

# EN 45545

## HAZARD LEVEL OF A VEHICLE

Fire safety requirements are part of the European Directive on the interoperability of the trans-European high-speed rail system. The seven-parts standard EN 45545 'Railway applications - Fire protection on railway vehicles' has been developed to harmonize classifications and fire testing.

EN 45545 introduces a new concept – the hazard level of a vehicle (HL). This is obtained by combining the operation and design categories of the vehicle.



Operation category	Design category			
	N: Standard vehicles	A: Automatic vehicles	D: Double de-cked vehicle	S: Sleeping and couchette cars
1. Surface Operation	<b>HL1</b>	<b>HL1</b>	<b>HL1</b>	<b>HL2</b>
2. Metro - Tunnel Operation	<b>HL2</b>	<b>HL2</b>	<b>HL2</b>	<b>HL2</b>
2. Inter-City Tunnel Operation	<b>HL2</b>	<b>HL2</b>	<b>HL2</b>	<b>HL3</b>
4. Metro - Tunnel Operation - Restricted	<b>HL3</b>	<b>HL3</b>	<b>HL3</b>	<b>HL3</b>

EN 45545-2:2013 classifies all material on board in groups which have to fulfil specific requirement sets which often includes several test methods. The most important fire tests used in EN 45545-2 are the flame propagation, the cone calorimeter and the smoke and toxicity tests. For requirement set R1 they are all based on radiant panels with heat fluxes 50 kW/m<sup>2</sup>.

### REQUIREMENTS FOLLOW THE FIRST PRINCIPLES:

- Flame Spread
- Ignitability
- Heat Release
- Smoke Emissions
- Toxic Gas Emissions

Requirement set	Test method reference	Parameter unit	Requirement definition	HL1	HL2	HL3
R1 (for insulation material)	Spread of flame ISO 5658-2	CFE kWm <sup>-2</sup>	Minimum	20	20	20
	Heat release, smoke production and mass loss rate ISO 5660-1	MAHRE kWm <sup>-2</sup>	Maximum	-	90	60
	Smoke optical density and toxicity EN ISO 5659-2	Ds(4) dimensionless	Maximum	600	300	150
		VOF4 Minutes	Maximum	1200	600	300
		CITG dimensionless	Maximum	1.2	0.9	0.75