

ZEON

Cyclo Olefin Polymer (COP)

ZEONEX[®]



ZEON CORPORATION

New high-performance thermoplastics for next-generation

For optics, electronics, and medical applications

Another industry-leading development from ZEON CORPORATION

ZEONEX®— Cyclo Olefin Polymer(COP) offers excellent optical properties for creating optical parts for cameras and laser beam printers.

ZEONEX's high purity is suitable for a wide range of medical packaging products, while its low dielectric constant and loss tangents are appropriate for electrical insulation applications.



ZEONEX® Applications

Digital camera lenses, prisms and Mobile phone camera lenses

ZEONEX® has earned high marks for low moisture absorption, good transparency, and high precision molding ability.



Mirrors

ZEONEX's low moisture absorption, good dimensional stability, and high-precision molding are perfectly fit for mirrors.



Pickup lenses, LBP F θ lenses.

For pickup lenses and LBP F θ lenses, ZEONEX's low birefringence, low moisture absorption, and high-precision molding ability will bring high values.



Other applications

ZEONEX® is also favored in electronics, medical packaging and optronics fields, with its outstanding heat resistance, low impurity, chemical resistance and electric properties.



ZEONEX® representative properties

| Properties | Measurement methods | Unit | Requirements | ZEONEX®K22R |
|-------------------------------|---------------------|---------|------------------------|----------------------|
| Specific gravity | ASTM D792 | - | - | 1.01 |
| Water absorption | ASTM D570 | % | - | 0.014 |
| Heat distortion temperature | ASTM D648 | °C | 1.82PaNo annealing | 132 |
| Linear expansion coefficient | ASTM E831 | cm/cm°C | -50~100°C | 5.8×10^{-5} |
| Izod impact strength | ASTM D256 | J/m | 3.2mm Notched | 23 |
| Pencil hardness | JISK5401 | - | - | F |
| Volume resistivity | IEC93 | Ωcm | - | 1.3×10^{17} |
| Dielectric breakdown strength | ASTM D149 | kV/mm | short-time method, 1mm | 110 |
| Dielectric constant | IEC250 | - | 1MHz | 2.5 |
| Dielectric loss tangent | IEC250 | - | 1MHz | 0.003 |

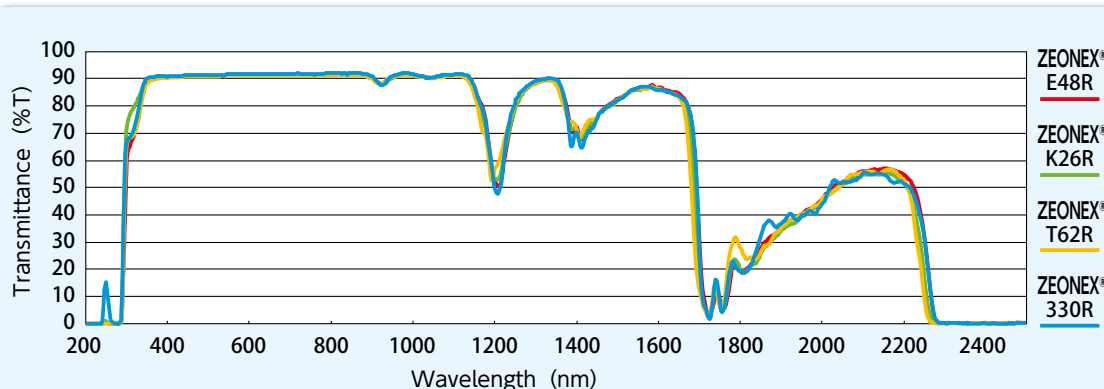
※Data represents experimental results and does not guarantee specific performance levels under actual usage.

ZEONEX® properties comparative

| Properties | Measurement methods | Unit | Requirements | ZEONEX® K26R | ZEONEX® K22R | ZEONEX® E48R | ZEONEX® F52R | ZEONEX® T62R | ZEONEX® 330R | ZEONEX® 480R |
|------------------------------|---------------------|---------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Refractive index | ASTM D542 | - | - | 1.535 | 1.535 | 1.531 | 1.535 | 1.536 | 1.509 | 1.525 |
| Glass transition temperature | JIS K7121 | °C | - | 143 | 143 | 139 | 156 | 154 | 123 | 138 |
| MFR | ISO 1133 | g/10min | 260°C 21.18N | | | | | | 11 | |
| | | | 280°C 21.18N | 52 | 32 | 25 | 22 | 16 | | 21 |
| Flexural modulus | ISO 178 | MPa | - | 2360 | 2410 | 2240 | 2480 | 2540 | 2780 | 1930 |
| Flexural strength | ISO 178 | MPa | - | 80 | 115 | 115 | 99 | 98 | 90 | 97 |
| Tensile modulus | ISO 527 | MPa | - | 2530 | 2570 | 2450 | 2740 | 2650 | 3010 | 2100 |
| Tensile strength | ISO 527 | MPa | - | 54 | 72 | 73 | 60 | 67 | 37 | 60 |
| Tensile elongation | ISO 527 | % | Surrender | - | 5.2 | 5.5 | - | - | - | 5.5 |
| | | % | Destruction | 2.8 | 24 | 62 | 3.1 | 3.9 | 1.5 | 43 |
| Flammability | IEC250 | - | the UL standard | 94HB | 94HB | 94HB | 94HB | 94HB | 94HB | 94HB |

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Transmittance data 3mmplate 200-2500nm



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ZEONEX® characteristic properties

ZEONEX® basic molding properties

Predrying

Air(oxygen) dissolved in ZEONEX® pellets can cause discoloration, carbide and the occurrence of voids. ZEONEX® should be dried (heated) to remove air in the pellets for 4 to 10 hours at the temperatures recommended for each product number indicated below before molding. Drying for too long a period may cause heat deterioration, and possibly discoloration in the molded articles.

| Product name | ZEONEX® 480R | ZEONEX® E48R | ZEONEX® F52R | ZEONEX® K26R·K22R | ZEONEX® 330R | ZEONEX® T62R |
|-------------------------|-----------------|-----------------|-----------------|----------------------|-----------------|-----------------|
| Recommended temperature | 100~110℃ | 100~110℃ | 100~110℃ | 100~110℃ | 90~100℃ | 100~110℃ |

Standard injection molding conditions

Since molding conditions will differ depending on molding machine, shape and size of molded item, runner & sprue & gate design, please refer to the glass transition temperature and the recommended conditions below to determine with reference.

| Product name | ZEONEX® 480R | ZEONEX® E48R | ZEONEX® F52R | ZEONEX® K26R·K22R | ZEONEX® 330R | ZEONEX® T62R |
|----------------------|-----------------|-----------------|-----------------|----------------------|-----------------|-----------------|
| Cylinder temperature | 260~290℃ | 260~290℃ | 270~300℃ | 270~300℃ | 240~260℃ | 270~300℃ |
| Mold temperature | 90~135℃ | 90~135℃ | 105~150℃ | 95~140℃ | 90~120℃ | 120~150℃ |
| Injection pressure | 50~180MPa | | | | | |
| Holding pressure | 50~180MPa | | | | | |
| Back pressure | 5~10MPa | | | | | |
| Injection speed | 30~80cm³/sec | | | | | |
| Screw speed | 20~60rpm | | | | | |

Nitrogen sealing

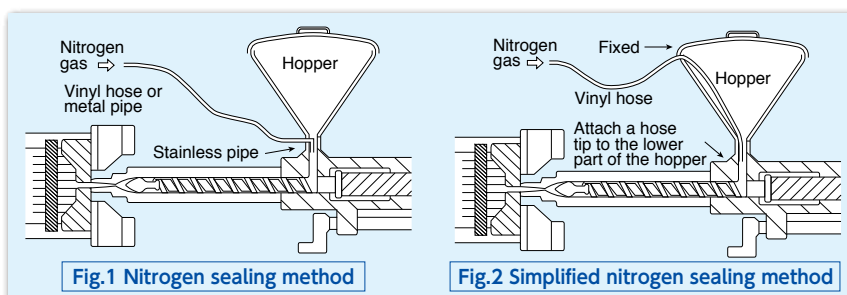
(1) Necessity of Nitrogen Sealing

ZEONEX® is stable even at 280℃ for 30 hours when oxygen is not present, so defects such as carbonization, burning and discoloration do not occur in products. Since these problems will arise in the presence of oxygen, nitrogen sealing should be used to prevent oxygen from entering into the injection molding process. Nitrogen sealing is very effective for molding optical parts, preventing discoloration and the entrance of contamination caused by resin decomposition.

(2) Nitrogen Sealing Method

Fig.1 Shows the method for nitrogen sealing, and Fig.2 shows a simplified nitrogen sealing method.

- (1) As shown below, feeding nitrogen to the lower part of the hopper prevents mixture with air. This is also effective when air is used for transport.
- (2) Before increasing the cylinder temperature, nitrogen is introduced in order to purge air from the inside of the cylinder. After this, the resin can be poured.
- (3) The flow rate of nitrogen depends on the capacity of the molding machine. For example, nitrogen flow rate 15 liters/minute (cylinder diameter: 15 to 30 mm; resin residence time: 5 to 30 minutes). Concentration of N₂ should be 99% or higher, and a concentration of 99.9% or higher is recommended.



※For more details, please ask ZEON

※When a nitrogen sealing is applied, carefully monitor the increase in nitrogen density in the molding room and be sure to provide periodical ventilation.



PL(Product Liability) Notes

1. Please observe the following precautions for the storage and use of the product and items molded from the product.

- (1) Keep away from fire, since ZEONEX® is combustible.
- (2) Avoid exposure to direct sunlight and high-energy-light, which can make ZEONEX® discolouration.
- (3) Do not use or expose to temperatures over heat distortion temperature, ZEONEX® may discolor, deform, or melt.
- (4) Avoid exposure to high temperature for a long time, which can distort ZEONEX®.
- (5) Do not use under high heat temperature and near heat source; ZEONEX® may emit smoke or ignite.
- (6) Do not use near high-energy-light source, ZEONEX® may emit smoke or ignite due to heat generation by light absorption.
- (7) Improper molding conditions or use with a poorly designed mold may induce solvent cracking through residual stress.
- (8) Do not use for parts that are subject to continuing load (snap fit insert molded products, screw stops, etc.); the material may crack.
- (9) Do not expose to the following solvents and liquids which may cause ZEONEX® to liquefy or swell.
 - Aromatic solvents such as benzene, toluene, etc.
 - Chlorinated hydrocarbon solvents, including dichloromethane, carbon tetrachloride, etc.
 - Animal vegetable and mineral oils and greases
 - Hydrocarbon solvents such as n-Hexane, cyclohexane and ligroin, etc.
 - Ethers such as diethylether, etc.
 - Ketones such as cyclohexanone, etc.
 - Prior to use test other materials and liquids containing long-chain alkyl groups in their structure.
- (10) Test ZEONEX® under the harsh conditions to be encountered to determine the safety and suitability of the materials prior to use.

2. Contact ZEON CORPORATION before utilizing ZEONEX® in medical care products, foods or toys.

3. Please refer to the Safety Data Sheet for specific details.

Related laws and standards

1. TSCA : TSCA Inventory
2. EINECS : EINECS Inventory

Other disclaimers and warnings

- (1) Specifications listed in the catalog are typical measurements using standard test methods, but are not intended to imply guaranteed values for all possible applications. Consequently, listed values may not be applicable to products used under differing conditions.
- (2) Catalog descriptions and specifications are subject to change without notice.
- (3) Applicable industrial patents and copyrights should be observed when adopting applications introduced in this catalog.
- (4) Physical properties cited for other resins are drawn from related catalogs and documents.
- (5) Contact ZEON CORPORATION for detailed technical information.