Swiss fire regulations according to VKF

Possibilities of timber constructions

Fire safety for timber constructions
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Member of the project team „fire safety for timber constructions“, Lignum, holz 21
Content

- Swiss fire regulations according to VKF
- Structures – fire compartments
- Facades
- Summary
Classification according to EN codes

Fire resistance:

Load bearing capacity $= R$
Integrity $= E$
Thermal insulation $= I$

Demand for non-combustible building materials must be stated.

nbb $\rightarrow$ non-combustible (nicht brennbar)
REI 60 $\rightarrow$ timber constructions are possible
REI 60 (nbb) $\rightarrow$ no timber constructions are allowed
Timber constructions with a 60 minutes fire resistance

- Timber constructions
- Non-combustible outer claddings with a fire resistance for 30 minutes (K30)

### REI60

- Timber constructions
- Combustible insulations layers covered with board for 30 minutes fire resistance

### REI60/EI30 (nbb)

- Timber constructions
- Non-combustible outer claddings with a fire resistance for 30 minutes (K30)
- Non-combustible insulation layers
Constructions with a 60 minutes fire resistance

| REI 60 (nbb) | • Without any combustible building materials only:  
| REI 60 (nbb) | • Reinforced concrete  
| REI 60 (nbb) | • Brick  
| REI 60 (nbb) | • Steel  
| REI 60 (nbb) | • Non-combustible insulation

- Without any combustible building materials only:
  - Reinforced concrete
  - Brick
  - Steel
  - Non-combustible insulation
Fire safety concepts

Regulations for fire safety

Constructional
Technical
(Sprinkler)

Exception

Standard concepts of fire safety

Specially applied concept of fire safety

Building fullfills the fire safety concept
One-familiy houses
Single storey buildings
Attic / top floor
2 storey buildings
Constructional concept of apartments, offices and schools

- Structure: R30 (timber construction)
- Fire compartment: EI30 (timber construction)
- Staircase: REI60/EI30(nbb) (timber construction with a non-combustible cladding)
3 storey buildings

**Constructional concept** of apartments, offices and schools

<table>
<thead>
<tr>
<th>Component</th>
<th>Fire Resistance</th>
<th>Type of Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>R60</td>
<td>timber construction</td>
</tr>
<tr>
<td>Fire compartment</td>
<td>EI60</td>
<td>timber construction</td>
</tr>
<tr>
<td>Staircase</td>
<td>REI60 (nbb)</td>
<td>no timber construction</td>
</tr>
</tbody>
</table>
4 storey buildings

Concept with sprinkler of apartments, offices and schools

<table>
<thead>
<tr>
<th>Element</th>
<th>Classification</th>
<th>Fire Resistance</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
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<tr>
<td>Staircase</td>
<td>REI60 (nbb)</td>
<td>no timber construction</td>
<td></td>
</tr>
</tbody>
</table>
Constructional concept of apartments, offices and schools

Structure: R60/E130 (nbb) timber construction with a non-combustible cladding
Fire compartment: EI60/E130 (nbb) timber construction with a non-combustible cladding
Staircase: REI60 (nbb) no timber construction

Quality management system
Concept with sprinkler of apartments, offices and schools

<table>
<thead>
<tr>
<th>Component</th>
<th>Fire Rating</th>
<th>Construction Type</th>
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<tbody>
<tr>
<td>Structure</td>
<td>R60</td>
<td>timber construction</td>
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<tr>
<td>Staircase</td>
<td>REI60 (nbb)</td>
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</tr>
</tbody>
</table>

Quality management system
Fire safety on facades

Testing of single building components (SBI or national tests)

Large scale tests

Anforderungen an das Brandverhalten bei Aussenwänden

<table>
<thead>
<tr>
<th></th>
<th>≤ 3 Geschosse</th>
<th>4 Geschosse bis Hochhausgrenze</th>
<th>Hoch-häuser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aussenschicht</td>
<td>4.2 (1)</td>
<td>4.3 (1) oder 6.3 (3)</td>
<td>6.3</td>
</tr>
<tr>
<td>Wärmedämmschicht / Zwischenschicht</td>
<td>4.1 (1) (4)</td>
<td>4.1 (5) oder 5 (200°C) (6)</td>
<td>6.3</td>
</tr>
<tr>
<td>Lichtbänder</td>
<td>4.2 (1) (7)</td>
<td>5.2 (7)</td>
<td>6.3</td>
</tr>
</tbody>
</table>
Large scale test V4 (MFPA Leipzig)

5th minute of the test

10th minute of the test

15th minute of the test

20th minute of the test
October 2003

4 ½ storey reinforced concrete board construction

Full scale test

Several timber claddings and constructional fire safety measures

Total of 700 m² facade in timber construction
Full scale test V2 in Merkers (Germany)

7th minute of the test
Flashover

11th minute of the test
Inflaming facade
(Simulation of the cross-ventilation)

32th minute of the test
Timber facade is not burning any longer on its own
Timber on facades

- Combustion alone isn’t substantial
- Overall construction is essential
- Well constructed facades achieve full protection
Housing estate  Herti 6, Zug (Switzerland)

- Timber facade of a 6-storey building
- variance
- Steel sheet sticks out the facade by 200 mm
Multi-storey timber constructions
Constructional standard fire safety concepts

<table>
<thead>
<tr>
<th>Structures and fire compartments</th>
<th>Application: multy storey apartment, office or school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 2004</td>
<td>since 2005</td>
</tr>
<tr>
<td>F 30bb timber construction</td>
<td>REI 30 timber construction</td>
</tr>
<tr>
<td>REI 60 timber construction</td>
<td>REI 60 / EI 30 (nbb) timber construction with non-combustible cladding</td>
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</tbody>
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Since 2005 standard fire safety concepts