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	**HL1**	**HL1**	**HL1**	**HL2**
2. Metro - Tunnel Operation	**HL2**	**HL2**	**HL2**	**HL2**
2. Inter-City Tunnel Operation	**HL2**	**HL2**	**HL2**	**HL3**
4. Metro - Tunnel Operation - Restricted	**HL3**	**HL3**	**HL3**	**HL3**

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 the requirement set R1 they are all based on radiant panels with heat fluxes 50 kW/m².

REQUIREMENTS FOLLOW FIRST PRINCIPLES:

- **F**lame Spread
- **I**gnitability
- Heat **R**elease
- **S**moke Emissions
- **T**oxic 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^{-2}	Minimum	20	20	20
	Heat release, smoke production and mass loss rate ISO 5660-1	MAHRE kWm^{-2}	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