

## TECHNICAL DATA

## Granular modified PTFE FLUORPLAST® PN-M

HaloPolymer modified PTFE grade PN-M is a granular powder product designed for general purpose compression molding. This fully fluorinated resin has the same applications as conventional PTFE, improved electrical, mechanical properties and reduced porosity.

- **Product overview:** Granular modified PTFE is best suited for compression moulding. This material can be used for production of articles for chemical, mechanical, low-friction and electrical applications.
- **Typical applications:** General purpose: pipes, tubes, spacers, O-rings, skived sheets, skived films, laboratory and chemical equipment. Grade PN-M is also suitable for big billets production.
- **Availability:** 28 kg cardbox with 2x14 kg polyethylene inserts.
- **Technical and Application Assistance:** Contact our customer support team:  
Tel. +7 495 725 44 00  
e-mail: [halosupport@hpol.ru](mailto:halosupport@hpol.ru)

## TYPICAL PROPERTIES OF MODIFIED PTFE GRADE PN-M

Properties	Test Method	Units	Typical Value, PN-M
ASTM Type/Grade	ASTM D4894	-	III
Bulk density	ASTM D4894	g/l	570
Average particle size ( $d_{50}$ )	Internal, Laser Scatt.	µm	120
Mould shrinkage	ASTM D4894	%	4,0
Std. specific gravity (SSG)	ASTM D4894	g/cm <sup>3</sup>	2,16
Melting points	DSC	°C (°F)	335(635)
Molding pressure	Internal	MPa (psi)	20-25 (2900-3625)
Sintering temperature	Internal	°C (°F)	365 (689)
Tensile strength	ASTM D4894	MPa (psi)	35 (5076)
Elongation at break	ASTM D4894	%	370

## CERTIFICATION

Certificate of conformity FDA 21 CFR 177.1380 & FDA 21 CFR 177.1550	PTFE	Intertek Polychemlab	USA
Certificate of conformity Class VI acc. USP 35 <88>	PTFE	Pacific BioLabs	USA
Declaration of Compliance commission reg. (EU) 10/2011	PTFE	SGS Multilab	EU

## PRODUCT DESCRIPTION

Modified PTFE granular powder grade PN-M is a product of suspension polymerization of TFE performed with a small amount of modifier. This grade can be used for production of a variety of general purpose articles by compression molding technique.

## PROCESSING BASICS

Conventional plastics processing techniques are not suitable for PTFE resin processing due to its high melting temperature and very high melt viscosity.

Grade PN-M fabrication includes mould pressing of PTFE powder at ambient temperature, preform sintering in several stages with the maximum temperature of 365° C and subsequent controlled cooling. Billets can be further processed into finished articles by machining or cutting

## STORAGE AND HANDLING

Bags with PTFE powder should be stored in a cold dry place. Recommended storage temperature range is 15-20 °C. Bags with powder stored below this range should be kept closed until warmed to room temperature. Optimal temperature range for PTFE compression moulding is 20-25°C. Below this temperature PTFE changes its crystalline structure with volume variation of 1-2%, causing formation of cracks in preforms.

Mechanical manipulations with PTFE powders should be reduced. At the temperature higher than 30°C PTFE tends to form clumps.

PTFE powders attract dust and moisture from ambience and should be processed at clean and dry conditions.

Sintering of PTFE is linked to an emission of toxic gaseous products. Therefore sintering process should be performed in a ventilated area. Air from the processing zone must be evacuated.

## PRESSING

The pressing process of PTFE powder requires careful powder de-clumping. Uniform layer-by-layer mold filling is essential to avoid cracks formation in preform. The temperature of PTFE powder should be kept above 19° C.

Mold filled with PTFE powder is pressed into a solid preform with density of 1,80-2,00 kg/l.

Compression ratio parameter indicates volume compaction of powder during the pressing process. It is based on a preform/bulk density ratio. The rate of ram travel is adjusted to allow air to leave preform.

## TYPICAL MOLDING PROPERTIES

Properties	PN-M
Bulk density, g/l	570
Compression ratio	~3,5
Molding pressure, MPa	20-25

## SINTERING

The preformed PTFE powder is sintered under a temperature program generally containing 7 temperature steps including:

- heating,
- dwell before melting,
- complete melting of a billet,
- dwell above melting point,
- cooling to crystallization point,
- crystallization of the melt of PTFE,
- final cooling.

Annealing steps are also required for bigger billets sintering in order to reduce article distortion.

## MACHINING

PTFE billets are machined in the same way that mild metals are. Sharp steel cutting tools are suitable for the machining process. PTFE billets designed for further skived films production are processed at elevated temperatures.

Head Office:  
HaloPolymer  
Russia, Moscow, 125284  
Leningradskiy prospect,  
Business center «Monarch», 31A,  
building 1, 30th floor  
Tel: +7 495 725 44 00

US Office:  
Halopolymer Trading, Inc.  
Two Houston Center, 909 Fannin Suite 3250  
Houston TX, 77010-1046, USA  
Tel/Fax: 713 590 5103; 832 627 8698

Technical and Application Assistance:  
Tel: +7 495 725 44 00  
e-mail: [halosupport@hpol.ru](mailto:halosupport@hpol.ru)