

PCR CONTAINING RESINS FOR CONSUMER ELECTRONICS

Post-consumer recycled containing resins supporting the environmentally-friendly trend in plastics

Post-consumer recycled (PCR) containing resins and their positive environmental benefits are an important trend in plastics. Besides regular PC and PC/ABS resins, Trinseo offers PCR containing PC and PC/ABS resins, providing product designers with a more environmentally-friendly choice and higher design flexibility - we call this material our EMERGE™ ECO Advanced Resins series.



POST-CONSUMER RECYCLED containing resins

PCR containing resins are plastic resins that contain used and recycled plastic waste created by consumers, such as unwanted electronic device casings, toys, enclosures of home appliances, and water bottles. Before the plastic waste is turned into resins for reuse, it is gathered and sent through a proprietary recycling process.

When using PCR containing resins for injection molding or extrusion, it is not unusual to see minor black flecks, grey or yellow tinting and gels in the materials. The occasional inconsistent colors and sometimes uneven surfaces are generally a result of the recycled material and when combined with virgin resin can be formulated to effectively meet the performance requirements of an application.



TRINSEO'S PCR containing products

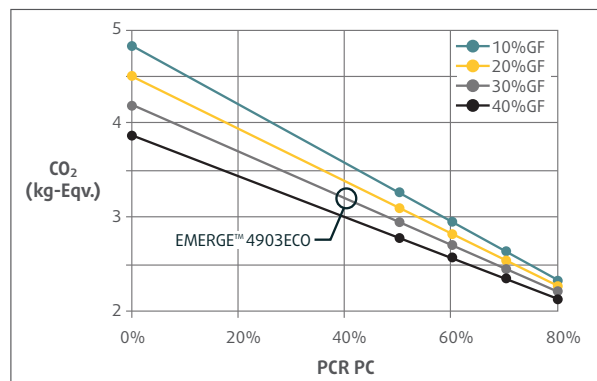
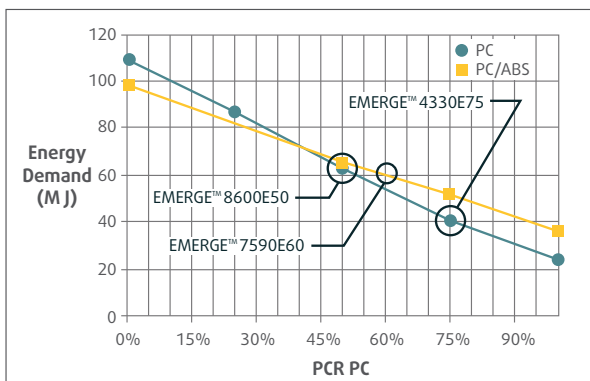
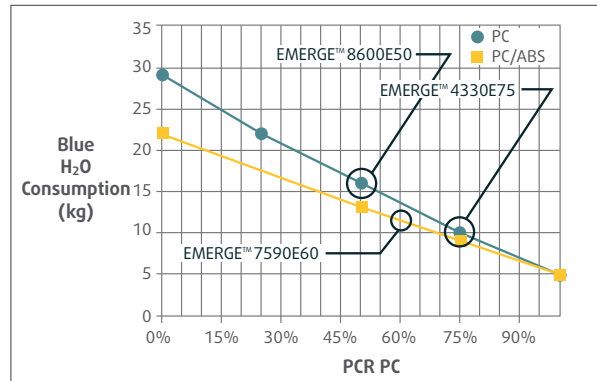
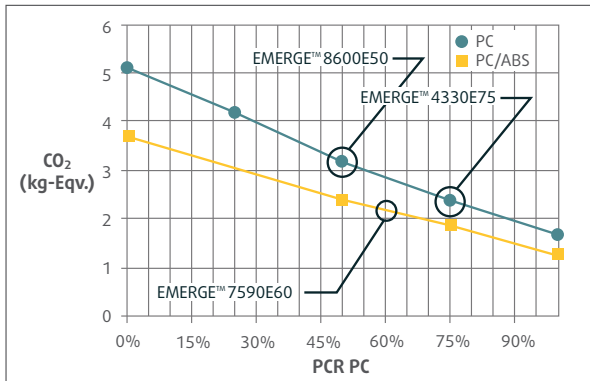
Sustainability is intrinsic to Trinseo and our everyday approach to business, and that is one of the reasons we offer a series of PCR containing resins that allow product designers to create products that are relatively more environmentally-friendly.

Our EMERGE™ ECO Advanced Resins suit many applications particularly in the consumer electronics sector. In fact, we can customize the PCR level to up to 95% to fit a customer's requirements.



PROVEN TO HAVE A POSITIVE IMPACT on the environment

Trinseo engaged Thinkstep¹ to perform lifecycle analysis on our PCR containing products, in comparison with virgin materials, to compare the difference in carbon dioxide (CO₂) emissions and water and energy consumption. In all cases, our PCR containing resins had a reduced environmental impact.

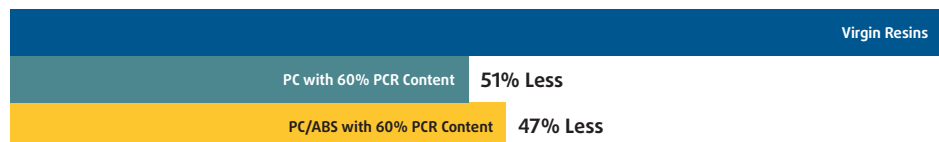


¹ Thinkstep is a sustainability software and consulting company based in Germany. It is a working group in the field of Life Cycle Assessment and Life Cycle Engineering. Thinkstep is the leader in sustainability performance management, helping 2,500 companies – including 40% of the Fortune 500 – create business value through sustainability.

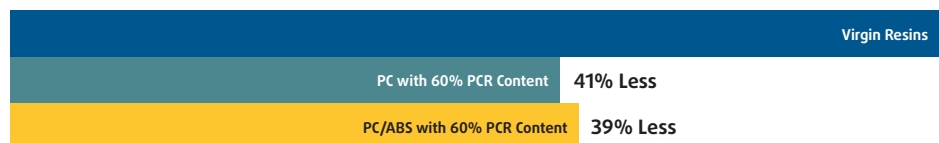
Taking Trinseo's PC and PC/ABS with 60% PCR content as examples:



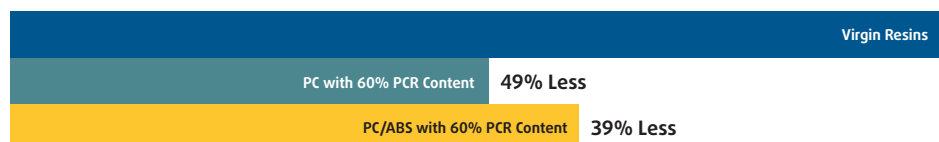
Water
Consumption



Carbon
Dioxide
Emission



Energy
Consumption



APPLICABLE TO A WIDE RANGE of industries and products

The occasional color variation and uneven surfaces of PCR material are strictly cosmetic and to be expected. Despite the appearance versus virgin resins, Trinseo's PCR containing PC and PC/ABS products can be formulated to achieve similar color and mechanical properties to virgin resins based on application specifications, and can even be produced without bromine and chlorine additives. This enables Trinseo's PCR containing resins to be used in a wide range of consumer electronics applications such as enclosures of products and accessories, powered parts, packaging and dividers, and even semi-structural parts.

Trinseo's PCR containing resins comply with the following standards:

- UL 2809: Environmental Claim Validation Procedure (ECVP) for Recycled Content
- EPEAT is for molded products



WHEN COLOR is a concern

When plastic waste is added into virgin resins, inconsistency in color and uneven surface are not uncommon. Trinseo is taking PCR containing resins to the next level by being highly selective and specific in the sourcing of our PCR resins. Thus we are able to produce PCR containing resins in white and even transparent color.

For parts or packaging in which color is a concern, Trinseo EMERGE™ PC 4330 ECO Advanced resins are ideal, as they are IEEE 1680:2006 certified with an extremely low black spec level, and meet the stringent requirement of high gloss white color space.



FAST FACT SHEET

ENGINEERED MATERIALS | PCR



TRINSEO PCR product portfolio

Trinseo materials are available as opaque, transparent, and with glass filler. Materials can be customized to various recycled content with up to 95 percent recycled content. Grades indicated in the chart below are the most commonly selected.

Polymer	Virgin Resins	PCR Containing Resins		Optical/Flame Retardancy/MFR (PC @ 300°C/1.2 kg; PC/ABS @ 230°C/3.8 kg)
	Grade	Grade	PCR %	
PC (Transparent)	EMERGE™ 4310-20	EMERGE™ 4310E75-20	75%	Transparent/HB*/20
	EMERGE™ 4310-15	EMERGE™ 4310E75-15	75%	Transparent/HB*/15
	EMERGE™ 8410-10, 13	EMERGE™ 8410ECO-10, 13	50%	Transparent/V0 @ 1.8 mm/10, 13
	EMERGE™ 4330-15	EMERGE™ 4330E60-15	60%	Transparent/V2 @ 0.5 mm/15
	EMERGE™ 4330-22	EMERGE™ 4330E75-20	75%	Transparent/V2 @ 0.5 mm/20
PC (Opaque)	EMERGE™ 8600-10, 15, 20	EMERGE™ 8600E50-10, 15, 20	50%	Opaque/V0 @ 1.5 mm/10, 15, 20
	EMERGE™ 8130-10	EMERGE™ 8160ECO-10	50%	Opaque/V0 @ 1.0 mm/10
	EMERGE™ 8600-10	EMERGE™ 8600ECO-10	75%	Opaque/V0 @ 1.5 mm/10 in black & gray
	EMERGE™ 8600-20	EMERGE™ 8600ECO-20	75%	Opaque/V0 @ 1.5 mm/20
	EMERGE™ 4350-22	EMERGE™ 4330E75-20	75%	Opaque/V2 @ 0.5 mm/20
	/	EMERGE™ LDS/PC 8900ECO	40%	Opaque/V0 @ 0.5 mm/13 for LDS applications
PC/ABS	EMERGE™ 8900	EMERGE™ 8900ECO	40%	Opaque/V0 @ 0.5 mm/13
	/	EMERGE™ 7160ECO	30%	Opaque/HB*/5.5
	EMERGE™ 7350	EMERGE™ 7350ECO	50%	Opaque/HB/4.3
	EMERGE™ 7560	EMERGE™ 7560ECO	60%	Opaque/V0 @ 1.5 mm/20
	EMERGE™ 7590	EMERGE™ 7590E60	60%	Opaque/V0 @ 1.5 mm/15
	EMERGE™ 7590	EMERGE™ 7590ECO	30%	Opaque/V0 @ 1.5 mm/15
	/	EMERGE™ 7800	40%	Opaque/V0 @ 1.7 mm/13
	/	EMERGE™ 7880ECO	50%	Opaque/V0 @ 1.0 mm/10
	EMERGE™ 7580	EMERGE™ 7580ECO	50%	Opaque/V0 @ 1.5 mm/12; high HDT 86°C

Polymer	Glass-filled %	Virgin Resins	PCR Containing Resins		Optical/Flame Retardancy/MFR (PC @ 300°C/1.2 kg; PC/ABS @ 230°C/3.8 kg)
		Grade	Grade	PCR %	
High HDT (Heat Deflection Temperature)	10%	EMERGE™ 4201*	EMERGE™ 4201ECO*	80%	Opaque/HB*/20
		EMERGE™ 8701	EMERGE™ 8701ECO	70%	Opaque/V0 @ 1.5 mm/15
	20%	EMERGE™ 4202	EMERGE™ 4202ECO	70%	Opaque/HB/12
		EMERGE™ 8702	EMERGE™ 8702ECO	65%	Opaque/V0 @ 1.5 mm/18
	30%	EMERGE™ 4203*	EMERGE™ 4203ECO*	60%	Opaque/HB*/15
		EMERGE™ 8703*	EMERGE™ 8703ECO*	50%	Opaque/V0 @ 1.5 mm/15
	40%	EMERGE™ 4204*	EMERGE™ 4204ECO*	50%	Opaque/HB/12
		EMERGE™ 8704	EMERGE™ 8704ECO*	40%	Opaque/V1 @ 1.5 mm/13
High Flow	20%	EMERGE™ 4902	EMERGE™ 4902ECO	50%	Opaque/V0 @ 1.6 mm/22
	30%	EMERGE™ 4903	EMERGE™ 4903ECO	40%	Opaque/V0 @ 1.0 mm/15
	40%	EMERGE™ 4314	EMERGE™ 4314ECO*	30%	Opaque/HB/15

* Internal data and adjustments can be made according to application requirements

The principles of Responsible Care® and sustainability influence the production of printed literature for Trinseo S.A. and its affiliated companies. As a contribution towards the protection of our environments, Trinseo's printed literature is produced in small quantities and on paper containing recovered/post-consumer fiber and using 100 percent soy-based ink whenever possible.

Product Stewardship

Trinseo and its affiliated companies have a fundamental concern for all who make, distribute, and use their products and for the environment in which we live. This concern is the basis for our Product Stewardship philosophy by which we assess the safety, health, and environmental information on our products so that appropriate steps may be taken to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Trinseo products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

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