



## Displacement ventilation for indoor firing ranges VA-RSA

# Displacement ventilation for firing ranges

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## General

Shooting with firearms in indoor firing ranges releases gases and airborne particles which pollute the indoor air. Using a properly dimensioned air-conditioning system is a way of reducing the air pollutants to prevent the health of shooters from being endangered.

The only type of ventilation suitable for such facilities is displacement ventilation whose task it is to keep gases and airborne particles away from the breathing region of the shooter and to carry them off.

For this purpose, the supply air is discharged exclusively through the entire wall surface behind the shooter. The air flow is to be rated so that the mean air velocity across the indoor firing range is not less than 0.25 m/s.

The supply air is „pushed“ through the complete indoor firing range and the polluted air is extracted in the bullet trap area. The most essential feature of this ventilation and extraction system is the non-occurrence of backflow, which would pollute the air breathed by the shooter.

The optimum mode of operation of the proposed system is to be proved by tests relating to indoor air velocities and air flow pattern (using flog fluid). The relevant shooting facility regulations are to be observed.

To achieve uniform air diffusion it would be best if the wall supplying the fresh air would have no door or window. Yet should this be inevitable, the intrados of these doors and windows should be designed in such a way that they also provide some air supply.

What is also important is to take care that the plenum of the air supply wall does not limit the visual field of the person watching behind the window. Therefore, the lateral parts of the window intrados must be at an angle to enable the watcher to have a view of nearly the whole area.

## System design

KRANTZ KOMPONENTEN designs, manufactures and supplies air supply walls for indoor firing ranges tailored to the individual indoor firing range architecture.

The system is designed to ensure an extensive supply air discharge into the indoor firing ranges.

The air supply wall consists of a support profile fitted with panels with special perforations and integrated air distribution units. Thermal influences on the room can be balanced with slot diffusers. These slot diffusers are arranged horizontally in the panels and can be adjusted individually to generate a uniform laminar flow.

The profiles and panels are painted to a RAL colour (according to the requirements of the client).

The delivery includes all profiles and panels required for the specific project, sheet metal profiles for connection to sidewalls, floor and ceiling, as well as all fastening devices required, like screws and plugs. All parts are prepared (with boreholes and tapped holes) so that only the assembly of the system is to be made on site.

It is also possible to deliver the supply air walls as a modular system. Here additional single casings with connection spigot can be arranged on top of each other or side by side to an air distributing wall.

## Laboratory test

The performance of the supply air walls for indoor firing ranges developed by KRANTZ KOMPONENTEN was tested in our R&D department. The uniform flow was tested with smoke tracers in various distances and areas.

The lab tests were documented in a report and a video film which are available upon request.

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## Examples of different models of indoor firing ranges



Indoor firing range with supply air ceiling and wall

## Renovation of the supply air wall of an indoor firing range



Old design of the wall



Supply air wall with perforated metal sheet panels and slot diffusers



New design of the wall

Make KRANTZ KOMPONENTEN with achieved optimum indoor air velocity and flow direction



Supply air wall with perforated metal sheet panels and slot diffusers. Window for the supervision of the shooter with air distributing perforated metal sheet panels.

You will find an excerpt of our project list on page 4.

Subject to technical alterations.

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## The following projects have already been executed:

- Firing range 'SG Tell Uttenreuth', 3250 l/s [11 700 m<sup>3</sup>/h]
- Delmenhorst Police Force, 4 167 l/s [15 000 m<sup>3</sup>/h]
- Borne Police Force, 6 111 l/s [22 000 m<sup>3</sup>/h]
- Nürthingen Police Force, 3 472 l/s [12 500 m<sup>3</sup>/h]
- 'Schloß & Gut Liebenberg', up to 7 525 l/s [27 450 m<sup>3</sup>/h]  
(4 indoor firing ranges, 25 m, 50 m, 100 m and shooting cinema)
- Meiningen Police Force, 2 389 l/s [8 600 m<sup>3</sup>/h]
- Hattingen Police Force, 4 069 l/s [14 650 m<sup>3</sup>/h]
- A7 Gebouwenkomplex, Netherlands
- Hamburg Police Force, 9 firing ranges up to 8 917 l/s [32 100 m<sup>3</sup>/h]
- Firing range Nagold, 4 250 l/s [15 300 m<sup>3</sup>/h]