18 Appendix E - Example of sound insulation calculations

The target sound insulation between adjacent rooms is specified in terms of the in-situ room-to-room weighted standardised level difference $D_{nT,w}$. It is important to know the partition configuration or if this is not known, the equivalent value in terms of laboratory – tests i.e. weighted sound-reduction index R_w. This will assist in providing an anchor in terms of building element performance, offer examples of building element constructions and communicate the result effectively to other project stakeholders and manufactures or product suppliers. The difference between the two values depends on a number of factors, including:

- the surface area of the separating wall / floor (m^2);
- the volume of the receiving room (m^3);
- the standard of workmanship;
- the acoustic integrity of flanking constructions, junction details and service penetrations.

Typically, values of 7 dB (lightweight construction) and 4 dB (masonry construction) are typical to allow for a reasonable standard of workmanship and a small amount of flanking i.e. a lightweight partition on site is likely to be at least 7 dB below its laboratory - tested performance.

a. To calculate the R_w required to meet a given $D_{nT,w}$, the following relationships should be used:

For lightweight walls / floors:

$Rw \equiv D_{nT,w} - 10 \log (T/Tr) + 10 \log(ST/0.16V) + 7$

For masonry walls / floors:

$Rw \equiv D_{nT,w} - 10 \log (T/Tr) + 10 \log(ST/0.16V) + 4$

Where:

S = common area of separating element being considered (m^2);

V = volume of receiving room (m^3);

T = measured reverberation time in receiver room as per BS EN ISO 140-4;

T_r = the reference reverberation time taken to be 0.8 seconds.

Simplified versions of the aforementioned equations are:

For lightweight walls / floors:

$R_w \equiv D_{nT,w} + 10 \log (S/V) + 14$

For masonry walls / floors:

$R_w \equiv D_{nT,w} + 10 \log (S/V) + 11$

Calculations are to be undertaken using both rooms as source and selecting the most onerous figure e.g. consulting room to waiting room and waiting room to consulting room.

For very small receiving rooms that do not generate noise and are not noise sensitive e.g. linen store, the sound insulation derived from the above equations is unnecessarily high, owing to the small dimensions. Provided the receiving room is not normally occupied or if it is its only by staff, the receiving room may be assumed to have the same dimensions as the source room. If a person was to spend time for the referenced example i.e. in the linen store the level of privacy from the adjacent room would be low.

Note: ≡ means - equivalent to.