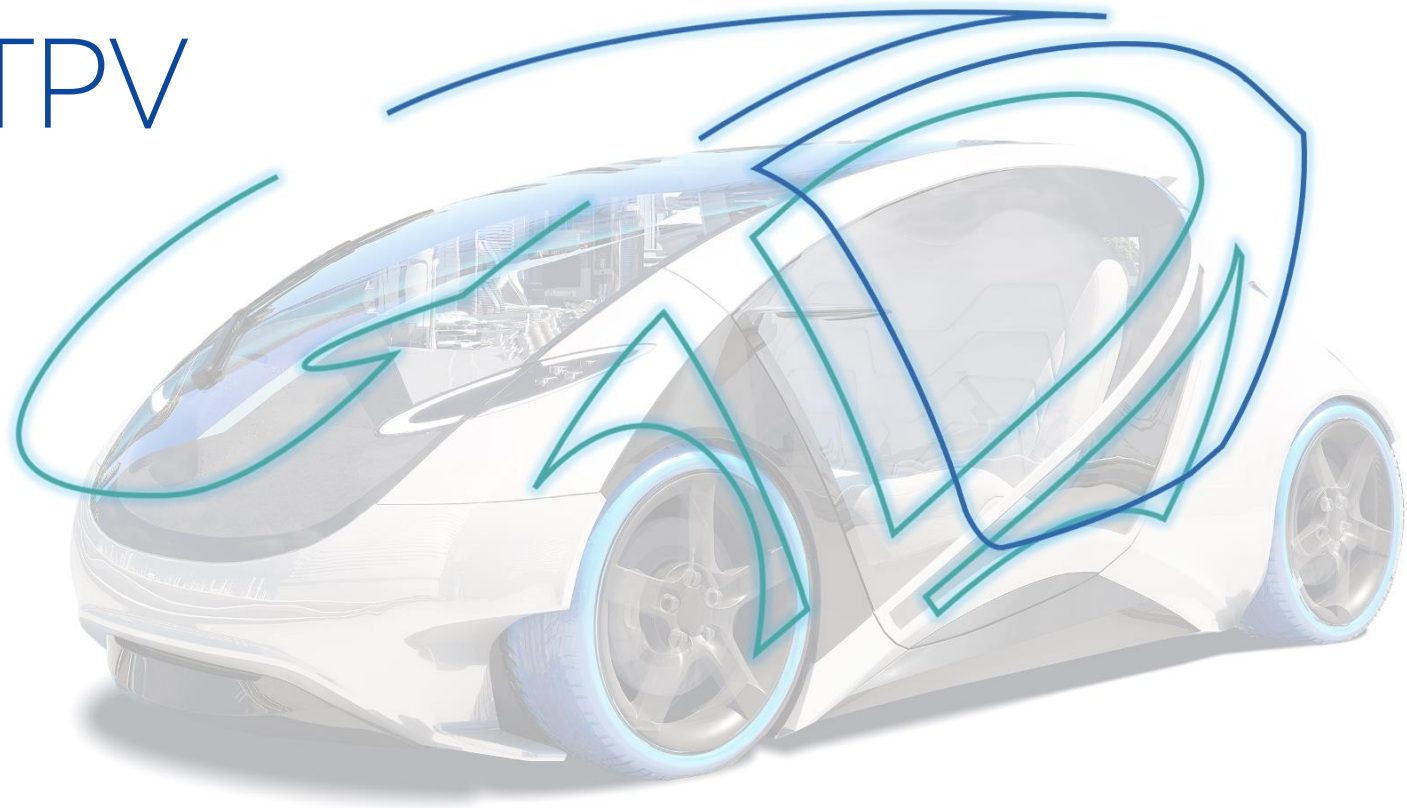
Santoprene™ R² TPV



ExxonMobil

Energy lives here™

Glass run channel

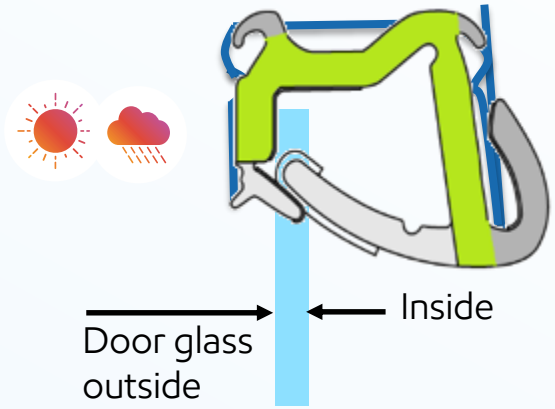
Lips: High elasticity

Skin/lip: Medium elasticity

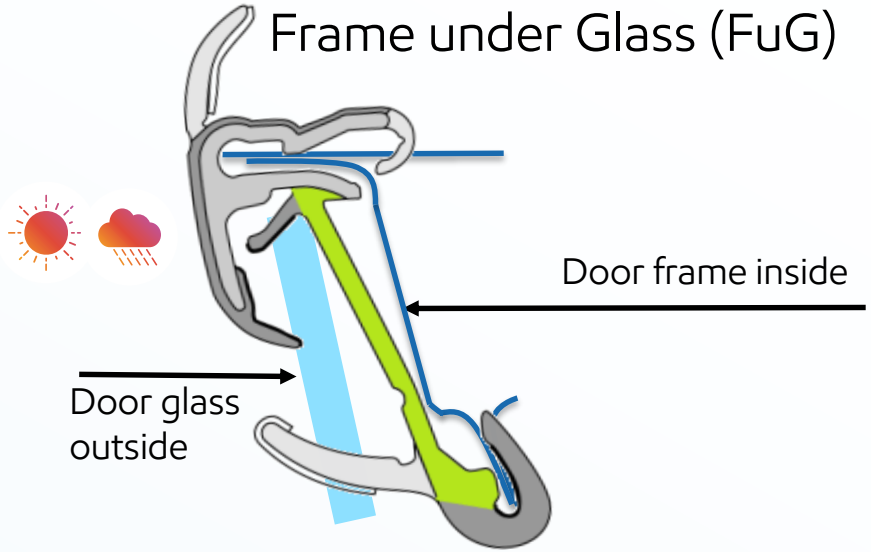
Foot: Low elasticity

Metal frame

Channel Mounted (ChM)



Frame under Glass (FuG)



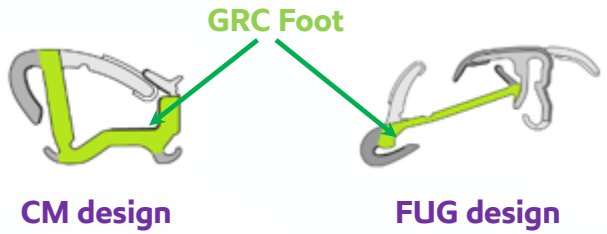
	Channel Mounted (ChM)	Frame under Glass (FuG)

Function	• Basic sealing
	  • with noise and
	  • vibration reduction
		• Advanced sealing performance + roof seal
		  • advanced noise and vibration reduction
		• Provide surface aesthetics

Material requirements	• Elasticity • UV and aging requirements • Abrasion resistance	• Better elasticity • Higher UV and aging requirements • Abrasion resistance
Complexity	• 2-3 materials needed	• 4-5 materials needed

Source: ExxonMobil

Santoprene™ R² 9101-80E100 TPV
executive summary



Product Positioning

	121-73W175	**9101-80E100**
Brand	Santoprene	Santoprene
Targeted segment(s)	GRC lip, foot	GRC foot
OEM Spec – GRC foot	Pass	Pass
UV	+	N/A
Compression Set	+	o

Development Objective:

Develop a cost optimized glass run channel (GRC) "foot grade" solution while meeting the functional requirements of the market (Fit-for-Purpose)

Key targeted benefits:

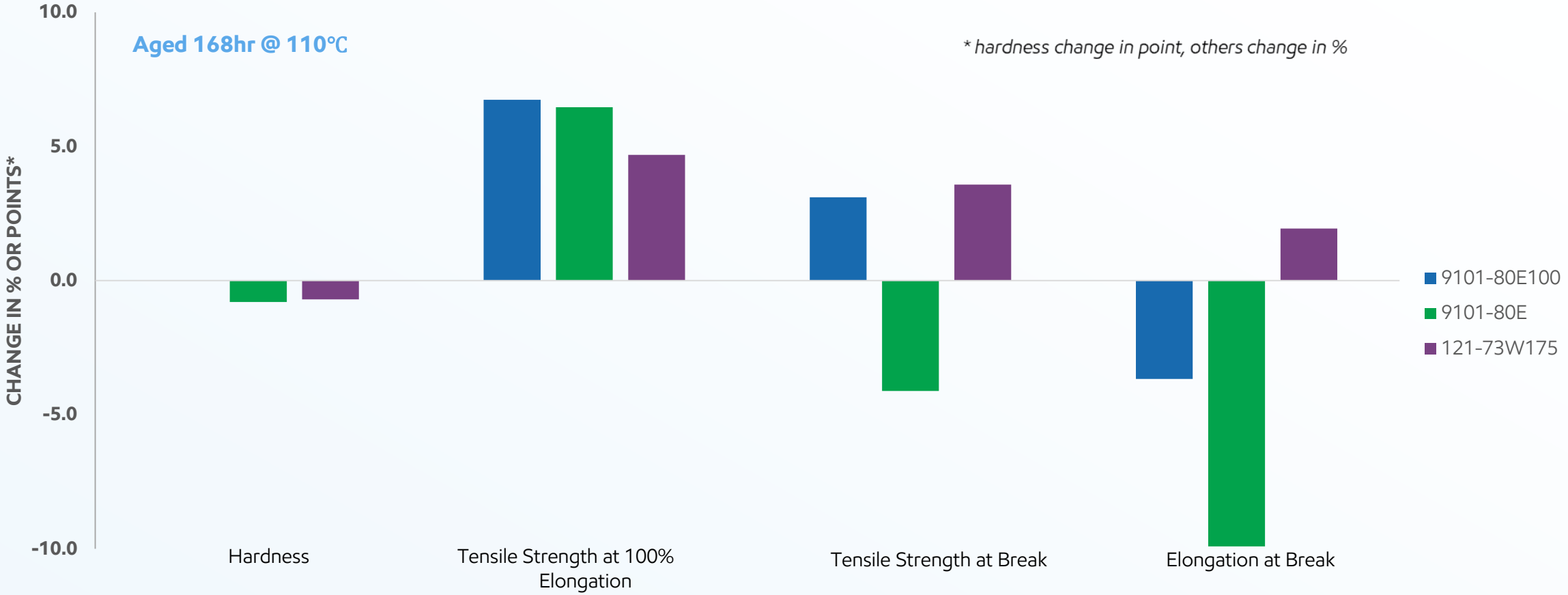
- Offer GRC system cost savings by optimized cost product
- Balanced properties – Hardness, Modulus, and Compression set, meeting functional requirements
- Further improves sustainability value of Santoprene – incorporates at least 15% PCR (post-consumer recycled) material

Santoprene™ R² 9101-80E100 TPV delivers competitive physical performance

Physical property	Test method* based on	Units	9101-80E100	9101-80E	121-73W175
Specific Gravity	ASTM D792	-	0.976	0.984	0.976
Shore A Hardness	ASTM D2240	Shore A	82	81	78
Modulus, 25%	ASTM D412	MPa	2.8	2.7	2.3
Modulus, 100%	ASTM D412	MPa	3.8	3.7	3.8
Tensile strength at break	ASTM D412	MPa	7.6	6.3	7.6
Elongation at break	ASTM D412	%	495	526	348
Tear strength	ASTM D624	N/cm	314	274	361
Compression set, RT 22h at 25% strain	ASTM D395B	%	30	34	25
Compression set, 70°C 22h at 25% strain	ASTM D395B	%	34	46	28
Compression set, 110°C 22h at 25% strain	ASTM D395B	%	47	55	39
Compression set, 125°C 70h at 25% strain	ASTM D395B	%	56	65	49
LCR App Viscosity, 204C	TPE-0200	Pa.s @ $200s^{-1}$	331	353	350
	TPE-0200	Pa.s @ $1200s^{-1}$	89	92	88

*Where applicable, test results based on fan gated, 2.0 mm injection molded plaques. Tensile strength, elongation and tensile stress are measured across the flow direction. Test results are generated by ExxonMobil test methods that may not fully conform to the ASTM and/or ISO methods. Test methods are available upon request

Santoprene™ R² 9101-80E100 TPV delivers good short-term heat aging performance



Hardness test based on ASTM D2240
Tensile test based on ASTM D412

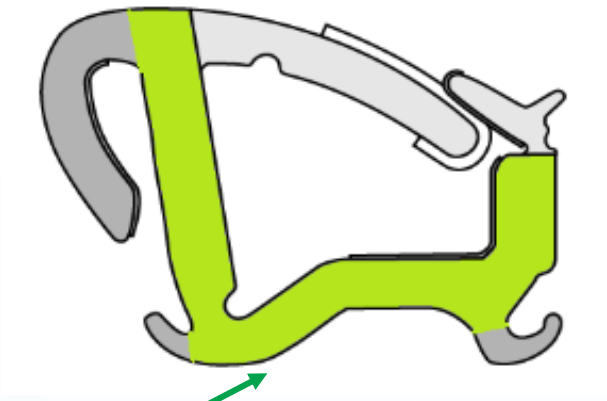
*Where applicable, test results based on fan gated, 2.0 mm injection molded plaques. Tensile strength, elongation and tensile stress are measured across the flow direction. Test results are generated by ExxonMobil test methods that may not fully conform to the ASTM and/or ISO methods. Test methods are available upon request

Santoprene™ R² 9101-80E100 TPV delivers good long-term heat aging performance

Hardness test based on ASTM D2240
Tensile test based on ASTM D412

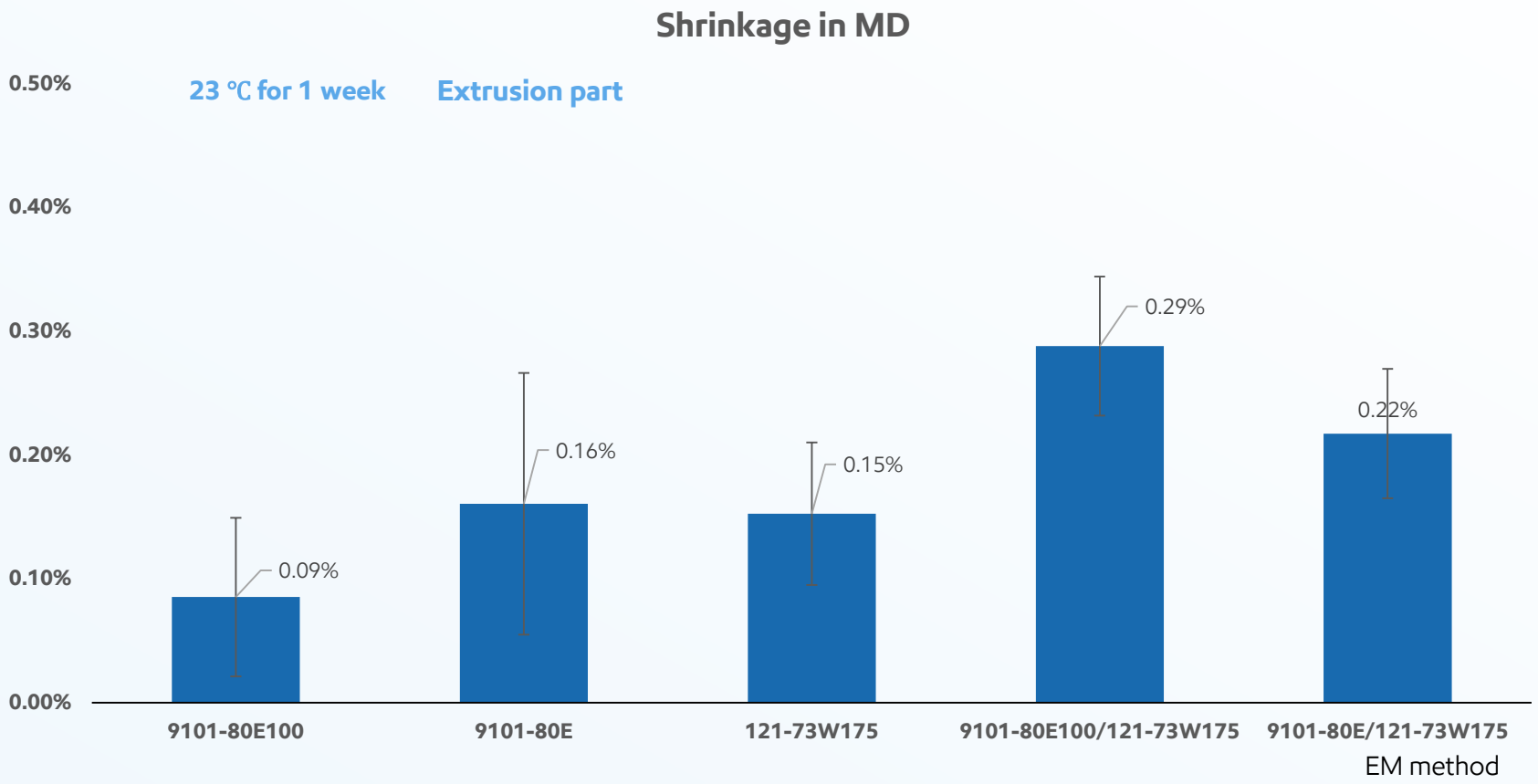
*Where applicable, test results based on fan gated, 2.0 mm injection molded plaques. Tensile strength, elongation and tensile stress are measured across the flow direction. Test results are generated by ExxonMobil test methods that may not fully conform to the ASTM and/or ISO methods. Test methods are available upon request

Santoprene™ R² 9101-80E100 TPV shows superior extrusion part finish



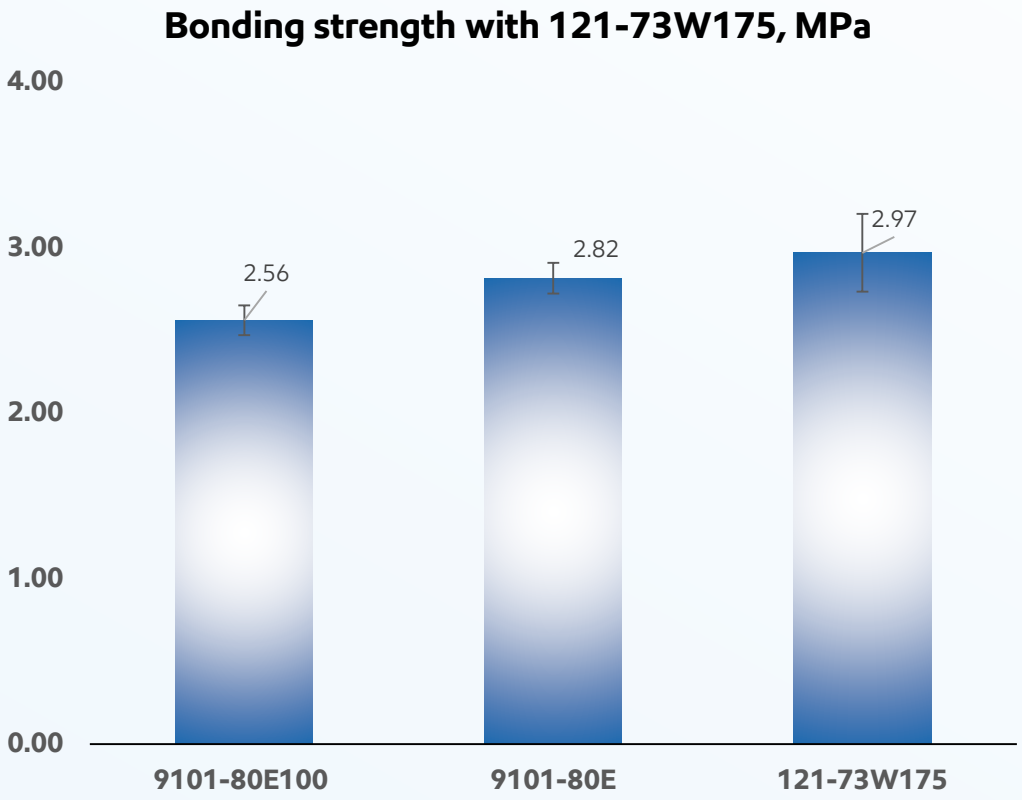
Good processability material

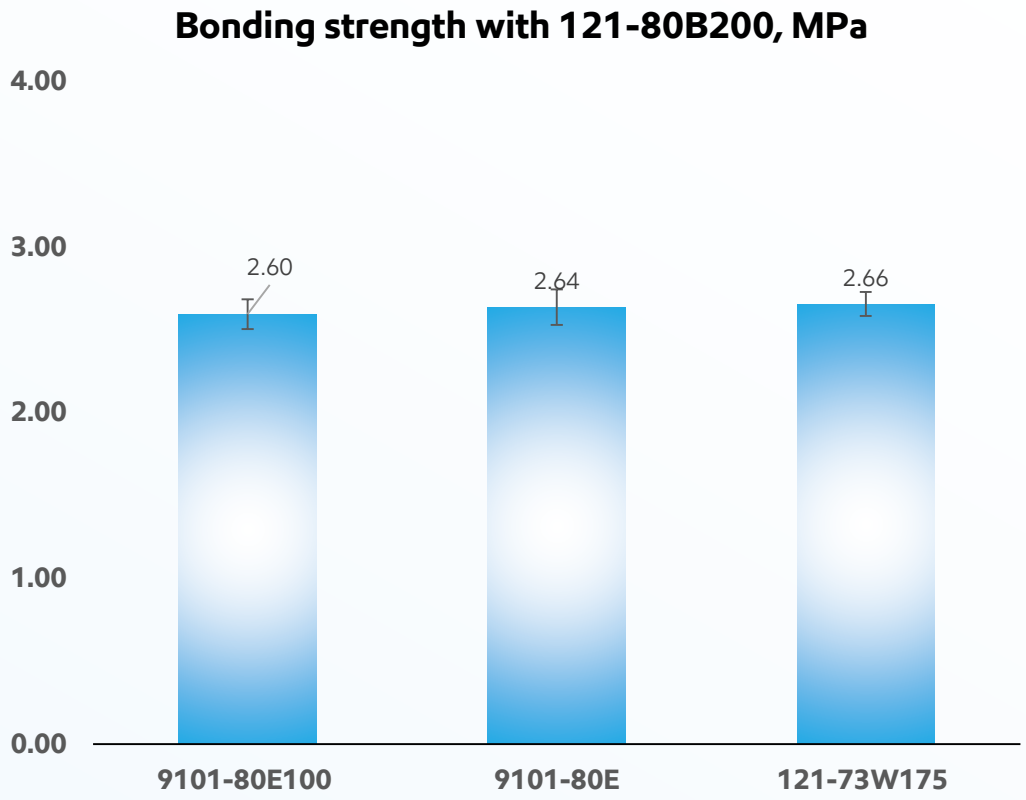
Santoprene™ R² 9101-80E100 TPV demonstrates low shrinkage



Low Shrinkage meet GRC requirement

Santoprene™ R² 9101-80E100 TPV provides good bonding performance

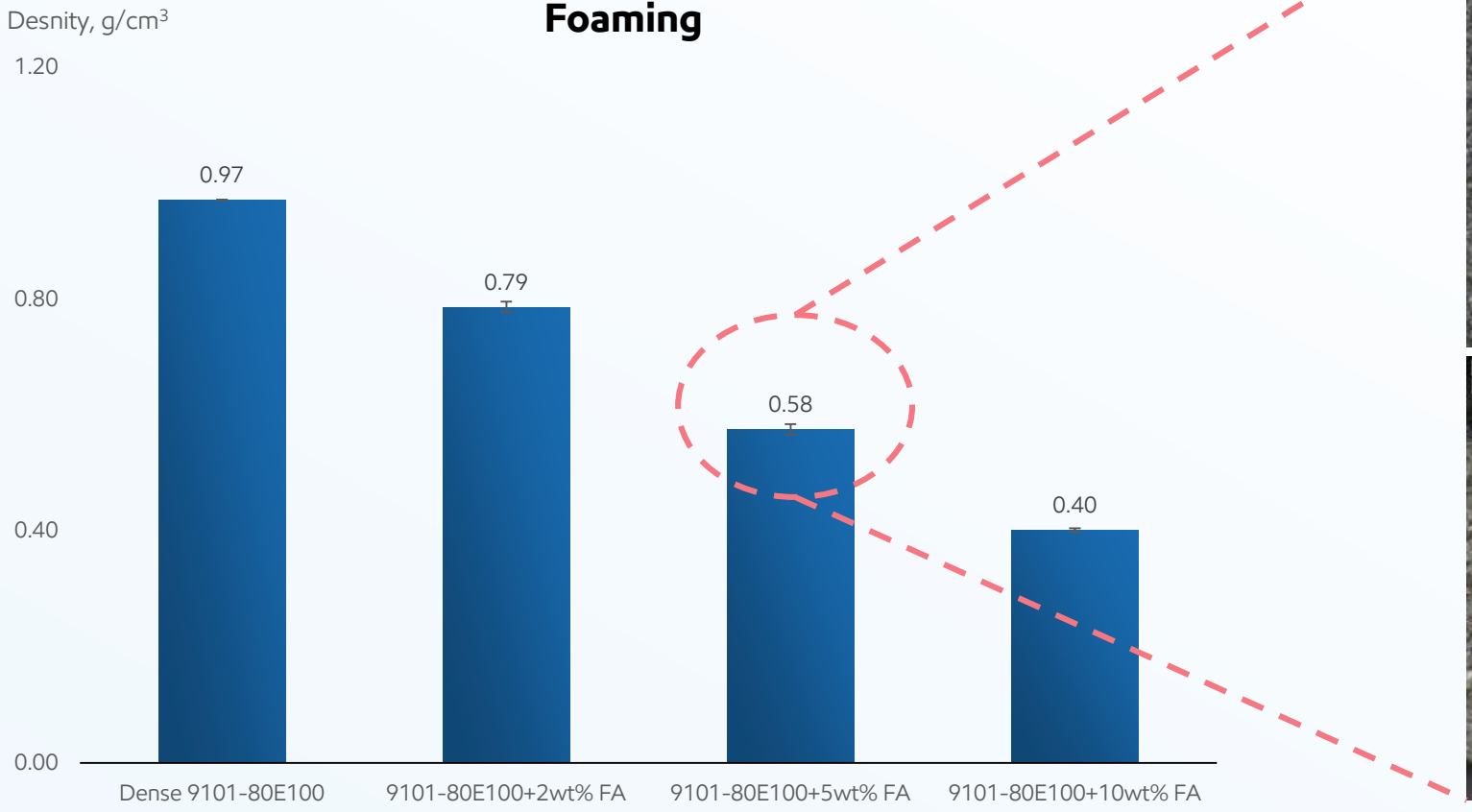


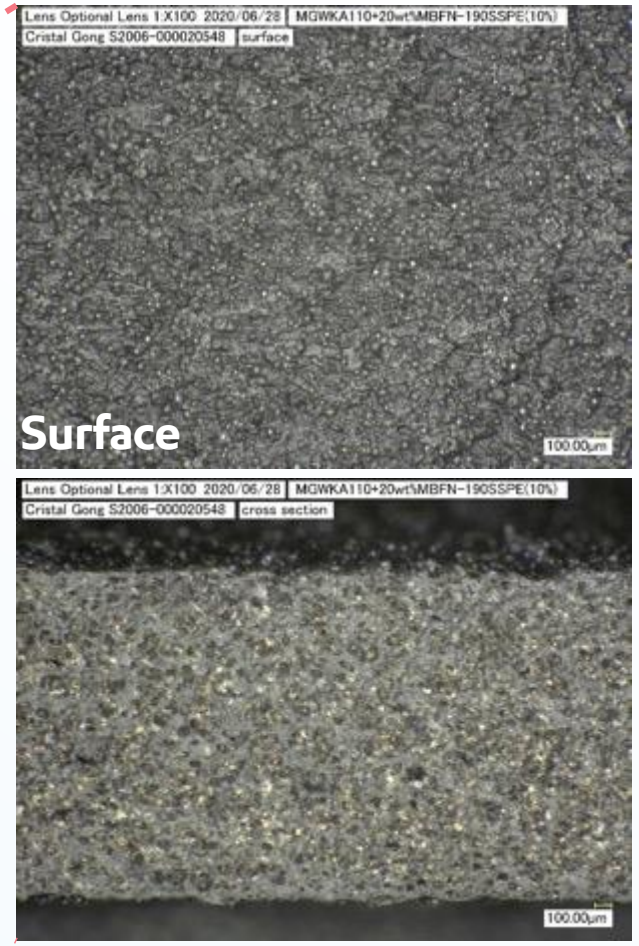


EM method

Good bonding performance to GRC lip and corner molding

Santoprene™ R² 9101-80E100 TPV shows excellent foaming ability





EM method

Good surface appearance and stable dimensional consistency

Santoprene™ R² 9101-80E100 TPV shows sustainability value

New Santoprene™ R² 9101-80E100 TPV incorporates

at least **15%** Post-Consumer Recycled (PCR) content

Higher content options feasible depending on customer's needs

Valuable use of plastic waste

Helps OEMs meet recycled content goals

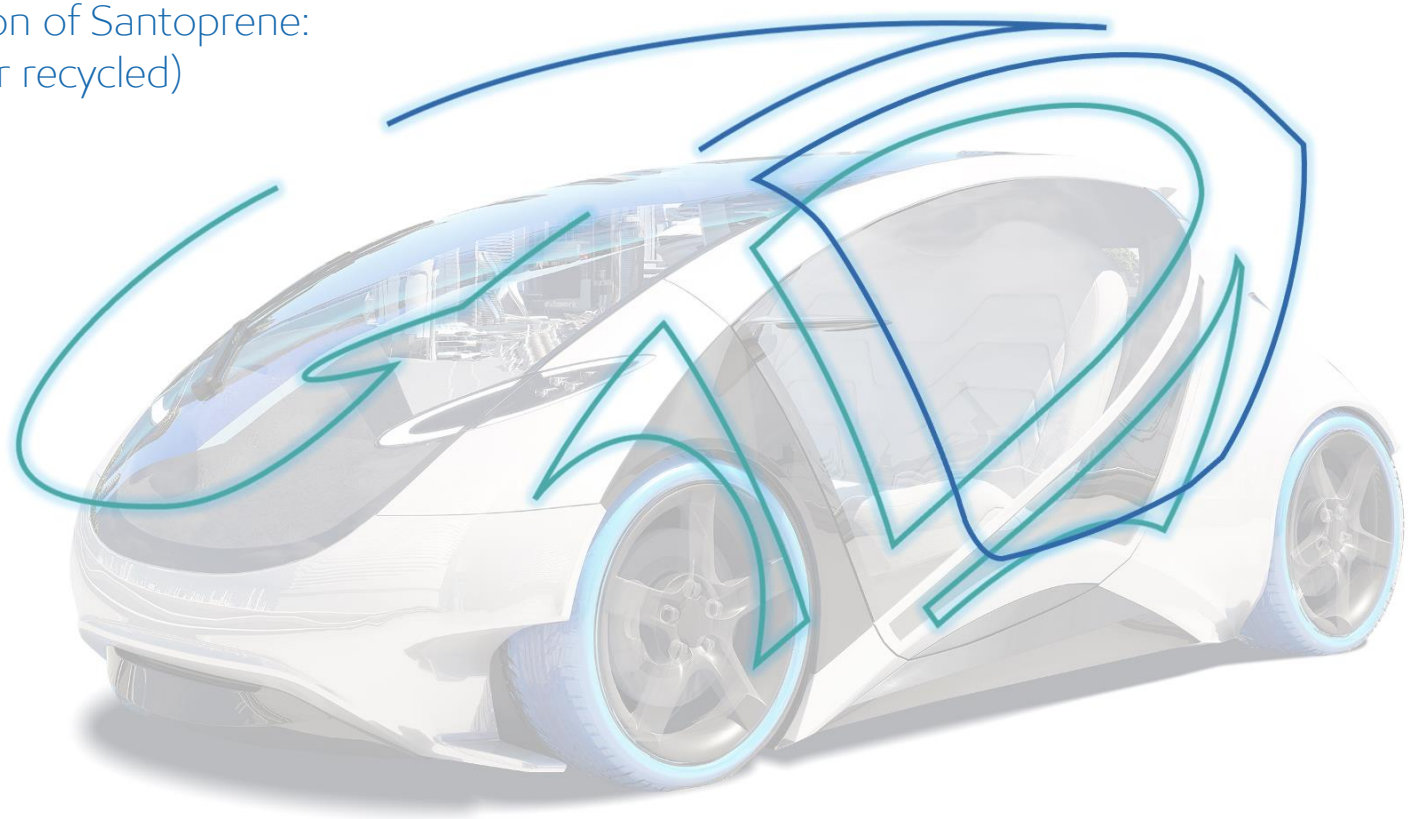
Processing Guidelines

- Safety of operations
  - Refer to detailed information related to safe handling of Santoprene TPV in MSDS available on dedicated website (www.santoprene.com)
- Dry 9101-80E100 before using to avoid surface defects, surging/low melt strength, irregular edges, etc.
  - Desiccant circulating air drying
  - 80 ℃ for 3 hours
  - Moisture content < 0.08%
  - For regrind– extended drying time
  - For colorant – separate drying
- Clean resin residues from die/head/screw before start-up
- Set barrel and die temperatures (see recommendations in Table)
- Start extruder with low screw speed until material exits die
- Higher screw rpm and temperature recommended to troubleshoot edge-tear, surface appearance etc
- Lower temperatures, quicker cooling, support calibrators etc recommended for higher melt strength/lower sagging after die
- Cooling: Water spray and/or immersion should be used

	Temperature, ℃
Zone 1	165 – 170
Zone 2	170 – 200
Zone 3	175 – 205
Zone 4	180 – 210
Head	185 – 215
Die	190 – 220
Melt	190 – 210

Santoprene™ R² 9101-80E100 TPV

- Offer GRC system cost savings by optimized cost product
- Balanced properties: Hardness, modulus, and compression set meeting functional requirements
- Further improves sustainability value proposition of Santoprene: Incorporates at least 15% PCR (post-consumer recycled) material



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