

# Viscoelastic Foam

Make high performing polyurethanes from polyols based on CO<sub>2</sub>



Add renewable carbon to memory foam mattresses and more

Now VE foams can be made from renewable CO<sub>2</sub>. By licensing Econic's patented process and using our unique catalyst, polyols producers who supply the VE foam industry can help their customers offer more sustainable, higher performing end products from renewable carbon. Our technology makes polycarbonate ether (PCE) polyols that are phase stable and compatible with polyether polyols, standard surfactants and catalysts. Produce foams with existing equipment at a variety of densities and isocyanate indices.

## KEY BENEFITS

Reduce carbon footprint by up to 30%

Transform CO<sub>2</sub> into valuable raw material

Better performance vs. existing polyether polyols

Fully compatible with existing foam equipment

Easily incorporate into existing supply chains

Clear and colorless with no odor

### REPLACE FOSSIL FEEDSTOCKS

Our catalyst transforms inert carbon dioxide into a reactive feedstock; replacing propylene oxide or ethylene oxide in the polyether production process.

Conventional process with fossil-based raw materials



Econic's process for polymers with captured CO<sub>2</sub>

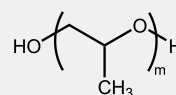


Econic's renewable carbon + bio + recycled products

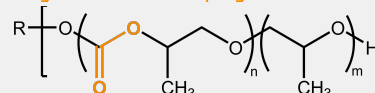


### FINETUNE PROPERTIES

Polyether polyols



Polycarbonate ether polyols



Carbonate linkages can change the properties of polyurethanes.

# Our Proof-of-Concept PCE Polyols

	2002-A	2002-B	3003-A	3003-B
CO <sub>2</sub> Content	17 wt%	20 wt%	10 wt%	16 wt%
Molecular Wt, g/mol	2000	2000	3000	3000
Hydroxyl Number, mg KOH/g	52-58	52-58	50-56	50-56
Viscosity, cPs @ 25°C	~10,000	~20,000	~3,000	~10,000
Acid Value, mg KOH/g	<0.5	<0.5	<0.5	<0.5
Water Content, ppm	<500	<500	<500	<500

Cyclic carbonate content: <0.1 wt%, polydispersity: ~1.3

## Concept Formulations for VE Foams

Choose from a range of CO<sub>2</sub> content and performance characteristics

### FORMULATIONS

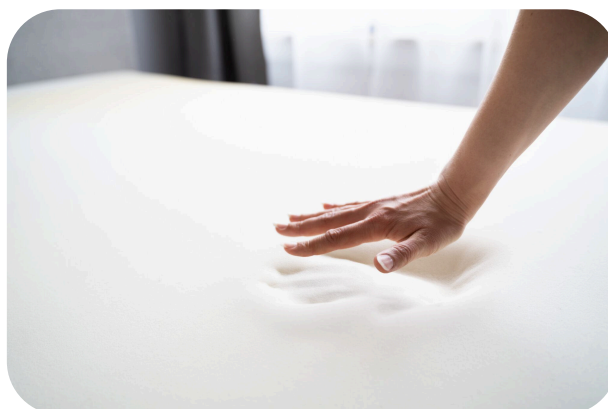
CO <sub>2</sub> POLYOL %	45	42.5	45	45
PE700*	45	42.5	45	45
PCE 3003-A	45	42.5	45	45
CELL OPENER POLYOL**	10	15	10	10
WATER	1.70	1.70	2.80	3.20
SURFACTANT	1.50	1.50	1.50	1.50
AMINE CATALYST 1	0.15	0.25	0.15	0.15
AMINE CATALYST 2	0.15	0.25	0.15	0.15
TIN CATALYST	0.02	-	0.02	0.02
ISOCYANATE INDEX	90	90	90	90

### PERFORMANCE DATA

DENSITY (kg/m <sup>3</sup> )	56	51	37	34
BALL REBOUND (%)	6	5	11	15
TENSILE STRENGTH (kPa)	80	63	110	100
ULTIMATE ELONGATION (%)	390	370	310	200
CLD, 40% (kPa)	1.6	1.0	2.9	2.9
RECOVERY TIME (s)	9	9	11	10

\*PE700 Polyether, 700 MW PO homopolymer

\*\*Cell opener polyol Polyether, 5000 MW, high EO content



CO<sub>2</sub> isn't just a challenge, it's a resource. By adding renewable carbon to viscoelastic foams, companies can create better performing products.



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