

**DETERMINING THE EFFECT OF SCREENS IN EXPOSURE
TO AEROLS IN RESTAURANTS**
DR. ROBERTO TRAVERSARI



INDEX

EVALUATION OF SPREADING AEROSOLS IN RESTAURANTS

- 01. INTRODUCTION
- 02. METHOD
- 03. RESULTS
- 04. CONCLUSIONS

DISCLOSURE

Dr. Roberto Traversari

› I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)
- I do not have any potential conflict of interest

01 April 2021 | Determining the effect of screens in exposure to aerols in restaurants

BACKGROUND

PROBLEM

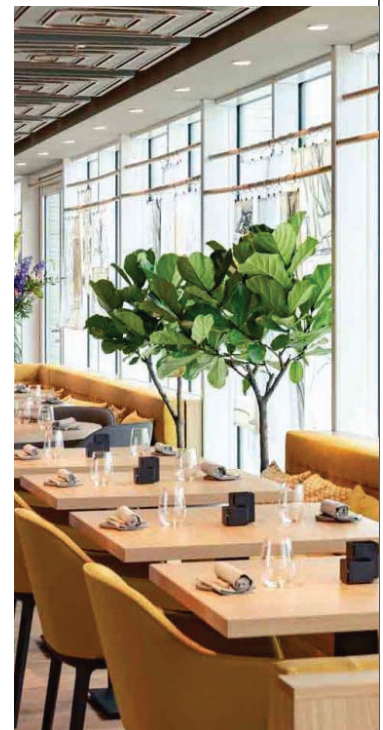
- › Reference setting is social distancing at > 1,5 meter (between different households)
- › Limiting the capacity of a restaurant
- › Can screens help to reduce the 1.5 distance in a safe way?
- › Is there a relation with the ventilation system and ventilation rate?

Main research question:

How to determine the effect of (protective) screens in a restaurant setting?

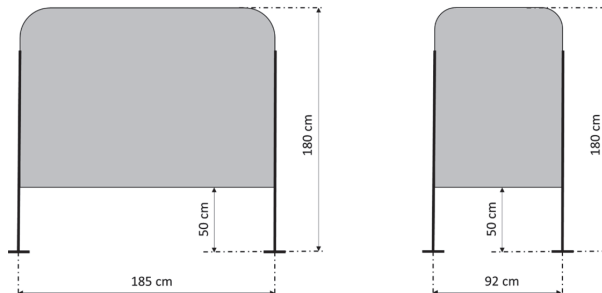
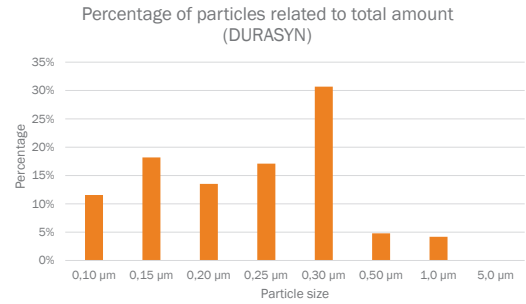
Project funded by the Dutch Ministry of Economic Affairs and Climate Policy

01 April 2021 | Determining the effect of screens in exposure to aerols in restaurants



METHOD

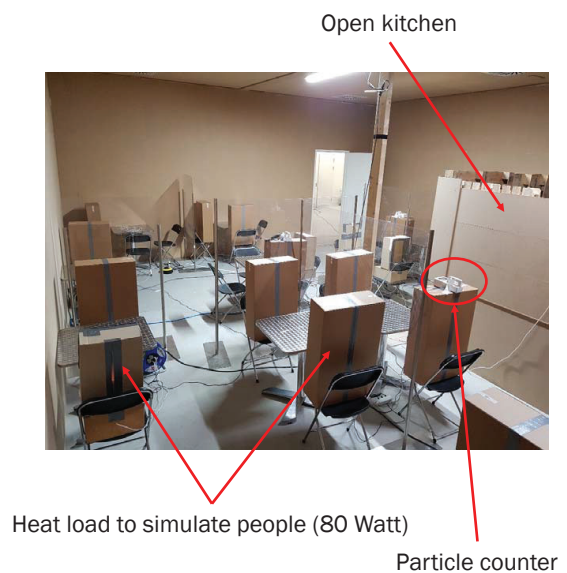
- › Method was based on the guidelines for operating rooms (e.g. ISO 14644-3, HTM-03, DIN 1946-4, VCCN guideline 7)
- › Emission of aerosols (particles) and measure particle levels
- › Measuring the concentration of particles with particle counters
- › Using $\geq 0.5 \mu\text{m}$ as guiding particles (airborne appr. $< 5 \mu\text{m}$)
- › Concentration at 1,5 meter was the reference
- › With and without screens
- › Mock up (9 x 7 x 3 meters)



01 April 2021 | Determining the effect of screens in exposure to aerols in restaurants

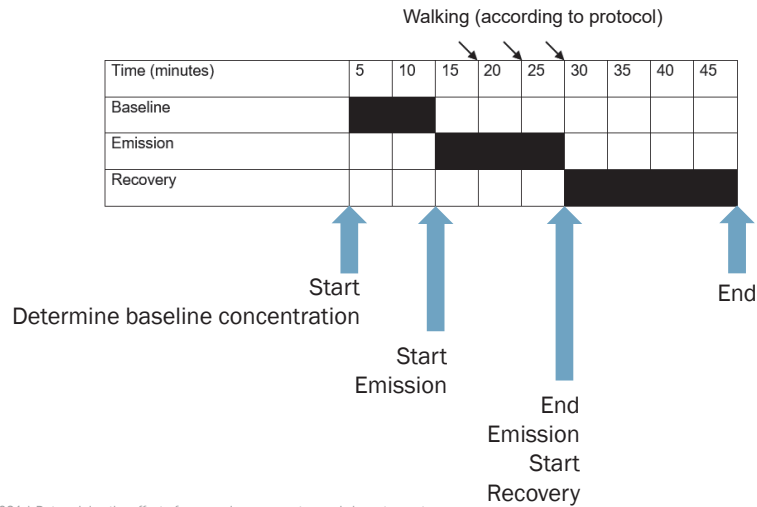
EXPERIMENTS MOCK UP

- › Two ventilation systems
 - › linear diffusers
 - › swirl diffusers
- › Three “ventilation” rates (air with relative low particle level)
 - › Low ($900 \text{ m}^3 \text{ h}^{-1}$, Dutch building act)
 - › Medium ($1.700 \text{ m}^3 \text{ h}^{-1}$)
 - › High ($2.500 \text{ m}^3 \text{ h}^{-1}$)
- › Three different setups (excluding the reference setup)



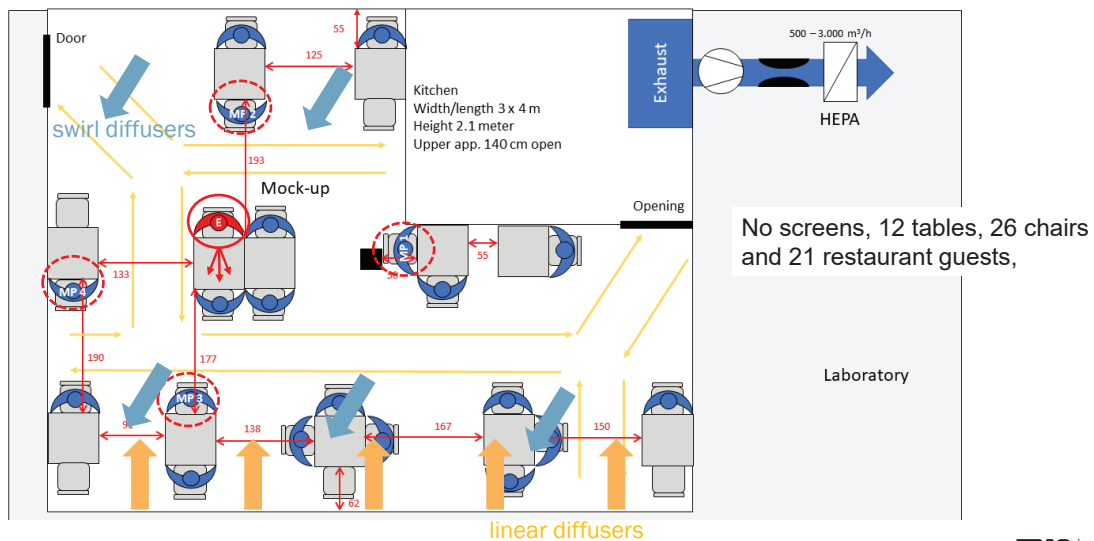
01 April 2021 | Determining the effect of screens in exposure to aerols in restaurants

PROCEDURE



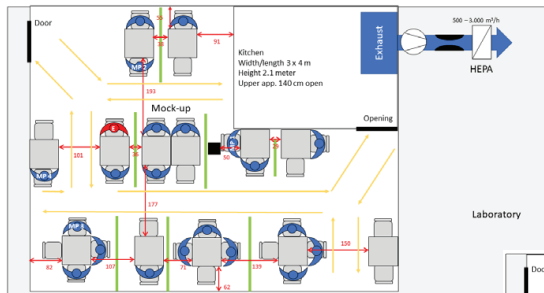
01 April 2021 | Determining the effect of screens in exposure to aerols in restaurants

REFERENCE SETUP



01 April 2021 | Determining the effect of screens in exposure to aerols in restaurants

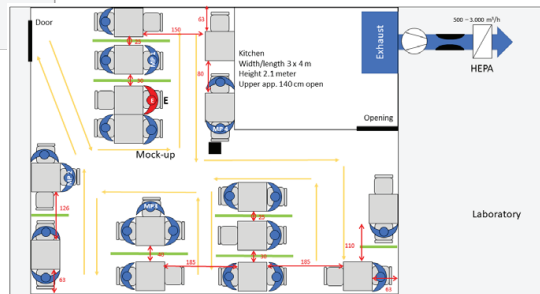
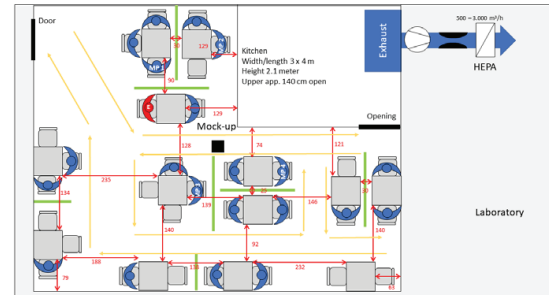
SETUPS WITH SCREENS



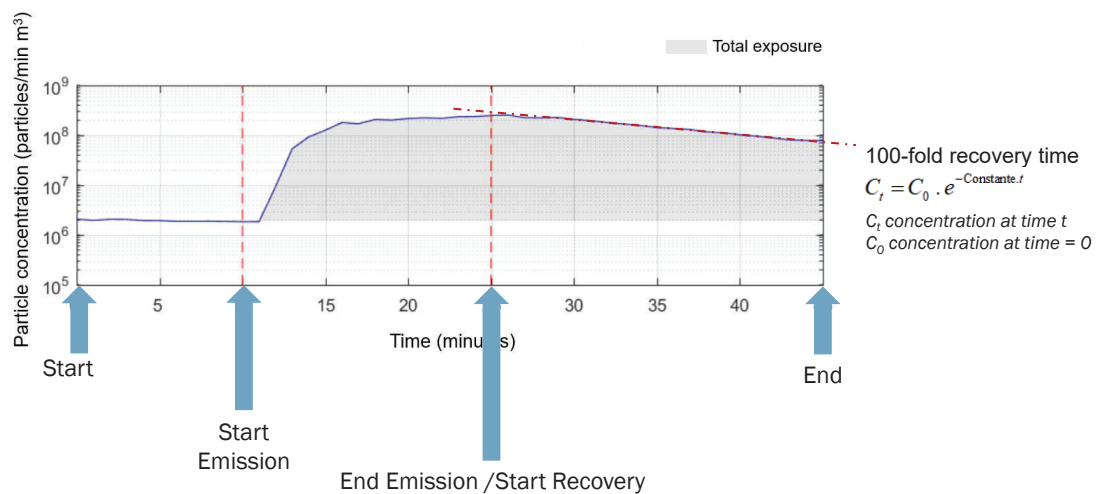
Setup A, 6 full screens, one half screen, 13 tables, 32 chairs and 22 restaurant guests

Setup C, 5 full screens, two half screens, 15 tables, 31 chairs and 23 restaurant guests

Setup B, 5 full screens, two half screens, 13 tables, 32 chairs and 22 restaurant guests

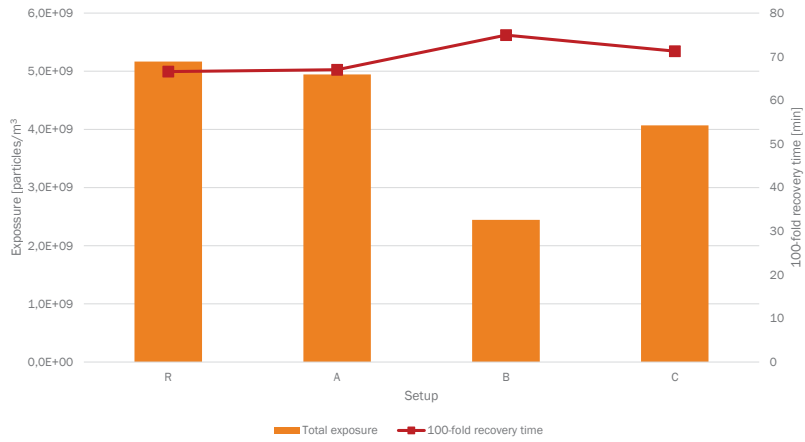


EXAMPLE OF THE MEASURED CONCENTRATION

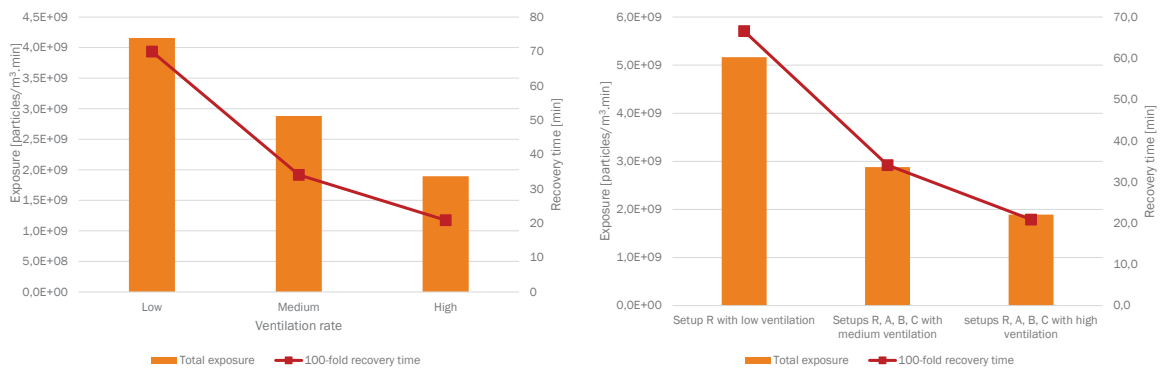


RESULTS

LOW VENTILATION RATE



RESULTS



› CONCLUSIONS

- › The amount of ventilation is the most determining factor for the total exposure and for the 100-fold recovery time. The higher the ventilation, the lower the total exposure and the faster the 100-fold recovery.
- › The medium and high ventilation quantities result in a lower total exposure than the setup with the 1.5 meter protocol with a low ventilation quantity; the total exposure is on average 44% and 63% lower for the medium and high ventilation volume respectively. In addition, the 100-fold recovery is faster with a higher amount of ventilation.
- › The diffuser type (line diffusers or swirl diffusers) has no significant influence.
- › With the low ventilation amount, the total exposure for the three setups with screens is lower than for the reference situation. However, this difference is not significant for setup A.

› **THANK YOU FOR
YOUR TIME**

ROBERTO.TRAVERSARI@TNO.NL

