

CHEMISTRY THAT MATTERS™



NEW LNP™ ELCRIN™ RECYCLED GLASS FIBER FOR FURTHER CARBON FOOTPRINT REDUCTION

Aug 2021



THE COMMERCIAL PACKAGE

SABIC SPECIALTY SUSTAINABILITY

SABIC'S SPECIALTIES BUSINESS OUR CONTRIBUTIONS TO THE UNITED NATIONS SDG'S

13 CLIMATE ACTION

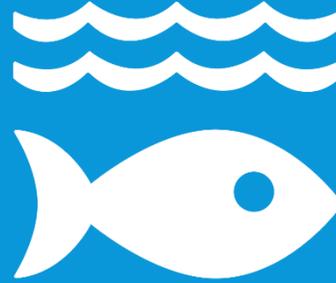


NET-ZERO CARBON

Specialty material performance with lower carbon footprint

Application development for longer life and enhanced recyclability

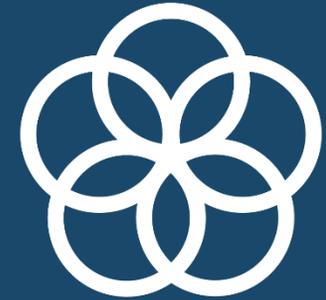
14 LIFE BELOW WATER



10 BY 10

Our market ambition is to divert 10 Billion PET single-use bottles in 10 years

17 PARTNERSHIPS FOR THE GOALS



INNOVATING THROUGH THE VALUE CHAIN

Alliances across the value chain

SUSTAINABILITY IN SPECIALTIES

SPECIALTIES SUSTAINABILITY PILLARS

MECHANICALLY RECYCLED PORTFOLIOS



Products incorporating mechanically recycled resins and/or fillers from PCR or PIR sources providing customers with options for carbon reduction maintaining close to virgin-like properties

CHEMICALLY RECYCLED PORTFOLIOS



Products containing resins derived from upcycling of post consumer waste. Properties equivalent to virgin polymers with drop-in processing profiles and color space properties

CERTIFIED RENEWABLE COMPOUNDS



Products using bio-based feedstock that is not in competition with the food chain. Mass balance certification delivers properties equivalent to virgin resins without need for requalification

DESIGN FOR SUSTAINABILITY



Products offering improved durability in applications, reducing weight and material use, processing efficiencies supporting energy and carbon emission reductions, part simplification, etc.

CIRCULAR ECONOMY



Create value chain collaborations, such as closed-loop initiatives to improve the circular economy by recovering and reusing resins

2050 ASSET CARBON NEUTRALITY



Reduction in carbon footprints of assets by implementing energy efficiency projects, use of renewable energy and building an electrification strategy

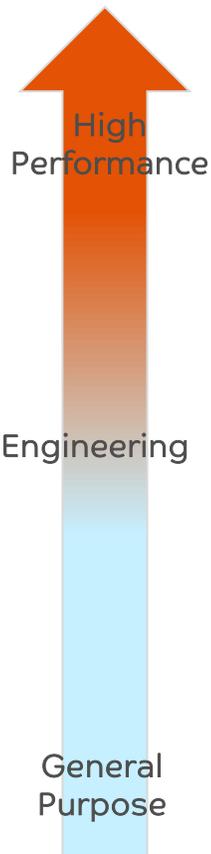
➤ Strategic pillars defined to drive actions towards reducing carbon in our products and processes

THE COMMERCIAL PACKAGE

LNP™ ELCRIN™ NEW CIRCULAR SOLUTION AND VALUE PROPOSITION – RECYCLED GLASS COMPOUNDS

LNPT™ CUSTOM COMPOUNDS – KEY EFFECTS

High Temperature



Low Temperature

>30 base resins

PEEK, PEI, PES,
PPS, PPA

 LNPT™ ELCRIN™ iQ PBT,
PCR PC, Bio-feedstock
PC, PC-Copolymers

PC, PC-Copolymers,
Polyamides, TPU,
PBT, PPO, PSU,
PC/ABS, POM,
Polyester
Elastomers, LCP

PMMA, SAN, PS,
PE, PP, ABS



>200 additives

ADVANCED: Ceramics, long
carbon fiber, X-linking agents,
CNT, LDS, Shielding, FR
additives

 Pre-Consumer Recycled
Carbon Fiber, Glass fiber

REINFORCEMENTS: Carbon
fiber, Aramid fibers, Stainless
steel, Milled glass fiber,
Wollastonite, mixed glass
systems

FILLERS: PTFE, MoS2,
Graphite, Silicone, Carbon
powder, mica, quartz, talc



LNPT Effects
>2000 grades

- Structural
- Low Warp Technology
- BSR, Wear & Friction
- Electrically Conductive
- EMI Shielding
- Thermal Management
- Sustainable Solutions
- Circuit Solutions
- Aesthetic & Colors

PRE-CONSUMER RECYCLED GLASS FIBERS

- Pre-Consumer recycled glass fibers followed the definition of **Pre-Consumer Material**

Pre-Consumer (Post-Industrial) Recycled Content* – Material that has never reached the end user, having been diverted from the waste stream during a manufacturing process. Excluded is the reutilization of materials generated in a process and capable of being reused as a substitute for a raw material without being modified in any way.

- Pre-Consumer recycled glass fibers achieved **100% recycled content** via mass balance verified by UL2809

 **1st LNP™ ELCRIN™ compounds utilized pre-consumer recycled glass fiber to the market**

REDUCTION IN CARBON FOOTPRINT & IMPROVEMENT IN RECYCLED CONTENT

LNP™ ELCRIN™ WF006XXPiQ (also known as experimental grade ER015800) is a general purpose 30% recycled glass fiber reinforced iQ PBT compound.

LNP™ ELCRIN™ WF0061XPiQ (also known as experimental grade ER015801) is a non-Br/Cl flame retardant (FR) iQ PBT compound also with 30% recycled glass fiber reinforcement.

MATERIAL	Recycle content (%)	Reduction of kg CO ₂ eq./kg** (%)
Standard 30% GF PBT	0	-
LNP ELCRIN WF006XiQ	37%	22%
LNP ELCRIN WF006XXPiQ	67%	29%
Standard 30% GF FR PBT	0	
LNP ELCRIN WF0061iQ	25%	16%
LNP ELCRIN WF0061XPiQ	55%	24%

* Preliminary LCA results of PIR GF certified at 100% PIR level by mass balance

** This study did not undergo a third-party critical review

➤ Further reduction in carbon footprint from LNP ELCRIN iQ PBT* and increase of recycle content

PROPERTY COMPARISON OF LNP™ ELCRIN™ iQ PBT BASED BLENDS

LNP™ ELCRIN™ WF006XXPiQ (also known as experimental grade ER015800) is a general purpose 30% recycled glass fiber reinforced iQ PBT compound.

	LNP ELCRIN WF006XiQ	LNP ELCRIN WF006XXPiQ	Units	Standard
Melt Volume Rate MVR 250 °C / 5kg	36	38	cm ³ /10min	ISO 1133
Specific Gravity	1.55	1.55	-	ASTM D 792
MECHANICAL				
Flexural Modulus, 1.3 mm/min	8930	8800	MPa	ASTM D 790
Flexural Strength, break, 1.3 mm/min	230	224	MPa	ASTM D 790
Tensile Modulus, 5 mm/min	10520	10175	MPa	ASTM D 638
Tensile Strength, break, 5 mm/min	138	133	MPa	ASTM D 638
IMPACT				
Notched Izod Impact, 23°C	92	82	J/m	ASTM D256
Un-notched Izod Impact, 23°C	872	872	J/m	ASTM D256
THERMAL				
HDT, 1.82 MPa, 3.2 mm, unannealed	203	202	°C	ASTM D 648
HDT, 0.455 MPa, 3.2 mm, unannealed	215	215	°C	ASTM D 648

➤ All properties are comparable between standard and recycled glass fibers in PBT based blends

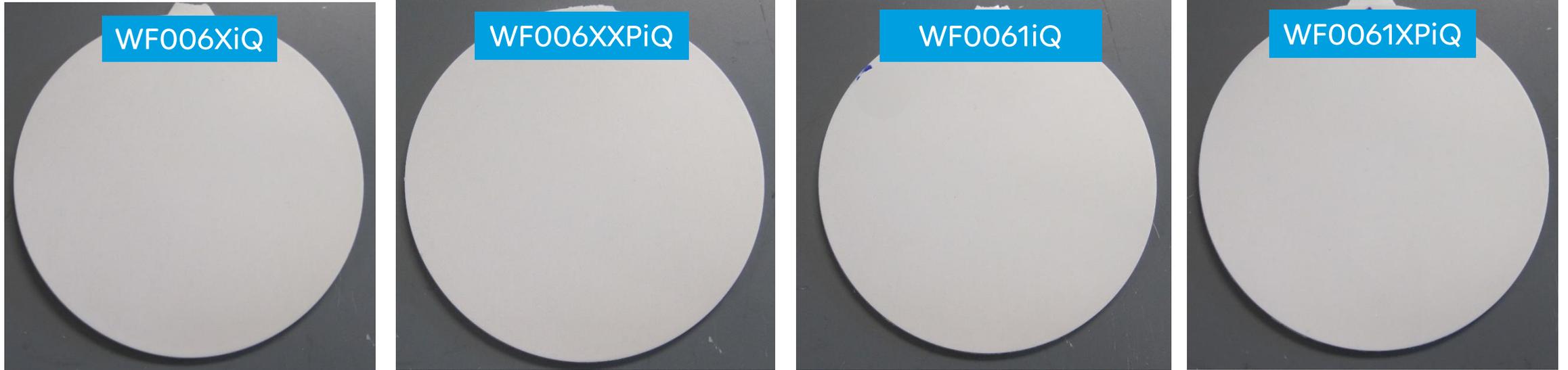
PROPERTY COMPARISON OF LNP™ ELCRIN™ iQ PBT BASED BLENDS

LNP™ ELCRIN™ WF0061XPiQ (also known as experimental grade ER015801) is a non-Br/Cl flame retardant (FR) iQ PBT compound also with 30% recycled glass fiber reinforcement.

	LNP ELCRIN WF0061iQ	LNP ELCRIN WF0061XPiQ	Units	Standard
Melt Volume Rate MVR 250 °C / 5kg	13	12	cm ³ /10min	ISO 1133
Specific Gravity	1.57	1.57	-	ASTM D 792
MECHANICAL				
Flexural Modulus, 1.3 mm/min	9900	9710	MPa	ASTM D 790
Flexural Strength, break, 1.3 mm/min	180	165	MPa	ASTM D 790
Tensile Modulus, 5 mm/min	11300	11180	MPa	ASTM D 638
Tensile Strength, break, 5 mm/min	105	101	MPa	ASTM D 638
IMPACT				
Notched Izod Impact, 23°C	74	68	J/m	ASTM D256
Un-notched Izod Impact, 23°C	582	589	J/m	ASTM D256
THERMAL				
HDT, 1.82 MPa, 3.2 mm, unannealed	201	200	°C	ASTM D 648
HDT, 0.455 MPa, 3.2 mm, unannealed	215	215	°C	ASTM D 648
Flame				
UL94 V-0 Flame Class Rating	0.8	0.8	mm	UL94

➤ All properties are comparable between standard and recycled glass fibers in PBT based blends

COLOR ABILITY OF LNPT™ ELCRIN™ RECYCLED GLASS FIBER COMPOUNDS



- Natural color* from the compounds is similar
- Expected similar color space used recycled glass fiber vs conventional glass fiber (GF) reinforced compounds

➤ Similar base color observed and expected similar color space vs conventional GF compounds

* All parts shown are natural color (no colorants added)

VALUE PROPOSITION OF RECYCLED GLASS FIBER COMPOUNDS

LNP™ ELCRIN™ Pre-Consumer Recycled Glass fiber (GF) reinforced compounds drive toward net-zero carbon solutions and fueled by our mission to compound the answer.

**Pre-Consumer Recycled
GF Compounds**



**LNP ELCRIN Recycled GF
Compounds**

- Reduction in LCA
- Improved recycled content
- Drop in solution
- Virgin equivalent property

COMPARED WITH CONVENTIONAL GF REINFORCED COMPOUNDS



Better carbon/energy footprint



Improved total recycled content



Equivalent properties and color ability*



Drop-in solution (no need to change tooling and design)



100% Pre-Consumer Recycled Glass Content via mass balance verified by UL2809

LET'S WORK TOGETHER FOR NET-ZERO EMISSIONS & CLIMATE RESILIENCE

More than what we say, it's what we do that matters.
At SABIC, we remain true to our purpose by delivering on our commitments:



1 DRIVING PERFORMANCE FOR CUSTOMERS

We push the limits of quality, efficiency, and performance to drive customer success with our broad portfolio of products and services.



2 LONG TERM COMMITMENT TO SUSTAINABILITY

We strive for innovative solutions for ever better performance from resource efficiency to reducing material use and waste and enhanced quality of life for everyone.



3 BUILDING VALUABLE RELATIONSHIPS

We collaborate closely to create opportunities. Our one global dedicated team serving the packaging market enables ease of doing business



THANK YOU



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