

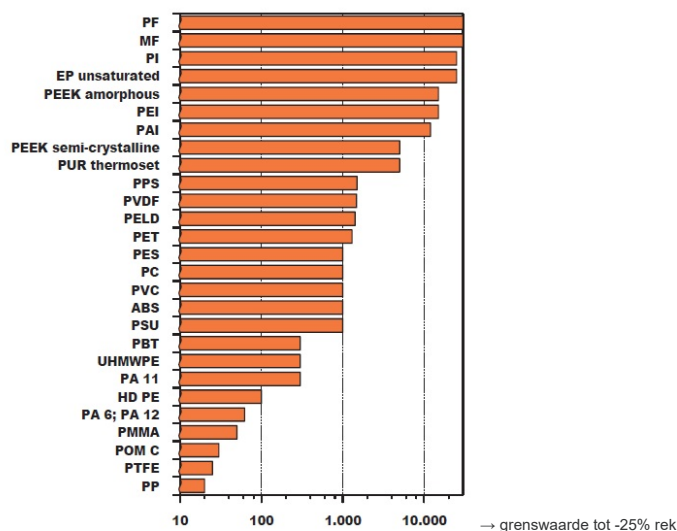
Resistance of plastics against high energy radiation

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Health and safety are priority number one in critical production environments such as nuclear power plants. Polyfluor Plastics supplies products that are specifically designed for applications in environments with extremely high pressure, steam and/or radioactivity.

There is no difference in the change of properties of plastic materials with respect to the radiation effect between Electron, X-ray and gamma radiation, but there is an indirect difference between the electrons and the gamma radiation; at the radiation an oxidative decline takes place. For the electron radiation it is many times higher than the gamma radiation, at the same dose.



[kGy]

The relative resistance to high energy radiation:

The image shows the pure radiation resistance of various plastics. As limit for the properties, the reduction of elongation at break is taken of -25% from baseline before exposure to the radiation.

The amount of energy is indicated as a measure of the radiation energy. The SI unit is [J/kg] or [Gy] (the old unit is [rad], "rd" or "rad"), and the conversion is as follows: 1J/kg = 1 Gy = 100 rad. The value indicates how rapidly the energy is absorbed [Gy/s].

It shows that the thermosets (retain their shape when heated) Phenol-formaldehyde (PF) and melamine formaldehyde (MF) are more resilient than the thermoplastic resins (these will become softer at a certain temperature and are therefore easily deformable).

The aromatic plastics (such as PEEK and polyimide) can withstand better than the aliphatic plastics such as polyethylene and polypropylene. Plastics with a smaller specific gravity show a better resistance.

Polyfluor supplies PEEK, PEEK compounds and PI (polyimide), semi-finished and finished products for these critical applications (nuclear, coatings) and thermosets. Please contact our sales department for more advice and/or requests.