



# CRAY VALLEY TECHNOLOGIES

FOR RUBBER FLOORING



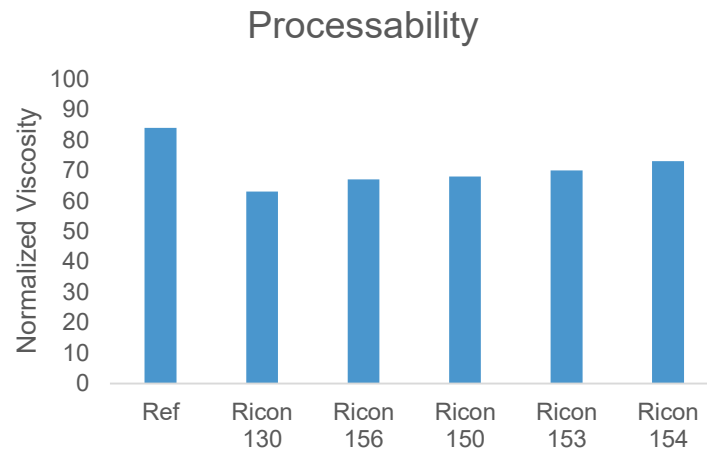
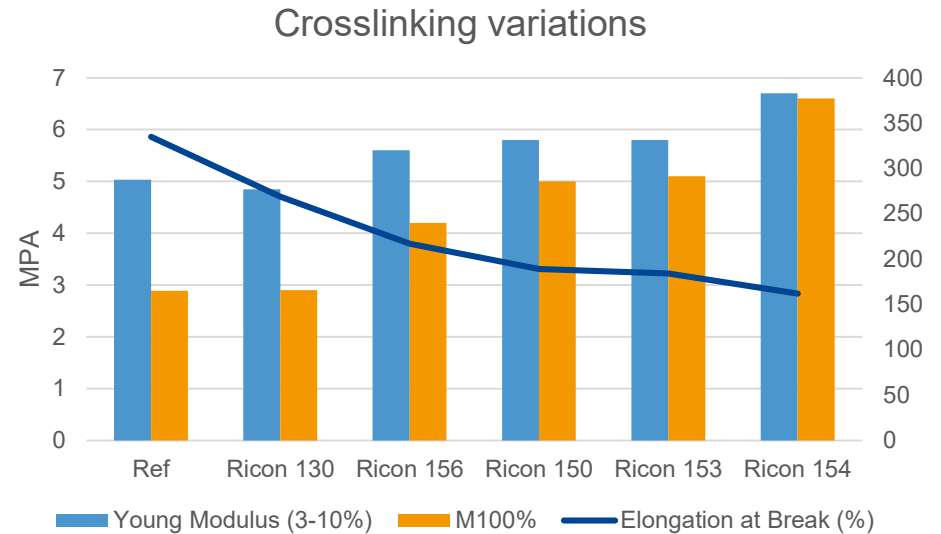


## RUBBER FLOORING

- Application: Rubber Flooring for Recreational, Institutional and Residential segments
- Forms: Rubber tiles, pads , rolls/sheet and recycle crumbs
- Rubber compounds: SBR rubber & granules; EPDM; recycled rubber
- Cray Valley solution: High Vinyl Ricon
- Benefits
  - Acts as plasticizers to improve processability during mixing
  - Allow curing rate adjustment
  - Increase the crosslinking density
  - Works as compatibilizer/dispersing agent for recycled crumb rubber

# RESULTS – PEROXIDE CURING

EPDM Recipe	phr
EPDM (Buna EPG 3440 – 4.1% ENB)	100
N550	65
Oil (Flexon 876)	20
ZnO	5
AO	1
Luperox F40P	6
Ricon	5



- Ricons act as coagents
  - Crosslinking density increases with Mn and %vinyl
- All Ricons act as plasticizers

## RESULTS – SULFUR CURING

Typical Recipe	phr
<i>Tire Grind</i>	100
Ricon	1-5
Curing package (ZnO/Sulfur/accelerator)	Variable



Molded rubber products, including tile for flooring

US 4,481,335

### *Ricon structure/property relationships*

	Monomer Composition	Diene Microstructure	Tg	Molecular Weight
Traction (Slip Resistance)	Increases with random styrene content	Increases with vinyl content	Higher Tg (vinyl & styrene content) = higher traction)	Increases up to 25k (hysteresis effect)
Hysteresis (Impact Absorption)	Decreases with styrene content (reduced sulfur reactivity)	Decreases with vinyl content (reduced sulfur reactivity)	No direct effect	Decrease with decreasing molecular weight
Abrasion Resistance (Wear/Durability)	Increases with styrene content	Increases with vinyl content	Higher T = increased abrasion resistance	No direct effect

- Adhesion: provided by functionalized polybutadiene



## RICON® Liquid Polybutadiene

Product Name	Mn(g/mol)	Viscosity cP, 25°C	1,2-vinyl %	vinyl /chain
Ricon130	2,500	750	28	14
Ricon131	4,500	2,750	28	23
Ricon134	8,000	15,000	28	41
Ricon142	3,900	9,750	55	40
Ricon150	3,900	40,000	70	50
Ricon152	2,900	20,000 *	80	43
Ricon153	4,700	60,000 *	85	74
Ricon154	5,200	250,000*	90	87
Ricon156	1,400	1,600	70	18
Ricon157	1,800	6,000	70	23
RiconP30D	NA	powder	NA	NA

## RICON®LSBR

Liquid Styrene-Butadiene Copolymers

Product Name	Mn(g/mol)	Viscosity cP, 25°C	1,2-vinyl %	Styrene %
Ricon100	4,500	40,000 *	70	25
Ricon181	3,200	17,500	30	28
Ricon184	8,600	75,000	30	28

\*45°C \*\*55°C

## Polybd OH group terminated PBD

Product Name	Mn(g/mol)	OH/chain	Viscosity cP, 23°C	1,2-vinyl %
R-45HTLO	2800	2.5	7,500	20
R-20LM	1200	2.5	2,200	20

## RICON® MA Maleic Anhydride grafted

Product Name	Mn(g/mol)	Viscosity cP, 25°C	MA/chain	Acid anhydride EW
Ricon130MA8	2,700	6,500	2	1,238
Ricon130MA13	2,900	17,000	4	762
Ricon130MA20	3,100	35,000 **	6	472
Ricon131MA5	4,700	15,000	2	1,981
Ricon131MA10	5,000	48,000	5	981
Ricon131MA17	5,400	50,000 *	9	583
Ricon131MA20	5,600	100,000	11	495
Ricon184MA6	9,100	170,000	6	1,651

## Krasol OH group terminated Polybutadiene

Product Name	Type	Mn(g/mol)	OH/chain	Viscosity cP, 25°C	1,2 vinyl%
LBH2000	Sec-OH	2,000	1.95	13,000	65
LBH-P2000	Pri-OH	2,000	1.95	13,000	65
LBH3000	Sec-OH	3,000	1.95	20,000	65
LBH-P3000	Pri-OH	3,000	1.95	20,000	65
HLBH-P2000	Hydrogenated	2,000	1.9	1,750*	-
HLBH-P3000	Hydrogenated	3,000	1.9	3,000*	-
F3000	Primery OH	3000	2.0	1,700	-
F3100	Hydrogenated	3000	2.0	15,000	-

\*@60°C

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