

## Krantz Components

Displacement outlet  
for indoor firing ranges VA-RSA

**Air distribution systems**

*Krantz*

# Displacement outlet for indoor firing ranges

## General

Shooting with firearms in indoor firing ranges releases gases and airborne particles which pollute the indoor air. Using a properly dimensioned HVAC system is a way of reducing the air pollutants to protect the health of shooters.

The best suitable air distribution system for such facilities is low-turbulence displacement ventilation, also called piston principle in this context, which keeps gases and airborne particles away from the shooter's breathing zone and removes them.

For this purpose, the supply air is discharged horizontally through the entire wall surface behind the shooter. The air flow is to be rated correspondingly so that the mean air velocity across the indoor firing range is not less than 0.25 m/s. Depending on the type of firearm, the used ammunition and the shot rate, an increase of the mean air velocity to maximum 0.35 m/s may become necessary.

Thanks to this special type of air distribution the airborne pollutants that are released when shooting with firearms are effectively displaced towards the extraction system at the bullet trap by using the piston principle. Thus the accumulation of gun powder rests as well as health hazard of the shooters are avoided effectively. High air quality is generated in the area around the shooter. The ballistics of the projectile will not be influenced by the air flow.

After completion of the air distribution wall the performance can be proved by visualisation with smoke (artificial fog) as well as by measurements of indoor air velocities and air flow direction.

To achieve a uniform air pattern, the air distribution wall should preferably not include any door or window. Yet should this be inevitable, the embrasures of these doors and windows should be designed in such a way that they can also discharge supply air.

Furthermore it is important to take care that the plenum of the air distribution wall does not obstruct the visual field of the supervisor watching behind the window. Therefore, the lateral parts of the window embrasure must be splayed out, to provide a view of the whole active area in front of the air distribution wall.

## System design

Krantz Components designs, manufactures and supplies air distribution walls for indoor firing ranges tailored to the individual indoor firing range architecture. These walls are designed to ensure an extensive supply air discharge into the indoor firing ranges.

The air distribution wall consists of a post-and-beam structure, fitted with air discharge panels with special perforations and built-in air guiding devices. Thermal influences in the room (e.g. because of different surface temperatures of the room enclosing surfaces) or differences between supply air and indoor air temperatures can be balanced by adjustable linear slot diffusers. These slot diffusers are arranged horizontally in the air discharge panels and can be adjusted individually to generate a very uniform air flow pattern.

All the necessary parts for installation like post-and-beam structure and air discharge panels, brackets etc. for connection to side-walls, floor and ceiling as well as fastening material like screws and dowels are delivered. All parts are prepared with bore holes and threaded holes to enable the customer to assemble the entire air distribution wall on site without great effort.

The post-and-beam structure and the panels are provided with a robust powder coating in the colour required by the customer.

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

By request our experts will provide technical support for the design of the air distribution wall for your indoor firing range.

## Laboratory test and performance

The mode of operation of the air distribution walls for indoor firing ranges developed by Krantz Components was tested in our R&D department and proved by means of smoke tracers in various distances and areas.

The lab test was documented in a report and a video film which is available upon request.

All delivered displacement outlets for indoor firing ranges are inspected and released by an authorised expert.

# Displacement outlet for indoor firing ranges

## Examples

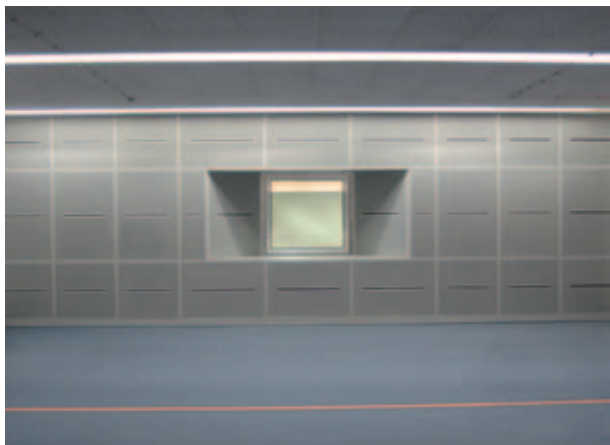
### Examples of different designs of new indoor firing ranges



Indoor firing range with air distribution through ceiling and wall



Air distribution wall with perforated air discharge panels and linear slot diffusers



Air distribution wall with perforated discharge panels and linear slot diffusers  
Window for the supervision of the shooter with air distributing embrasures

### Replacement of the air distribution wall in an existing indoor firing range



Former design of the wall (other manufacturer)



New design of the wall  
Make Krantz Components with improved indoor air velocity and flow direction

# Displacement outlet for indoor firing ranges

## Features and tender text

### Features

- Breathing zone of the shooter is free of hazardous substances
- High thermal comfort because of draught-free air supply
- Air distribution without influence on ballistics
- Easy and quick assembly (modular system)
- Optional integration of windows and doors for the supervision of the shooters
- Stable piston flow, even at temperature differences of up to  $\pm 4$  K between supply air and indoor air
- Individual design, tailored to the architecture
- Robust powder coating with free choice of colour
- Support in layout and concept by our experts
- Proof of function during commissioning if desired

### Tender text

...units

Displacement outlet for indoor firing ranges to build an air distribution wall to generate extremely low-turbulence displacement flow across the indoor firing range.

Functioning according to the piston principle, the supply air is discharged horizontally in an even flow from the entire back wall of the indoor firing range through easily removable perforated air discharge panels into the firing range. Slight temperature fluctuations in the room with a temperature difference of about  $\pm 4$  K can be equalized by integrated air guiding devices. Built as a false wall and acting as a pressurised plenum, with acoustic lining provided by the customer, on the back wall of the room, with connection to floor, walls and ceiling.

Air distribution wall as false wall, consisting of:  
Perforated air discharge panels with screw connections, fixed at a post-and-beam structure; with integrated, horizontally arranged, adjustable slot diffusers;  
with air distributing embrasures in wall openings for doors and windows.

Vertical embrasures at the observation window, with splayed enlargement of the window to provide unobstructed observation of the shooter. With all necessary brackets and cover sheets for connection to sidewalls, floor and ceiling as well as necessary installation material like screws and dowels. Delivery in convenient units that are easy to assemble on site.

### Technical data

Supply air volume flow rate: .....l/s [ $m^3/h$ ]

Material  
Air discharge panel: galvanized sheet metal  
Post-and-beam structure: mild steel

All visible parts like air discharge panels, post-and-beam structure and cover sheets powder coated to RAL ....

Range dimensions  
Width: ..... m  
Height: ..... m  
Depth: ..... m

Dimensions of air distribution wall  
Width: ..... mm  
Height: ..... mm  
Depth: ..... mm

Door openings  
Width: ..... mm  
Height: ..... mm

Window openings  
Width: ..... mm  
Height: ..... mm

Make: Krantz Components  
Type: VA-RSA

Note:  
After completion we offer to carry out a test or an inspection of the delivered displacement outlets (made by an expert according to the guidelines for firing ranges). This service is provided upon request of the customer.

Subject to technical alterations.

# Displacement outlet for indoor firing ranges

## Reference projects

### Excerpt from our reference list

<b>National</b>	<b>Supply air volume flow rate</b>	<b>International</b>	<b>Supply air volume flow rate</b>
Meiningen AFTP Police Force	2 861 l/s [10 300 m <sup>3</sup> /h]	<b>Australia</b>	
Lübeck Local Authority Centre	2 861 l/s [10 300 m <sup>3</sup> /h]	– Victoria Police Academy	11 111 l/s [40 000 m <sup>3</sup> /h]
Delmenhorst Police Force	4 583 l/s [16 500 m <sup>3</sup> /h]	<b>France</b>	
Hamburg Police Force, 9 firing ranges up to 9 444 l/s [34 000 m <sup>3</sup> /h]		– Paris 12th district, Police Station	4 167 l/s [15 000 m <sup>3</sup> /h]
Hattingen Police Force	4 070 l/s [14 650 m <sup>3</sup> /h]	– Auchel Indoor Firing Range	3 375 l/s [12 150 m <sup>3</sup> /h]
Selm Police Force	5 944 l/s [21 400 m <sup>3</sup> /h]	– Monterau Indoor Firing Range	9 722 l/s [35 000 m <sup>3</sup> /h]
Nürtingen Police Station	3 375 l/s [12 150 m <sup>3</sup> /h]	– Pyretherm Indoor Firing Range	8 333 l/s [30 000 m <sup>3</sup> /h]
RSA Nagold	4 250 l/s [15 300 m <sup>3</sup> /h]	<b>Great Britain</b>	
Indoor Firing Range ‘SG Tell Uttenreuth’	3 500 l/s [12 600 m <sup>3</sup> /h]	Yardley Chase Rifle Range	2 222 l/s [8 000 m <sup>3</sup> /h]
‘Schloß & Gut Liebenberg’ (castle & estate)	7 625 l/s [27 450 m <sup>3</sup> /h]	<b>Netherlands</b>	
(4 indoor firing ranges, 25 m, 50 m, 100 m and shooting cinema)		– A7 Gebouwenkomplex	6 500 l/s [23 400 m <sup>3</sup> /h]
		– Borne Police Force	6 639 l/s [23 900 m <sup>3</sup> /h]
		<b>Switzerland</b>	
		– Aargau Gun Firing Range	6 167 l/s [11 400 m <sup>3</sup> /h]
		– Teufen Indoor Firing Range	8 333 l/s [30 000 m <sup>3</sup> /h]



**Caverion Deutschland GmbH**  
**Krantz Components**

Uersfeld 24, 52072 Aachen, Germany

Phone: +49 241 441-1

Fax: +49 241 441-555

[info.komponenten@krantz.de](mailto:info.komponenten@krantz.de)

[www.krantz.de](http://www.krantz.de)

A trademark of Caverion