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MEASUREMENT OF THE IMPACT SOUND INSULATION IMPROVEMENT

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INTRODUCTION

Impact sound insulation measurements are usually carried out by means of a standardized tapping machine. This machine is the same in e.g the standards ISO 140-1978, ANSI/ASTM E 492-77 and DIN 52210. In a joint Scandinavian project the problems of this measurement method has been studied. The aim is to supplement ISO 140 with further details in order to improve the reproduceability of the test method.

SOME RESULTS

Effects of adhesive mounting

Comparative tests have been made with loosely and adherently mounted samples of different floor covering. In Fig.3 one example with a felt-backed PVC covering is presented. The result indicates better improvement values when using adhesives.

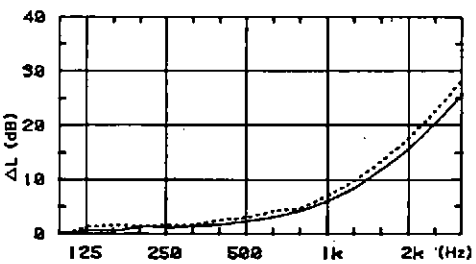

Fig.1.

The improvement of impact sound insulation ΔL of a felt-backed floor covering.

—— loosely mounted

···· adherently mounted

Effects of load on a floating floor

As to loads on a floating floor ISO 140/VIII recommends 100 kg/m^2. This is probably too much to be typical. In Fig.2 the effect of a 20 kg/m^2 load on a light weight floating floor is shown. The result indicates that the impact insulation becomes lower with load.

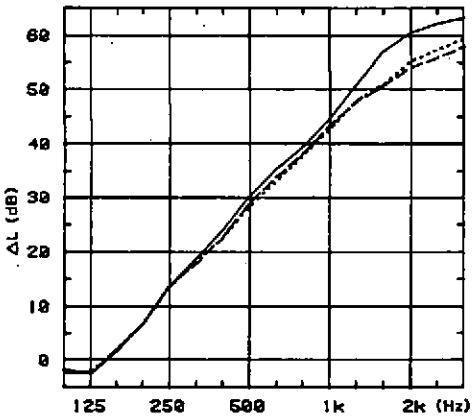

Fig.2.

The improvement ΔL of impact sound insulation of a floating floor consisting of 6.4 mm fibre board +20 mineral wool with a density of 250 kg/m^3.

—— without load

···· with 20 kg/m^2 load

---- with 20 kg/m^2 load, another measurement

The effects of different production runs

By chance our laboratory received two sets of test objects of one and the same product, from one and the same source but from different production runs. These two sets were received within a short time period and the respective measurements were carried out in identical ways. The results which are presented in Fig.3 indicate large differences at high frequencies.

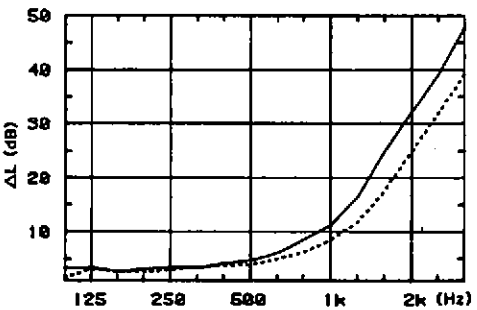

Fig.3.

The improvement ΔL of the impact sound insulation of two different production runs of the same adherently mounted foam-backed covering.

—— Run no 1

···· Run no 2

The effects of different tapping machines

According to ISO 140 the supports of tapping machine shall be at least 100 mm from the hammer line. In Fig.4 it is shown that the difference between two tapping machines where one does not fulfil this criterion can be considerable at the critical low frequencies.

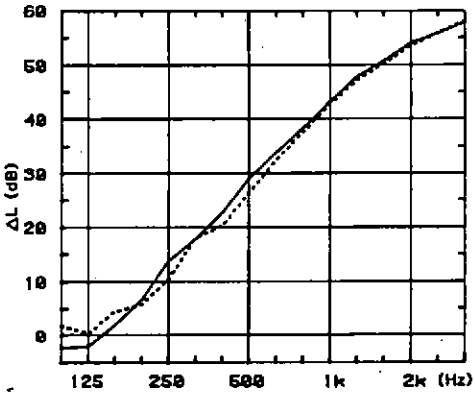

Fig.4.

Different tapping machines on a 6.4 mm fibre board + 20 mineral wool (250 kg/m^3) on a 177 mm concrete slab and with 20 kg/m^2 distributed load.

—— Feet according to ISO

···· Feet not according to ISO

Effects of measurement period and temperature

The impact sound pressure level often depends on the time t, where t denotes the start of the tapping machine as illustrated in Fig.5.

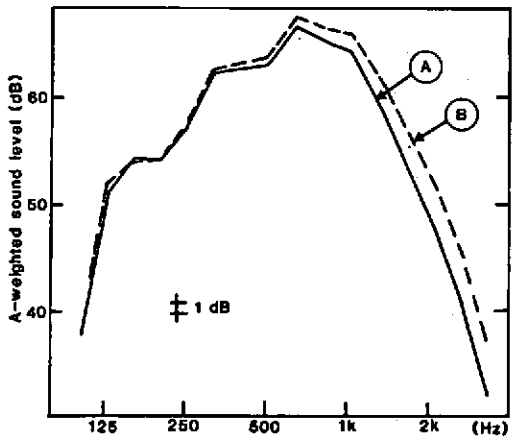

Fig.5.

The impact sound pressure level dependency on the choice of measurement period for a felt-backed PVC covering.

—— t = 0 - 64 s

---- t = 600 - 664 s

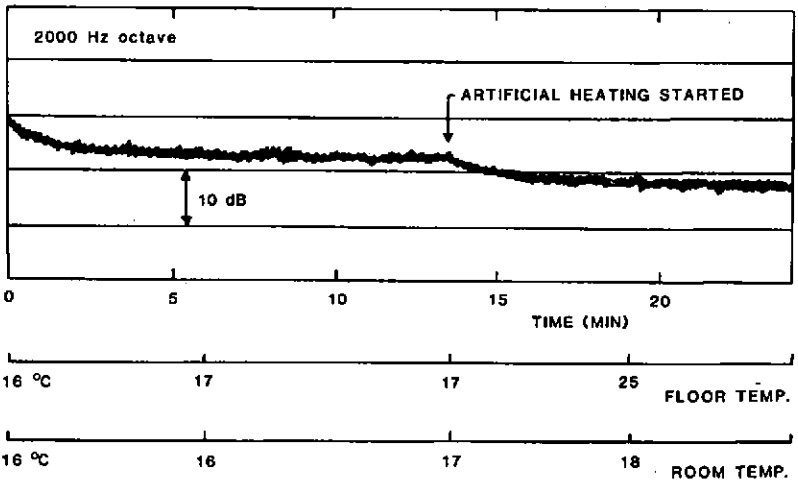

Fig.6. The impact sound pressure level dependency on time and temperature for a flexible foam-backed PVC flooring. The figure presents a level recording for the 2000 Hz octave band after the tapping machine has been started in a fixed position. After about 13 minutes artificial heating of the floor covering was applied.

Contrary to what is shown in Fig.5 for a felt-backed covering the sound pressure level may also decrease with t. This is illustrated in Fig.6 which also shows the effect of temperature.

SOME CONCLUSIONS

The longer a tapping machine is allowed to tap on a felt-backed covering the smaller improvement values will be obtained. For foam backed PVC coverings the opposite is the case. Thus it is necessary to specify the measurement time very accurately. Using adhesives will as a rule improve the impact sound insulation slightly at the high frequencies. Different tapping machines may yield different results. Especially the feet of the machine are very critical.

REFERENCE

Kaj Bodlund 1983
Laboratory measurement of the improvement of impact sound insulation by floor coverings on a standard floor.
Report SP-RAPP 1983:1 from the Swedish National Testing Institute.