



## Detailed measurement on a HESCO diffuser

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# Detailed measurement on a HESCO diffuser

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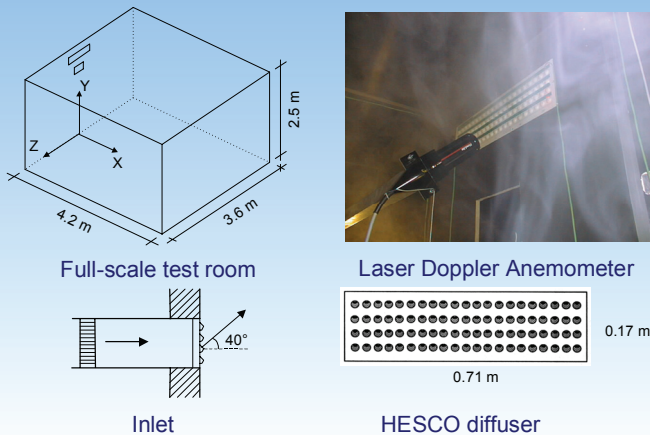
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## SUMMARY

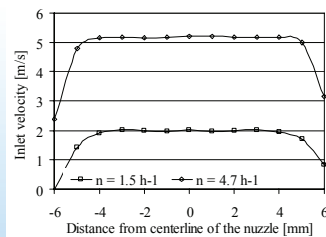
This paper focuses on measuring the inlet velocity from a HESCO diffuser used in the IEA Annex 20 work as a function of the volume flow it provides. The aim of the present work is to establish a relation between the inlet velocity, the effective area and the airflow. This is important because the inlet velocity is a significant boundary condition in CFD calculation as well as general flow measurements. If only the volume flow and the geometrical area are used, a relatively large error in the inlet velocity may result. From the detailed measurements it was possible to establish an expression between the inlet velocity and the effective area.

## EXPERIMENTAL SET-UP

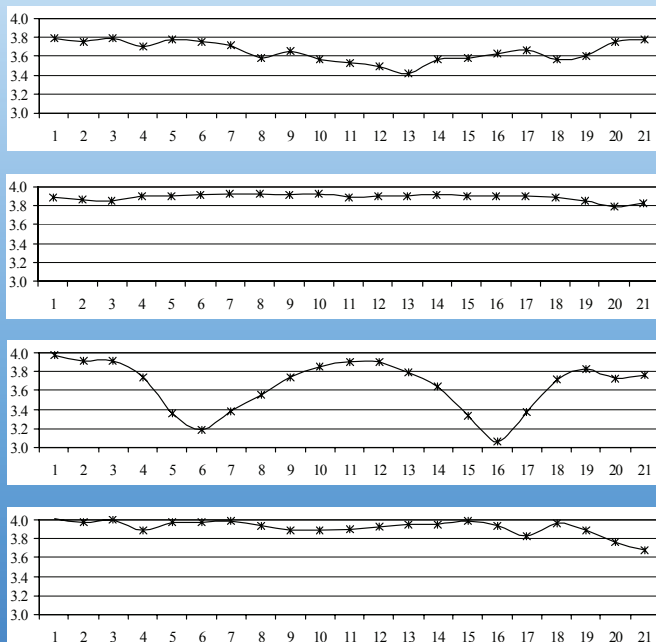


## Velocity profile across a nozzle

A square velocity profile is assumed. The figure shows that to be a fair assumption.



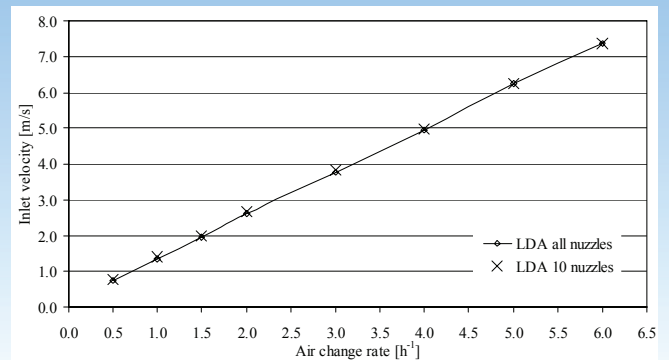
## Inlet velocity



All nozzles at an air change rate of 3 h<sup>-1</sup>

## RESULTS

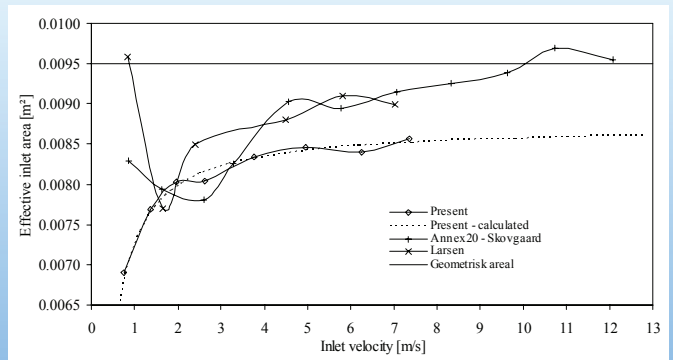
Mean inlet velocity as a function of air change rate



Effective inlet area as a function of air change rate

$$a_0 = \frac{1}{114,7 + 15,99 \cdot n^{-1}} \quad a_0 \rightarrow 0,0872 \text{ for } n \rightarrow \infty$$

Comparison with previous results



## CONCLUSIONS

When determining the effective inlet area, it is important to verify that the assumption regarding e.g. the velocity profile across the nozzles holds. Also, one should be careful to measure only at a limited number of points since there can be large variations between (in this case) the different nozzles.

Based on the measurements, an expression for the effective inlet area given as a function of the air change rate is derived. The agreement between the expression and the measurements is excellent and therefore, the expression should be used when determining boundary conditions for CFD simulations based on the Annex 20 room geometry.

## ACKNOWLEDGEMENT

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