

# Focus on IFA's work

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## Sound exposure of music teachers

### Problem

Music is not generally perceived as noise, even though the sound pressure level generated may be high. Professional musicians and music teachers are often exposed to noise in this form for several hours each day. The levels encountered vary according to the instrument being played. Of the musical instruments which require no electrical amplification, wind and percussion instruments in particular generate high sound pressure levels.

In music schools, the teachers, who may be employees or self-employed, often teach small groups or individuals for several hours each day. They also work in orchestras or bands. The rooms in which lessons are held are frequently not specially fitted out for music teaching; the acoustic properties and insulation to adjacent rooms may therefore be less than ideal.

### Activities

The exposure of music teachers in a music school to sound was measured in response to an initiative by the VBG, the German Social Accident Insurance Institution for the administrative sector. The exposure was measured for 20 teachers giving lessons in rooms with fittings of diverse quality. For the greater part, the pupils are children and teenagers, at both beginner and advanced level.



Music: also a form of noise

Lessons take place during the afternoon, each lesson lasting from thirty to forty-five minutes. Orchestra and band practice sessions are generally of longer duration (two hours). Personal measurements were conducted by means of noise dosimeters. The microphone was fitted to the teacher's shoulder close to the ear. Averaged noise exposure levels were recorded by the dosimeters at one-minute intervals. The measurements were observed and the course of the lesson logged, together with any unusual events.

In order to describe the acoustic properties of the rooms, the reverberation time was measured and compared with the desired values recommended for music in the DIN 18041 standard.

## Results and Application

Differences between noise exposure levels are attributable to the timetable, the instruments played (piano, string instruments, woodwind and brass instruments), and the form and duration of the lesson (individual or group tuition, music practice).

Noise exposure levels of between 73 and 80 dB(A) were measured for piano and string instruments, 85 dB(A) for a string orchestra practice. Values of 85 to 86 dB(A) were measured for the woodwind instruments, the highest value, that of 92 dB(A), being measured for saxophone lessons. Averaged values of 88 to 94 dB(A) were measured during lessons on brass instruments. During band practice sessions, teachers had to endure exposure levels of 91 to 96 dB(A).

In the last of these cases, teachers should not teach under the least favourable circumstances for longer than three hours per week without hearing protection if they are to avoid the risk of occupational hearing impairment. In view of the need for regular practice, this time constraint cannot be observed.

Measures must therefore be found to induce music teachers to wear hearing protection. A number of manufacturers now offer special hearing protectors for musicians: ear plugs or custom moulded ear plugs with a very shallow sound level attenuation characteristic, which make the smallest possible change to the subjective sound. The use of hearing protectors necessitates habit and practice, however.

## Area of Application

Music schools and conservatories

## Additional Information

- DIN 18041: Acoustical quality in small to medium-sized rooms (05.04). Beuth, Berlin 2004

## Expert Assistance

IFA, Division 4: Ergonomics – Physical environmental factors

## Literature Requests

IFA, Central Division