

OPTICAL POLYESTER – O-PET (OKP-4)

Physical and mechanical properties: Osaka Gas Co. Ltd and Kanebo Ltd have co-developed an amorphous polyester material, OKP-4. It is now available commercially from Osaka Gas Chemical. The characteristics of OKP-4 are as follows:

- High refractive index (>1.6)
- Low birefringence

Having a slightly lower transmittance value (90 % for 3 mm thickness) than cycloolefin polymer (COP), OKP-4 is mainly used for an alternative to this latter in optical system when a higher refractive index is required. Moreover, its Abbe number, quantifying the refractive index change with the wavelength, is relatively low compared to the high value of this index (at a given wavelength). Jointly, its density is 20% more important than Zeonex, and slightly superior to PC's and PMMA's.

Chemical properties: OKP-4 has very low water absorption, two times less than PMMA and 30% less than PC. Up to 60°C, it resists fairly well low concentration organic acids and diluted minerals as well as diluted alkaline solutions. Its resistance to diminishing light transmission due to aging is very good. However, as a polyester, it must not be used with the following materials at ambient temperature:

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| • Alcohol - Butyl | • Benzyl Alcohol | • Hydrofluosilicic Acid 10% |
| • Alcohol – Isopropyl 100% | • Chlorine – Wet Gas, Water | • Hydrogen Chloride, Wet Gas |
| • Alcohol – Secondary Butyl | • Chloroacetic Acid 0-50% | • Pyridine |
| • Ammonium Hydroxide ≥ 10% | • Copper Cyanide / Fluoride | • Sulfuric Acid ≥ 30% and ≤ 50% |
| • Ammonium Persulfate / Phosphate | • Di-Ammonium Phosphate | • Sulfurous Acid 10% |
| • Barium Acetate | • Dibutyl Ether | • Toluene |
| • Barium Sulfide | • Dimethyl / Dioctyl Phthalate | • Xylene |

Please refer to the manufacturer or GAGGIONE for a use at a temperature superior or equal to 60 °C, in which case the chemical use is more restrictive.

Electrical properties: Like COP, OKP-4 polyester has a low dielectric constant that makes it useable as electric insulating components.

Thermal properties: OKP-4 has a relatively low thermal expansion coefficient, comparable as the one of PMMA or Zeonex. As these latter, OKP-4 is combustible and burns without producing an excessive amount of smoke (UL 94 HB). Depending on the particular grade, the glass transition temperature is between 121 and 142 °C. This makes a much more permissive use of OKP-4 than PMMA, allowing to be used in an environment with a temperature up to 100°C, even more for some grades. This is not the case for PMMA, for which the heat deflection temperature under 1.80 MPa doesn't go above 100°C, but goes to 123 °C for a grade of OKP-4 (OKP4HT).

Printing and marking properties: OKP-4 is suitable for both vacuum-applied metallization and silk-screening.

Implementation properties:

- Injection: The very high fluidity of OKP-4 makes it easy to obtain high performance injection-molded objects and films.
- Machining: As OKP-4 very well resist to high temperature, machining is feasible on this material (diamond turning for instance).