

Description

INOFLON™640 is a white powder (see Table I) with a nominal particle size of 20 μm. The unique characteristics of this fine cut resin include its very low particle size and a relatively high bulk density. Low particle size helps to minimize the void content in the part at a relatively low moulding pressure. INOFLON™640 produces parts with the highest possible mechanical properties due to its small particle size and low void content.

Very low particle size and irregular shape of INOFLON™640 imparts better reinforcement and uniform distribution of fillers which are added to modify properties of the moulded parts depending on the application. To achieve the maximum homogeneity in compounds, it is preferred to mix the resin with fillers at a high shear rate. The temperature during mixing must be controlled < 19°C (66°F) to prevent agglomeration of resin particles which may result in white spots in the final product.

When correctly processed, products fabricated from INOFLON™640 exhibit the superior properties that we have come to expect 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, low friction and non-stick surfaces. Moulded articles are moderately stiff and possess tensile properties that meet requirements of many applications. Parts made using pure INOFLON™640 provide smooth surface finish.

Compounds based on INOFLON™640 provide a wide range of modified properties such as high thermal conductivity, better wear & tear resistance, good creep resistance, low coefficient of friction etc. Parts made from INOFLON™640 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. 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 fabricated by moulding compounds of INOFLON™640 and machining of shapes. Examples include large billets for low thickness skived films and sheets, gaskets, mechanical seals, bridge bearing pads, shaft bearings, electrical insulators, piston rings, expansion bellows and chemical linings. A wide range of products are made from filled compound based on INOFLON™640, depending on the application requirements which includes seals, valve seats, gaskets with high resistance to compression, bearings with high wear resistance, support slide for heavy loads etc.

FDA Compliance

When products made from INOFLON™640 are correctly processed, that is sintered at high temperatures practiced by the industry; they may comply with FDA Regulation 21 CFR 177.1550 for use in contact with food.



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Before using, the powder must be conditioned above 19°C (66°F). First the mould is filled manually with the resin. Next, it is compacted into a preform that has a shape similar to the final shape of the desired moulding. The preform is then sintered in an oven where it undergoes heating and cooling cycles, in which heating and cooling rates and dwell times are defined and programmed. The two cycles together are commonly called *sintering cycle*. The preform is heated to a temperature above the crystalline melting point of the resin during the sintering cycle. The cooling cycle is used to control the crystallinity of the part. The properties of a part are functions of preforming pressure, dwell time, sintering time and temperature and the cooling rate.

Table I- Typical Properties of INOFLON™ 640

Properties	Test Method	Unit	Nominal Value
Bulk Density	ASTM D 4894	g/l	400
Avg. Particle Size	ASTM D 4894	µm	20
Mould Shrinkage (max.)	ASTM D 4894	%	<3
Std. Specific Gravity	ASTM D 4894	-	2.16 - 2.18
Melting Point Initial	ASTM D 4894	°C (°F)	342 (648)
Melting Point Second		°C (°F)	327 (621)
Tensile Strength	ASTM D 4894	MPa(Psi)	30 (4350)
Elongation	ASTM D 4894	%	400

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.

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™ 640 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.