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CRACKING NOISES FROM RESIDENTIAL TIMBER FLOOR STRUCTURES CONSTRUCTED WITH ENGINEERED 'I' JOISTS

The Gypsum Products Association (GPA) has been investigating the noise phenomena of cracking noises from residential timber floor structures constructed with engineered 'I' joists spanning between solid masonry walls lined with plasterboard on gypsum adhesive. Guidance was produced in March 2016 and has now been updated with this version.

The GPA commissioned Salford University to undertake further extensive research into the noise phenomena. This research involved;

1. Monitoring site behaviour experiencing issue and recording
2. Replicating site layout with exact materials within test laboratory conditions
3. Carrying out [FE] Finite Element models to further understand behaviour

The latest research project has identified and concluded that a cracking noise is created due to the very minimal displacement that occurs between the timber engineered 'I' joist structure and plasterboard when the structure flexes.

A stick-slip action occurs at the junction/interface between the timber engineered 'I' joist, plasterboard ceiling, and drylining plasterboard bonded ('dot and dabbed') to the masonry wall.

The outcome of this research project has provided two clear conclusions:

1. The mechanism of generating 'cracking noises' has been identified, understood, validated, and can now be modelled;

   The comprehensive research indicates that stronger floors are likely to be effective in reducing noise instances, as deflections under load are reduced and subsequent displacements minimised.

Subject to appropriate assessment by the project design team, design considerations to help reduce the identified displacement may include:

- Increasing joists sectional size
- Reducing joist centres
- Reducing spans of individual joists
- Solid joists of same overall cross-section

The use of resilient layers or small movement junctions as outlined in point 2 (next page) may also be considered.

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2. Potential modifications to the construction have also been identified.

In respect of the potential modifications the findings have reconfirmed the existing cross industry advice of providing a resilient layer (e.g. via metal resilient bars) between timber engineered 'I' joist and ceiling plasterboard is effective, and remains an appropriate mitigation option. See Fig 1.

Also that careful attention is paid to the ceiling to masonry wall lining junction (See Fig 2), at time of construction when the plasterboards are applied, to ensure that none of the gypsum plasterboard adhesive, compressed at the back of the plasterboard, is forced too far up above the top of the wall lining and into contact with the underside of the timber engineered I-joist lined ceiling. A nominal distance of 50mm after installation should be targeted. Plasterboard adhesive "dabs" should be applied in accordance with manufacturer's instruction. Plasterboards should only be lightly abutted to the underside of the ceiling, touching or with small gap, then sealed/finished accordingly.

Fig 1.

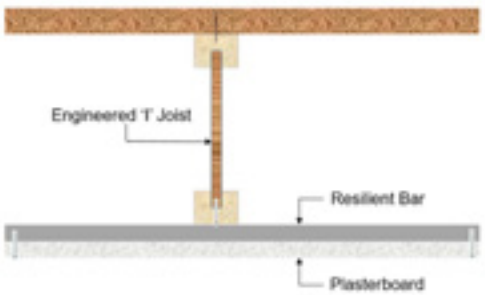
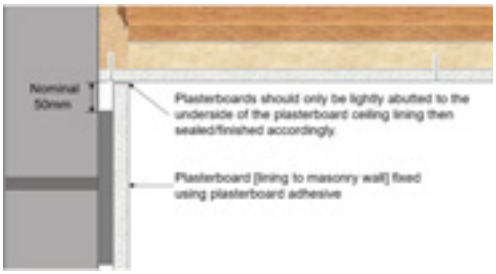


Fig 2.



Feedback needs to be sought from industry partners to ascertain their preference for solutions to reduce the occurrence of the phenomena.

Click here to view a summary copy of the GPDA research project supported by Salford University.