

# Test method for fire suppression systems in buses and coaches

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Agenda item 2(a))

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# Bus fires – a world-wide increasing issue

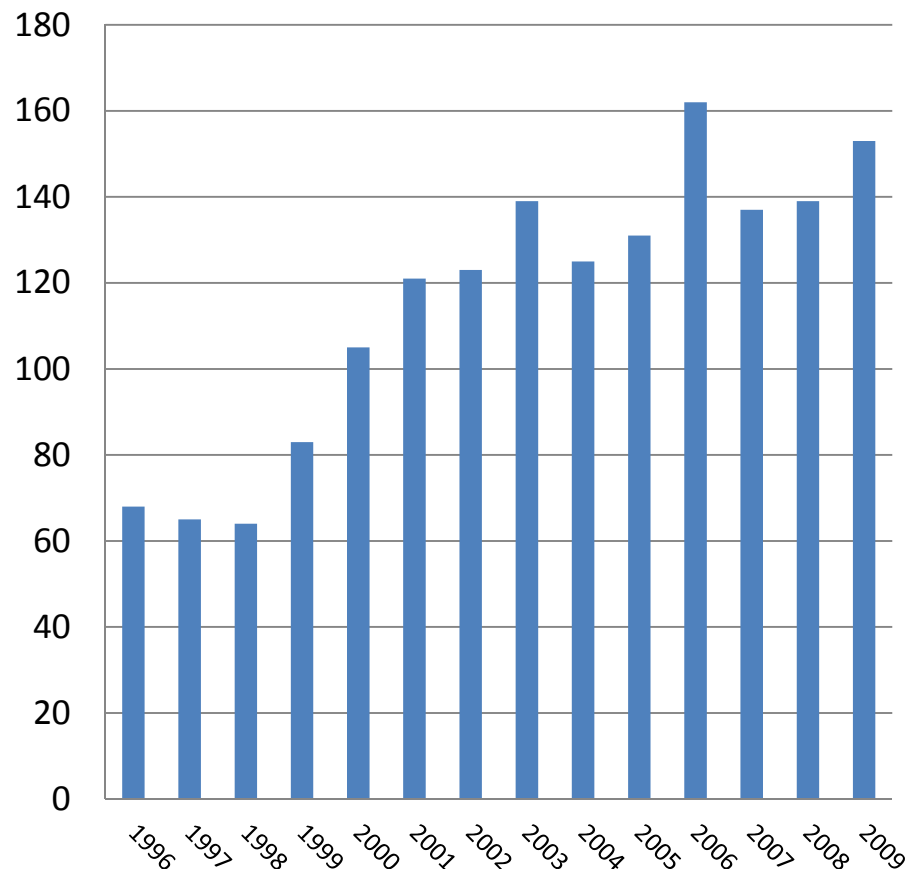


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# Statistical survey of bus fires

- The number of reported bus fires has more than doubled in Sweden since the late 90's
- A fire incident is reported in 1 % of all buses in Sweden every year
- On the basis of statistics we estimate that roughly 10 % of all buses are involved in a fire incident during their lifespan

Bus fire incidents in Sweden (1996 – 2009)



Source: The Swedish Bus and Coach Federation (2010),  
SP Technical Research Institute of Swedish (2011)



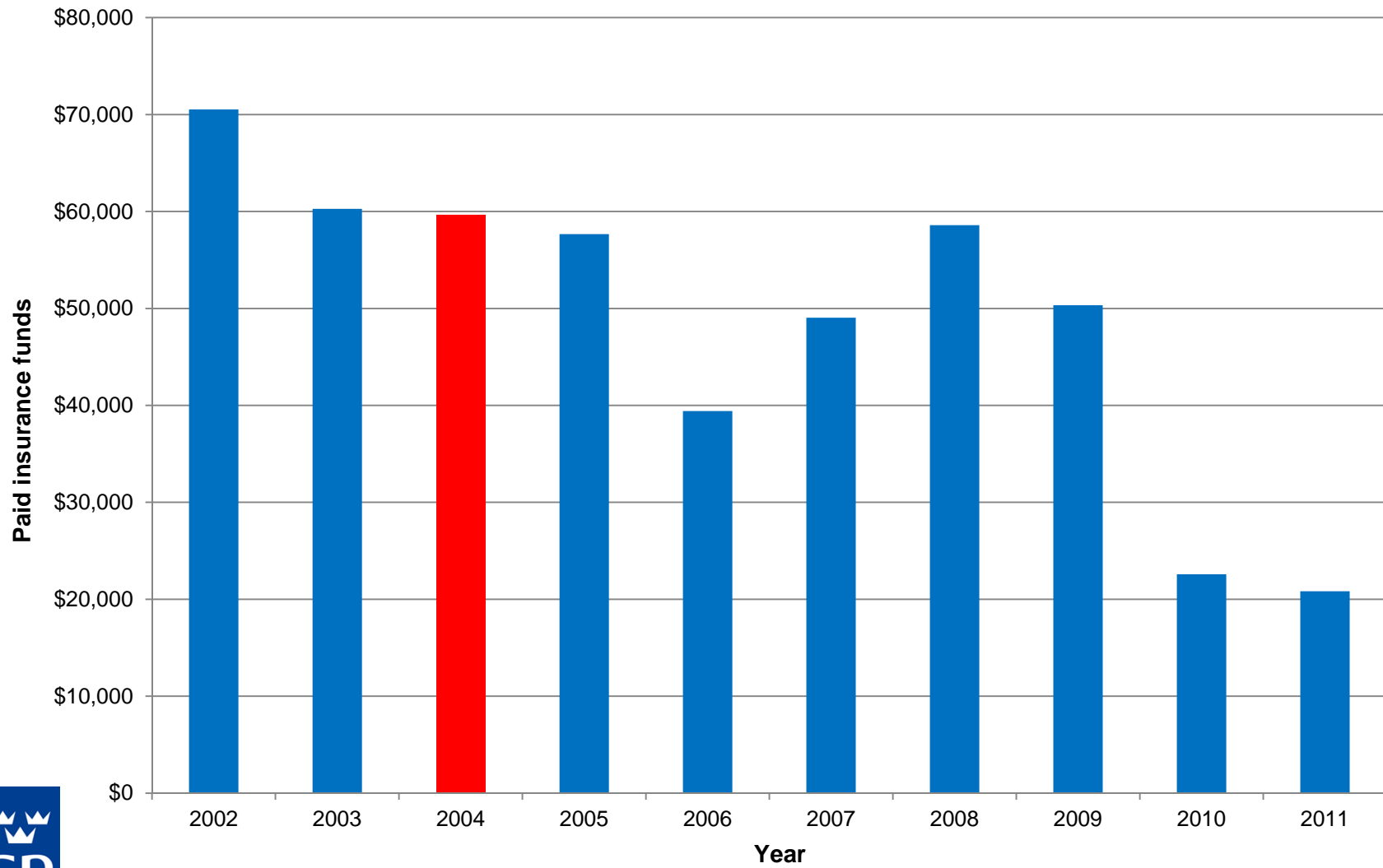
# Statistical survey of bus fires

- Report from Germany:
  - 350 - 400 bus fires is reported every year in Germany (0.4 % of all buses)  
*Source: PUBA (2010)*
- Report from Finland:
  - Bus fires has almost doubled in Finland over the last 10 years  
*Source: VTT (2010)*
- Report from USA:
  - An average of six bus or school bus fires reported every day in USA  
*Source: NFPA (2006)*



# Fire safety regulations with good results

## Average cost per bus fire for insurance companies in Sweden



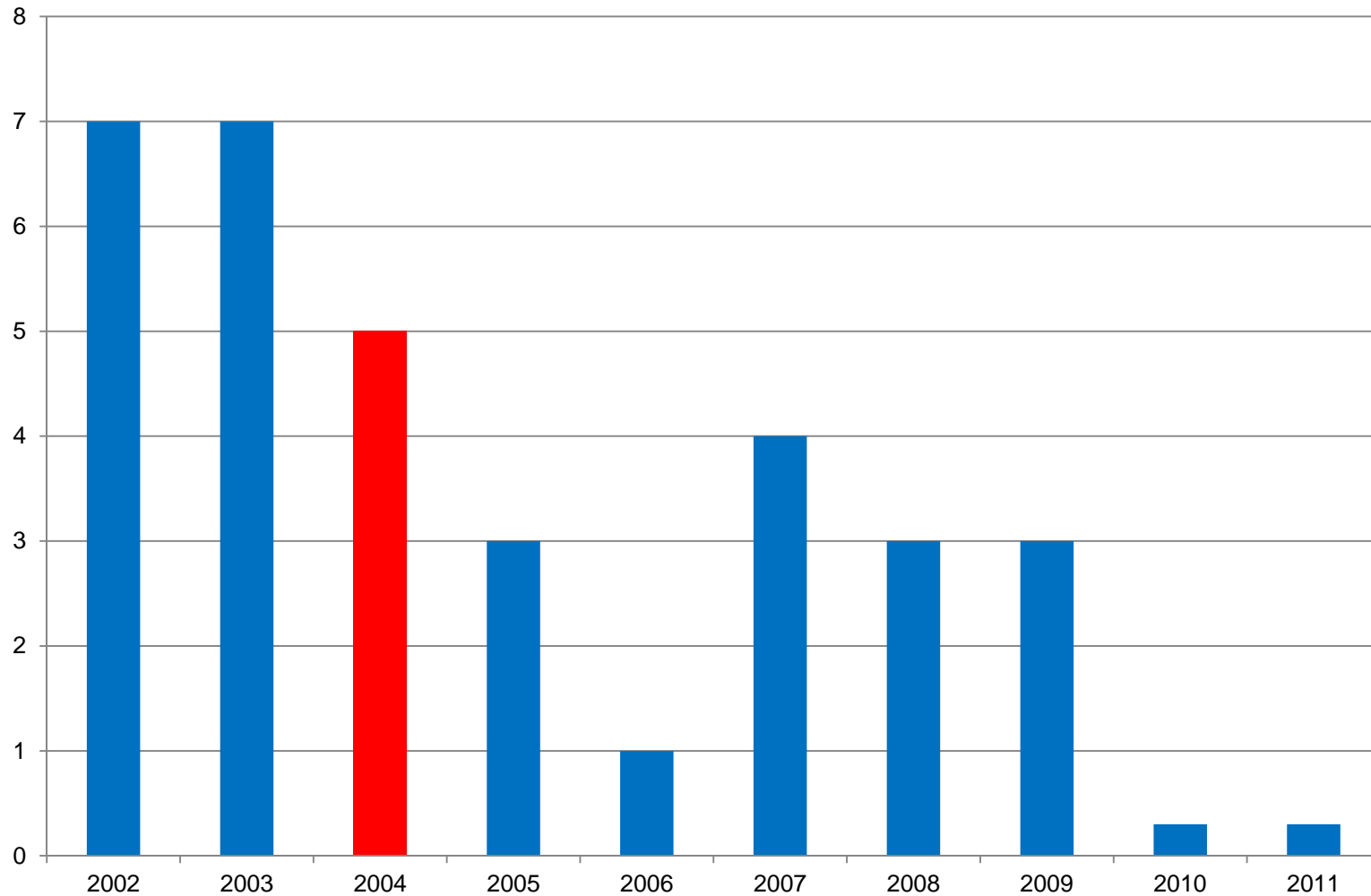
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Source: Swedish Insurance companies, 2012



# Fire safety regulations with good results

Number of bus fires with a cost above \$150,000



# Fire Suppression Technologies

- Almost 20 manufacturers of Fire Suppression systems for vehicles in Europe and USA
- Different technologies to extinguish engine fires.
- For example:
  - Dry Chemical (ABC-powder and BC-powder)
  - Wet Chemical and foam
  - Water mist
  - Aerosol
  - Clean Agent (gaseous system)

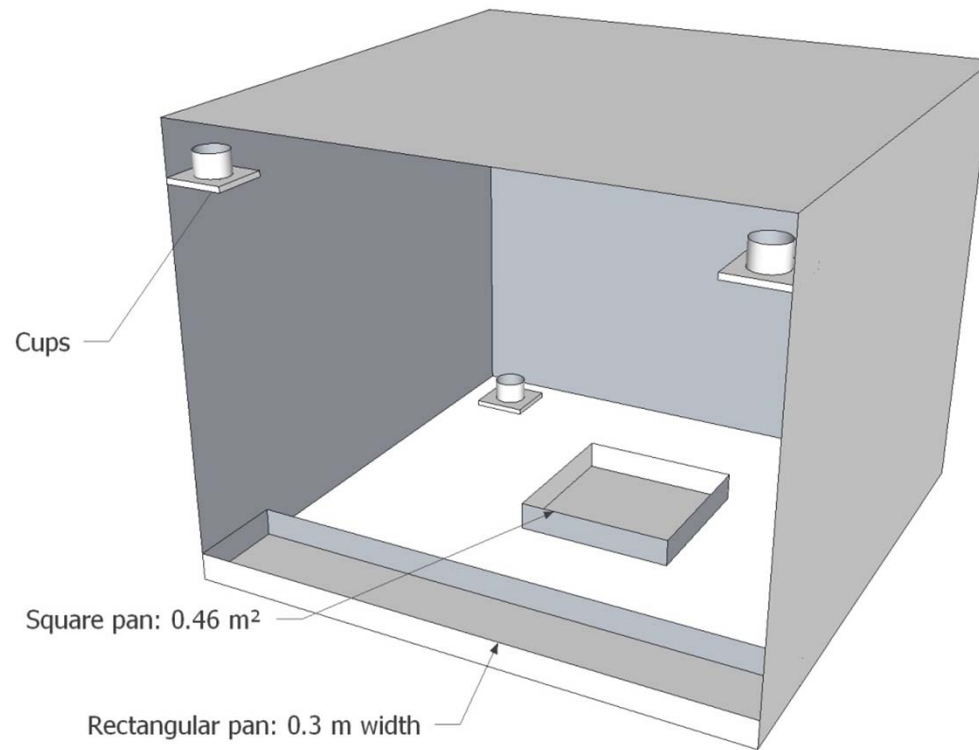
Are they all good enough?

How can the systems be validated?



# Test methods

- Repeatable test methods are usually very simplistic:



**Source: UL 1254**



# Test methods

- New approach: Combine repeatable test methods with realistic fire scenarios
- Identified properties which are important to include in the test:
  1. Complex geometry with many obstructions
  2. High air flow
  3. Multiple fire locations
  4. Different fire scenarios
  5. Hot surfaces with re-ignition potential



# The reference group



Suppression system manufacturers

Bus and coach manufacturers

Transport authorities

Trade associations

Bus operators

Insurance companies

Test institutes

Fire investigators



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# SP method 4912



## SP METHOD 4912

Edition 1, 2011-12-06

Method for testing the performance of fire suppression systems installed in engine compartments of buses and coaches



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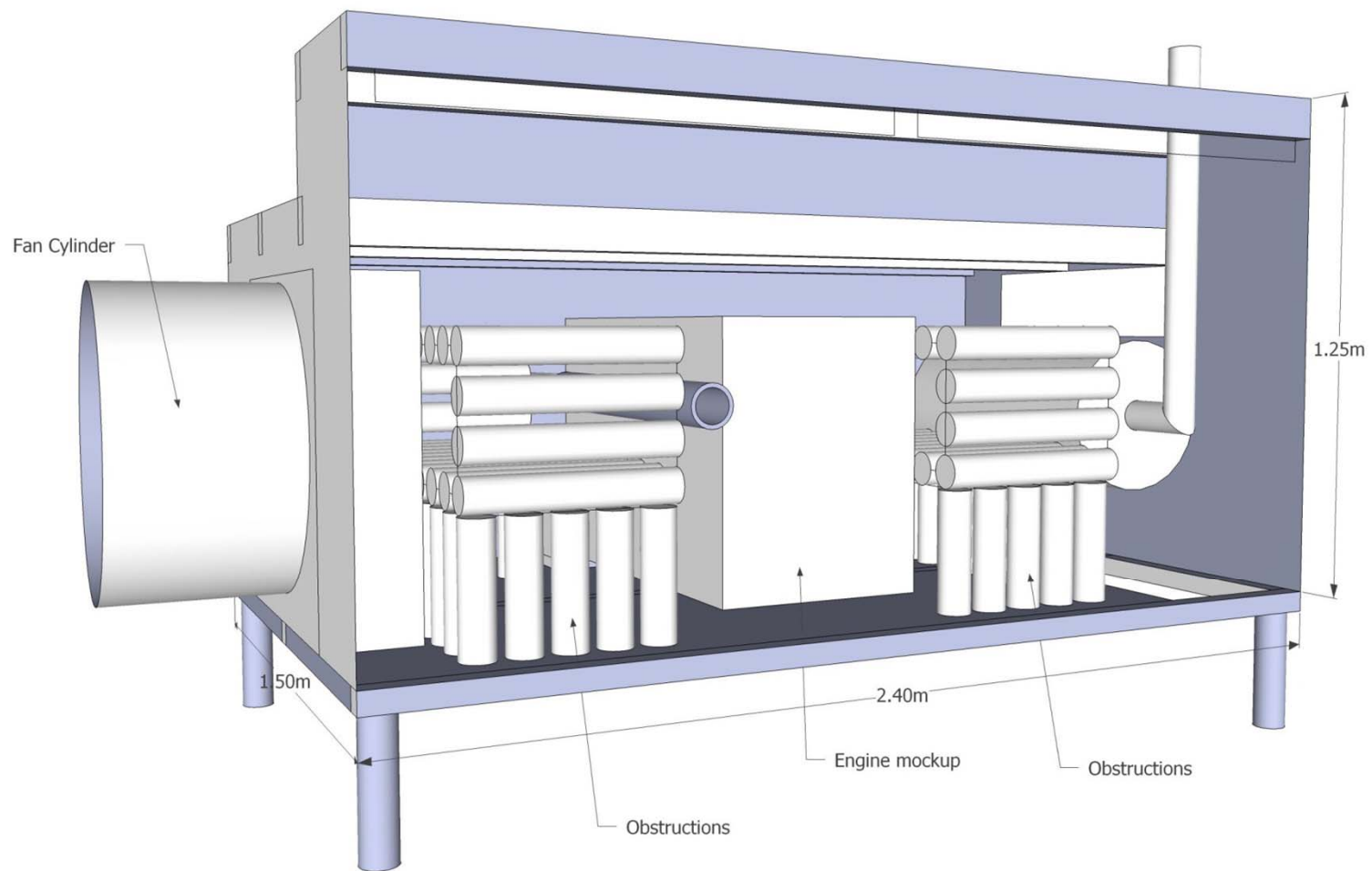
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## Complex geometry with many obstructions





# Test apparatus geometry

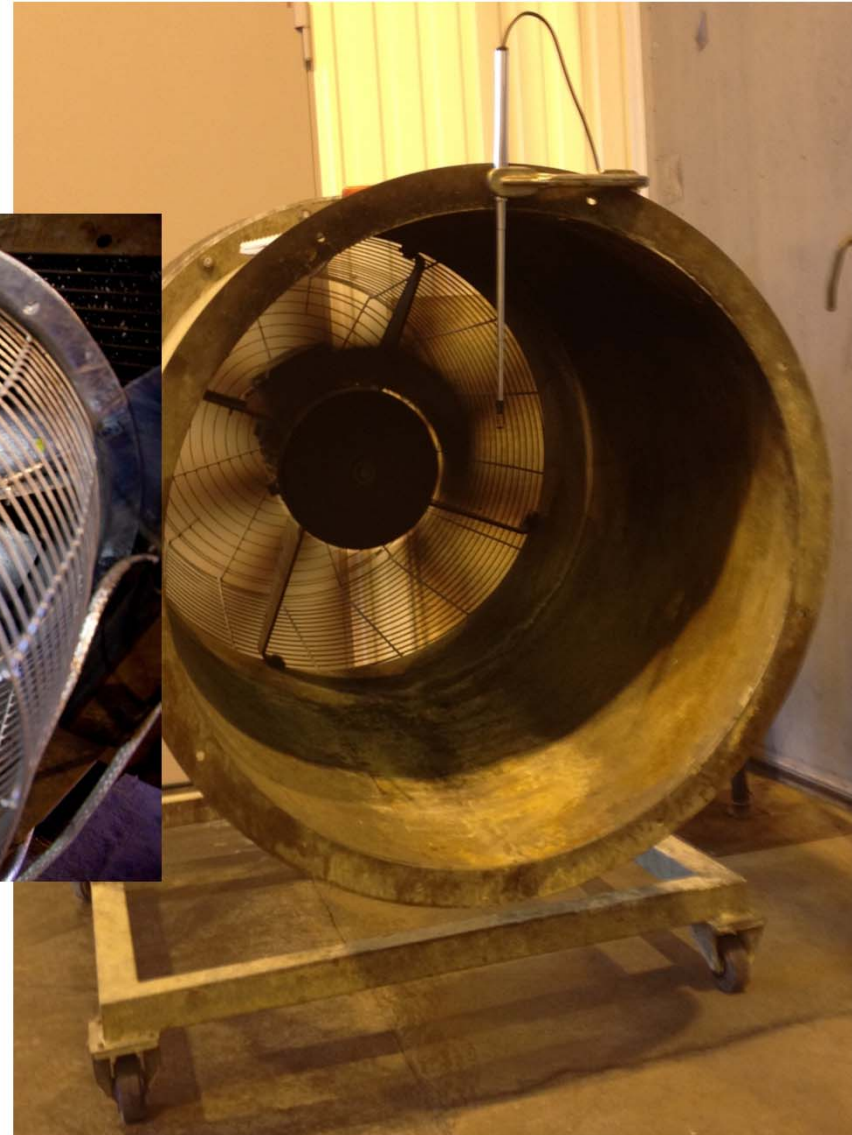


## High air flow





# Test apparatus fan

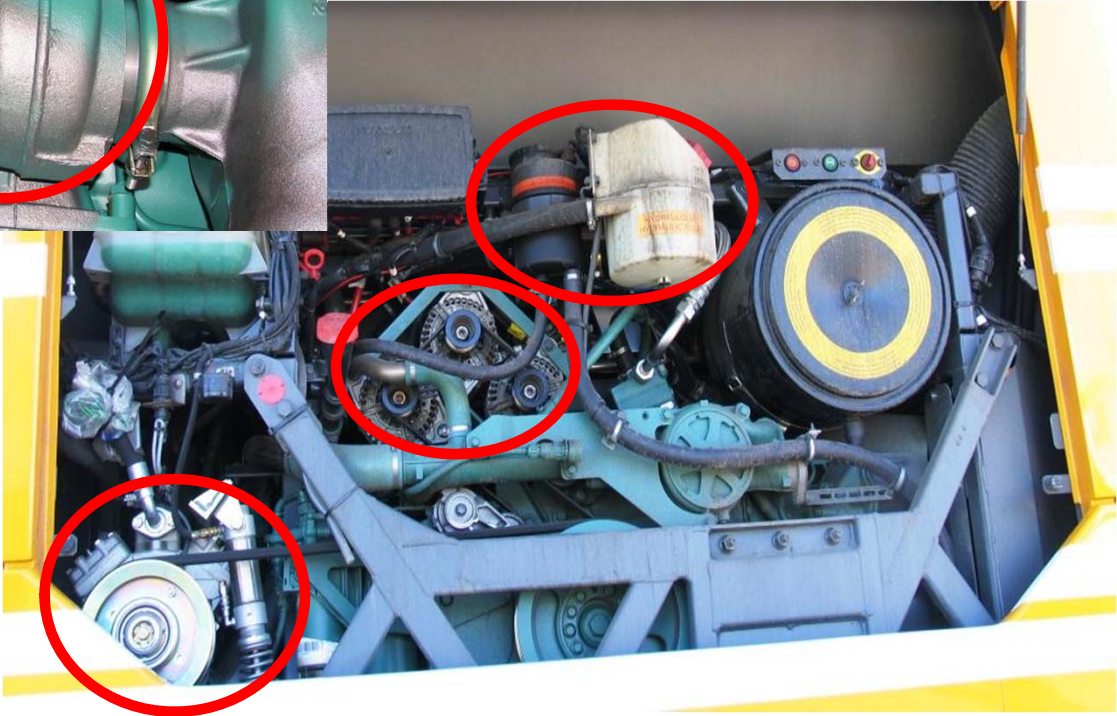
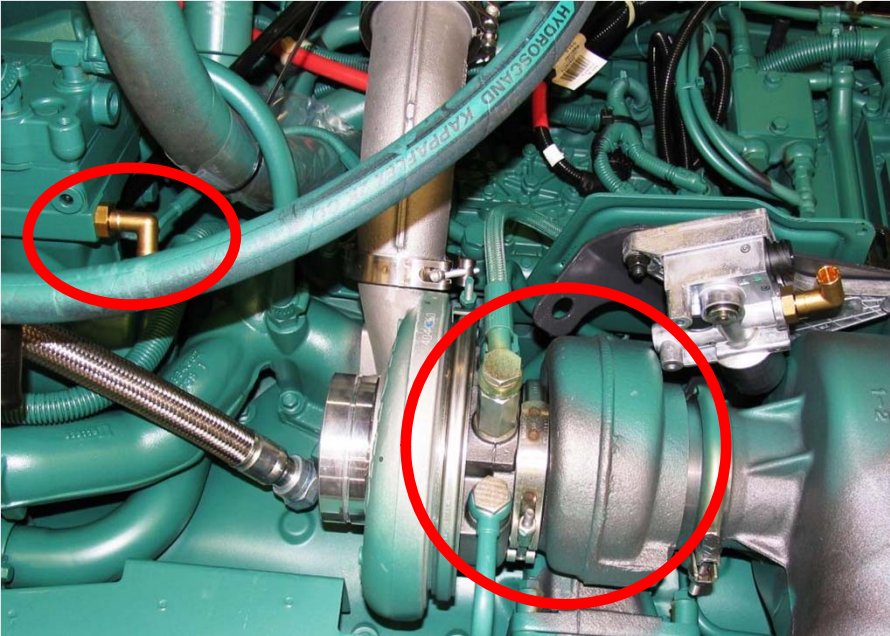


# Different fire scenarios

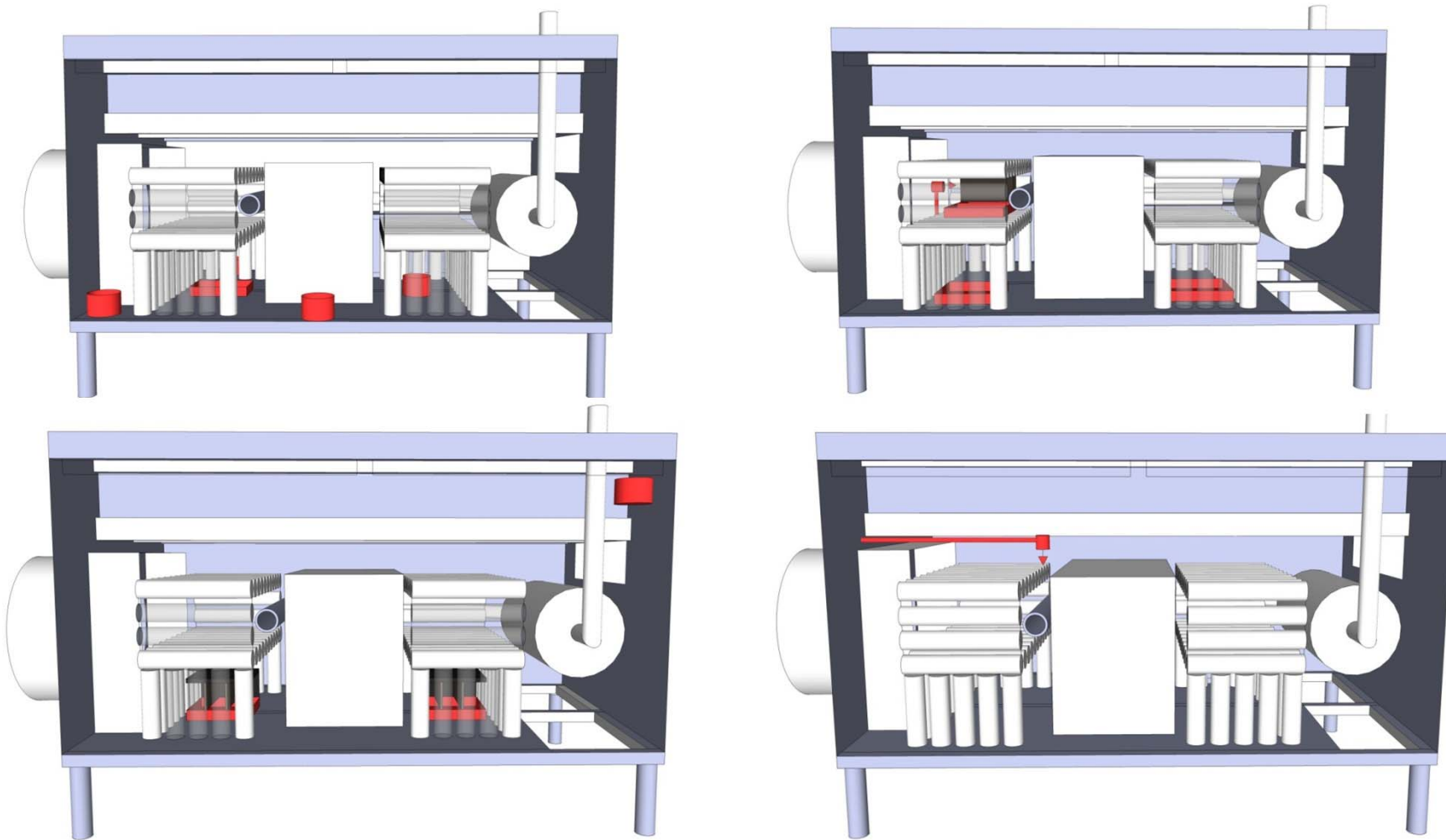




# Multiple potential fire locations



# Different fire scenarios



# Example: high fire load



# Thank you!

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