



PROTEAN®
OGR Barrier



PROTEAN®

PROTEAN® OGR

The PROTEAN OGR platform provides options for the pulp, paper and packaging industries to replace environmentally persistent oil and grease resistant barriers, such as fluorochemicals and extruded polyethylene, with eco-friendly alternatives.

Unlike existing fluorine-free alternatives, the proprietary formulas can be tailored to achieve a full range of 3M kit values, depending on the performance and environmental profile targets of the application. Lower kit values can be achieved without binders, with economical solutions using enhanced pigments and fillers. Higher kit values are possible in formulations with various binders while significantly reducing blocking or sticking.

It is a commercially viable and cost-effective technology that is available now for existing or readily available production equipment. PROTEAN OGR is suitable as an emulsifying agent and delivers grease resistant properties to paper at coat weights generally 1-4 gsm.

HSMG has acquired significant expertise related to the use of PROTEAN and will work with clients to tailor coating formulations to address a full range of barrier requirements.

Benefits:

- Cost equivalent to fluorochemicals
- Applied with standard equipment at commercial speeds
- Suitable for hot and cold products
- Combinations of recyclable, compostable and all-bio derived formulations are available
- Compatible with other barrier solutions to achieve unique formulations
- Serves as a replacement for fluorochemicals, bioplastics and silicones
- OGR alternative for various paper grades, bleached or unbleached
- Coating can be applied before or after printing

PROTEAN OGR Barrier Performance

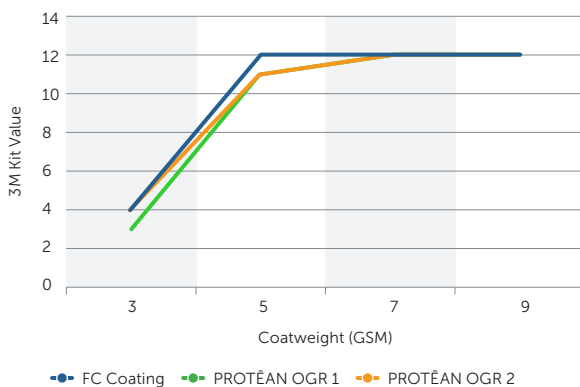
APPLICATION METHOD	3M KIT 4-6	3M KIT 6-9	3M KIT 9-12
Size press (Puddle)	✓		
Metering size press	✓	✓	
Rod or Blade Coater	✓	✓	✓

Blade Coated Prototypes

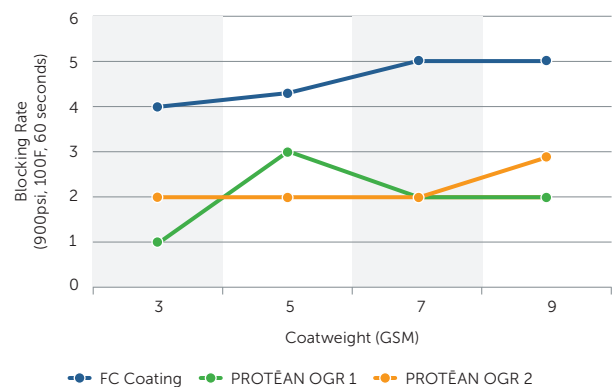
The graphs below demonstrate the capability of PROTEAN OGR to provide barrier properties while reducing blocking inherent to film-forming binder systems. PROTEAN OGR also protects hydrophilic binder systems from damage caused by water moisture.

- Two different PROTEAN OGR formulations were applied to 65gsm wood-free base paper using a pilot bent blade coater.
- A commercial barrier resin was used as a control and demonstrated excessive blocking at the reel.
- PROTEAN OGR maintains the barrier performance that was achieved through the commercial barrier resin while significantly reducing blocking tendency.

COATWEIGHT VS. KIT VALUE
(65gsm prototype)



ANTI-BLOCKING IMPROVEMENT



Contact HSMG® to learn more about PROTEAN® OGR Barrier



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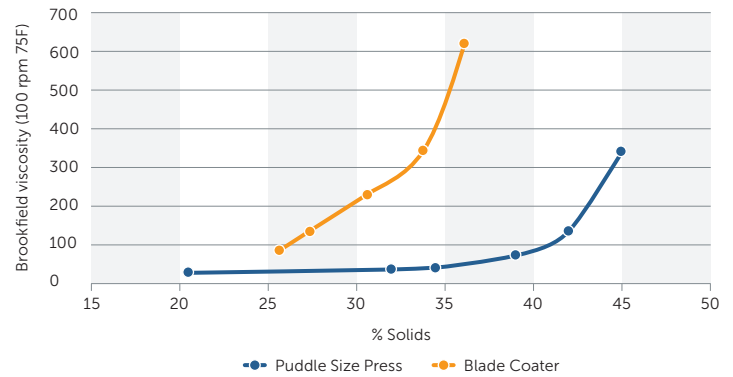
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PROTEAN® OGR Rheology

Formulation Experience

- Coating viscosity/solids are highly adjustable as needed to achieve coat weight targets on a range of coating equipment:
 - Blade, rod and MSP coaters: 30 - 45% solids
 - Brookfield viscosity 200-800 cps at 100 rpm
 - Hercules viscosity 25-50 cps at 4400 rpm
- Puddle Size Press: 10 – 20+% solids.
Brookfield viscosity <100 cps.
- Compatible binders and fillers include latex, clays, pigments, starches etc.
- The pH ranges from 7.5 to 9.5, based on components used.
- The shelf life can be 6+ months.

VISCOSITY VS SOLIDS



Regulatory

- Basic PROTEAN OGR solutions are FDA approved under 21 CFR 172.867 and meet specifications described in Generally Recognized as Safe (GRAS) notices GRN 227 and 325, with the exception of liquid infant formula containers. PROTEAN is compliant with Bfr XXXVI.
- An exemplary PROTEAN OGR formulation is BPI certified under CERT # 105298940 for composting. PROTEAN formulations are, in general, recyclable and repulpable. Compostability and recyclability will vary by selection of substrate, binder and local regulatory requirements.

Effective Date: April 1, 2020

The information contained herein is offered as guidance for your own investigations into suitability for relevant applications. HSMG makes no warranty about the accuracy of the information or fitness for use of the materials.

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