

arxada

Glycolube® P Lubricant Multi-Functional Additive

Materials Protection



Glycolube® P Lubricant is an effective lubricant for many polymer materials in both extrusion and molding processes. This product is recommended as a mold release for polycarbonate and is also compatible with many other thermoplastic polyesters and engineering thermoplastics.

Polycarbonate polymers are used to produce a variety of materials and are useful when impact resistance and/or transparency are a product requirement (e.g. in bullet-proof glass). Polycarbonate can be used for plastic lenses in eyewear, medical devices, automotive components, protective gear, greenhouses, digital discs (CDs, DVDs, and Blu-rays), and exterior lighting fixtures.

Glycolube® P Lubricant Delivers Processing Performance

This multifunctional lubricant's thermal stability allows for use in polycarbonate systems without degrading at processing temperatures. At a processing temperature of 300°C, the addition of Glycolube® P Lubricant reduces processing torque as compared at the same metered rate of material addition to the extruder, as seen in Fig. 1.

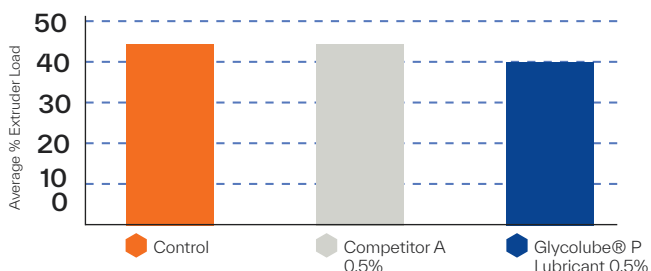
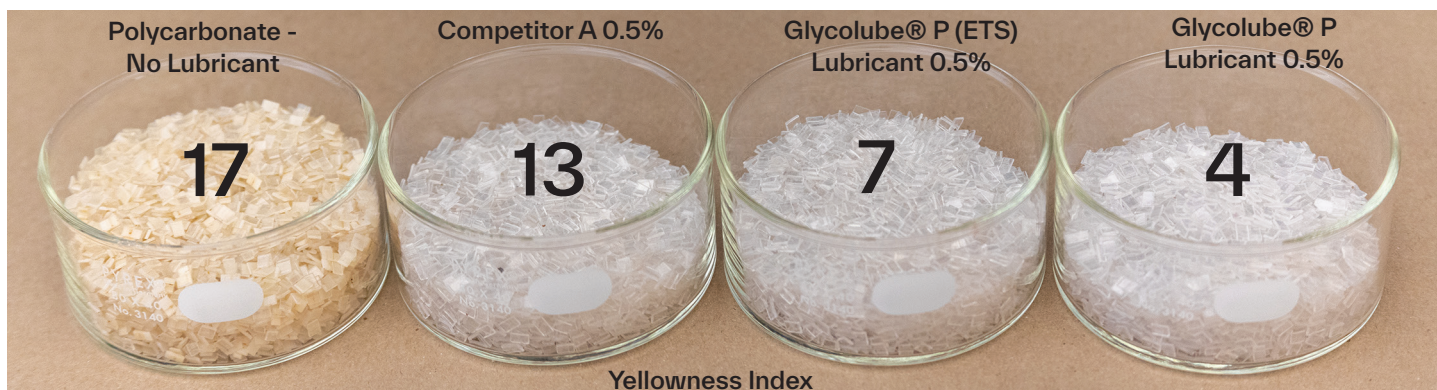


Figure 1: Glycolube® P Lubricant improves flow through the extruder, as seen in this reduction in torque during extrusion

Glycolube® P Lubricant also exhibits external lubricity while improving haze compared to competitive lubricants. Good external lubrication can come at the cost of increased haze in the final polycarbonate product, but Glycolube® P Lubricant maintains strong clarity of the final product.



The Risk of Thermal Degradation to Product Quality

Thermal degradation of polymer materials while undergoing the high heat and shear of the extrusion process will have a significant impact on the physical quality and appearance of the final product. A large-scale study of rheological behavior was performed to characterize the effect of lubricants on viscosity at various shear rates. Using the well-known Fox-Flory relationship allows us to relate melt viscosity to molecular weight - Fig. 2 shows the result of these calculations. It is evident that Glycolube® P Lubricant not only protects the polymer from molecular weight degradation during the course of typical extrusion (in this case about 3.5 minutes) but also maintains molecular weight over even longer extruder residence times.

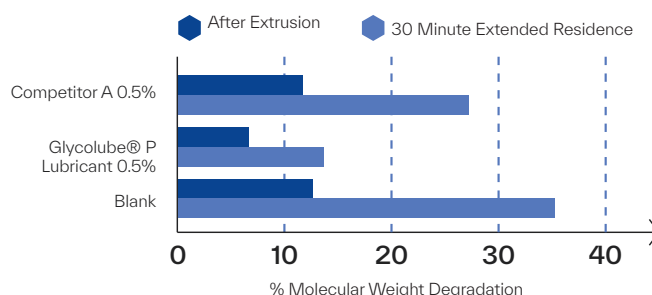
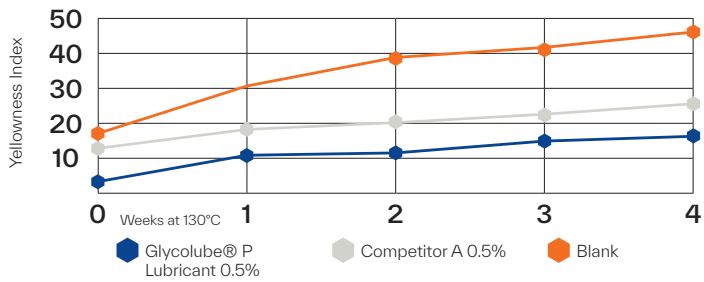


Figure 2: Calculated molecular weight degradation with exposure to 300°C barrel temperature over time

This trend continues with increasing loading of Glycolube® P Lubricant. As compared to the lower addition level, 1% loading shows more than 5x reduction in % degradation.

In addition to thermal degradation during processing, environmental degradation after production is of concern, especially in automotive applications and other similar markets. Two accelerated aging protocols were used to test heat and humidity stability. Heat stability was tested by placing extruded polycarbonate in an oven at 130°C for 4 weeks, measuring color every week and MVR at the end. Humidity stability was tested at 85°C and 85% relative humidity for 200 hours, with MVR measured at the end.



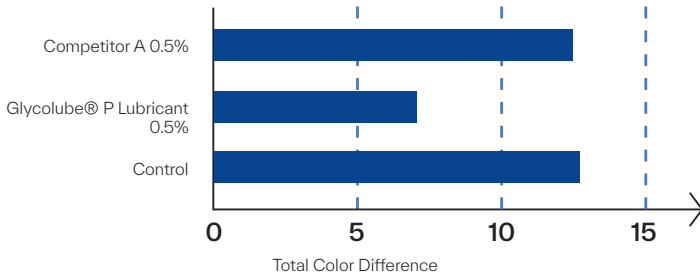
Glycolube® P Lubricant Even Outperforms Products of the Same Chemistry

Even when compared to competitor materials based on the same chemistry, the premium grade Glycolube® P Lubricant demonstrates consistently superior results due to its high purity, in particular with regards to unwelcome alkali earth metals.

Sodium, ppm 2.5 Max

Potassium, ppm 2.5 Max

CIElab Color Difference After 4 Weeks Heat Aging



Figures 3 and 4: Color stability of polycarbonate over time while exposed to 130°C

Use of Glycolube® P Lubricant not only delivers lower yellowness directly post-extrusion but also maintains low color change over time.

Similarly to the processing stability results, Glycolube® P Lubricant preserves polycarbonate molecular weight during exposure to heat and humidity aging.

Arxada offers three grades of Glycolube® P Lubricant:

	Acid Value	Melting Point	Particle Size ST-10M	Particle Size ST-100M	RSPO Certified	VEG Based
Glycolube® P Lubricant	1 Max	60 - 65	98% Min	5% Max	No	No
Glycolube® P (ETS) Lubricant	2Max	60 - 65	100% Min	10% Max	No	No
Glycolube® P K RSPO Lubricant	2 Max	60 - 65	100% Min	10% Max	Yes	Yes

Molecular Weight Degradation After Accelerated Aging

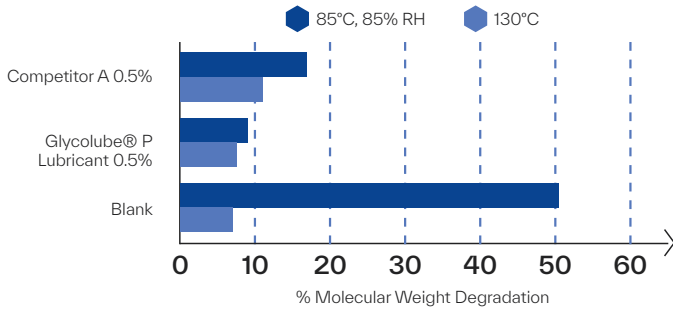


Figure 5: Change in molecular weight of polycarbonate after accelerated aging



Glycolube® P Lubricant REACH Compliant:

- Registration number 01-2119531112-58-XXXX
- Global Inventories: US, Canada, China, Japan, Taiwan, Philippines, Australia, New Zealand

Food Contact

(EU) No 10/2011
Plastics additives positive list
(EU) BfR recommendation XXI
Slip and antirelease agent for commodities based on Natural and Synthetic

Rubber

(US) 21CFR 177.1580
Mold release agent for food contact polycarbonate resins
(US) 21CFR 177.1585
Polyestercarbonate Resins
(US) 21CFR 177.1200

Cellophane

(US) 21CFR 178.2010
Antioxidants and/or stabilizers for polymers
(US) 21CFR 175.105

Adhesives

(US) 21CFR 176.170
Components of paper and paperboard in contact with aqueous and fatty foods
(US) 21CFR 176.180

Paper / Paperboard, dry food

(China) GB9685:2016
Listed as allowed additive for plastics (polycarbonate) and adhesives
and paper and paperboard

Sustainable Palm Oil

- Glycolube® P K RSPO Lubricant is RSPO Mass Balance certified - certification that any palm oil derivatives used come from sustainable source

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Use Biocides Safely. Review and follow all product safety instructions.

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