Secrets of smoke extraction and HPWM in the new underground garage beside Hungarian Parliament

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Full range of active fire fighting

4 levels, 560 car parking, 22,000m²
# Relations between smoke extraction and HPWM in Hungarian National Regulation of Fire Safety

## 1. Why do we need automatic fire fighting systems?

More than one level underground garages must be equipped by automatic fire extinguishing system and detection system.

## 2. What would be the smoke extraction due to National Regulations?

541§ Machinery smoke extraction can ransom gravity natural smoke extraction. Each effective m² open surface shall be considered as 2 m³/sec machinery ventilation. For garages 1% of total fire section shall be the min open surface for natural smoke extraction.

We have: 3750 m² maximum fire section

1% = 37.5 m² smoke extraction x 2 m³/sec = 270.000 m³/h

## 3. How can we reduce smoke extraction, without loss of safety?

506§ SUBJECT SMOKE EXTRACTION

For non standardised cases, individual designed solutions must be controlled by computer simulations (software must be accepted by Hungarian Nationa Disaster Ministry=FDS). Due to this simulation we could reduce down to 0.5%.

135.000 m³/h
4. Which are these paragraphs support us on optimising system?

507§ SUBJECT SMOKE EXTRACTION
(1) The application of smoke extraction is forbidden for rooms where total flooding automatic fire fighting system is designed. (high expansion foam, gas, open nozzle HPWM)
(2) For those rooms where water mist system is installed (bulb system), Hungarian National Disaster Ministry will define the need and density of smoke extraction.

5. How can we reduce the heat resistance requirements by HPWM?

515 § Smoke extraction equipments (fan motor, cable duct must be at least 400°C heat resistant for 90min operation designed. Due to the results of FDS simulation, the max temperature has been improved not to exceed 300°C.
3. SAVINGS

- Instead of 400C resistant JET and extraction fans 300C installed, thanks to FDS simulation and HPWM. Only seining on equipments
- Saving on 50% of air volume (duct, cables, extraction fans) due to FDS simulation and HPWM
- -1 level total flooding system, open HPWM system, therefore we totally save smoke extraction for this level. Fans, cabling ducting

Surplus cost for HPWM on conventional sprinkler system 420.000€

What benefits does the project win, by applying HPWM?
1. Reduced size of smoke extraction ducts on level -4, -3, -2
2. No smoke extraction on level -1 except evacuation corridors
3. Better fire suppression system
4. Long life span stainless steel piping
5. No ugly air intake and outlet louvers above ground, fit to architect design
4. Initial data's for FDS simulation

-2. level ignited car position defined by authority

-4. level ignited car position defined by authority

• 1 car 4.7MW Citroën
• Every 2nd parking place one car
• 9 nozzles and 6 smoke detection sensors added to simulation
<table>
<thead>
<tr>
<th>Timing delay criteria for visibility</th>
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<tbody>
<tr>
<td>Smoke detection system</td>
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<tr>
<td>Preparation at fire department</td>
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<tr>
<td>Arrival of fire brigade 2,2km*40km/h=</td>
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<td>Access unpacking at destination</td>
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<td><strong>Total</strong></td>
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- 2 nozzles will be activated
- Maximum temperature 277°Celsius
- The visibility has to be checked after 8 minutes, so that the access to fire seat is ensured by smoke extraction
Visibility on – 4 level

Snotaview 5.6 – Oct 25 2010

Frame: 0
Time: 0.0

TŰZŐR Ltd official distributor for Hungary
Water mist development -2 level
-2 level Temperature y
Thanks for your attention!
Questions?