideline for house dust mites: 1 µg Der I allergen/g dust.

Radon

Proposed guidelines: At radon concentrations between 200 and 400 Bq/m³ simple measures should be undertaken. At concentrations above 400 Bq/m³, measures should be undertaken even if expensive. Radon concentrations in future buildings should not exceed 200 Bq/m³.

Volatile Organic Compounds

Proposed guideline: Unnecessary exposure should be avoided. Occurrence of especially irritating or reactive compounds must be evaluated separately.

Asbestos

Proposed guideline: Free asbestos fibres should not occur in indoor environments.

Practical guideline: Free asbestos fibres should not be found in indoor air at concentrations above 0.001 fibres/ml air.

Man Made Mineral Fibres (MMMMF)

Proposed guideline: Free MMMF should not be found in indoor air at concentrations above 0.01 fibres/ml air.

Suspended Particles (PM_{2.5})

Proposed guideline: 20 µg/m³ (24 hrs).

References

1. Becher R, Hongslo JK, Bakke JV, Kvendbø JF, Sanner T, Schwarze PE, Dybing E. Recommended Norms for Indoor Climate. Report from the National Institute of Public Health, Oslo, Norway (in Norwegian) November 1998, ISBN 82-7364133.
2. Becher R, Hongslo JK, Bakke JV, Kvendbø JF, Sanner T, Schwarze PE, Dybing E (1999). Revised Guidelines for Indoor Air Quality in Norway. Proceedings from Indoor Air 99; 2: 171-6.