

### Description

INOFLON™ 510 is a white free flowing powder (see Table I) with a nominal particle size of 750  $\mu\text{m}$ . This resin has been produced using PTFE that has been melted once. The melting point of INOFLON™ 510 decreases from the original nominal temperature of 342°C (648°F) to 327°C (621°F). Crystallinity of the PTFE also decreases from 95-98% to 50-70% as a result of the manufacturing process. These property changes impart unique characteristics to this resin e.g. its ability to withstand high pressures generated during ram extrusion and resistance to Poker Chipping. Ram extrusion is a continuous process by which tubes, rods and other profiles are extruded using successive charges of PTFE which undergo compaction and sintering within the same die.

INOFLON™ 510 allows production of small diameter rods and thin wall tubes and other profiles. High bulk density of INOFLON™ 510 makes it suitable for smooth automatic feeding in ram extruder.

When correctly processed; products fabricated from this resin exhibit the superior properties of polytetrafluoroethylene resins. The parts retain useful properties at service temperatures in the range of -240°C (-400°F) to +260°C (+500°F) such as chemical inertness to almost every industrial chemical and solvent, excellent weather resistance, low friction and non-stick surfaces. The dielectric properties of parts made from INOFLON™ 510 are outstanding and stable with frequency and temperature.

Parts made from INOFLON™ 510 resist ignition when exposed to fire and do not spread flame. These parts generate a small amount of heat and smoke when ignited by an external flame source. Please note that these remarks are not intended to predict the hazards of burning of PTFE in an actual fire.

### Typical End Use Products

Many end products are made by extruding INOFLON™ 510. It is especially recommended for the extrusion of small rods and thin wall tubes. More complex profiles are also produced using this resin. The extrudate of this resin are machined into parts and components used as electrical insulators, fluid handling seal rings and bearings, bushings and many other parts.

### FDA Compliance

When products made from INOFLON™ 510 are correctly processed, that is sintered at high temperatures as practiced by the industry; they may comply with FDA Regulation 21 CFR 177.1550 for use in contact with food.



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## Processing

Ram extrusion is a continuous process which combines the preforming and sintering of PTFE into a single operation. The feed resin is forced to move down by a reciprocating ram through the heated section of the extruder die which is followed by a cooling zone. Compaction, heating and cooling are carried out in series within a single extruder die. The temperature of the heated section of the die is above the crystalline melting point of the resin to weld the successive charges of the powder. The advantage of ram extrusion over compression moulding is the possibility of obtaining very long parts suitable for automatic machining. The design of the extruder, extrusion rate, back-pressure generated by the resin itself and the temperature must be carefully controlled. Variation in these parameters affects the quality of the extrudate.

Table I - Typical Properties of INOFLON™510

Properties	Test Method	Unit	Nominal Value
Bulk Density	ASTM D 4894	g/l	650
Avg. Particle Size	ASTM D 4894	µm	750
Mould Shrinkage	ASTM D 4894	%	-
Std. Specific Gravity	ASTM D 4894	-	-
Melting Point Initial	ASTM D 4894	°C (°F)	-
Melting Point Second		°C (°F)	327 (621)
Powder Flow	Modified ASTM D 1855	g/min	353
Tensile Strength	ASTM D 4894	Mpa (Psi)	-
Elongation	ASTM D 4894	%	-

Note: These are typical properties and are not to be used for specification purposes.

## Safety Precautions

Handling and processing of PTFE must be done in ventilated areas to prevent personnel exposure to the fumes liberated during sintering and heating of the resin. Fumes should not be inhaled and eye and skin contact must be avoided. In case of skin contact, wash with soap & water immediately. In case of eye contact, flush with water immediately and seek medical help. Smoking tobacco or cigarettes contaminated with PTFE may result in a flu-like condition including chills, fever and sore throat that may not occur until a few hours after exposure has taken place. This symptom usually passes within about 24 hours. Vapors and gases generated by PTFE during sintering must be completely removed from the factory areas. Mixtures of some metal powders such as magnesium or aluminum are flammable and explosive under some conditions. Please read the Material Safety Data Sheet and the detailed information in the "Guide to the Safe Handling of Fluoropolymer Resins" published by the Fluoropolymer Division of The Society of the Plastics Industry available at [www.fluoropolymers.org](http://www.fluoropolymers.org).

## Handling and Storage

Preforming at temperatures in the range of 23-28°C (73-82°F) is most preferable. Resin temperature must be above 19°C (66°F) during moulding because of a special molecular transition of PTFE at 19°C (66°F). PTFE molecule, which has a helical shape, tightens up by transition from a helix where 15 carbons are required for 180° turn to 13 carbons. Below 19°C (66°F), PTFE molecule becomes stiff and less conformable, thus there is a chance that moulded parts could end up cracked. PTFE powder becomes sticky, forms lumps and loses all flow at temperatures above 28°C (82°F).

For best results, the powder processing areas should be kept clean and free of all contamination. Organic contamination and foreign matter usually appear as dark spots often easily visible against the white PTFE background. Organic contamination material degrades at the sintering temperatures and forms discolored spots. They oxidize away as carbon dioxide wherever sufficient oxygen exposure takes place. It is, therefore, not unusual to encounter discoloration inside a part away from the surface where hardly any oxygen is present.

## Packaging

INOFLON™510 is packed in plastic or fiber drums™ or corrugated boxes. Inside of this, resin is filled in double liner bags & closed with a plastic tie.

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**NOTE Warning:** Do not use any of INOFLON™ PTFE resins in medical devices that are designed for permanent implantation in the human body. For other medical uses, prior permission of GFL may be sought.