New changes are ongoing in the railway industry, due to the new interoperability of the Trans-European High-Speed Rail System Directive, which aims to standardize the regulation in order to guarantee the same level of security whatever the location in the EU. After years of experimentation and discussion, the big bang is gone and we enter now in a new period for material testing and qualification.

**The Real World**

EN 45545 accounts 7 parts, which feature all critical points on rolling stocks. Part 2 devoted lots of energy to find his way through the fire testing standards. The basement of this new standard is linked to the FIRESTARR project, jointly funded by the European Commission and Industry. It was established in 1997 to assist the work of CEN/TC256/WG1 and CENELEC/TC9X/WG3 in drafting a Part 2 (Requirements for the fire behaviour of materials and components) for a 7-part European Standard pREN 45545 “Fire protection on railway vehicles”. In June 13, the EN 45545 part 2 has been approved and released by national standardization offices. During a 3 years transition period, each member state and each operator will have the freedom to ask for any standards amongst EN 45545-2 or national standard NF, DIN, BS, PL, UNI. Between 2013 and 2016, operators should ask for EN 45545-2 testing. However, if the product fails, derogation could be accepted through the national standard. The aim is not to blacklist EN 45545-2 non-compliant product but to trigger product upgrade for a better safety of the European citizen. From 2016, only EN 45545 will be recognized.

**How Does It Work?**

Part 1 defines evaluation of conformity (including design verification, validation and quality management), four operation categories and four design categories. Fire protection measures to be adopted are specified in all of the 6 parts of EN 45545.

<table>
<thead>
<tr>
<th>Design category</th>
<th>Standard vehicles</th>
<th>Automatic vehicles</th>
<th>Double decked vehicles</th>
<th>Sleeping and couche t cars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HL1</td>
<td>HL1</td>
<td>HL1</td>
<td>HL2</td>
<td></td>
</tr>
<tr>
<td>2 HL2</td>
<td>HL2</td>
<td>HL2</td>
<td>HL2</td>
<td></td>
</tr>
<tr>
<td>3 HL2</td>
<td>HL2</td>
<td>HL2</td>
<td>HL3</td>
<td></td>
</tr>
<tr>
<td>4 HL3</td>
<td>HL3</td>
<td>HL3</td>
<td>HL3</td>
<td></td>
</tr>
</tbody>
</table>

The basis of the EN 45545-2 classification system is based on this table, linking the operation and design categories (as defined in EN 45545-1) in order to establish hazard levels required for each materials.

**A Necessary Evolution of Materials**

Even if most of the tests used to qualify materials according to this standards exist since many years and are directly inspired from existing national railway standards, these new trends imply key changes in the material development approaches. Indeed this new standard involves products with a low kinetic of degradation, a low smoke production and a low heat release. This implies the use of new fire-retardant chemistry and opens the space for a new generation of solutions, which has been achieved in thermoset resins, although there is still work to be done for other polymeric applications.

**FIRE Reaction Testing for European Railway: This is it!!!!**

**The Key Parameters assessed can be summarized by the FIRST criteria.**

- **F** Flame spread
- **I** Ignitability
- **R** Rate of heat release
- **S** Smoke
- **T** Toxicity
- **K** Key tests

**Main tests required by the EN 45545-2**

- ISO 5658-2, Lateral Flame Spread – Propagation test
- NF EN ISO 9239-1, Radiant Panel Floor
- ISO 5660-1, Cone calorimeter test
- ISO 5659-2, Determination of Smoke Opacity
- 5659-2 Smoke Chamber, using FTIR analysis Technique
- NFX 70-100, Toxic gas emission
- ISO 4589-2, Limit of Oxygen Index determination

**More information at [www.crepim.fr](http://www.crepim.fr)**