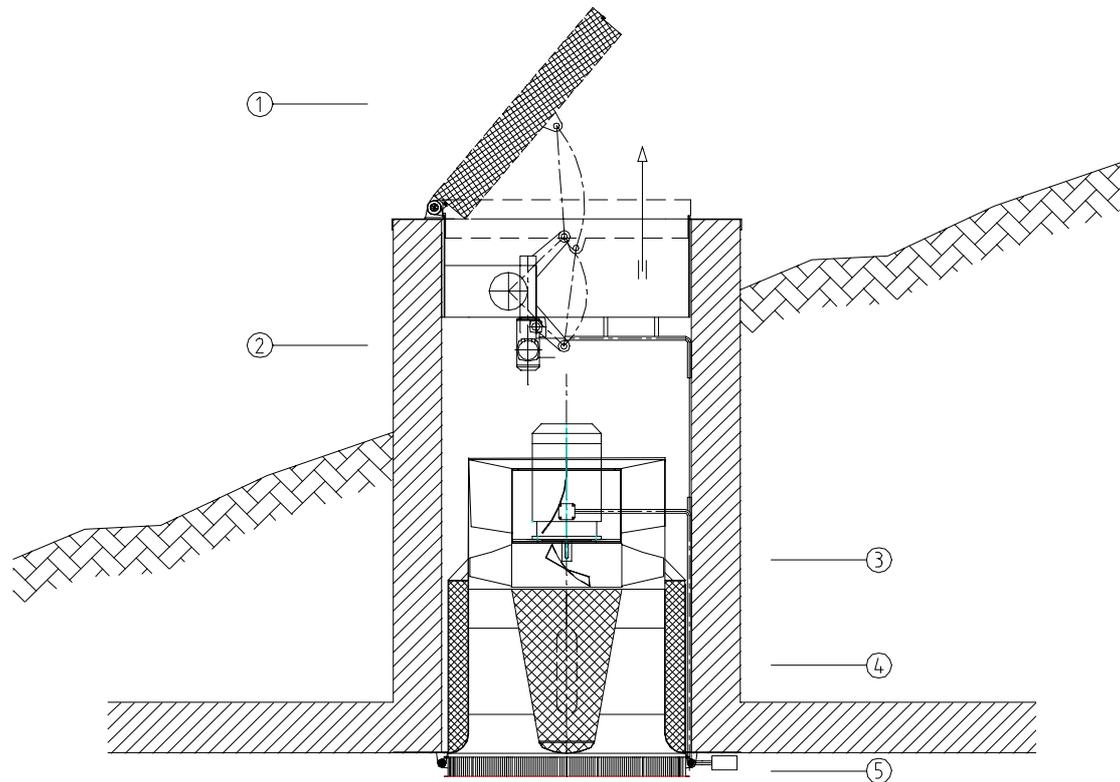


Tunnel Heat and Smoke Extraction Unit



Legend:

- 1) Noise damped hatch with automatic damper
- 2) Motorised damper actuator opens the damper within 20 s
- 3) Heat rated smoke extraction fan with $10 \text{ m}^3/\text{s}$ to $15 \text{ m}^3/\text{s}$
- 4) Conical silencer with 10 dB noise attenuation
- 5) Flame stop to prevent the flash-over of a fire

Description:

All parts of the unit are made of corrosion resistant stainless steel and to withstand hot gas temperatures of 400°C to 600°C over a period of at least 120 minutes to 60 minutes (class F400 and F600 according to DIN-EN 12101-3). All those electrical parts, exposed to the fire's heat, such as cables, contactors and boxes are protected by heat resistant calcium-silicate board or mineral fibre wrapping with an external stainless steel sheet cover. The special fan motor fits into the heat insulated cylindrical mounting shaft of the fan. The fan operation is supervised by a pressure differential switch which shall close the related exhaust damper automatically if the fan fails, in order to avoid the re-circulation of smoke between adjacent exhaust units when operating simultaneously in parallel. The acoustical insulation of the hatch reduces the noise emitted from the traffic of the tunnel into the neighbourhood by 30 dB to 50 dB. The damper shall be sealed airtight, noise-tight and watertight and persons may walk over it with a total load of 250 kg. The flame stop filter shall prevent the flash-over of the flame from the tunnel inside to the outside. The smoke and fire gases shall be blown over the roof of the neighbouring houses.

Pictures of the heat and smoke exhaust shafts:



Top view of the exhaust shafts for the installation of the extract fans and dampers (20 May 2004).



Bottom view of the shafts and holes for the installation of the extract fans and cables (20. May 2004).

Most effective arrangement of the heat and smoke extraction units:



Heat and smoke exhaust units will be placed across the tunnel roof at right angles to the tunnel axis. In this way all heat and smoke released from a car fire can be removed best. A separate ventilation system with jet fans will be provided for the control of the air pollution inside and outside of the tunnel (09. June 2003).



The height of the exhaust shafts follows the shape of the re-constructed hill slope (20. May 2004).