

General information

Overview

PEIs are competitive not only with other high-performance polymers such as polysulphones and polyketones but also with PPS, polyarylates, PAIs and PC.

Strengths

Much cheaper than PEEK (a competitive material for certain applications). Higher tensile strength at room temperature than PES or PSU. Lower water absorption than PES, high continuous use temperature (170 °C (340 °F)), similar to PES. Highest flame resistance of all thermoplastics except fluoropolymers, low smoke emission (lower than even PES). Transparent (though amber colored).

Limitations

Lower maximum service temperature and impact strength than PEEK, relatively low notched impact strength lower tensile strength than PAI. Prone to stress cracking in chlorinated solvents, yellow tint.

Tradenames

Superio-UT, Sustatec, Tecapei, Tempalux, Ultem, Whistatt

Typical uses

Guitar picks, high temperature switchgear, microwave cookware, electrical connectors, lamp housings, under-bonnet components.

Composition overview

Compositional summary

$(-N-[CO]_2-C_6H_3-O-C_6H_4-[CH_3]_2-C_6H_4-O-C_6H_3-[CO]_2-N-C_6H_4-)_n$

Material family

Plastic (thermoplastic, amorphous)

Base material

PEI (Polyether imide)

CAS number

61128-46-9

Processing properties

First commercial production

1982

Forming

Excellent melt flow rate. Injection molded (runner-less), injection blow-molding, extrusion, and foaming. Rotational molding (very difficult) and vacuum-forming. Very high melt temperatures 375-425°C (710-800 °F). Pre-drying for 11 hr is required.

Machining

Easy to machine.

Joining

Easy to bond with cyclohexanone being a recommended solvent. Various commercial adhesives can be used. Suitable for all types of welding (particularly friction and ultrasonic) except radio freq. Hot gas welding difficult. Hot plate welding produces strong bonds but requires careful dimensional and temperature control (PEI degrades too significantly at 427 °C (800 °F) for strong welds, just 28 °C (50 °F) above the recommended heating range). Can produce strong welds to PBT and PC. Suitable for snap-fits and ultrasonic staking. Self-tapping screws can be used.

Surface treatment

Suitable for painting.

Geo-economic data for principal component

Annual world production

1.48e4 - 2.36e4 ton/yr