OIL & GREASE RESISTANCE FOR MOLDED FIBER

A one-page technical overview of treatment options and PFAS-free technology trends

WHY IT MATTERS:

Molded fiber foodservice and protective-packaging products often fail by oil/grease wicking and staining. OGR performance is commonly screened using tests such as TAPPI T559 (Kit test) or equivalent customer-specific oil/grease holdout methods, often alongside water resistance (Cobb/absorption) and heat-use conditions (hot fill, oven, microwave).

1) TREATMENT PATHWAYS (Where the barrier is built)

Surface-applied barriers (most common for high OGR):

- **Spray coating (manual or automated):** flexible for molded parts; can target only food-contact surfaces.
- **Curtain/rod/roll coat (flat stock or formed parts where geometry allows):** high uniformity and throughput.
- **Dip / impregnation (less common):** higher add-on; may impact repulpability and drying load.
- **Fountain coating:** good even spreading of coating.
- **Topcoat + primer systems:** improves anchoring to fiber and reduces pinholes.
- **New technologies in development:** misting & power drop

Internal (in-pulp) approaches (improves bulk resistance; rarely enough alone for aggressive grease):

- **Internal sizing + retention strategy:** reduces wicking and improves uniformity of surface treatment.
- **Internal OGR/bulk hydrophobes:** can raise baseline resistance and reduce required surface-coat add-on.
- **Hybrid programs:** moderate internal treatment + lighter surface topcoat (often the best cost/performance balance).

2) TECHNOLOGY FAMILIES (What chemistry is used)

Legacy PFAS-based grease barriers (being phased out):

Historically used for strong oil/grease holdout, but market and regulatory pressure has accelerated transitions to PFAS-free systems. In the U.S., FDA noted that as of January 2024, PFAS-containing grease-proofing materials are no longer being sold into the U.S. market for food-contact use.

PFAS-free alternatives (current mainstream + emerging):

- **Water-based polymer dispersions (e.g., acrylic / styrene-acrylic / latex):** good grease resistance when properly formulated; often paired with mineral pigments.
- **PVOH/PVA-based systems:** strong film formation and grease resistance; moisture sensitivity must be managed (often via crosslinking or multilayers).
- **Biopolymer coatings:** starch, proteins, chitosan/cellulose derivatives—improving rapidly; compostability-friendly but can be humidity-sensitive.
- **Waxes and wax blends:** useful for moderate grease and water repellency; heat resistance varies by wax type and add-on.
- **Bioplastics and bio-based barriers:** PLA, PHA, and related systems used as coatings/laminates; performance depends on coat weight and process.
- **Advanced/novel approaches:** nano-cellulose and chitin/chitosan derivatives; mineral/SiOx-style barriers; plasma/ALD-like thin films for very high barrier needs.

3) SELECTION GUIDANCE (What to match to the application)

Use-case drivers to confirm early:

- **Temperature & food type:** hot oil (fried foods) is the most demanding; microwave/oven adds heat and potential softening.
- **Add-on limits:** higher coating weights improve OGR but increase cost, drying energy, and risk of cracking on deep draws.
- **Compostability/repulpability targets:** some high-barrier systems reduce fiber recyclability; choose intentionally. Limits and regulations continue to become more stringent.
- **Manufacturing realities:** high-fines recycled furnishes and variable cleanliness raise the need for robust retention and consistent surface coverage.
- Food safety – FDA compliance is not always available

4) MARKET & REGULATORY TREND: "GOING GREEN" AND REDUCING PFAS

The industry trend is moving rapidly toward PFAS-free molded fiber barriers. Drivers include brand commitments, compostability goals, and tightening state-level restrictions on PFAS in food packaging. Washington State, for example, has implemented phased restrictions on PFAS in certain food packaging categories, and more states have enacted or proposed similar limits.

QUICK COMPARISON SNAPSHOT

OPTION	OGR PERFORMANCE POTENTIAL	BEST FIT	WATCH-OUTS
Surface spray / coat (PFAS-free)	High (with good coverage & film)	Food-contact molded parts, targeted barriers	Pinholes, coat cracking, drying load, cost control
Internal sizing + retention	Low–Medium	Baseline wicking reduction, support for topcoats	Often insufficient for hot-oil alone
Hybrid internal + light topcoat	Medium–High	Best cost/performance balance for many SKUs	Requires process control + QA testing
PVOH-based barriers	High (grease), variable (water)	Grease-driven SKUs, multilayers	Humidity sensitivity unless modified
Bio-based coatings (starch/chitosan/ etc.)	Medium–High (improving)	Compostability-forward products	Heat/humidity limits; formulation-specific

Practical note: For molded fiber, surface uniformity (coverage) often matters as much as chemistry. Trial design should include coat-weight tracking, contact-angle/absorption checks, and kit/holdout testing at the target temperature.