

Application for exemption from EU REACHPFAS control for PTFE

Subject: Application for permanent exemption of polytetrafluoroethylene resins

Basis: First, polytetrafluoroethylene can not be replaced because of its unique excellent performance;

Second, PTFE has good low dielectric properties and low loss factor under high frequency conditions, which can provide ultra-high frequency and high-speed performance for data centers, signal towers and personal electronic equipment.

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Polytetrafluoroethylene is known as the "plastic king", the father of fluorine resin Roy Plunkett in 1936 in the United States DuPont Company research and development. Unique and excellent properties are as follows:

Peculiarity	Main content
Temperature tolerance	PTFE can be used for a long time at a temperature of -100°C-260°C
Corrosion resistance	PTFE is one of the most chemically inert polymer materials among the known organic compounds. It is capable of almost all strong acids (including aqua regia), strong bases and organic solvents.
Weather-proof	PTFE has the best aging life among plastics.
Self-lubricating	PTFE friction coefficient is very small, with the smallest friction coefficient of plastics (0.04), is known to be practical sliding surface materials of the lowest friction coefficient value, is an ideal lubrication material.
Non-tack	Due to the extremely low intermolecular forces of PTFE fluoro-carbon chain, it has the smallest surface tension among solid materials without adhering to any substance.
Nonhazardous	PTFE as a medical material implanted in the human body will not cause rejection of the body, no physiological side effects on the human body, with physiological inertia since the 1970s, it has been first applied to make artificial blood vessels for clinical use.

Hydrophobicity	PTFE has a large density of 2.14-2.20g/cm ³ , almost no water absorption, and the equilibrium water absorption rate is less than 0.01%.
Electrical insulation	PTFE is the ideal Class C insulation material, and a single layer of newspaper thickness can block high pressures of 1500V.

PTFE has excellent insulation and is not easy to be interfered with by high-frequency waves, and fluoropolymers have good low dielectric properties and low loss factors under high frequency conditions, which can provide ultra-high frequency and high-speed performance for data centers, signal towers and personal electronic devices. Polytetrafluoroethylene has been rapidly applied in the following 4 aspects:

1, As a low dielectric loss material: high-frequency transmission technology is one of the key technologies of 5G wireless communication, it can increase the availability of frequency band resources, enhance the technical requirements of 5G wireless communication technology for network development. In order to achieve high-frequency transmission, it is necessary to use functional materials with low dielectric constant and low dielectric loss, and the dielectric constant of 5G for low dielectric materials is between 2.8 and 3.2. Low dielectric constant materials are mainly used in 5G mobile phone antenna materials, circuit board materials, cover materials and shell materials. Low dielectric constant materials mainly include PTFE, PPO, LCP and PI(or MPI). PTFE as one of the lowest intermediate electrical constants of organic materials, it is widely used in the field of 5G communication.

2□ As the core material of the printed circuit board: the printed circuit board is referred to as the PCB, which is the carrier of the electrical connection of electronic components and the support body of electronic components, and its main role is to provide circuit connection for the electronic components laid on the printed circuit board. Copper clad plate is the main raw material of printed circuit board, and printed circuit board is produced by circuit printing on it. Copper-clad sheet is a plate-like material made by dipping the reinforced material such as petroleum wood pulp paper or glass fiber cloth with resin and covering one or both sides with copper foil by hot pressing with adhesive. At present, epoxy resin glass cloth based copper clad plate is widely used in the PCB of 4G communication field, and the dielectric material energy loss value (Df) is above 0.01, while the 5G field is mainly for micron and millimeter wave applications, and the dielectric material energy loss (Df) of low dielectric constant resin is usually required to be less than 0.005. PTFE, as one of the polymer materials with the lowest dielectric constant found so far, shows excellent dielectric properties in copper-clad plates, and the dielectric material energy loss (Df) is less than 0.002 under high frequency and high speed conditions, which meets the requirements of 5G communication base stations.

3, As a 5G base station antenna filter material: the filter is a frequency selection device, is an indispensable part of communication equipment, its principle through the electromagnetic wave of different frequencies in the cavity oscillation, to retain the electromagnetic wave to reach the resonance frequency of the filter, while other frequencies of electromagnetic waves dissipate in the

oscillation, from the function of filtering. At present, the main filters used by major communication equipment manufacturers are metal cavity filters. The technology of metal cavity filters is mature and the production cost is low, which is mainly used in the remote radio frequency unit (RRU) and active antenna unit (AAU) of the base station. Many PTFE parts are used in the metal filter, which plays the role of support, insulation and heat insulation. In the 5G era, the metal cavity filter is further optimized, more miniaturized, more internal structure, and the amount of PTFE is larger than that in the 4G era.

4, As a key component of 5G smart phones: 5G mobile phones and 5G base stations are important terminals in 5G networks, which need to send and receive signals for data transmission, so 5G mobile phones also have radio frequency and antenna modules as the base stations, but the modules in 5G mobile phones are more sophisticated and miniaturized. The motherboard of the 5G mobile phone uses a PTFE-based high frequency copper-coated printed circuit board (PCB) to reduce signal loss. The RF signal transmission between the 5G mobile phone RF module and the antenna module is completed through the PTFE fine RF coaxial cable to ensure that the high-frequency high-speed signal of the mobile phone is low loss.