



**Ecorr<sup>®</sup> RNR**

## **Regular Natural rubber Reclaim**

**Ecorr<sup>®</sup> RNR40 B11**

**Ecorr<sup>®</sup> RNR30 B01**

**Ecorr<sup>®</sup> RNR30 B91**

**Ecorr<sup>®</sup> RWR20 B52**

**Ecorr<sup>®</sup> RWR20 B66**

# Grades of Ecorr<sup>®</sup> RNR

Key Grades			TYRE INDUSTRY			OTHER APPLICATIONS	
			RNR40 B11	RNR30 B01	RNR30 B91	RWR20 B52	RWR20 B66
Acetone-extract	%	ASTM D297-18	14 ± 2	14 ± 2	17 ± 2	20 ± 3	10 ± 4
Ashes	%	ASTM D297-18	4 ± 2	4 ± 2	7 ± 2	10 ± 3	18 ± 4
Carbon Black	%	ASTM E 1131	28 ± 2	30 ± 2	28 ± 2	26 ± 3	26 ± 4
Polymer content	%	ASTM E 1131	55 ± 3	52 ± 3	49 ± 3	46 ± 4	46 ± 4
Density	kg/m	ASTM D297-15	1120 ± 20	1135 ± 20	1150 ± 20	1200 ± 20	< 1350
Hardness	Shore A	ASTM D2240	57 ± 3	56 ± 3	55 ± 5	55 ± 5	65 ± 5
Tensile strength	MPa	ASTM D412	> 8	> 6	> 6	> 5	> 5
Elongation at break	%	ASTM D412	> 280	240 ± 40	> 220	> 200	> 200
Mooney viscosity	ML(1+4)@100°C	ASTM D1646	50 - 70	40 - 65	35 - 65	35 - 65	35 - 65
Heat loss, 100 °C	%	ASTM D1278	< 1	< 1	< 1	< 1	< 1
Physical appearance			Black slabs of 10 kg. (40x60x4 cm). Each slab is packed in a low melting foil.				
Curing	t 90, 150°C		Packaging	Pallets	[cm]	120x100x135	
	Reclaim	100 phr		Net weight	[kg]	1250	
	ZnO	5 phr		Net weight	[pounds]	2755	
	Stearic acid	2 phr					
	Sulphur	3 phr		Pallets	[cm]	120x100x110	
	MBT	0.5 phr		Net weight	[kg]	1000	
	DPG	0.2 phr		Net weight	[pounds]	2204	

## Advantages

The main advantages derived from the use of reclaim concern the processing behaviour of the compound. These include:

- Lower power consumption resulting from shorter mixing cycles.
- Low calendering, mixing and extrusion temperature.
- Improved penetration of fabric and cord.
- Lower swelling and shrinking during extrusion and calendering.
- Increased tack.
- Improved reversion and ageing performance of natural rubber compounds (ozone, UV).
- Lower raw material costs.



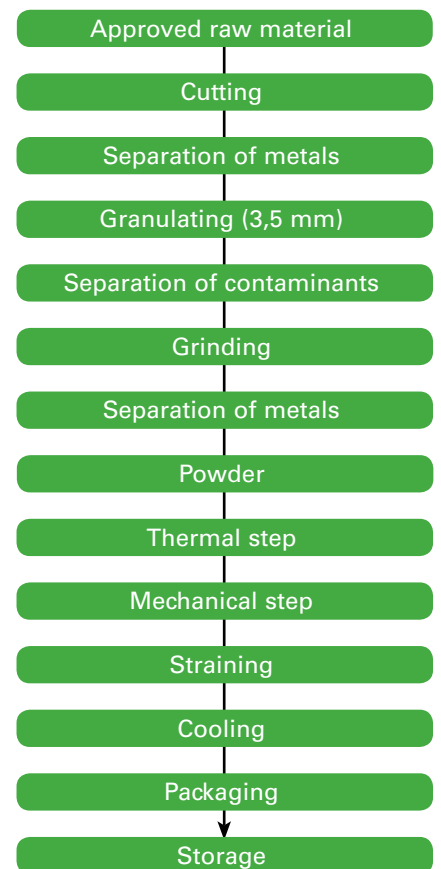
## RNR process

- The exclusive feedstock for Ecorr<sup>®</sup> RNR reclaim consists of truck tyre tread peelings and buffings supplied by carefully selected European retreaders. The compounds from which these truck treads are produced have proven to be very stable and consistent.
- Granulation: the material is absolutely free of contaminants (steel, fibre, stones, etc.) through a sophisticated separation and purification process.
- At this stage of the production process, the granulated material may be sold in various sizes of powder.
- During devulcanisation, a combination of mechanical and thermal steps break down the material's sulphur crosslinks. The result is a reclaimed rubber compound with a Mooney Viscosity in the range of 40-60.
- This reclaimed material may then be used as a masterbatch to which a vulcanisation system is added.
- It may also be added to a compound, typically at 10-30 p.h.r.

Application:	RNR40	RNR30	RNR30	RWR20	RWR20
	B11	B01	B91	B52	B66
Passenger and truck tyres:					
Treads	P	P			
Sidewalls	P				
Carcass	P	P	P		
Bead	P	P	P		
Apex	P	P		P	P
Bicycle tyres	P	P			
Solid tyres			M/P	M/P	M/P
Automotive moulded goods		M/P	M/P	M/P	M/P
Mechanical moulded goods		M/P	M/P	M/P	M/P
Mats (flooring, automotive)	M	M	M	M	M
Conveyer belts	P	P	P		
Hoses	P	P	P	P	
Shoes	M/P	M/P	M/P	M/P	M/P

M = Masterbatch

P = Part of a virgin compound



## Applications overview

The most common applications for each material are indicated in the chart above. It is very important to distinguish if a reclaim is to be used as a masterbatch or as part of a total compound. For each application it is possible and / or necessary to optimise the total compound recipe.

# Using reclaim in a tread compound

Each virgin compound responds differently when the reclaim is substituted for a portion of the virgin rubber, affecting physical and processing properties such as vulcanisation behaviour. Over the years, Rubber Resources has developed different techniques leading to full control of these affects. A brief example using a tyre tread compound is provided in the chart mentioned below.

	Virgin Compound	+20 phr B01	+PVI	-PVI -15 phr CB -10 phr oil
SBR 1500	80	70	70	70
BR 1220	20	20	20	20
B01	-	20	20	20
ISAF N234	75	75	75	60
Low PCA oil	25	25	25	15
Stearic acid	1	1	1	1
Struktol 40 MS	3	3	3	3
TMO	2	2	2	2
IPPD	2	2	2	2
Antilux 654	1.5	1.5	1.5	1.5
ZnO	5	5	5	5
TBBS	1.5	1.5	1.5	1.5
SU-109	2.4	2.4	2.5	2.4
PVI	-	-	0,5	-
Mooney ML(1+4)@100°C	71	75	73	71
Rheo @ 160 °C				
ML	11	14	13	12
MH	68	69	69	71
ts2	4'39"	3'51"	5'26"	4'54"
t50	7'22"	6'02"	8'57"	8'21"
t90	10'20"	8'40"	11'25"	10'53"
Modulus (MPa)				
100%	1.7	2.3	2.1	2.0
200%	2.9	5.2	4.9	4.6
300%	6.9	9.3	9.0	8.4
400%	8.6	13.3	12.9	12.4
500%	11.7			
Tensile strength (MPa)	17.4	14.7	14.8	15.5
Elongation at break (%)	577	456	456	480
Hardness (° Shore A)	71	74	74	75
Density (g/cm3)	1.17	1.18	1.18	1.16
Din Abrasion (mm3)	81	106	82	75
Tear Delft				
⊥ [N]	62	60	57	65
// [N]	57	56	56	59

Example:

Using reclaim in a tread compound

In the first column, the recipe and properties of a tyre tread compound are indicated. In the second column, the effect of substituting 10 parts of the SBR rubber for 20 parts of Ecorr<sup>®</sup> RNR30B01 reclaim (which contains ± 50% RHC) is indicated. In the last two columns, possible optimisation steps and their effect on the compound properties are summarized.

## Increase in Mooney viscosity

The phenomenon of the hardening of natural rubber during storage is well known throughout the rubber industry. Due to the high proportion of natural rubber in tyre tread reclaim, the hardening behaviour of reclaim during storage is similar to that of natural rubber. The rate of increase depends on storage time and temperature. It can be calculated with the following empirical equation:

$$M_t = M_0 * (1 + a * t^{0.55})$$

$M_t$  = Mooney after t days of storage

$M_0$  = Mooney at the day of production

t = Storage time in days

a = 0.04 for T = 23°C

= 0.15 for T = 50°C

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