

Proposal for fire safety improvement of bus interiors

Jesper Axelsson,
Jan Petzäll, Asbjørn Hagerupsen



Statens vegvesen



SP Technical Research Institute of Sweden



Is there a problem?



Belgium 2003
11 dead



US Texas 2005
24 dead



Poland 2005
12 dead



Switzerland 2006
3 dead

Real-scale fire test at SP



SP Technical Research Institute of Sweden

Background – Research project

- Statistical survey of bus fires in Norway and Sweden
- Survey and fire tests of interior materials in buses
- Bus construction risk assessment
- Engine compartment – partition and fire suppression
- Fire simulations
- Real-scale fire test
- Proposals for improvements and change



Regulation No. 118 – burning rate test

- Test of horizontal flame spread (ISO 3795)
- Burning rate of 100 mm/minute is the main fire safety requirement for interior materials



Other transportation sectors

Fire safety requirements are well established in other sectors of transportation where escape is or can be difficult:

- Trains
- Passenger ships
- Subways

In comparison, the requirements for buses are very weak and allow much lower safety than the examples above



Proposed fire tests for Reg. No. 118

Use of established ISO tests, applied world-wide.

Evaluation of:

- Ignition and flame spread behaviour
- Smoke production
- Toxic/irritant gas generation
- Heat release from seats in real scale

Established in transportation → Complying materials exist on the market



Proposed alternative test for Flame Spread

- Horizontal flame spread test for surface linings (IMO, ISO)
- European harmonised flooring test (ISO)



Proposed test for Smoke and Toxic Gas production

- Accumulative smoke test (IMO, ISO)
- Simultaneous gas analysis by FTIR (IMO, ISO)



Proposed test for Seats



SP Tech

Conclusions

- Buses and coaches have weak fire safety requirements for interiors.
- The fire safety level can easily be improved with materials that:
 - resist fire for a longer period of time,
 - produce less smoke and toxic gases.
- This can be accomplished using established international fire tests, also used in other public transportation.
- Proposed solution in draft amendment to Reg. No. 118 in informal documents at GRSG 94.
- Will result in more time for evacuation, easier evacuation, more time to extinguish the fire, decreased risk in tunnels.

