Status of Flammability Standards in Sweden

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Some background information regarding fire protection in Sweden

Fire and fire protection in homes and public buildings
An analysis of Swedish fire statistics and fire protection strategies

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According to Swedish experts, fire safety is considered to be dependent on:

• How individuals behave
• How organization's behave
• The vulnerability of the people exposed to the fire
• The fire properties of products
• The technical fire safety in the building
• The fire brigade’s ability to respond to a fire
Table 11
Number of fire deaths and fire deaths per million population in the Nordic countries

Source: Nordic fire authorities at www.nordstat.net, Eurostat

<table>
<thead>
<tr>
<th></th>
<th>Denmark</th>
<th>Iceland</th>
<th>Finland</th>
<th>Norway</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fire deaths</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>86</td>
<td>3</td>
<td>94</td>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td><strong>Average 2000-2004</strong></td>
<td>82,2</td>
<td>3</td>
<td>71,8</td>
<td>59</td>
<td>115,4</td>
</tr>
<tr>
<td><strong>Fire deaths per million population</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>15,93</td>
<td>10,32</td>
<td>18,01</td>
<td>12,02</td>
<td>7,24</td>
</tr>
<tr>
<td><strong>Average 2000-2004</strong></td>
<td>15,32</td>
<td>10,50</td>
<td>13,82</td>
<td>13,03</td>
<td>12,95</td>
</tr>
</tbody>
</table>

15 10.5 14 13 13

Ratio (in Sweden) of casualties : majors injuries : minor injuries

Accidents in general have the ratio 1:30:200 whereas fire has 1:7:7.
### Table 7
Fatal home fires by smoke detector function, Sweden, 2000-2004

*Source: Fatal fire statistics, Swedish Rescue Services Agency*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Proportion of fatal fires</th>
</tr>
</thead>
<tbody>
<tr>
<td>No smoke detector present</td>
<td>61%</td>
</tr>
<tr>
<td>Smoke detector present and functioned</td>
<td>14%</td>
</tr>
<tr>
<td>Smoke detector present but failed to function</td>
<td>4%</td>
</tr>
<tr>
<td>Smoke detector present, function unknown</td>
<td>5%</td>
</tr>
<tr>
<td>Unknown whether smoke detector was present</td>
<td>16%</td>
</tr>
</tbody>
</table>

### Table 5
Number of fatal home fires per object of origin, Sweden, 2004 and average for 2000-2004

*Source: Fatal fire statistics, Swedish Rescue Services Agency*

<table>
<thead>
<tr>
<th>Object of origin</th>
<th>2004</th>
<th>Average 2000-2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed</td>
<td>11</td>
<td>16,0</td>
</tr>
<tr>
<td>Sofa, armchair</td>
<td>8</td>
<td>8,0</td>
</tr>
<tr>
<td>Other loose fittings</td>
<td>8</td>
<td>8,0</td>
</tr>
<tr>
<td>Cooker</td>
<td>2</td>
<td>6,4</td>
</tr>
<tr>
<td>Clothing</td>
<td>1</td>
<td>4,0</td>
</tr>
</tbody>
</table>
Diagram 7
Medical diagnoses with fire as an external cause of death, Sweden, 1969-2002
Source: Cause of death register, Swedish Board of Health and Welfare
Diagram 10
Death rate for diagnosis burns with fire as an external cause for males 15-64, Sweden, 1969-2002

Source: Cause of death register, Swedish Board of Health and Welfare
Several authorities are engaged in fire safety control and measures in Sweden, e.g. at a governmental level:
- the Construction authority
- the Consumer authority
- the Swedish Civil Contingencies Agency

And at a local level the responsible fire officers

We do separate private homes and public domains

Tillsynen grundas på en brandteknisk helhetsbedömning, där alla ingående komponenter värderas och vägs samman. Säkerhetsnivå värderas för varje enskilt fall.

The community must perform controls according to the law regarding prevention of accidents (2003:778). The owner is responsible to have applied reasonable management to prevent fires and spreading of fires.

The control is based on a holistic fire technical assessment in which all components need to be assessed and weight together. The fire safety level is assessed in each individual case.
Inventory

Authorities and retailers can request that furniture/corresponding indoor goods shall pass certain standardized flammability tests.

A product that has passed the test can not automatically be used in any applications. This is regulated by the construction authority and the provincial fire officers.
At new production of a construction it is expected to be built with a surface layer according to the authority regulations [Boverkets Byggregler (BBR)].

The present guidelines are given for upholstered sitting furniture is given in KOVS 1988:2 and for mattresses in KOVS 1990:1. For upholstered furniture there is a standard, EN 1021-1 (ISO 8191-1), the furniture is not to be ignites by a glowing cigarette.

According to the law of product safety, all goods must be safe. This is a guarantee that is commonly given by the manufacturer. For upholstered furniture the standard EN 1021-1 (ISO 8191-1) is valid (glowing cigarette).
EN 597-1
EN 1021-1
ISO 8191-1

EN 1021-2

Flammability Standards: How Science Can Inform Policy, Cairns August 26, 2012
Public Indoor Environments

For upholstered furniture in restaurants, hotels, meeting facilities the standard EN 1021-2 is applied (gas flame similar to a burning match).

For beds in hotels and similar facilities the standard is EN 597-2. i.e. a small flame.

For furniture in other public facilities the standard is EN 597-1,

The flammability of other bed items (not mattresses) in hotels are tested according to the standard EN 14533. The articles are classified A, B and C. Class A is passing the tests with both open small flame and glowing cigarette; Class B I passing the test with a glowing cigarette while Class C do not pass either one.
For beds in healthcare are to be tested according to SS 876 00 10 which is a more comprehensive test including assessments of ignition, fire development, heat emissions and smoke density.

For hanging textiles:
• **SS - EN 13773** Flammability – classification scheme
• **SS - EN 1101** Identification of ignition potency of vertical items subjected to a small flame (burning match)
• **SS - EN 1102** Identification of flame distribution of vertical items subjected to a small flame
• **SS - EN 13772** Identification of flame distribution of vertical items subjected to a large ignition source (four burning newspaper pages/burning basket)
SS 876 00 10 Hospital textiles, health care beds. The standard is define the fire demands of mattresses to be used for special duties. Testing refer to NT FIRE 032 – Upholstered Furniture: Burning behavior. Demand is put on assessment of heat emissions and smoke production. NT FIRE 032 testing makes it possible to measure toxic gas concentrations (FTIR).


Fire testing of upholstered beds and mattresses. Standard Ignition source: Glowing cigarette.

Read more about the test methods at the web site:
http://www.sp.se/sv/index/services/firetest_furniture/Sidor/default.aspx
**NT FIRE 032** does not include any fire criteria. It is a method for exploring the fire properties of a product. Therefore testing according to NT FIRE 032 may refer to other standards for testing, like SS 876 00 10 for beds in health care.
Additional test methods for flammability testing of furniture in Sweden

16 CFR Part 1632 Flammability of mattresses incl. bed mattresses
16 CFR Part 1633 Flammability (open flame) of mattresses sets (US government standard)
BS 5852:2006: Assessment of ignition susceptibility of upholstered furniture with glowing and flammable ignition sources.
BS 5852: Part 1:1979 Assessment of ignition susceptibility of upholstered furniture with glowing cigarette and a gas flame corresponding to a burning match
Test methods cont.

**BS 5852: Part 2:1982** Assessment of ignition susceptibility of upholstered furniture with gas flames corresponding to a burning match and a source corresponding to four pages of a newspaper

**BS 6807:2006**: …

**BS 7176:2007**

**BS 7177:2008**

**IMO Res A.652(16):1989**

**IMO Res A.688(17):1991**


**NT FIRE 032**

**NT FIRE 037 (1988)**
Conclusions

- Responsibility regarding fire properties distributed among authorities
- None of these discuss flame retardants as a prerequisite for fire safety
- But the Swedish Civil Contingencies Agency (MSB) do raise a finger of caution re. BFRs
- None of the sibling organizations to MSB, at least in EU, seem to devote work to fire retardants and their environmental and health effects
- No international harmonization for test methods
A million thanks goes to Björn Albinsson for his important contributions to this presentation.

Björn is willing to participate in the planned work on BFRs and regulations.

Thank you for listening.