Development of a European approach to assess the fire performance of facades

This presentation was made in Brussels on December 8, 2017, for EC, AGF and stakeholders

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Safety
Content

- Current state in Europe regarding regulations and façade fire tests
- General comments on the first draft
- Proposed assessment method
- Coming challenges
Current situation in Europe

- All EU/EFTA Member States have regulatory provisions on the fire performance of facades
- The regulations are mainly based on the existing European system on reaction to fire and fire resistance
- 14 Member States state that they have additional requirements, not covered by EN 13501 part 1 and 2
- Some countries specify a specific test method, some enables performance based testing
- 12 different test methods has been identified to presently be used
### Current situation in Europe

<table>
<thead>
<tr>
<th>Test methods</th>
<th>Countries using the test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PN-B-02867:2013</td>
<td>Poland</td>
</tr>
<tr>
<td>BS 8414-1:2015 and BS 8414-2:2015</td>
<td>UK, Republic of Ireland</td>
</tr>
<tr>
<td>DIN 4102-20</td>
<td>Switzerland, Germany</td>
</tr>
<tr>
<td>ÖNorm B 3800-5</td>
<td>Switzerland, Austria</td>
</tr>
<tr>
<td>Prüfbestimmung für Aussenwandbekleidungssysteme</td>
<td>Switzerland/ Lichtenstein</td>
</tr>
<tr>
<td>Technical regulation A 2.2.1.5</td>
<td>Germany</td>
</tr>
<tr>
<td>Lepir 2</td>
<td>France</td>
</tr>
<tr>
<td>MSZ 14800-6:2009</td>
<td>Hungary</td>
</tr>
<tr>
<td>SP Fire 105</td>
<td>Sweden, Norway, Denmark</td>
</tr>
<tr>
<td>Engineering guidance 16 (unofficial test method)</td>
<td>Finland</td>
</tr>
<tr>
<td>ISO 13785-2</td>
<td>Slovakia</td>
</tr>
<tr>
<td>ISO 13785-1</td>
<td>Czech Republic</td>
</tr>
</tbody>
</table>
Current situation in Europe – examples on test methods

- DIN 4102-20
- BS 8414
- PN-B-02867:2013
- Prüfbestimmung für Aussenwandbekleidungssysteme
- LEPIR 2

- MSZ 14800-6
- ÖNORM B 3800-5
- SP Fire 105
- ISO 13785-1
- ISO 13785-2
Current situation in Europe

- Targets addressed by the façade tests in use:
  - Flame spread – vertical and horizontal, surface and within the system
  - Fire spread from one room to another (above)
  - Junction between façade system and floor
  - Windows
  - Detailing around window openings
  - Smouldering
  - Falling parts and burning debris/droplets
  - Smoke
  - Fire from inside
  - Fire from outside
  - Damage to the system (assessed after the test)
The present project

- Invitation to tender from EC a year ago
- Develop a European approach to:
  - assess the fire performance of facades
  - define all relevant details
  - classify facades
- The BS 8414 series and DIN 4102-20 should be used as a basis for testing
- "Falling off" shall be included
- Meet the regulatory provisions in all Member States

- Project group with members from RISE (Sweden), BRE (UK), BAM (Germany), EMI (Hungary) and Efectis (France)
- Large group of sub-contractors
The work process

- Sub-contractors in all Member States
  - Collect information on the regulations and assessment procedures
  - Contact with the national regulators
  - Double-check and give eventual corrections

- A draft assessment procedure was presented to Advisory Group Fire/stakeholders/sub-contractors on June 16, 2017, in Brussels

- Comments on the draft assessment procedure was collected from AGF/stakeholders/sub-contractors

- The assessment procedure has been remade, where all comments have been addressed
Main comments on the draft proposal

- Develop a new modern test method
  - Outside the scope of the present project

- Smoke is important
  - There are no regulations on smoke with respect to additional facades tests (although included in R2F)

- Smouldering shall be considered - Smouldering shall not be considered
  - There is a European method for smouldering, EN 16733

- Use of historical data
  - The use of historical data has been omitted since this is dealt with nationally until CE-marking is mandatory. How and if historical data can be used in the future cannot be decided within this project.
  - The introduction within the Round Robin phase of façade solution tested at the national level, required by Member States to evaluate the fire safety level of such current draft (see last slide), will also give some input data for the issue of historical data

- Detailing such as mounting around openings
  - Most are in favour of having this kind of detailing

- Classification
  - Aim for a simple classification system, with as few classes as possible
Definitions and national regulations

- The definition of "façade" is very different, and varies from the complete external wall, to the outer skin of a building

- Define the scope of the assessment method
  - As broad as possible – all types of external walls/claddings/facades
  - Excluding curtain walling which is covered by fire resistance

- Define which performance criteria must be included
  - Based on the current regulations in the Member States
## Handling of the regulatory provisions

<table>
<thead>
<tr>
<th>Regulation characteristics</th>
<th>Slovak republic</th>
<th>Hungary</th>
<th>Switzerland</th>
<th>Sweden</th>
<th>Austria</th>
<th>Germany DIN</th>
<th>Germany - technical regulation</th>
<th>Finland</th>
<th>Poland</th>
<th>England &amp; Wales, Scotland, Irelands</th>
<th>France</th>
<th>Denmark-Norway</th>
<th>Proposed criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flame spread – vertical</td>
<td>x x x x x x</td>
<td>x x</td>
<td></td>
<td>x</td>
<td>x x</td>
<td>x x</td>
<td>x x x x x x x x x</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Flame spread horizontal</td>
<td></td>
<td></td>
<td>x x x x x x</td>
<td></td>
<td></td>
<td></td>
<td>x x x x x x x x x</td>
<td>Yes</td>
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<tr>
<td>Flame spread – internal</td>
<td>x x x x x x x x</td>
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<td></td>
<td></td>
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<td></td>
<td>x x x x x x x x x</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junction between floor and facade</td>
<td></td>
<td></td>
<td></td>
<td>x x</td>
<td>x x</td>
<td></td>
<td>x x x x x x x x x</td>
<td>Optional</td>
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<td></td>
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<tr>
<td>Smouldering</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x x x x x x x x x</td>
<td>EN 16733</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Falling parts</td>
<td>x x x x x x x x</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>x x x x x x x x</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Smoke</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x x x x x x x x x</td>
<td>Only observations</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Heat (through temperature or flux)</td>
<td>x x x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x x x x x x x x x</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detailing (window openings, fire stop, etc)</td>
<td>x x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x x x x x x x x x</td>
<td>Yes</td>
<td></td>
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</tr>
</tbody>
</table>
Proposed test method

- The shape and size of the different methods are quite similar.
- Two different heat exposures are proposed
  - medium fire exposure (30 kg wood crib)
  - large fire exposure (400 kg wood crib)
- Detailing around openings is introduced
- Junction between façade and floor is introduced as optional
- Classification in four different classes, two for the large fire exposure and two for the medium fire exposure
Secondary opening

- Mandatory in the method
- Mounting and detailing of the façade system around openings
Flame spread – vertical and horizontal

- Assessed by measurements
- Measure with thermocouples
- Temperature rise < 500/600 K
The criterion is that falling parts shall not be a risk for the evacuation, the rescue personnel nor the fire brigade. As a guideline the weight of a single falling part shall not exceed 5 kg and the area of a falling part that may be dangerous (e.g. glass panes, panels) shall not be larger than 0.2 m².

The general criterion is that burning particles and/or droplets shall not be able to spread the fire downwards. If the material falling down continues to burn for more than 20 seconds, it is considered to failed the criterion.
Test procedure

- Document the test set-up
- Confirm that all measurement devices are functioning
- Determine the ambient test conditions; wind speed, precipitation and local temperatures
- Begin data logging and audio-visual recording equipment.
- Ignite the timber cribs following the relevant procedure for the selected fire load scenario
- Monitor and record the behaviour of the test sample during the full 60 minute test period
- The fire load shall be extinguished 22 or 30 minutes, depending on fire scenario, after the ignition using the technique detailed in the relevant clauses.
- Continue to record measurements and observations for the full duration of the test.
- Terminate the test 60 mins after ignition of the timber crib.
- Record observations of damage to the test samples following the test.
Classification

- LS1 – Large test fulfilling flame spread and falling parts
- LS2 – Large test fulfilling flame spread but not falling parts
- LS3 – Medium test fulfilling flame spread and falling parts
- LS4 – Medium test fulfilling flame spread but not falling parts

- LS1 will cover all other classes
- LS2 will cover LS4
- LS3 will cover LS4
Challenges

- Get acceptance for a new assessment method in the MS
  - Changes for all MS

- Is the proposed test method good/severe enough?
  - Very little data on repeatability and reproducibility of facade test methods
  - The method have to be validated for novel and innovative facade systems (solar panels, green facades...)
  - Environmental conditions - in many countries are the tests performed outdoors
  - A Round Robin phase is required to evaluate the consistency and robustness of the test method
  - The Round Robin phase shall include solution already tested according to national test method so that concerned countries can compare the safety levels between national test method and the current draft

- Field of application
  - Both direct and extended field of application will be needed
  - Due to the wide scope it will be a challenging work
THANK YOU!

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