

## TECHNICAL DATA SHEET

## Granular PTFE FLUORPLAST® PN, PN-90

HaloPolymer PTFE grades PN and PN-90 are granular powder products designed for general purpose compression molding. These fully fluorinated resins have excellent chemical stability, electrical and mechanical properties.

- **Product overview:** This virgin granular PTFE powder is best suited for compression molding. 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, laboratory and chemical equipment. Suitable for skiving sheets and films.
- **Availability:** 25 kg cardbox with 2x12,5 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 PTFE GRADES PN, PN-90

Properties	Test Method	Units	Typical Value, PN	Typical Value, PN-90
ASTM Type/Grade	ASTM D4894	-	I	II
Bulk density	ASTM D4894	g/l	575	525
Average particle size ( $d_{50}$ )	Internal, Laser Scatt.	μm	200	90
Mould shrinkage	ASTM D4894	%	2,2	2,3
Std. specific gravity (SSG)	ASTM D4894	g/cm <sup>3</sup>	2,15	2,15
Melting points	DSC	°C (°F)	342 (648) (Initial) 327 (621) (Second)	342 (648) (Initial) 327 (621) (Second)
Molding pressure	Internal	MPa (psi)	28-32 (4060-4640)	20-25 (2900-3625)
Sintering temperature	Internal	°C (°F)	370-380 (698-716)	365-375 (689-707)
Tensile strength	ASTM D4894	MPa (psi)	25 (3625)	28,5 (4133)
Elongation at break	ASTM D4894	%	250	280
Electric Breakdown	Internal	KV/mm	50	100

### 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

Halopolymer PTFE granular powders PN and PN90 are products of suspension polymerization of TFE subjected to grinding. These grades 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.

PTFE fabrication includes mould pressing of PTFE powder at ambient temperature, preform sintering in several stages with the maximum temperature of 360-380° C and subsequent controlled cooling. Generally grades PN and PN-90 require different sintering temperatures and different moulding pressure. 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	PN-90
Bulk density, g/l	575	525
Compression ratio	~3.5	~4
Molding pressure, MPa	28-32	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.

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