Ventilation Design Criteria in Different Countries And Common Practise in Poland
Dipl.-HTL-Ing. Bernhard Hoepperger:

- More than 20 years of experience in tunnel ventilation design
- Finished about 300 tunnel projects worldwide (> 20 countries on 5 continents)
- Re-located 2012 and 2013 in Los Angeles for a big tunnel project
- Member of the Austrian Guideline **RVS 09.02.31** and **RVS 09.02.32**
- Official reviewer of **PIARC**

- Started his own company TFD Consulting Engineer e.U. in 2015
- TFD Consulting Engineer e.U.:
  - engineering company for mechanical engineering
  - specialized on ventilation design
    - for road tunnels
    - train tunnels
    - subway systems
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**Agenda:**

- Overview of most relevant ventilation systems
- Ventilation systems in Swiss (ASTRA)
- Ventilation systems in Germany (RABT and EABT)
- Ventilation systems in Austria (RVS)
- Comparison with common polish standard
Overview of Most Relevant Ventilation Systems

- Longitudinal ventilation system usually using jet fans

- Point extraction usually combined with a longitudinal ventilation system

- Semi transverse ventilation system having an exhaust duct and dampers

Source figures: ASTRA 13001
Swiss ASTRA 13001

- Usually no mechanical ventilation system for less than 800 m
- Based on traffic data and gradient a longitudinal ventilation system for
  - One way traffic up to 3,000 m
  - Two way traffic up to 1,500 m
- Based on traffic data, gradient and tunnel length
  - Point extraction
  - Semi transverse ventilation system
- Design heat release rate of 30 MW
- 55 road tunnels are >2,000 m
German RABT2006 and EABT-80/100

- Usually no mechanical ventilation system for less than 600 m
- Based on traffic data a longitudinal ventilation system for
  - One way traffic up to 3,000 m
  - Two way traffic up to 1,200 m

- Based on traffic data and tunnel length
  - Point extraction
  - Semi transverse ventilation system

- Design heat release rate of 30 MW
  - >4,000 trucks.km/day/tube 50 MW
  - >6,000 trucks.km/day/tube 100 MW

- 74 road tunnels are >1,000 m
Austrian RVS 09.02.31

- Usually no mechanical ventilation system for less than 700 m
- Based on traffic data a longitudinal ventilation system for
  - One way traffic up to 5,000 m
  - Two way traffic up to 3,000 m

- Based on traffic data and tunnel length
  - Point extraction
  - Semi transverse ventilation system

- Design heat release rate of 30 MW
  - >15% trucks based on risk analyses increase to 50 MW

- More than 40 road tunnel are >1,500 m
## Comparison with common polish standard

<table>
<thead>
<tr>
<th></th>
<th>ASTRA</th>
<th>RABT / EABT</th>
<th>RVS</th>
<th>Poland</th>
</tr>
</thead>
<tbody>
<tr>
<td>no mechanical ventilation system</td>
<td>&lt;800 m</td>
<td>&lt;600 m</td>
<td>&lt;700 m</td>
<td>each project has their own definitions, PFU's and requirements. Mostly a sum of different guidelines</td>
</tr>
<tr>
<td>longitudinal ventilation system one-way traffic</td>
<td>&lt;3.000 m</td>
<td>&lt;3.000 m</td>
<td>&lt;5.000 m</td>
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<tr>
<td>longitudinal ventilation system two-way traffic</td>
<td>&lt;1.500 m</td>
<td>&lt;1.200 m</td>
<td>&lt;3.000 m</td>
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</tr>
<tr>
<td>design heat release</td>
<td>30 MW</td>
<td>standard is 30 MW</td>
<td>standard is 30 MW</td>
<td>mostly 100 MW</td>
</tr>
</tbody>
</table>

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**Prepare a Polish Tunnel Ventilation Guideline**
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