

## Product Information

### PA 2241 FR

#### 1 General

PA 2241 FR is a flame retardant polyamide 12 for processing in laser sintering systems. It contains a halogen-based flame retardant. Mainly due to its recyclability the material is economical, enabling low-cost part production.

##### Typical applications

aviation (interior, e.g. air ducts and air outlet valves)

#### 2 Technical data

##### General material properties

Colour		white	
Bulk density (new powder)	EN ISO 60	0.45	g/cm <sup>3</sup>
Colour of laser-sintered parts		white	
Density of laser-sintered part	EOS-method	1.00	g/cm <sup>3</sup>

Tests have been conducted by:  
EOS GmbH, Krailling

##### Mechanical properties

		<i>dry / cond</i>		
Tensile modulus	EN ISO 527	x-direction	1900 / 1600	MPa
		y-direction	1900 / 1600	MPa
		z-direction	1900 / 1600	MPa
Tensile strength	EN ISO 527	x-direction	49 / 44	MPa
		y-direction	49 / 44	MPa
		z-direction	46 / 41	MPa

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			<i>dry / cond</i>	
Tensile strain at tensile strength	EN ISO 527	x-direction	7 / 11	%
		y-direction	7 / 11	%
		z-direction	6 / 8	%
Strain at break	EN ISO 527	x-direction	15 / 22	%
		y-direction	15 / 22	%
		z-direction	6 / 9	%

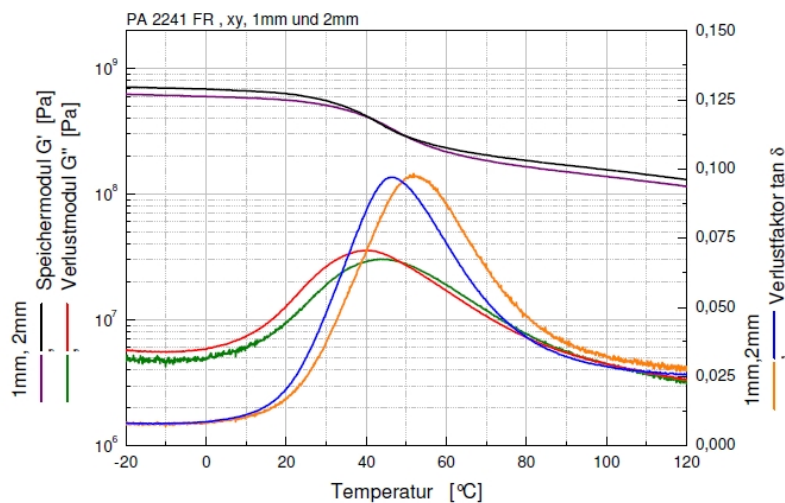
Tests have been conducted by:  
EOS GmbH, Krailling

### Short term influence of temperature on mechanical properties

Dynamic Mechanical Thermal Analysis (DMTA):

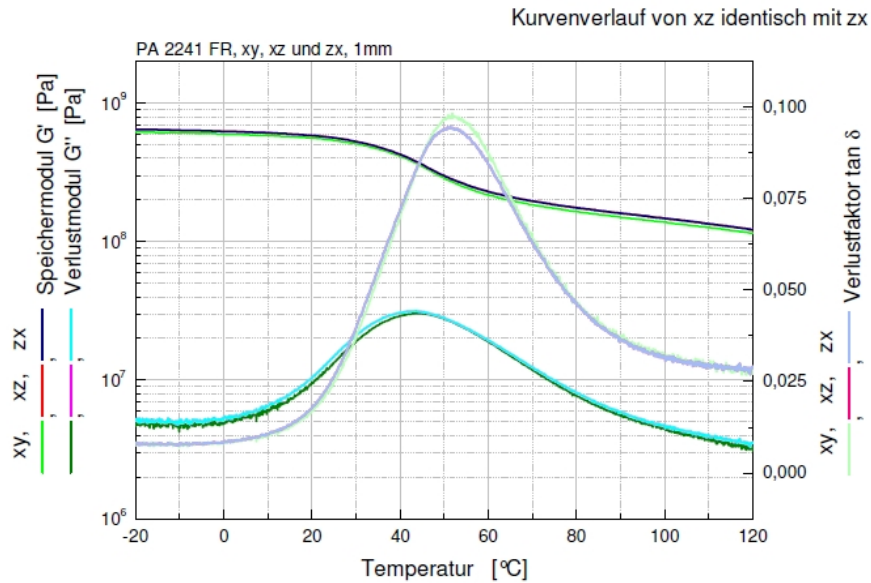
Dynamic modulus (*Speichermodul  $G'$* ),  
loss modulus (*Verlustmodul  $G''$* ) and  
loss factor (*Verlustfaktor  $\tan \delta$* ) as a function of temperature.

### Influence of the wall-thickness



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### Influence of the orientation in the building room



Tests have been conducted by:  
Polymer Service GmbH Merseburg

### Thermal properties

Heat distortion temperature			
- HDT A	EN ISO 75	84	°C
- HDT B	EN ISO 75	154	°C
Melting point (new powder)			
	EN ISO 11357-1	185	°C
Decomposition temperature			
	EN ISO 11358	> 330	°C

Tests have been conducted by:  
Polymer Service GmbH, Merseburg  
Kunststoff Vertrieb Dr. Schiffers GmbH und  
Co. KG, Ulm  
NETZSCH-Gerätebau GmbH

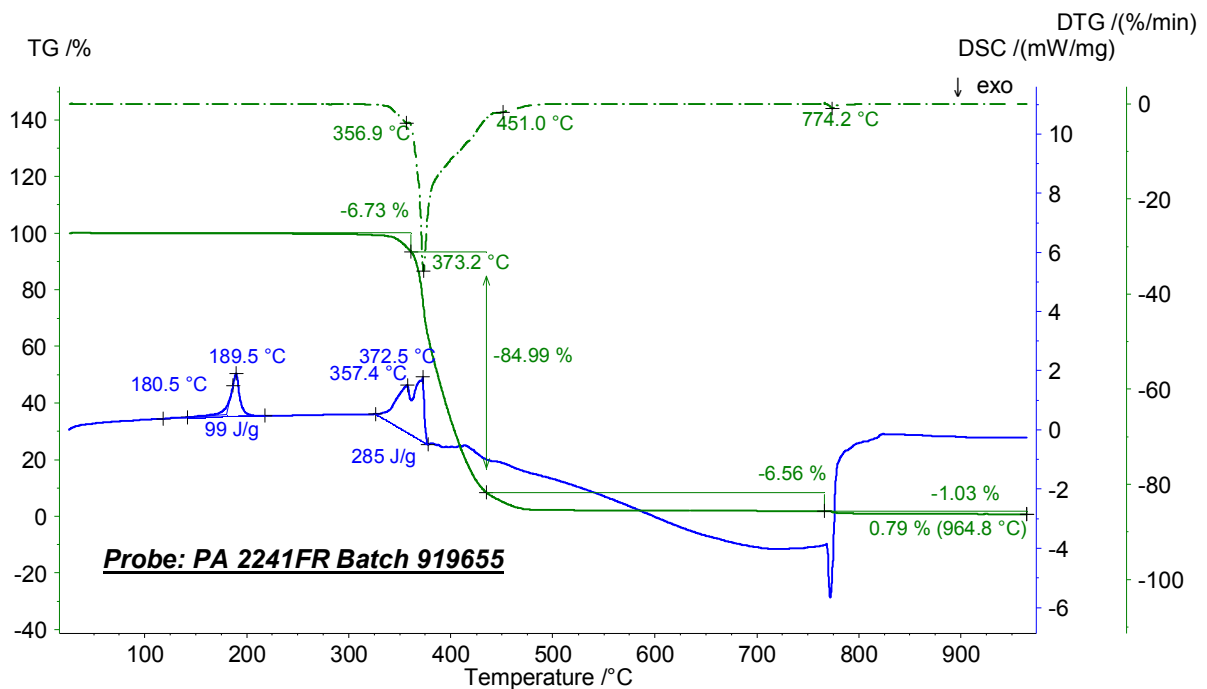
## Product Information

### Thermo Gravimetric Analysis / Differential Scanning Calorimetry

[Rate of mass change](#)

[Change in mass](#)

[Differential Scanning Calorimetry](#)



Change in test atmosphere from N<sub>2</sub> to air at 770°C.

Tests have been conducted by:  
NETZSCH-Gerätebau GmbH

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### Burning behaviours

Flammability properties	CS 25 / JAR25 / FAR 25 § 25-853 (a) App. F Part I Vertical Bunsen Burner Test		
	12s Ignition Time	1.0 / 1.5 / 2.0	mm
	60s Ignition Time	1.0 / 1.5 / 2.0	mm
Smoke generation	ABD 0031 (Issue: F), method: AITM 2.0007	1.0 / 1.5 / 2.0	mm
Toxic gas generation	ABD 0031 (Issue: F), method: AITM 3.0005	1.0 / 1.5 / 2.0	mm

Conversion of units: 1.0 mm is equivalent to 0.03937 inches

Tests of burning behaviours have been conducted by:

Direction Générale de l'armement, DGA Techniques aéronautiques

### Others

Plastics – evaluation of action of microorganisms	EN ISO 846, procedure A	Growth intensity: 0 (0,0,0,0,0)
<ul style="list-style-type: none"> <li>• Aspergillus niger</li> <li>• Penicillium funiculosum</li> <li>• Paecilomyces variotii</li> <li>• Gliocladium virens</li> <li>• Chaetomium globosum</li> </ul>		0 = no growth, not even microscopically detectable

Tests have been conducted by:

Amtliche Materialprüfanstalt Bremen

Ask for the test reports at EOS GmbH, feel free to contact us for further informations.

The test specimens have been manufactured in accordance with the operating instructions and training manual.  
All test specimens were built with refreshed powder (refreshing 50 %).

The data correspond to our knowledge and experience at the time of publication. They do not on their own represent a sufficient basis for any part design, neither do they provide any agreement about or guarantee the specific properties of a product or part or the suitability of a product or a part for a specific application.

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