

TECHNICAL DATA SHEET

Free flow PTFE FLUOROPLAST® A

HaloPolymer PTFE grade A is a free flow powder product designed for manufacturing of precise articles by automatic, compression or isostatic molding. This fully fluorinated resin has excellent chemical stability, electrical and mechanical properties. PTFE grade A resin does not get caked during transportation, offering improved handling and better productivity.

- Product overview:** This free-flow virgin PTFE is best suited for automatic, isostatic or compression molding. This material can be used for production of articles for chemical, mechanical and low-friction applications.
- Typical applications:** Automatic production of small articles, O-rings
Compression molding of sheets
Isostatic pressing of articles of complicated shapes
RAM-extrusion of rods and pipes
- Availability:** 30 kg cardboard with 2x15 kg polyethylene inserts.
- Technical and Application Assistance:** Contact our customer support team:
Tel. +7 495 725 44 00
e-mail: halosupport@hpol.ru

TYPICAL PROPERTIES OF PTFE GRADE A

Properties	Test Method	Units	Typical Value, A*
ASTM Type/Grade	ASTM D4894	-	IV
Bulk density	ASTM D4894	g/l	780-890
Average particle size (d_{50})	Internal, Laser Scatt.	µm	500
Mould shrinkage	ASTM D4894	%	2.2
Std. specific gravity (SSG)	ASTM D4894	g/cm ³	2.16
Melting points	DSC	°C (°F)	342 (648) (Initial) 327 (621) (Second)
Tensile strength	ASTM D4894	MPa (psi)	28.5 (4135)
Elongation at break	ASTM D4894	%	260

* available in extra grades upon special request (for RAM-extrusion, for automatic, isostatic and compression molding).

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

PTFE free flow powder grade A is a product of suspension polymerization of TFE subjected to agglomeration. Grade A powder does not form clumps and has good flowability allowing uniform automatic dosing and repeatable form filling.

Grade A is available in additional grades upon special request: for automatic, isostatic or compression molding. Powder with reduced particle size span, bulk density over 850 g/liter or improved mechanical properties allow to produce articles at the required level of productivity.

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 370-375°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 associated with 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 Grade A powder does not require powder de-clumping. Good flowability allows uniform layer-by-layer mold filling which 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	A
Bulk density, g/l	780-890
Compression ratio	~2-2.5
Molding pressure, MPa	30-35

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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