

Fire Standards

*Transport Applications : Aircraft, Coaches,
Railway, Marine*

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► Transport (Interior materials)

- Road
- Rail
- Marine
- Aircraft

► Reaction to fire criteria :

- F I R S T

F : Fire spread

I : Ignitability

R : Rate of heat release

S: Smoke

T: Toxicity



	REGULATION	PARAMETERS / TEST METHOD					APPARATUS TYPE	
		F	I	R	S	T		
		Flame spread	Ignitability	Heat Release	Smoke	Toxicity		
ROAD	ECE-R 118	R118 Annex 6 and Annex 8 ISO 3795					Horizontal / vertical burning test	
RAIL	EN45545	EN ISO 4589-2					Limiting Oxygen Index	
		ISO 5658-2					Radiant panel (vertical)	
		ISO 5660-1					Cone calorimeter (HRR)	
					ISO 5659-2	ISO 5659-2 + FTIR	NBS Smoke Chamber	
		EN ISO 9239-1					Radiant panel (horizontal)	
		EN ISO 11925-2					Vertical burning test	
MARINE	IMO (FTP Code 2010)	ISO 5658-2					Radiant panel (vertical)	
				ISO 5659-2	ISO 5659-2 + FTIR	NBS Smoke Chamber		
AIRCRAFT	FAR 25	FAR/CS 25 § 25.853 App F Part I					Horizontal / vertical burning test	
		FAR/CS 25 § 25.856(a) App F Part VII					Radiant panel (horizontal)	
				FAR/CS 25 § 25.853 (d) App F Part IV				OSU chamber (HRR)
					FAR/CS 25 § 25.853 (d) App F Part V			NBS Smoke Chamber



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RAIL	EN45545	EN ISO 4589-2					Limiting Oxygen Index			
		ISO 5658-2					Radiant panel (vertical)			
				ISO 5660-1		★	★	Cone calorimeter (HRR)		
		★ EN ISO 9239-1				★	ISO 5659-2	★	ISO 5659-2 + FTIR	NBS Smoke Chamber
		EN ISO 11925-2							Radiant panel (horizontal)	
MARINE	IMO (FTP Code 2010)	★ ISO 5658-2					Radiant panel (vertical)			
				★		★	ISO 5659-2	ISO 5659-2 + FTIR	NBS Smoke Chamber	
AIRCRAFT	FAR 25	★ FAR/CS 25 § 25.853 App F Part I					Horizontal / vertical burning test			
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★ Example : test methods used for floor covering products



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ECE Regul.118-2

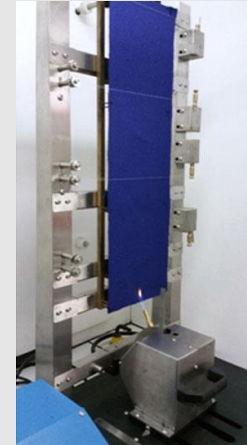
Horizontal test
ECE-R 118 Annex 6
(=FMVSS 302, ISO 3795)

Requirement : flame spread < 100mm/min



Picture from FTT

ROAD



Vertical test
ECE-R 118 Annex 8
(=ISO 6941)
“Only for material in a vertical position“

Application time of flame : 5s

Requirement : flame spread < 100mm/min or flame extinction

Single-Flame Source Test EN ISO 11925-2



Picture from Crepim

20mm flame

Application time of flame : 30s

Requirements :

- Flame reaches 150mm within 60s
- Evaluation of burning drips

RAIL

FAR/CS 25 § 25.853 App F Part I



38mm flame

Application time of flame : 12s or 60s

Requirements :

- After flame time < 15s
- Evaluation of burned length and burning drips

AIRCRAFT



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❑ ISO 5658-2 Lateral flame spread



Picture from Rise

Vertical burning test

Gradient Heat Flux 1.5 to 50.5 kW/m²

Parameter : CHF (Critical Heat Flux at Extinguishment)

RAIL +
MARINE

❑ ISO 9239-1 Flooring Radiant Panel



Picture from Rise

Radiant panel test for horizontal flame spread of floorings

Gradient Heat Flux 1.1 to 10.9 kW/m²

Parameter : CHF

RAIL



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☐ SMOKE : ISO 5659 Smoke Obscuration Test



NBS Smoke Chamber

$$D_m = 132 \cdot \log_{10} \left(\frac{100}{T_t} \right)$$

Main differences between applications :

- Heat Flux (up to 50kW/m2 for Rail / IMO, 25kW/m2 for Aircraft)
- Sample configuration (Vertical for Aircraft)
- Duration of testing (up to 20min for Rail)

Smoke Parameter : Maximum specific optical density (Ds max)



☐ TOXICITY : ISO 5659 + determination of gas concentration

NBS Smoke Chamber (NB : Smoke and Toxicity can be measured during the same trial)

Main differences between applications :

- Measurement of gas concentration (FTIR → IMO + EN45545)
- Method of toxicity evaluation
- Time of gas measurements

Toxicity Parameters : Gas concentrations (ppm) for IMO or Conventional Index of Toxicity CIT (EN45545)

