

Statement

This statement is in relation to audible cracking noises in intermediate floors in domestic buildings. It is written as a joint statement between NHBC, GPDA and the Engineered Wood Product manufacturer's in the UKTFA based on the research commissioned by the 3 organisations to find the location and root cause of the noise. The investigation was carried out by the University of Salford Acoustics Research Centre. This statement reflects the findings and associated recommendations from the research: identifying the location of the cracking noise.

1. A total of 3 properties exhibiting the cracking noise phenomena have been investigated in this research project. In each property tests were carried out to determine the location and acoustic levels of origin of each cracking sound and in one property sound levels were also measured.
2. All properties were traditional masonry construction with intermediate floors using engineered joists built into external and party walls, lined with 15mm plasterboards to the underside (without perimeter noggings). The floor structure was decked with 22mm particle board. Internally the walls were finished with plasterboard installed using the dot and dab technique.
3. The investigation technique, developed specifically for this project, made it possible to track individual cracking noises to within a few centimetres of their origin. By someone walking over the floor, to dynamically load particular parts of the floor, it was possible to trigger cracking noise events with a single point of origin.
4. In all 3 properties the source of each dominant repeatable cracking noise was tracked to the junction between the wall lining and the underside of the floor structure at the point where a floor joist was built into the wall.
5. The mechanics of how the impact/weight of footfall on the floor above transferred through the floor structure, resulting in the cracking noises at these specific locations, was not determined. However, it was established that by making modifications, at the interface between the wall lining and the floor structure, the noise could be significantly reduced or even eliminated.
6. The acoustic levels before and after modifications were analysed and it was found that after disconnecting the wall lining with the floor structure cracking noise events were either eliminated or became less frequent and of a lower noise level.
7. A simple saw cut between the wall and ceiling boards was not always, in itself, sufficient to fully eliminate all cracking noise sources.
8. Further investigation suggests this was because gypsum based adhesive dabs bridged the gap between the wall lining and the floor structure in some places.
9. Once this adhesive had been removed, and the connection between the wall lining and the floor structure was completely disconnected, the cracking noises from this location were eliminated.
10. After eliminating the main sources of cracking noise the floor structure still exhibited some residual cracking/creaking noises. These residual noises were found to be less frequent and of a similar acoustic level to the footfalls used to trigger the main cracking events and as such are less likely to be a source of complaint.

11. The exact mechanism that generates the noise has not been conclusively determined at this stage but the location and largely successful remedial action strongly suggest that minor revisions to installation procedures and good workmanship may provide a solution that eliminates or at least minimises this issue in future builds
12. The vertical deflection of the floor joists when subjected to known load was directly measured . In all cases the vertical deflection was within the design value. It is worth noting that all individual components of the floor structure and wall lining are manufactured in accordance with their respective British and European standards.

Recommendations

13. Based on the findings of the research, in order to minimise the risk of such noise incidents occurring it is clear that particular care should be taken when constructing the junction between the blockwork wall, the wall/ceiling lining and the joists. The installer should avoid items interfering with the bottom of the joists. Specifically, care should be taken to ensure that gypsum plasterboard adhesive plaster dabs **do not** spread up the back of the plasterboard and set in contact with the lower flange of the joist.
14. Gypsum product manufacturers (British Gypsum, Knauf and Siniat) provide installation guidance. Diverging from this could have unforeseen ramifications, both from the standpoint of possible cracking noise – reiterating that the causes of the noise are not yet fully understood - phenomenon and effect on performance (acoustic, thermal and fire resistance). For further details please refer to individual industry body or manufacturer websites.

