Where acoustic performance is a key consideration, steps can be taken to minimise this loss of performance. **Figure 5 - Deflection head B** (page 25) shows the generally accepted method of achieving this and, provided that care is taken to ensure a tight fit between cloaking angle and lining board surface, the loss in performance can be reduced. A loss in performance of around 1 dB to 2 dB would be typical with this method. Other factors, such as flanking transmission through the structural soffit, can significantly affect the overall level of sound insulation. Therefore, to optimise sound insulation performance, other measures may need to be taken.

A suspended ceiling installed on both sides of the partition may provide a similar cloaking effect to that of steel angles. **CasoLine MF** can deliver a similar reduction in air leakage at the partition head. A tight fit between the ceiling perimeter and the surface of the partition lining board is important, although mechanically fixed perimeters are not essential. Ceilings with recessed light fittings may be less effective and if these cannot be sealed in some way, the installation of cloaking angles at the partition head should be considered. A suspended ceiling may also reduce the level of sound flanking transmission via the soffit.

Sound by-passing a partition via the void above a suspended ceiling

This is a common source of sound transmission particularly where the ceiling is porous to sound. Where sound insulation is important, partitions should, wherever possible, continue through the ceiling to the structural soffit and be sealed at the perimeter junctions. Sound can easily travel through a perforated tile or lightweight suspended ceiling and over the top of a partition where it abuts the underside of the suspended ceiling. Gyproc plasterboard suspended ceilings offer better insulation where partitions must stop at ceiling level to provide a continuous plenum, and in this instance an option is to include a cavity barrier above the ceiling line.

Figure 6 - Performance of typical ceiling / partition junctions (page 27) shows the stages of sound insulation improvement for typical ceiling / high performance partition junctions. The best result is achieved by running the partition through to the structural soffits.

Composite construction

A common mistake made when designing a building is to specify a high performance element and then incorporate a lower performing element within it, e.g. a door within a partition. Where the difference between insulation is relatively small (7 dB or less) there needs to be a comparatively large area of the lower insulation element before the overall sound insulation is significantly affected. A greater difference in sound insulation between the two elements normally results in a greater reduction of overall sound insulation performance.

Figure 7 - Composite calculation chart (page 32) can be used to calculate the net mean sound insulation of composite partitions, e.g. a window in a partition. The correct mean sound insulation value for each part of the partition must be known in order to calculate the difference. This difference, read off on the curved line against the appropriate ratios on the vertical scale, gives the loss of insulation in dB on the horizontal scale. This figure is subtracted from the value of the part with the higher resistance to obtain the net sound insulation of the partition. **Figure 7** may also be used to assess the effect of gaps or holes in a partition by giving a sound insulation value of 0 dB to the aperture.

Example

Difference between insulation values of 30 dB with ratio of areas (vertical scale) equal to 1:4. Loss of insulation (horizontal scale) = 23 dB. Therefore, if the two parts had mean sound insulation values of 15 dB and 45 dB respectively, the net sound insulation of the partition would be only 22 dB, i.e. 45 dB - 23 dB = 22 dB.

Table 3 shows the acoustic effect on a range of partitions when various types of door are installed. It can be seen that if a poor performance door is included in a partition, it does not matter if the wall achieves 25 dB or 50 dB sound insulation as the net performance will never be better than 27 dB. The lowest performing element will always dominate the overall performance.

Table 3 - Effect of installing various door types within a partition system

Door construction	Mean sound insulation of partition alone (dB)					
	25	30	35	40	45	50
	Mean sound insulation of partition with doorways accounting for 7% of area (dB)					
Any door with large gaps around the edge	23	25	27	27	27	27
Light door with edge sealing	24	28	30	32	32	32
Heavy door with edge sealing	25	29	33	35	37	37
Double doors with a sound lock	25	30	35	40	44	49

Acoustic privacy

Two main factors affect the level of acoustic privacy achieved when designing a building:

- The sound insulation performance of the structure separating the two spaces.
- The ambient background noise present within the listening room.

The ambient background noise level can be a useful tool when designing buildings, as it is possible to mask speech from an adjacent space and hence provide enhanced speech confidentiality. There are a number of commercially available systems for achieving this and the technique is referred to as acoustic perfume. It is, however, more common to treat the problem by specifying appropriate levels of sound insulation. A guide to sound insulation levels is given in **Table 4**.

Table 4 - Guide to sound insulation levels for speech privacy

Sound insulation between rooms R_w	Speech privacy
25 dB	Normal speech can be overheard
30 dB	Loud speech can be heard clearly
35 dB	Loud speech can be distinguished under normal conditions
40 dB	Loud speech can be heard but not distinguished
45 dB	Loud speech can be heard faintly but not distinguished
> 50 dB	Loud speech can only be heard with great difficulty

Acoustic privacy issues are dealt with in detail for healthcare and educational environments within the **WHITE BOOK Health sector guide** and **WHITE BOOK Education sector guide**, available to download from www.british-gypsum.com

When designing for residential purposes, the standards of sound insulation given in **Table 4** are not adequate, and reference should be made to Building Regulations Approved Document E requirements and the guidance given in the British Gypsum **HomeSpec** publication,