CPD Overview

Induction Ratios of Grilles and Diffusers

Understanding how induction influences airflow, comfort, and system performance

Brooke Air
a brand of MAICO

Overview

This CPD explains how different air-terminal devices mix supply air with room air through entrainment, how induction ratio is defined and measured, and why it matters for comfort, acoustics, and energy efficiency. It provides practical guidance for selecting and applying grilles and diffusers based on induction behaviour rather than marketing claims.

What delegates will learn

After completing this CPD, participants should be able to:

- Define the induction ratio and understand its link to entrainment and velocity decay.
- Explain how fluid-dynamic effects such as Coandă attachment influence throw, draft risk, and comfort.
- Identify typical induction characteristics for common outlet types.
- Evaluate “high-induction” claims using meaningful criteria such as ADPI, pressure drop, and acoustic performance.
- Apply simple design and commissioning guidance to control air speeds, temperature differences, and noise in occupied spaces.

Key points covered

Air terminals and mixing: Supply jets entrain surrounding room air as they decay, increasing total mass flow downstream. High induction = rapid dilution and short throw; low induction = stratified flow and longer horizontal travel.	**Commercial claims:** “Very high induction” products may require higher pressure drop and more outlets to meet the same duty. IR alone is not an adequate performance metric; ADPI remains the industry standard.	**Influencing factors:** Outlet geometry, free area, discharge velocity, temperature difference, and proximity to surfaces. Coandă attachment extends throw but reduces induction on the attached side.
Induction ratio: IR = Q_x / Q_0. A value of 4 means every 1 L/s supplied entrains 3 L/s of room air. It is strongly influenced by the rate at which the jet slows and spreads.	**Commissioning:** Balance airflows, measure velocities, check noise levels, and verify that throw and comfort align with design assumptions.	**Comfort limits:** Room air speeds typically 0.05 – 0.2 m/s. Higher induction can handle larger cooling temperature differences, but often with more noise unless free area is increased.

Why it matters

Correctly matching induction performance to the application avoids common issues such as drafts, stratification, short-circuiting, and excessive noise. Proper diffuser selection improves comfort, indoor air quality, and energy performance while reducing the cost of over-specified or inefficient outlets.

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