TECHNICAL BULLETIN

NOFIA PHOSPHONATES FOR GF PC APPLICATIONS

Overview

Nofia HM1100, HM9000, and copolymers are a family of phosphonate polymeric flame retardant (FR) materials that are suitable for flame retarding glass-reinforced (GF) polycarbonate (PC). The Nofia phosphonates enable the production of very thin parts with very high glass fiber loadings that still can obtain a UL94 V0 rating, while maintaining high heat distortion temperatures (HDT). Furthermore, relatively high melt flows can be obtained, which improves injection molding of the highly filled compounds.

Features and Benefits

- UL94 V0 down to 0.8mm
- Improved flow
- Improved HDT

Applications include:

- Electronic enclosures and housings
- Structural parts for automotive

Starting Formulations and Compounding Temperatures

	Loading [wt%]
PC (MVR ~10 ml/10 min, 300°C/1.2 kg)	41
Glass Fiber	40
Nofia HM1100	18.7
Teflon	0.3

- The molecular weight (flow) of PC should be chosen based on property targets. Higher molecular weight PC gives better/more robust notched Izod impact properties.
- Recommended compounding temperature from feed zone to die: 200/260/285/285/285/290/290/290°C.

Typical Properties of Nofia Phosphonate Based GF PC *vs.* Current Available Non Halogen FR GF PC Compounds

	Nofia HM1100 Based	Commercial Grade 1	Commercial Grade 2	Commercial Grade 3
GF [wt%]	40	40	40	40
Tensile strength [MPa]	120-160		141	90
Elongation at break [%]	1.5-1.8		2.3	2.0
Tensile Modulus, [GPa]	11 - 14		12	11
Unnotched Izod Impact [J/m, 3.2mm]	800		620	
Notched Izod Impact [J/m, 3.2mm]	130	96	145	
Unnotched Charpy Impact [kJ/m^2]			41	23
Notched Charpy Impact [kJ/m^2]			13	5
Melt Volume Rate [ml/10min, 300°C/5.0 kg]	15 - 20		12	7.9
HDT (1.82MPa) [°C]	121 - 125	100	98	110
UL 94 @ 0.8mm	V0	V0		
UL 94 @ 1.0mm			V0	
UL 94 @ 1.5mm				V-0

Drying Guidelines for Nofia Phosphonates

Nofia phosphonates are hygroscopic materials and quickly absorb moisture from the atmosphere. The presence of moisture will hydrolyze the polymer in the melt phase, reducing the molecular weight. Therefore, it is critical that the material is thoroughly dried prior to melt processing (<50 – 200 ppm moisture). For recommendations on drying, please refer to FRX Polymers' Technical Bulletin "Nofia Phosphonates Drying Recommendations".

The Tg of Joncryl 4400 is 65°C, which is lower than the polymers. Thus, need to cool down the polymers before dry blending with Joncryl. Consult BASF for handling and feeding of Joncryl.

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