DESIGNING PRESSURE AND DRAUGHT RELIEF SHAFTS FOR A METRO SYSTEM

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Design Concept and System Description
Objectives

• Provide consultancy for the preliminary design of pressure and draught relief shafts

• Dimension the pressure/draught relief shafts to keep the air velocities below 5 m/s at the stations
Simulation Methodology

- 1-D network modelling
- 3-D effects modeled using pressure and viscous loss coefficients
- No thermodynamic effects are modeled
- Generation of pressure waves (compressibility effects) are not taken into account
Results

Effect of “Pressure Relief Shafts” on air velocities at platforms and escalator shafts

- Velocities at platform and in escalator shaft are not effected by change in pressure shaft's cross sectional area
Results

Effect of “Draught Relief Shafts” on air velocities in escalator shafts

Design Criteria of 5 m/s

Area of Draught Relief Shafts at Ends of Station No. 4
Area of Draught Relief Shafts at Station Ends [m²]
Improved Design

- Aerodynamically disconnecting the pressure relief shafts
- Changing the geometrical configuration of fire resistance doors at escalator base
Results

Effect of “Draught Relief Shafts” on air velocities in escalator shafts
- Area of draught relief shafts = 20 m²

- Area of door opening at escalator base increased from 9 m² to 20 m²
Conclusions

• Aerodynamically disconnecting shafts along the tunnel under normal operations
• Providing draught relief shafts with cross sectional area of 20 m² at all station ends
• Increasing the opening area of the fire resistant doors at the base of escalator shafts
Thank you for your attention