Fan Coil Units Acoustic Design Principles

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There are a number of acoustic design principles that should be taken into account when designing a fan coil unit installation:

- do not expect very low NR levels from a fan coil unit installation; levels lower than NR30 are generally unrealistic unless special measures are taken
- noise from the inlet of a fan coil unit is normally more of an issue for ceiling void units, so these units are generally of the 'draw-through' type, see Figure 1

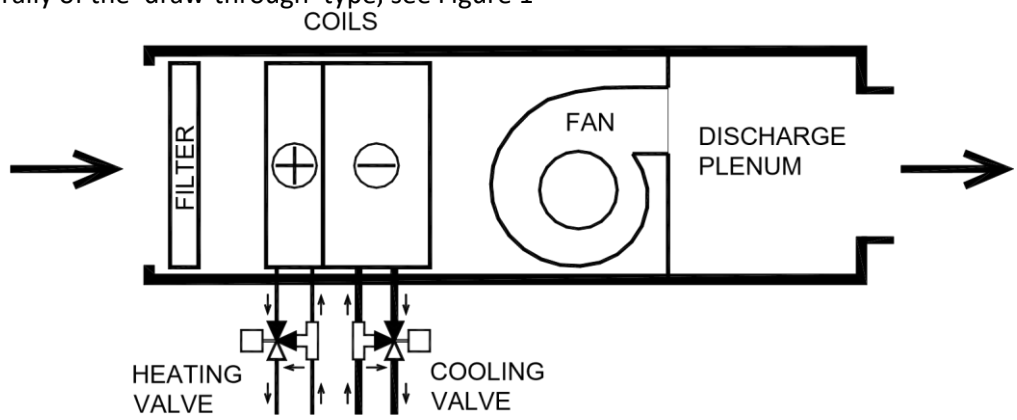

Figure 1 - Draw-Through Fan Coil Unit

- noise from the discharge of a fan coil unit is normally more of an issue for cased, floor standing units so these units are generally of the 'blow-through' type, see Figure 2

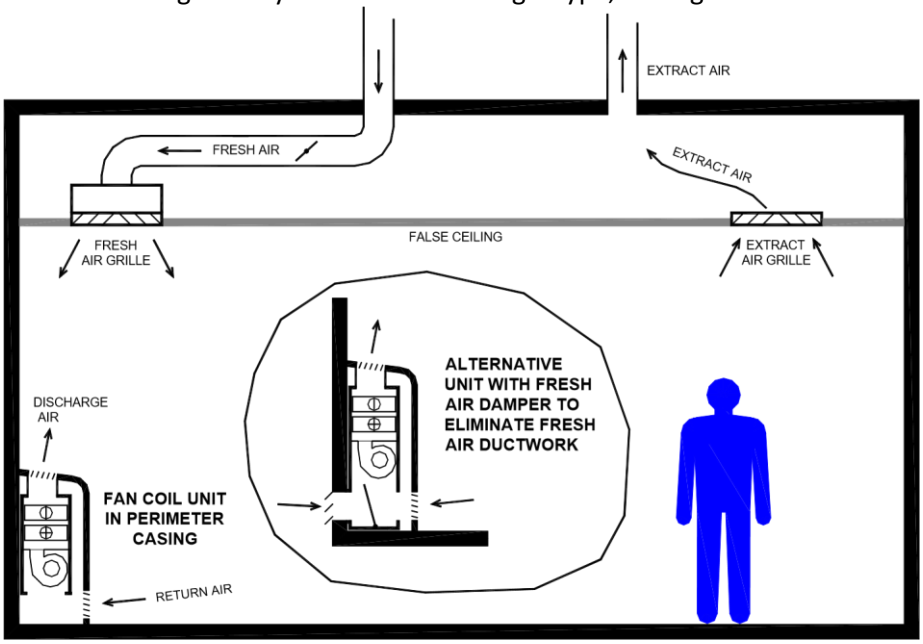

Figure 2 - Blow-Through Fan Coil Unit

- use the maximum number of discharge outlets possible on the fan coil unit to reduce air resistance over the unit and thereby reduce fan noise
- with a ceiling void installation beware of the poorly placed return grille, positioned directly under or near the fan coil unit air inlet and therefore close to occupants, see Figure 3, as this can increase overall noise levels by 3-4dB, see effect on NR curve in Figure 4

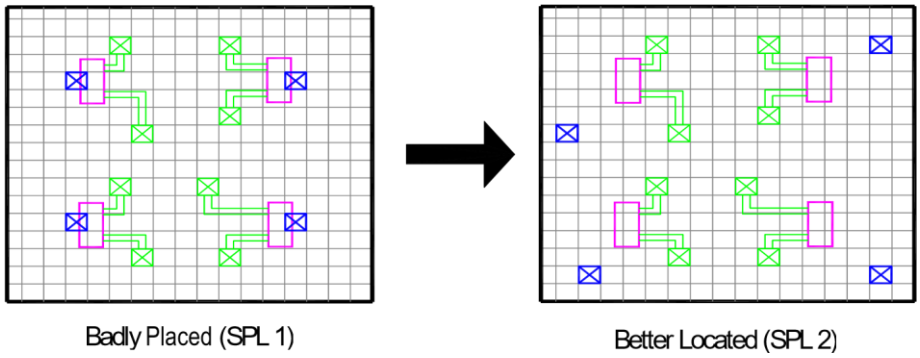

Figure 3 - Badly Placed and Better Located Return Grilles

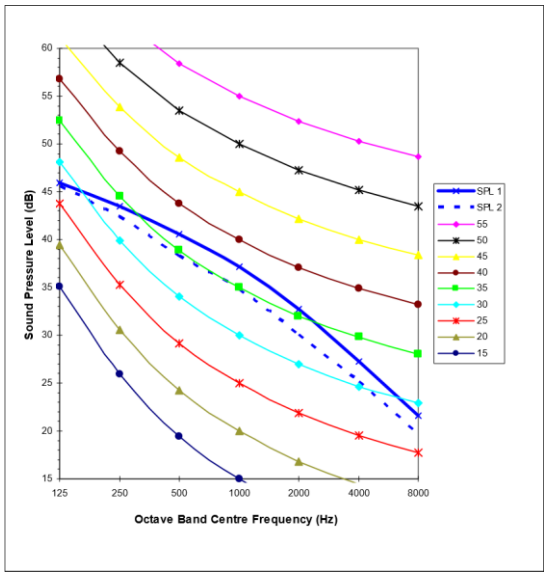

Figure 4 - NR Curves Showing effect of better located Grilles

- specify a good acoustic grade for the false ceiling which must be well installed with ceiling tiles fitting snugly in the ceiling frame
- hard surfaces on walls, ceilings and floors will produce 'Live' acoustics and result in higher noise levels
- to reduce air resistance over the fan coil unit, and thus noise levels, specify that filters be cleaned or

replaced before air volume flow rate and acoustic commissioning checks are carried out on site (filters often get dirty with builders' dust during a fit-out, especially if the FCUs are used for drying-out a building)

- for ducted ceiling void mounted units all rooms that the units serve should have an adequate return air path back to the units to minimise air resistance across them
- beware of fresh air ducted directly to the inlet of a fan coil unit with no air break as this can impose a significant air resistance across some units
- beware of tight duct bends, flexible corrugated ducting and reducing duct diameters all of which increase air resistance across the fan coil unit
- minimise duct leakage, see BESA DW144: *Specification for sheet metal ductwork*[1], as air leaks will require higher fan speeds to produce the specified duty
- avoid locating return air grilles in adjacent rooms too close to one another as they may provide a path for 'cross-talk' via the ceiling void. Using full height walls between cellular rooms is often impractical due to penetrations required for services. One solution is to ensure adequate separation, e.g. 4m between return air grilles serving different cellular spaces, to allow speech from one room to be absorbed in the ceiling void before it can enter the adjacent room. If this is not possible it may be necessary to use cross-talk silencers with a low air resistance, e.g. 5 Pa maximum, on the return air grilles.

More information on fan coil unit acoustics can be found in CIBSE Technical Memorandum TM43[2] and in HEVAC Guide Fan Coil Acoustics – Best Practice[3]

1. *Specification for sheet metal ductwork – low, medium & high pressure/velocity air systems* BESA DW/144 (London: Building Engineering Services Association (2016)

2. *Fan coil units* CIBSE TM43 (London: Chartered Institution of Building Services Engineers) (2006)

3. *Fan coil acoustics – Best practice* (Reading: HEVAC Association) (2009)