

Air calorimetry

Assuring luminaire performance

The effect that air handling through luminaires can have on lamp operating temperatures, and the consequent effect on lamp efficacies, needs to be understood by all within the specification process.

The efficacy of a fluorescent lamp is related to the coolest spot on the inner surface of the tube. This is because the light output is proportional to the amount of ultra violet light produced by the electrical discharge. Amongst other things, this depends on the mercury vapour pressure inside the discharge tube, which in turn is determined by the lowest temperature of the inside of the glass tube wall – the cool spot.

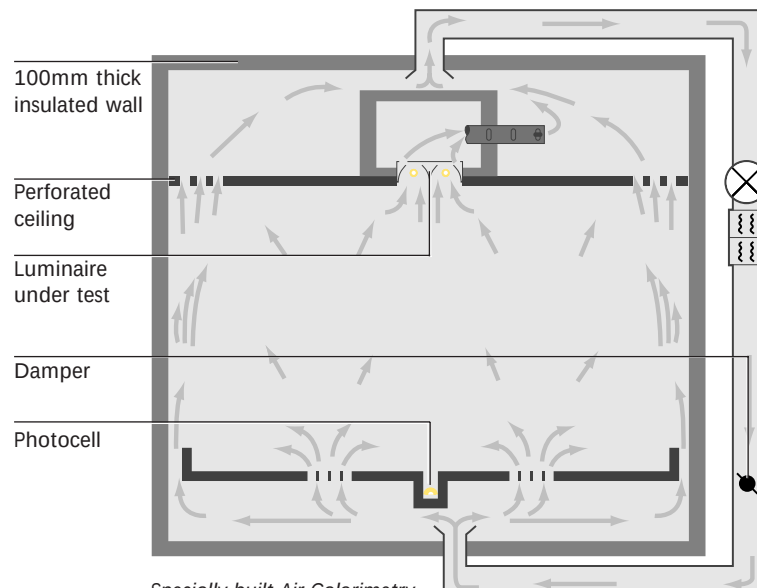
Confidence through superior technology

In order to allow lighting designers to work confidently with air handling lighting solutions, Whitecroft Lighting has developed and built a sophisticated air handling and calorimetry chamber. Traditionally, testing has been carried out using an air calorimeter mounted in a normal room.

At Whitecroft Lighting, the air calorimeter is part of the ceiling of an environmentally controlled chamber which allows installed conditions to be accurately reproduced. Depending upon client requirements, a number of tests can then be carried out. Typically these would cover the following areas/variables:

Luminaire performance versus air flow rate/temperature variables

If luminaires are to be used as the means of returning air from the occupied space into the ceiling void for ventilation purposes, then cooling of the lamps becomes a potential problem. Air at low temperatures, drawn through the luminaire at a high flow rate, can result in a reduction in light output of as much as 30%. If this were to occur on an installation where the design was based upon standard lamp and luminaire data then, clearly, the illumination level achieved would be 30% below the calculated levels.



Specially built Air Calorimetry chamber at our Customer Applications and Technology Centre

OVER-COOLING OF LAMPS

Depending on the type of lamp, the maximum light output will be achieved at temperatures between 36°C and 45°C. This is not a problem with the majority of luminaires but light output can be affected in air handling luminaires, where air is drawn over the lamps, thus cooling them.

A similar, but less common situation can occur when supply grilles are close to a non-air handling luminaire. Cool supply air travels across the ceiling, by the Coanda effect, and into the luminaire to circulate around the lamp, frequently cooling it to below its optimum running temperature. Both of these situations can result in installations where design lighting levels are not achieved.

