HL3 compliant system for transportation

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Historically testing was related to the reduction of flame spread and/or fire propagation

Fire Testing has undergone a distinct evolution over the past two decades

- leading to **New Standards**
- which are more complex than previous

New Standards have introduced additional parameters:

- Heat Release
- Smoke Density
- Toxicity (Components of the Smoke) Indices

EN 45545-2 (2013)

New European Standard for Rail Vehicles

- Replaces the historical standards, as new contracts are awarded
- International as countries outside Europe are involved in building rolling stock
- EN 45545-2 requirements are different to those specified by the UK BS 6853

The standard calls for high performance products to be used in high risk scenarios

With a definite emphasis on passenger/staff safety

Where the train goes (Operation)

+

What kind of train (Design)

=

Hazard Level (Risk)

EN 45545-2 (2013)

Operation Category (OC)

The relationship of service, infrastructure + evacuation conditions:

- OC1 = Surface Rail/Metro, Tunnels (<1km) – Evacuation possible on stopping
- OC2 = Underground, Tunnels (<5km) and/or Elevated – Short time to evacuation by side access
- OC3 = Underground, Tunnels (>5km) and/or Elevated – Longer time to evacuation by side access
- OC4 = Underground, Tunnels (<5km) and/or Elevated – no side access but a short time to evacuation

Design Category (Rail Stock)

- A = Automated Stock with no staff
- D = Double Decked
- S = Sleeping/Couchette
- N = All Other (Standard)

Hazard Level (HL) Requirements

	N	A	D	S
OC1	HL1	HL1	HL1	HL2
OC2	HL2	HL2	HL2	HL2
OC3	HL2	HL2	HL2	HL3
OC4	HL3	HL3	HL3	HL3

- The Higher the Risk, the Higher the Safety Factors required
- **Passenger/Staff Safety are the key drivers in EN 45545**
- With HL3 needing the highest compliance criteria

REICHHOLD'S Innovative Solution for HL3 in Rail

- **NORPOL® SVX 800-H**
  - **0.5-0,6 mm cured film**
- **DION® FR 7721-00**
  - **3.5 to 4 mm (three layers 450 g/m2 CSM glass)**
- An innovative HL3 system for use in the hand lay-up process
  - Additional Safety Margins

How?

- Intumescent Technology

- A material that swells and seals the surface
  - Hence its use in the gelcoat
  - Allows for the low heat release and low smoke/toxicity parameters that are both critical in EN 45545.
  - Parameters that we believe historical composite FR technology would not meet

For composites this has meant a complete re-think of our technology:

- Formulations
- Raw Materials
- Mechanisms involved in the fire retardancy process

Halogens free

- Reduced smoke density
- No smoke components such as Hydrogen Chloride or Hydrogen Bromide which increase toxicity

Low Nitrogen

- Low Nitrous oxides
- Better smoke properties

REICHHOLD'S Innovative Solution for HL3 in Rail

- **Chemistry of the Additives used makes this novel gelcoat grey in colour (RAL 7001)**
  - Allows for Painting which may cause a drop in the system approval to say HL2, even with an FR rated paint
- **Independently tested and verified:**
  - For use in Part sets R1 + R7 + R17 plus R2, R3, + R6
  - Test Results are all averages based on multiple test pieces and non-painted

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Test Results Obtained (Averages)

				Requirement		
Requirement	Parameter	**Result**	Definition	HL1	HL2	**HL3**
R1	CFE	**20,3**	Minimum	20	20	**20**
	MAHRE	**19,5**	Maximum	n/a	90	**60**
	Ds(4)	**45**	Maximum	600	300	**150**
	VOF4	**93**	Maximum	1200	600	**300**
	CITg (4 & 8)	**0,09 & 0,16**	Maximum	1,2	0,9	**0,75**
R7	CFE	**20,3**	Minimum	20	20	**20**
	MAHRE	**19,5**	Maximum	n/a	90	**60**
	Ds max (10 & 20)	**133 & 263**	Maximum	n/a	600	**300**
	CITg (4 & 8)	**0,09 & 0,16**	Maximum	n/a	1,8	**1,5**
R17	CFE	**20,3**	Minimum	13	13	**13**
	MAHRE	**19,5**	Maximum	n/a	90	**60**
	Ds max (10 & 20)	**133 & 263**	Maximum	n/a	600	**300**
	CITg (4 & 8)	**0,09 & 0,16**	Maximum	n/a	1,8	**1,5**

Summary:

Reichhold have developed an HL3 system for use in the composite transportation sector.

NORPOL® SVX 800-H

DION® FR 7721-00

System gives:

- Low Heat Release
- Low Smoke
- Low Toxicity

Thank You

For more information, please visit our stand:
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