UBEPOL BR® & UBEPOL VCR®
Product List

UBEPOL BR® Series			
For Rubber Application	**Mooney Viscosity (ML_{1+4},100°C)**	**5 wt.% Solution Viscosity in Toluene**	**Characteristics**
UBEPOL-BR150	**43**	**75**	▪ Standard grade of UBEPOL BR® ▪ Well-balanced between processability and physical properties
UBEPOL-BR150L	**43**	**105**	▪ High chain linearity type of BR150 ▪ Good physical properties; Excellent abrasion resistance, High rebound, ▪ Lower heat build up
UBEPOL-BR150B	**40**	**48**	▪ High chain branched type of BR150 ▪ Easy compounding ▪ Good open roll mill processability under high loading recipe
UBEPOL-BR130B	**29**	**30**	▪ Lower mooney viscosity type of BR150B ▪ More excellent processability than BR150B ▪ Most suitable for high loading of carbon black
For HIPS Application	**Mooney Viscosity (ML_{1+4},100°C)**	**5 wt.% Solution Viscosity in Styrene**	**Characteristics**
UBEPOL-BR15HB	**40**	**60**	▪ Standard grade UBEPOL BR® for HIPS ▪ Low solution viscosity
UBEPOL-BR15H	**43**	**92**	▪ In between linearity and solution viscosity of BR15HB and BR15HL
UBEPOL-BR15HL	**43**	**135**	▪ High solution viscosity ▪ Good balance between gloss and impact resistance
UBEPOL-BR13HB	**30**	**41**	▪ Lowest solution viscosity ▪ Excellent gloss for HIPS
UBEPOL-BR14H	**33**	**58**	▪ Improved solubility of rubber in styrene ▪ Short dissolving time in styrene monomer ▪ Easy to control rubber particle size in HIPS

UBEPOL-VCR® Series			
For Rubber Application	Mooney Viscosity (ML_{1+4},100°C)	n-Hexane Insolubles* (wt.%)	Characteristics
UBEPOL-VCR412	45	12	▪ Standard grade of UBEPOL VCR® ▪ Superior processability such as extrusion and mill behavior ▪ High hardness and modulus, and superior cut growth property
UBEPOL-VCR617	62	17	▪ Special grade of UBEPOL VCR® ▪ Superior processability compared to VCR412 ▪ Higher hardness and modulus compared to VCR412

Properties of UBEPOL BR®

Raw Polymer Properties

For Rubber Application			UBEPOL-BR150	UBEPOL-BR150L	UBEPOL-BR150B	UBEPOL-BR130B
Mooney Viscosity		ML_{1+4},100°C	43	43	40	29
T-cp*		(Cps)	75	105	48	30
Micro Structure	Cis	(wt.%)	98	98	97	96
	Trans	(wt.%)	1	1	2	2
	Vinyl	(wt.%)	1	1	1	2
Molecular Weight & Distribution	Mw	(10^4)	53	52	50	43
	Mn	(10^4)	19	21	15	13
	Mw/Mn		2.8	2.5	3.3	3.3
Oil content	Paraffinic	(phr)	-	-	-	-
Specific gravity		(g/cm3)	0.91	0.91	0.91	0.91
Stabilizer			Non-staining			
Packages			35kg bale			

* 5 wt.% solution viscosity in toluene at 25°C

Compound Properties

For Rubber Application			UBEPOL-BR150	UBEPOL-BR150L	UBEPOL-BR150B	UBEPOL-BR130B
Mooney Viscosity		ML_{1+4},100°C	62	71	59	42
Curing Rate	ML	(dN・m)	2.0	2.1	1.9	1.5
	MH	(dN・m)	10.1	10.9	9.0	8.1
	Ts1	min.	3.0	2.8	3.4	3.7
	Tc(50)	min.	8.5	8.3	8.6	8.8
	Tc(90)	min.	11.7	11.4	12.1	12.5

Vulcanizate Properties

For Rubber Application			UBEPOL-BR150	UBEPOL-BR150L	UBEPOL-BR150B	UBEPOL-BR130B
Hardness	Type A		64	65	62	60
100% Modulus		MPa	2.4	2.5	2.4	2.1
200% Modulus		MPa	6.5	6.9	6.0	5.3
300% Modulus		MPa	12.5	13.1	11.4	9.8
Tensile strength		MPa	16.0	17.1	15.7	12.9
Elongation		%	380	390	370	370
Tear resistance		kN/m	56	61	51	48
Rebound	BS	%	57	60	54	50
Compression set		%	22	20	25	28

Curing time; 50min

Raw Polymer Properties

For HIPS Application		UBEPOL-BR15HB	UBEPOL-BR15H	UBEPOL-BR15HL	UBEPOL-BR13HB	UBEPOL-BR14H
Mooney Viscosity (ML_{1+4}, 100°C)		40	43	43	30	33
Volatile Matter (wt. %)		0.5	0.5	0.5	0.5	0.5
Ash Content (wt. %)		0.05	0.05	0.05	0.05	0.05
Micro Structure (%)	Cis	97	98	98	96	97
	Trans	2	1	1	2	2
	Vinyl	1	1	1	2	1
Molecular weight & distribution	M_w ($\times 10^4$)	56	58	57	49	50
	M_n ($\times 10^4$)	15	19	23	13	15
	M_w/M_n	3.7	3.1	2.5	3.8	3.3
Linearity of Molecular Chain		less	medium	more	less	medium
5wt.% Solution in Styrene	Solution Viscosity (cps)	60	92	135	41	58
	Styrene Insoluble (wt. %)	0.003	0.003	0.003	0.003	0.003
	APHA Color	10	10	10	10	10
Remarks		Branching Type (Standard Grade)		Linear Type	Good Gloss	Good Balance between Gloss and Impact Strength

Physical Properties of HIPS

For HIPS Application		UBEPOL-BR15HB	UBEPOL-BR15H	UBEPOL-BR15HL	UBEPOL-BR13HB	UBEPOL-BR14H
Swelling Index		10.9	10.7	10.6	11.2	10.8
MEK/Acetone Insolubles (wt. %)		23.0	23.3	23.5	22.1	23.1
Rubber Particle Size (μm)		2.1	2.5	2.7	1.6	1.9
Tensile Strength (MPa)	at yield	30	29	29	31	30
	at break	29	29	30	30	29
Elongation (%)		22	23	25	20	22
Izod Impact Strength (J/m)		76	75	75	72	78
Gloss			56	51	68	66
Vicat Softening Point (°C)		101	101	101	101	101
Melt Flow Index (g/10min.)		3.6	3.5	3.6	3.6	3.6

Rubber Content =7 wt. %

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Properties of UBEPOL VCR®

Raw Polymer Properties			UBEPOL-VCR412	UBEPOL-VCR617
Mooney viscosity		ML_{1+4},100°C	45	62
n-Hexane Insoluble *1		(wt.%)	12.0	17.0
Micro Structure*2	cis	(wt.%)	98	98
	trans	(wt.%)	1	1
	vinyl	(wt.%)	1	1
Specific gravity		(g/cm^3)	0.91	0.91
Stabilizer			Non-staining	
Packages			35kg bale	

*1; SPB content in VCR
*2; Microstructure of Matrix Polymer

Compound Properties			UBEPOL-VCR412	UBEPOL-VCR617	UBEPOL-BR150
Mooney viscosity		ML_{1+4},100°C	71	98	62
Curing rate	ML	(dN・m)	2.8	3.9	2.0
	MH	(dN・m)	13.8	15.7	10.1
	Ts1	min.	1.9	1.6	3.0
	Tc(50)	min.	8.3	7.6	8.5
	Tc(90)	min.	12.2	10.8	11.7

Recipe; ASTM D3189

Vulcanizate Properties			UBEPOL-VCR412	UBEPOL-VCR617	UBEPOL-BR150
Hardness	Type A		75	81	64
100% Modulus		MPa	4.6	6.3	2.4
200% Modulus		MPa	11.0	13.7	6.5
300% Modulus		MPa	-	-	12.5
Tensile strength		MPa	16.4	16.2	16.0
Elongation		%	290	250	380
Tear resistance		kN/m	62	65	56
Rebound	BS	%	50	46	57
Compression set		%	25	24	22
Heat build-up	ΔT	°C	33	36	27
	P.S	%	12	13	8
Pico abrasion		INDEX	249	260	209
Lambourn	slip rate 20%	INDEX	72	62	100
Abrasion	slip rate 60%	INDEX	67	59	100
Cut growth (2mm→15mm)		time	28000	37000	4700
Cut generation		$x10^4$ time	14	7.7	27

Curing time; 50min