





ASSESSMENT OF POSSIBILITIES OF COOPERATION BETWEEN SMOKE AND HEAT EXHAUST VENTILATION AND WATER MIST INSTALLATION IN BUILDINGS

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- 1. BASIC
- 2. FIREFIGHTING SYSTEMS
- 3. NEW DESIGN
- 4. APPLICATIONS
- 5. CONCLUSION



BASIC INFORMATION

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FIRE GROWTH IN ENCLOSURE



30 seconds



75 seconds



135 seconds



180 seconds



197 seconds



200 seconds

Source: BRE Guidance and Report 2008 (www.bre.co.uk)

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FIRE GROWTH IN ENCLOSURE





COMBUSTION PRODUCTS AND GASES

<u>CAR</u> Heat release rate Smoke volume flow rate

COMPUTER PRINTER

Heat release rate **Smoke volume flow rate**

5 MW 20 m³/s (72.000 m³/h)

300 kW **0,5 m³/s** (1.800 m³/h)

REFRIGERATOR

Heat release rate **Smoke volume flow rate**

500 kW 1,5 m³/s (5.400 m³/h)

Source: vfdb (www.vfdb.de)



FIRE GROWTH IN ENCLOSURE - EVACUATION SAFETY



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DEVELOPMENT OF FIRE – SMOKE CONTROL VENTILATION



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FIREFIGHTING SYSTEMS

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ESTIMATED VALUE OF THE DAMAGES DUE TO FIRES IN GERMANY





FIREFIGHTING SYSTEMS



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SMOKE AND HEAT EXHAUST VENTILATION SYSTEMS (SHEVS)





WITHOUT SHEVS

MECHANICAL SHEVS

Source: vfdb (www.vfdb.de)

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SMOKE AND HEAT EXHAUST VENTILATION SYSTEMS (SHEVS)



Source: vfdb (www.vfdb.de)

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FIREFIGHTING SYSTEMS





Source: Prof. Obuchow, Fachverband TR e. V.

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SMOKE AND HEAT EXHAUST VENTILATION SYSTEMS (SHEVS)



NATURAL SHEVS



MECHANICAL SHEVS

Source: vfdb (www.vfdb.de)

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FIXED WATER FIREFIGHTING SYSTEMS

SPRINKLER SYSTEM



dropel diameter > 1 mm Reaction surface from 1 liter water ~ 3 m² WATER MIST SYSTEM



dropel diameter < 1 mm Reaction surface from 1 liter water ~ 60 m²

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FIREFIGHTING SYSTEMS

PROBLEMS OF COOPERATION BETWEEN SMOKE AND HEAT EXHAUST VENTILATION AND FIXED WATER-BASED FIREFIGHTING SYSTEM





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PROBLEMS OF COOPERATION BETWEEN SMOKE AND HEAT EXHAUST VENTILATION AND FIXED WATER-BASED FIREFIGHTING SYSTEM

INTERACTION

WATER FIREFIGHTING SYSTEM

- 1. WILL LIMIT FIRE SPREAD AND CONTROL GROWTH
- 2. WILL NOT REDUCE SMOKE DAMAGE

SMOKE CONTROL VENTILATION

- 1. WILL PREVENT SMOKE LOGGING
- 2. ASSIST ESCAPE
- 3. AID FIRE FIGHTING



NEW DESIGN

COOPERATION BETWEEN SHEVS AND WATER MIST

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NEW DESIGN



IMPORTANT PHENOMENA



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NEW DESIGN



- ✓ Cooling Effect (smoke and surface)
- ✓ Reduction of Radiant Heat
- ✓ Oxygen Depletion
- ✓ Interaction with Smoke

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PRINCIPLE OF OPERATION



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RESEARCH – TEST STAND





Standards: 1. ISO/TS 17431:2006 Fire tests – Reduced-scale model box test

2. NFPA 204





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NUMERICAL CALCULATIONS (CFD)



TRADITIONAL SHEVS

COOPERATION BETWEEN SHEVS AND WATER MIST INSTALLATION

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DROPLET TRAJECTORY MODEL – TRAVEL DISTANCES



Source: BRE Centre for Fire Safety Engineering University of Edinburgh

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EFFICIENCY TEMPERATURE REDUCTION

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APPLICATIONS

COOPERATION BETWEEN SHEVS AND WATER MIST

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Dunamenti Tűzvédelem member of mercor. group

APPLICATIONS





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MUSEUMS





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MULTISTOREYED BUILDING





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ENERGY EFFICIENT HVAC AND SHEVS OF NEW AND MODERNIZED SHOPPING CENTRE

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APPLICATIONS

FACTORY BUILDING







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HIGHRISE BUILDING





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CONCLUSION

COOPERATION BETWEEN SHEVS AND WATER MIST

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BENEFITS

- ✓ Good possibility and efficiency of cooperation between fire ventilation system and water mist system
- ✓ Good capability of the cooperating systems for improvement of human evacuation conditions
- ✓ Good capability of heat absorbed by water mist
- Good capability of protection technical equipment and elements of a building



THANK YOU FOR YOUR KIND ATTENTION

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