Active chilled beams can provide efficient heating and achieve high thermal comfort subject to correct system design that ensures that the secondary air temperature is low enough to adequately mix with the room air to prevent high levels of stratification within the occupied zone.

At the perimeter of the building the level of stratification will depend upon several factors such as window size, glazing inside surface temperature (U value dependant) and the available linear length of active chilled beams; the higher and colder the window, the colder the air falling down to the floor, having less linear m of active chilled beam will increase the required W/m heating and result in higher secondary air temperatures so resulting in the temperature gradient between secondary air and room air becoming higher.

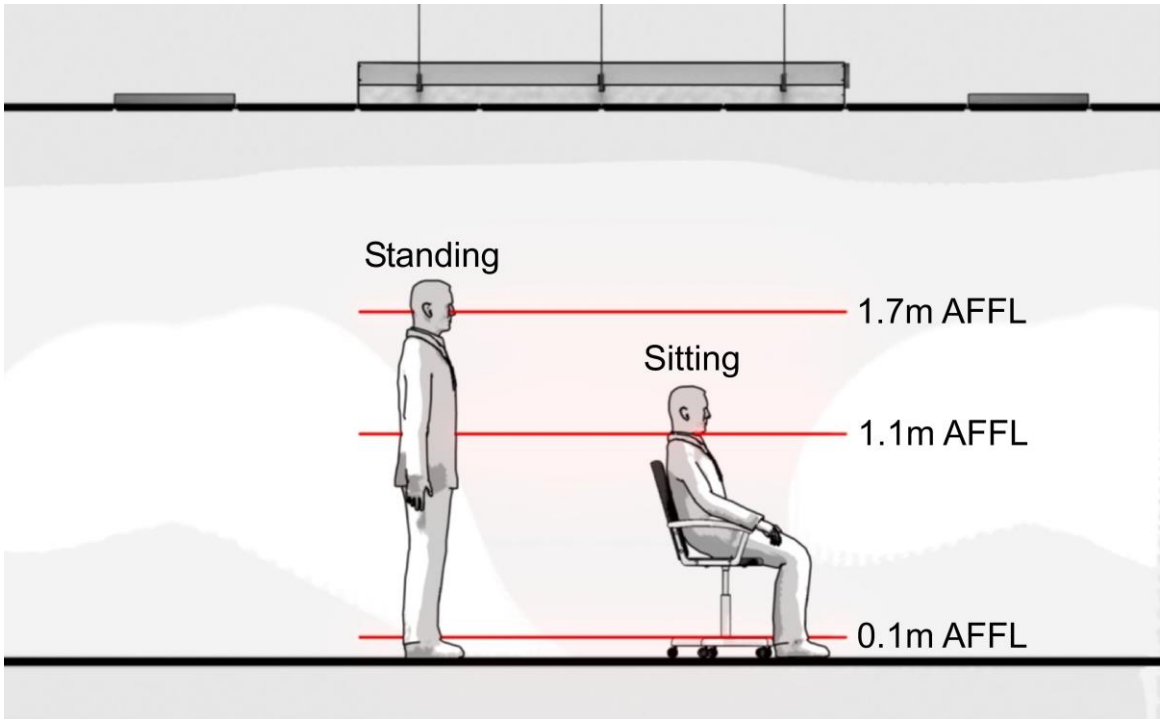
In order to quantify the required maximum thermal stratification for different spatial applications we can refer to Table C of BS EN ISO 7730 which details separate categories namely A, B & C where A is the highest level of indoor climate; most chilled beam applications (for standard offices) fall under a Category B environment.

Table C - Typical Design Criteria for Chilled Beam Applications

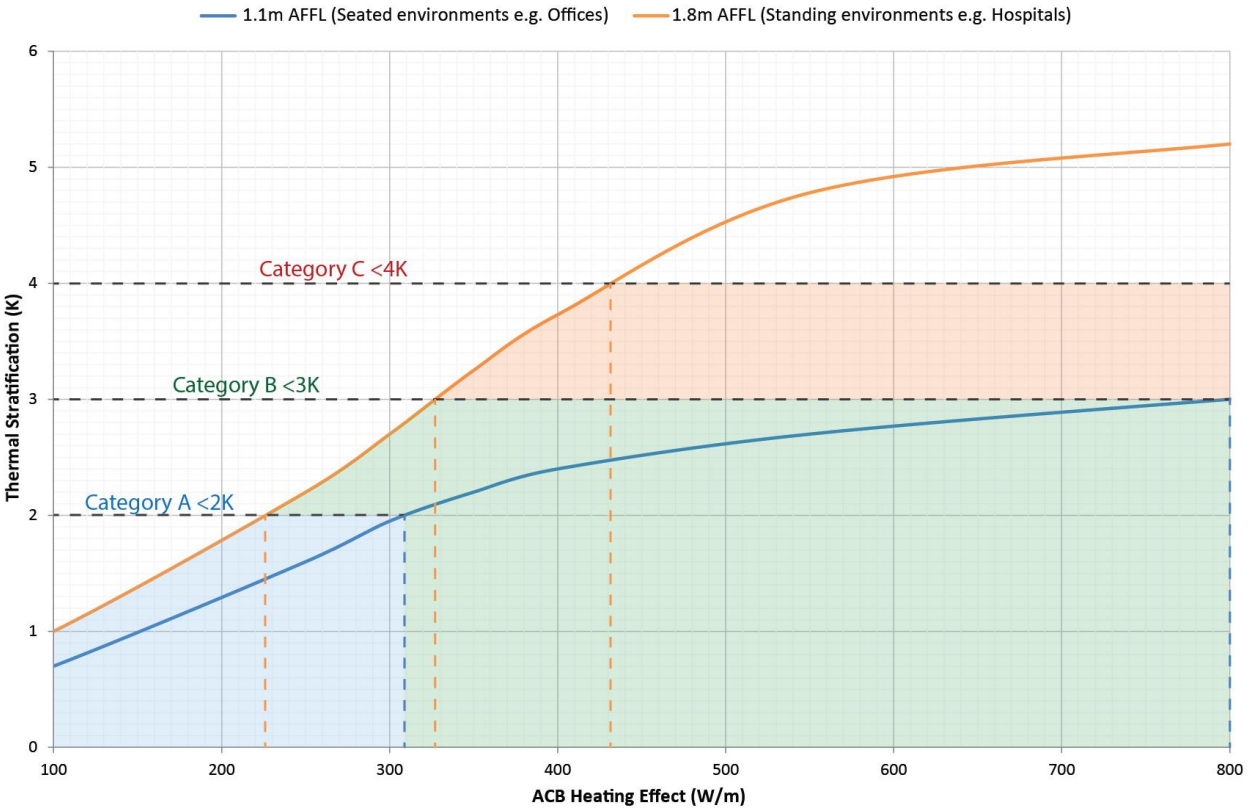
Type of Building / Space	Activity W/m²	Category	Operative Temperature (*) °C		Vertical Air Temperature Difference (**) °C	Maximum Mean Air Velocity (***) m/s	
			Summer (Cooling Season)	Winter (Heating Season)		Summer (Cooling Season)	Winter (Heating Season)
Single Office Landscape Office Conference Room Auditorium Cafeteria / Restaurant Classroom	70	A	24,5 ± 1,0	22,0 ± 1,0	< 2	0,12	0,10
		B	24,5 ± 1,5	22,0 ± 2,0	< 3	0,19	0,16
		C	24,5 ± 2,5	22,0 ± 3,0	< 4	0,24	0,21[b]

**Between 0.1m and 1.1m above fixed floor level.

It is normal (in office environments) for the occupied zone to be located between 0.1m and 1.1m above fixed floor level (FFL), as at these heights we find the most exposed parts of the seated body, namely the ankles and head/neck, which given the lack of clothing are the most likely locations for feeling any discomfort. In environments where occupants spend most of the time standing (for instance hospital staff working in wards) the occupied zone may be deemed to be between 0.1m and 1.7m above FFL.



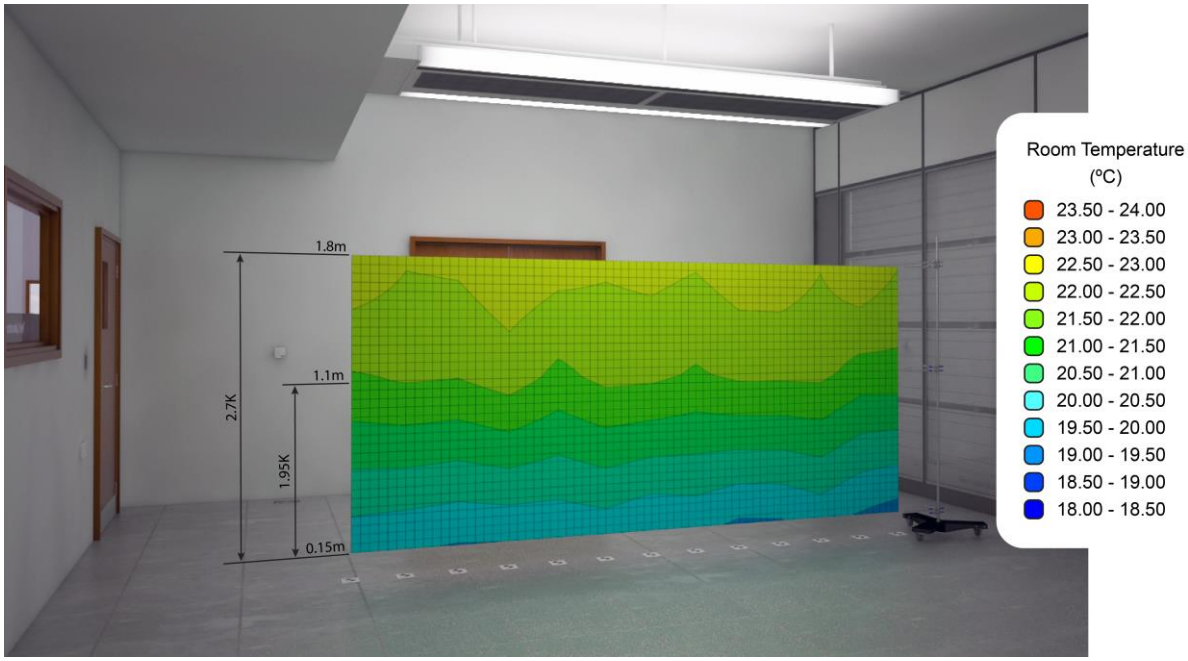
The following chart can be used to determine anticipated levels of thermal stratification within the occupied zone:



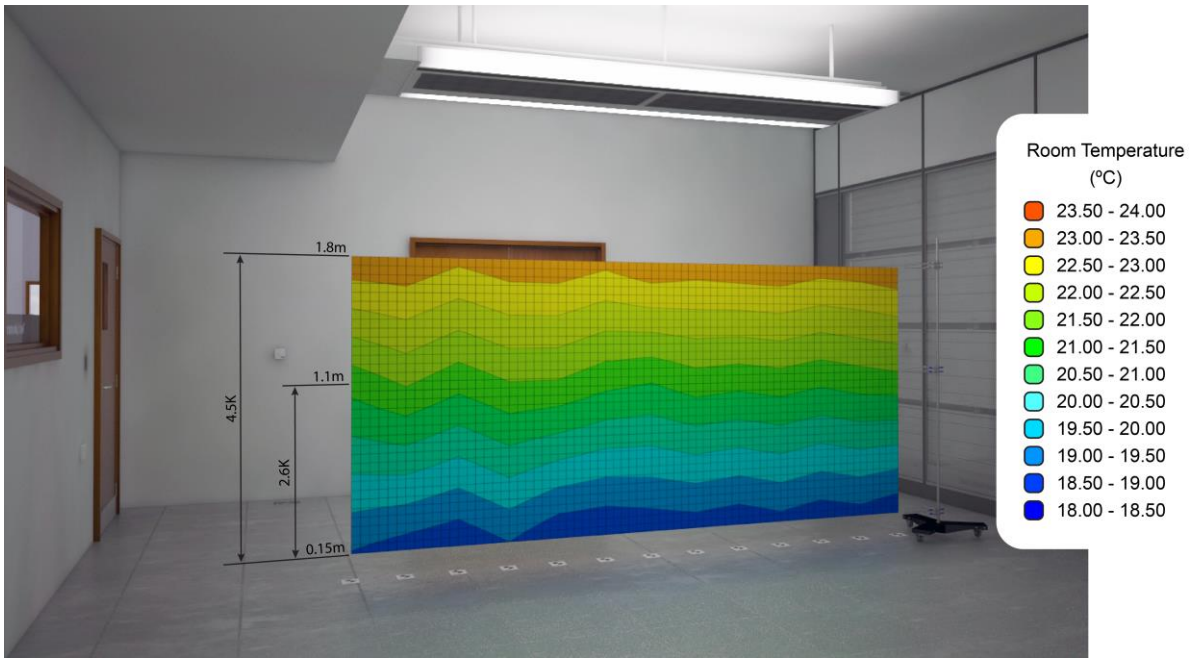
Note: The above relationships have been based on extensive Compact and Eco active chilled beam heating tests based on a worst case scenario I.e. Full height low surface temperature glazing and steady state conditions with no mixing of room air which simulates an unoccupied building.

The following graphics show the thermal stratification in in the occupied zone with active chilled beam heating at 300W/m, 500W/m and 800W/m, with an average room temperature of 21.0°C.

300W/m ACB Heating Effect (Category B <3K Stratification)



500W/m ACB Heating Effect



800W/m ACB Heating Effect