

Smoke Density and Surface Flammability Requirements for U.S. Public Transportation Vehicles

Smoke density and surface flammability fire test requirements of material used in the interior of U.S. public transportation vehicles to include rail passenger cars, transit buses, and transit vans.

There are three widely used documents that describe the required smoke and surface flammability maximums for transit materials:

- Federal Criteria 49 CFR Part 238
- Federal Transit Administration
- Docket 90-A National Fire Protection Association (NFPA) 130

While the documents are substantially the same, there are differences that are significant enough to require the reader to evaluate all standards independently.

For example, the Federal Transit Administration Docket 90-A sets a maximum smoke density of 200 at 4 minutes for foam seating cushions.

The federal rail criteria and NFPA reduces the maximum from 200 down to 175. Also, the "Product Category" listings are expressed differently in each of the three documents. The Govmark summaries of these requirements are offered as a ready reference.

SURFACE FLAMMABILITY & SMOKE DENSITY REQUIREMENTS SPECIFIED BY FEDERAL CRITERIA 49 CFR PART 238

CATEGORY	FUNCTION OF MATERIAL	ASTM E662		ASTM E162
		MAX SPECIFIC DENSITY		MAX FLAME SPREAD*
		90 SECONDS	4 MINUTES	
Cushions, Mattresses	All	100	175	25**
Fabrics	Seat upholstery, mattress ticking & covers, curtains, draperies, wall coverings, & window shades	NR	200	(1)
Other Vehicle Components	Seat & mattress frames, wall & ceiling panels, seat & toilet shrouds, tray & other tables, partitions, shelves, opaque windscreens, end caps, roof housings, & component boxes & covers	100	200	35
	Flexible cellular foams used in armrests & seat padding	100	175	25**
	Thermal & acoustic insulation	NR	100	25
	HVAC ducting	NR	100	35
	Floor covering	100	200	(2)
	Light diffusers, windows & transparent plastic windscreens	100	200	100
Elastomers	Window gaskets, door nosings, inter-car diaphragms, roof mats, & seat springs	100	200	(3)
Structural Components	Flooring, Other	N/A	N/A	N/A

NR = Not required
 N/A = Not applicable; Another test applies

* In addition, flaming running and/or dripping not permitted. **ASTM D3675

(1) FAA 12 Second Vertical: Maximum Afterflame*: 10 seconds; Maximum Burn Length: 6"

(2) ASTM E648: Minimum Critical Flux: 0.5 W/cm²

(3) ASTM C1166: Maximum Flame Propagation* " 4"

SURFACE FLAMMABILITY & SMOKE DENSITY REQUIREMENTS SPECIFIED BY FEDERAL TRANSIT ADMINISTRATION DOCKET 90-A

CATEGORY	FUNCTION OF MATERIAL	ASTM E662		ASTM E162
		MAX SPECIFIC DENSITY		MAX FLAME SPREAD*
		90 SECONDS	4 MINUTES	
Seating	Cushion	100	200	25**
	Frame	100	200	35
	Shroud	100	200	35
	Upholstery – Coated	NR	250	(1)
	Upholstery – Uncoated	NR	100	(1)
Panels	Wall	100	200	35
	Ceiling	100	200	35
	Partition	100	200	35
	Windscreen	100	200	35
	HVAC Ducting	NR	100	35
	Light Diffuser	100	200	100
Flooring	Wheel Well & Structural	NR	NR	N/A
	Carpeting	NR	NR	(2)
Insulation	Thermal	NR	100	25
	Acoustic	NR	100	25
Miscellaneous	Firewall	NR	NR	N/A
	Exterior Shell	100	200	35

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SURFACE FLAMMABILITY & SMOKE DENSITY REQUIREMENTS SPECIFIED BY NFPA 130

CATEGORY	FUNCTION OF MATERIAL	ASTM E662		ASTM E162
		MAX SPECIFIC DENSITY		MAX FLAME SPREAD*
		90 SECONDS	4 MINUTES	
Cushioning	All individual flexible cushioning materials used in seat cushions, mattresses, mattress pads, armrests, crash pads, & grab rail padding	100	175	25**
Fabrics	Seat upholstery, mattress ticking & covers, curtains, draperies, window shades, & woven seat cushion suspensions	NR	200	(1)
Other Vehicle Components	Seat & mattress frames, wall & ceiling lining & panels, seat & toilet shrouds, toilet seats, trays & other tables, partitions, shelves, opaque windscreens, combustible signage, end caps, roof housings, articulation bellows, exterior shells, nonmetallic skirts, & component boxes & covers	100	200	35
	Thermal & acoustical insulation	NR	100	25
	HVAC ducting	NR	100	25
	Floor covering	100	200	(2)
	Light diffusers, windows, & transparent plastic windscreens	100	200	100
	Adhesives & sealants	200	200	35
Elastomers	Window gaskets, door nosings, intercar diaphragms, seat cushion suspension diaphragms, & roof mats	100	200	(3)
Wire & Cable	All	N/A	N/A	N/A
Structural Components	Flooring, Other	NR	NR	N/A

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