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The Acoustic Classification System in Iceland. 20 Years' Experience.

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ABSTRACT

The history of an Acoustic Classification System in Iceland begins in 1998, when the draft Nordic Standard INSTA 122:1997 "Sound Classification of Dwellings" was introduced to the building industry and to building authorities by the Icelandic Building Research Institute. The draft standard became an Icelandic Standard in 2003: IST 45:2003 Sound Classification of Dwellings, and Class C in the standard became "recommendations" in the building code already in 1998. The standard was extended to include all types of buildings in 2011 and it was revised in 2016. In 2012 the acoustic regulations for buildings were changed in the Building Code, so that Class C in the standard IST 45 defines the minimum demands for acoustic quality. What is then the result of these changes in acoustic regulations the last 20 years? Firstly, the minimum demands have been made a little bit stricter, and the authorities now demand acoustic design reports for all medium sized or large building projects. This has resulted in better acoustics quality in new buildings than before. However, the acoustic classification system with the two better classes B and A, has only been used to a small extent. This is a disappointment.

Keywords: Acoustics, Classification, Building Code,
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1. INTRODUCTION

The history of an Acoustic Classification System in Iceland begins in 1998, when the draft Nordic Standard INSTA 122:1997 "Sound Classification of Dwellings" was introduced to the building industry and to building authorities by the Icelandic Building Research Institute.

The draft standard became an Icelandic Standard in 2003: IST 45:2003 Sound Classification of Dwellings, and Class C in the standard became "recommendations" in the building code already in 1998. The standard was extended to include all types of buildings in 2011 and it was revised in 2016. In 2012 the acoustic regulations for buildings were changed in the Building Code, so that Class C in the standard IST 45 now defines the minimum demands for acoustic quality.

Regarding the classification system, the standard introduced from the beginning two higher classes A and B, which defined demands for better and for much better acoustic quality than the minimum demands in Class C.

Class C is mandatory, but the higher classes are made available for the free market to use and to justify more expensive buildings with a better acoustic quality.

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2. THE EXPERIENCE

2.1 Increasing the demands in the building code

This first step in a two-step process to increase acoustic quality in different buildings has been successful. The building industry has developed the traditional building methods, so that the increased demands in the building code are fulfilled.

For sound insulation in dwellings as an example, the demands for airborne sound insulation were increased from $R'_w \geq 52$ dB to $R'_w \geq 55$ dB, and the demands for impact sound pressure level were increased from $L'_{n,w} \leq 58$ dB to $L'_{n,w} \leq 53$ dB.

Other acoustic parameters were justified in a similar way with an increase in demands usually 0-3 dB.

2.2 Increasing the demands by referring to the higher classes B (and A)

When the classification system was first introduced, it was in 2003 and for dwellings only. Several building contractors were willing to try out new building methods to fulfil the demands for Class B. The main challenge was to fulfil the demands for impact sound pressure level.

The traditional Icelandic dwellings have heavy concrete floors and heavy concrete walls between dwellings. The building contractors did not want to introduce lightweight floating floors. Instead they insisted on using heavy floating floors on top of a soft insulating layer. Imbedded in this heavy floating floor is often a "floor-heating" system.

The resulting sound insulation measurements have in many cases shown that acoustic Class B is fulfilled, but very often just fulfilled with a small margin, leading to many complaints from the people living in these houses. They complain about disturbing low frequency thumps. In other cases, acoustic Class B is not fulfilled, mainly because the floating floor slab is too thin, and/or the insulating layer is too thin/stiff.

2.3 Declaring the higher classes B (and A)

This uncertainty in fulfilling class B, even with the extra building cost of a heavy floating floor, has led to a reluctance from the building companies to declare increased acoustic quality in their new dwellings according to acoustic Class B.

Indeed, they declare increased acoustic quality and thus justifying higher prices, but they are afraid to claim Class B. The reason is that they have been facing law suits from the buyers, who assumed they were buying dwellings with the same acoustic privacy as between detached houses.

2.4 Using the classification system

So, the experience is that classification system is not referred to as much as the intention was when the system was introduced, and people in general don't really know that such a system exists, when they are buying a new dwelling. The building companies often use Class B parallel to Class C in the design stage, but they are afraid to declare that the house is designed according to Class B. Class A is almost never used or referred to.

This is the situation for the market in the private sector.

2.5 The classification system for official buildings

The situation is a bit different regarding official buildings, such as schools, kindergartens and official buildings in the health sector.

The communes are responsible for the primary schools and the kindergartens and they are sometimes willing to declare that a new building is designed according to Class B instead of the minimum demands in Class C. The same goes for some governmental

buildings. One example is a newly built patient-hotel, which is a part of the new University hospital in Reykjavik, which is now under construction.

However, just as in the private sector, designing and building according to acoustic Class A is never seen in the public sector.

3. ARE THE DEMANDS TOO STRICT?

3.1 The demands for Class C

The building industry has not had problems adapting to the new demands for Class C. This is generally met by increasing the concrete thickness or by using better lightweight stud-walls etc. There seem to be less complaints now from the inhabitants after the acoustic demands in the building code were made stricter. It would be very difficult for the building authorities to go back and make the demands less strict.

This may be done for certain single demands, which may be too strict. This will be open for discussions in the next revision of the classification standard, but the general demands in Class C are not considered to be too strict.

3.2 The demands for the higher classes B (and A)

In general, the distance in dB between the classes is 5 dB. This is the case for the classification standards in Iceland, Norway and Denmark, amongst others. Maybe this gap is too large?

In Sweden as an example, the distance between the classes is generally 4 dB, and in the proposal for a common European standard, the 4 dB distance has been proposed. Probably 3 dB is too small, the change between classes must be noticeable, so maybe the 4 dB steps are optimal.

The experience from Sweden is also that Class B in Sweden is more used than Class B in other Nordic countries with 5 dB steps. The catch however is that the primary demands in the building code in Sweden are less strict than the primary demands for Class C in the other Nordic countries.

It is not likely that lowering the demands for Class B by just 1 dB will change much for the more general use of the classification system in the other Nordic countries, but it may be one step on the way.

4. CONCLUSIONS

From the beginning, the introduction of the classification system was intended to be a tool to increase the acoustic quality in buildings in general. This goal has been reached, but the better acoustic quality has been gained mainly because of the (mandatory) increase in acoustic demands in the new building code.

The free market has not embraced the classes B and A to justify better acoustic quality and higher prices. The reason is probably the risk to declare a certain class (Class B or Class A), which then may not be reached, when control measurements are made.

However, the classification system has been used in the public sector to some extent, but not generally.

It is possible that the demands for the higher classes B and A may be a little bit too strict, but as stated before, it would be very difficult for the building authorities to go back and make the demands for Class C less strict.

Just by lowering the demands for Class B by 1 dB, will probably not change much for the more general use of the classification system, but it may be one small step in that direction.

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