

Item	Quant.	Description	Unit price €	Total price €
01		<p><b>General Requirements</b>                      The axial flow fans should be manufactured in a simple and sturdy manner. The fans should be exchangeable.</p> <p>The axial flow fans should be designed to be able to run in both directions. The volume flow has to reach at least 95% of the forward mode duty considering a quadratic resistance curve. In the event of an emergency it should be possible to change the direction within a de-energised period of 15 seconds.</p> <p>Under normal conditions, the fan has to be designed to run at temperatures between -20 and +40°C. In the event of a fire, the fan has to withstand a temperature of up to 400°C for 90 minutes. In order to prove this, for the relevant parts like impeller, motor, terminal box and terminals a heat test of a complete unit has to be conducted. The test must be certified by an independent laboratory. Testing of single parts e.g. impeller blades is not valid or sufficient. If the manufacturer can not provide a suitable certificate, then the costs for a heat test must be included in the quoted price.</p> <p><b>Fan characteristics</b>                      Different duty points have to be reached by speed control via a frequency converter. To enable the axial fans to run in parallel, the performance curve must be 'stall-free.' This should be ensured by a suitable anti-stall device.</p> <p><b>Casing</b>                      The casing and the motor support should be manufactured from heavy construction of min. 10 mm steel. To avoid corrosion in cracks, the flanges should be formed at the fan casing. Welds must be continuous.</p> <p>To avoid corrosion, the casing has to be hot dip galvanized and coated by suitable primer and epoxy paint. The thickness of the galvanization should be not less than 80 µm, and the additional coating not less than 150 µm.</p> <p>The separated external terminal boxes for power supply and control devices should be manufactured in IP65.</p>		

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		<p><b>Impeller</b> The impeller must be able to resist fire conditions. The blades should be made from corrosion-resistant, cast aluminium with imbedded structures of high quality steel or constructed as a welded steel hollow blade. The hub should be made from steel in a welded design. The impeller is directly mounted onto the motor shaft. To ensure high efficiencies, the blades should be profiled. The blade angle is adjustable when the fan is at standstill. The impeller has to be carefully statically and dynamically balanced (min. G6.3).</p> <p>To minimize the amount of maintenance and to ensure maximum safety in the event of fire, a design without hydraulically adjustable impeller blades would be preferable.</p> <p><b>Motor</b> For axial-flow fans, three-phase, fully enclosed, squirrel cage motors in IP 55 (according to IEC standards) should be used. To reach a well-balanced cooling and air stream, the motor design should be IMB5. The motor support with integrated guide vanes is welded onto the fan casing. The electrical start will be direct on line in voltage operation 400V +/- 5%.</p> <p>If the axial-flow fan be should be driven via a frequency converter, the motors have to be sized in a manner that the axial fan can run, considering a quadratic resistance curve, without motor overload in case the frequency converter fails.</p> <p>The motors are suitable to withstand 400°C for 90 minutes. A certificate from the motor manufacturer is required.</p> <p>The bearing lifetime is min. 50 000 hours. The bearings have to be easily re-lubricated from outside the casing.</p> <p>The halogen free and flame resistant power cables are connected to the external terminal box.</p>		



# Tunnel Ventilation

**Project Component**    **Reversible Axial Flow Fan**

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		<p><b>Accessories</b> The axial flow-fans should be equipped with the following accessories.</p> <p><b>Vibration attenuators</b> The axial-flow fans should be mounted on steel spring type vibration attenuators.</p> <p><b>Vibration control</b> A vibration control in IP 65 to measure the vibration velocity should be mounted at the fan casing. The sensor is furnished with an analogue output of 4 -20 mA corresponding to 0 –20 mm/s and a potential free switching contact of 30V 1A.</p> <p><b>Options</b></p> <ul style="list-style-type: none"> <li>○ Thermistor protection (3 PTC)</li> <li>○ Thermistor protection (6 PTC)</li> <li>○ Thermistor protection (3 Pt100)</li> <li>○ Monitoring of the bearing temperatures (PTC)</li> <li>○ Monitoring of the bearing temperatures (Pt100)</li> <li>○ Bearing control VC-1100</li> <li>○ Space heater</li> <li>○ Flex. Connection including counter flanges suitable for 400°C/90 min</li> <li>○ Antistall device</li> <li>○ Split casing</li> <li>○ Inspection opening</li> <li>○ Inlet cone</li> <li>○ Protection grills</li> </ul>		

DIN ISO 9001 certified



ISO 9001

Accredited by the Dutch Council for Certification

**WITT & SOHN**  
**IGW Ventilatoren**