## COMPOUNDS FOR TYRES **PERFORMANCES** ECO

### SUSTAINABILITY



WE MOVE FORWARD WITH INNOVATION

# EURORUBBER TECHNICAL COMPOUNDS

R&D

R&D

PRODUCTIO

# RAW MATERIALS





## WHO WE ARE MISSION AND VISION



# PROPER SOLUTIONS IN THE SHORTEST TIME

We will use our 50 years' experience in the rubber industry to understand your problems and, finally, propose compounds and solutions tailored to your needs.

We base our work on the relationship with customers. Our goal is to build long lasting partnerships with you.

Our laboratories, production units and technical staff will always be available to work with you on the development of new projects and to face new challenges.

We always consider our company.

### For these reasons, from EURORUBBER, you can expect more!

### OUR STRENGTH

We respond quickly to customer requests. We follow our products in their performance, in all phases of working life. We study the market evolution so that our compounds are updated and capable to satisfy increasingly demanding performance and regulations.





We always consider the customer first and at the heart of





In the hot retreading process, tread compound is applied on the buffed casing as extruded die profile (camelback) or overlapping extruded layers (strip winding).

By correct choosing, dosing and mixing of the ingredients (natural and sinthetic rubbers, carbon black, silica, softeners and curatives), Eurorubber expert compounders developed highly performing recipes for car, SUV, 4x4, Light Truck and Heavy Duty Truck.

These recipes are continuously improved following market changes and are capable to optimize main areas of performance of the tyre:

- Safety, providing maximum grip on all road surfaces and different weather conditions

- High Mileage, ensuring proper and regular wear in line with severity of road route
- Low Fuel Consumption, applying in compound development the technology to reduce significantly tyre Rolling Resistance.

In addition, Eurorubber developed compounds for Off-The-Road (OTR) tyre retreading. In this business, the knowledge of different applications and work conditions is essential to propose compound recipes capable to satisfy, all performances required by OTR tyres:

- High Chunking resistance in all service conditions to extend functionality of the tread pattern (traction and solidity)
- Low heat generation to extend casings life so to make further retreads possible.

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According to regulation EU1222/2009 (EU 740/2020), wet grip class is determined by wet braking test results.

Wet grip index is expressed by a coefficient (G) that is the ratio between test result of tested tyre (Wet braking distance or deceleration) and reference tyre (SRTT).

### CAR, LIGHT TRUCK and 4x4 TYRES WINTER TREAD COMPOUND

Tyre performance on ice and snow is certified by winter test homologations (3PMSF and N) mandatory for all tyres (retreads included ).

Characterist Hardness (Shore A) Adherence ice/snow HOMOLOGA

> Wet Brakir (Ranking c new tyre)

#### LEGEND

A - B | Max. Adherence **B - C | High Adherence** 

C - D | Standard Adherence

D - E | Medium Adherence

\* WET GRIP CLASSES







Winter tyre main reference performances are: 1) capability to overcome emergency situation on icy and/or snowy roads, 2) adherence on wet roads in terms of brake efficiency and traction.

For wet braking performance, no labeling is required for retreaded tyres, but it is possible to carry out tyre testing and results certification at official European testing centers (TUV, IDAWA, etc..) following same as new tyres test procedure and propose a similar performance rating criteria. In collaboration with new tyres manufacturers, Eurorubber carried out a significant number of wet braking tests using different tread compounds.

This testing activity has produced knowledge of the effect on wet braking of tread compounds, their ingredients, their mechanical characteristics and retreading process.

Product c	THERMO/MPG Nordic	SRC Alpine	T4S Wet - All Seasons	
	55	58	62	
on TIONS	N 🛕 3PMSF 🎪	N 🚵 3PMSF 🎪	3PMSF	
g iteria for	D-E	C - D	B-C	







According to regulation EU1222/2009 (EU 740/2020), wet grip class is determined by wet braking test results.

Wet grip index is expressed by a coefficient (G) that is the ratio between test result of tested tyre (Wet braking distance or deceleration) and reference tyre (SRTT).

### CAR, LIGHT TRUCK and 4x4 TYRES SUMMER TREAD COMPOUND

Characteristi Hardness (Shore A) Mileage

severe-mil x 1000 Km/ Wet Brakin

(Ranking cr new tyre)

#### LEGEND

A - B | Max. Adherence

**B - C | High Adherence** C - D | Standard Adherence

D - E | Medium Adherence

\* WET GRIP CLASSES









Summer tyre main reference performances are: 1) Mileage, normally measured by end user during tyre life, 2) Adherence on wet roads in terms of brake efficiency and traction.

For wet braking performance, no labeling is required for retreaded tyres, but it is possible to carry out tyre testing and results certification at official European testing centers (TUV, IDAWA, etc..) following same as new tyres test procedure and propose a similar performance rating criteria.

In collaboration with new tyres manufacturers, Eurorubber carried out a significant number of wet braking tests using different tread compounds. This testing activity has produced knowledge of the effect on wet braking of tread compounds, their ingredients, their mechanical characteristics and retreading process.

Eurorubber can propose different tread compound recipes for each product segment (High Performance, Standard and Light Truck) indicating their possible positioning for Wet Grip Index using same as new tyre performance rating criteria.

Product c	BSU High mileage - TL	H R T/H < 4x4	TWS V/W	
	70	65	65	
i mm	30-50	20-40	15-25	-
g iteria for	D-E	C - D	B-C	_



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### HEAVY DUTY TRUCK TYRE TREAD COMPOUND

The recipe and is responsible tyres: Mileage, Comsumption. Compound con at which the tyr - different posit Trailer)

- different Truck applications (Regional or Long Haul, City Bus or On-Off)

Rolling Resistance is the Tyre characteristic that has become increasingly important in the recent years because it is directly correlated to vehicle fuel consumption and, therefore, to COx emissions in the atmosphere. Aereodynamic drag and Rolling Resistance are the forces that opposes advancement of vehicle. Rolling Resistance is caused by friction forces generated in the compound by molecular interaction between rubber and reinforcing fillers (Carbon Black and Silica). The tread compound, compared to other components of the tyre, contributes to about 50% of the Rolling Resistance of the entire tyre. For this reason, Retreading Industry should pay great attention to Rolling Resistance that is becoming an increasingly decisive feature for the sustainability of the sector.

Rolling Resistance can be measured by regulated indoor test on road wheel. This testing activity may be carried out at official European testing centers.

Rolling Resistance coefficient is the ratio between the force opposing rolling and the maximum load at which the tyre can be submitted. The higher this coefficient, the greater the fuel consumption induced by the friction generated by the tyre in contact with road. Therefore, the energy classes, related to fuel consumption, from A (best) to F (worst) were created. Rolling resistance is included in new tyre labeling EU regulation (EU1222/2009 e 740/20020) but measurable on retreaded tyre as well. Eurorubber is working together with new and retreaded tyres manufacturers and has, internally, the necessary know how (compound + retreading process effects) to propose a competitive range of compounds, for all positions and services.

#### LEGEND

A - B | Low fuel consumption

B - C | Standard fuel consumption

C - D | Medium fuel consumption

D - E | High fuel consumption

\* ENERGY EFFICIENCY CLASSES









The recipe and mixing quality of tread compound is responsible of the overall performance of truck tyres: Mileage, Traction, Tear Resistance and Fuel Comsumption.

Compound composition determines the type of use at which the tyre will be submitted:

- different positions under the vehicle (drive or





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### **DRIVE-TRACTION AXLE**

Tread compound for truck drive tyre should transmit the motion and make the revolutions of motor axis become mileage. For this reason, tread compound should have traction capability (soft rubber that creeps into the roughness of the asphalt), but, at same time, ensure adequate mileage.

In addition, tread compound should not transfer in the tyre useless frictions and ensure traction/braking on all road surfaces and whether conditions (dry, wet, snow and ice). Natural rubber based compounds are particularly indicated to obtain 3PMSF/N homologations (new and retreaded tyres) mandatory for the circulation of trucks during winter season.

#### CITY BUS

Main characteristics of Urban and Extra Urban City Bus tyre are related to the safety:

- Traction/Braking on all road surfaces (concrete, smooth and rough asphalt) and all whether conditions (hot, cold, water, mood, snow and ice)
- Resistance to high service temperature induced by frequent vehicle stop&go.

In this Tyre segment, winter homologations (3PMSF) are of particular importance. In fact, without such approvals, truck Tyres cannot be mounted under the vehicle during winter season. The range of compounds proposed by Eurorubber are recommendable to pass winter homologation test (acceleration/braking on snow) that can be carried out at specialized Europeans testing centers.



#### LEGEND

- A B | Low fuel consumption
- B C | Standard fuel consumption
- C D | Medium fuel consumption
- D E | High fuel consumption

\* ENERGY EFFICIENCY CLASSES









KM Position	TRAX Drive High Milleage	WING Drive High Milleage Plus	PREMIUM Drive High Milleage - Low RR		
60	65	65	65		
5-7	7-8	9-10	8-9		
ISF 🎪	3PMSF	_	3PMSF		
C-D	C - D	D-E	B-C		





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### TRAILER

Product Characteristic	LKW <sub>GP</sub>	SS Low RR	SS Plus High Mileage/Low RR	
Hardness (Shore A)	65	66	66	
Mileage x 1000 Km/mm	4-5	5-6	6-7	
Adherence on ice/snow HOMOLOGATIONS	_	3PMSF	3PMSF	
Rolling Resistance (New Tyre criteria)	C - D	B-C	B-C	



#### ON-OFF

Tread compounds for on-off tyre should ensure acceptable performance to the vehicle, adequate to service at which is submitted:

- Use purely OFF (more than 75% of daily service) In this case, compound ultimate properties (tensile and Elongation at break) are optimized to avoid tread chunking phenomena caused by stones and sharp rock edges.
- Use purely ON (not more than 25% off service during daily service). In this case compound properties should be able to combine both performances: regional road and severe off routes in the building construction and industrial sites wear rate.

LEGEND

A - B | Low fuel consumption

B - C | Standard fuel consumption

C - D | Medium fuel consumption

D - E | High fuel consumption

\* ENERGY EFFICIENCY CLASSES



Tyre designed to be retreaded





Characteristic	KM - MTR-TRAX	МРХ
Hardness	63	65
Mileage x 1000 OFF* Km/mm 25%	5-6	6-8
Mileage OFF* x 1000 75% Km/mm	3-4	5-6







## **OFF THE ROAD (OTR) TYRES**

Eurorubber has developed a range of very competitive compounds for OTR retreading sector. In order to obtain best performance on final product, it is necessary that compound development expert knows the behavior of the tyres in the field as well as the retreading production process.

OTR retreading compound recipe is very complex: it is necessary to combine good processability (extrusion of large masses of rubber at high temperature by strip winding process) with high level of performance in the field (cut, abrasion, tear and heat generation resistance), normally required by this type of type products. In addition, we need to have tread compounds with physical properties suitable for different applications in the field (mining, transportation, buildings and roads construction sites etc.).



### Off The Road **TYRE SECTION**



OTR Tyre section, normally, consists of four elements:

1) Tread – Compound in contact with road surface. The recipe composition is function of pattern and use in the field (mining, transport, compacting, dumping) with physical properties optimized to reference performance (cut resistance, abrasion resistance and low heat generation).

2) Base - Intermediate compound at low heat generation. This recipe should ensure high physical properties combined with high resilience index.

3) Cushion - Gum layer connecting casing and tread. This compound should show high cure rate but, at same time, avoid premature crosslinking occurs on layers applied on top.

4) Sidewall – Tyre flanks cover compound. Normally, Tyre sidewall is buffed and repaired from cuts from previous life. Recipe composition should ensure same as new Tyre basic performances: ozone, fatigue and cut resistance.

In addition, the range of compounds for OTR tyres includes Cushion, Base, Sidewall and Cement.





**TREAD DEPTH** 



	E2 / E	3 / L3	E4,	/ L4	L5
Product Characteristic	C4 ROAD	B TRANS	A ROCK	A4 ROCK +	A5 ROCK ++
Hardness (Shore A)	62	63	65	66	68
Chunking resistance	Mec	Medium		ght	Extra
Temperature	Lo	Low		lium	Hight
Working conditions	Long Cy high/medi on good	Long Cycles at high/medium speed on good roads		Cycles at um speeds d roads	Short Cycles at low speed on sharp rocks

**ONet** 

LEGEND

- \* DIFFERENT TREAD COMPOUNDS
- A5 | Exceptional resistance to cuts and chunking on very rough surfaces.
- A4 | Superior cut resistance.

- A | High cut resistance at average speed higher than A4.
- B | High internal heat generation resistance.
- C4 | Superior heat generation resistance.

The graph shows the map of different tread recipes in function of OTR tyre application and ratio of utilization on road, land soil and rocks. Following physical characteristics control the entire working cycle of OTR tread compound:

- propagation (higher is better).
- generation).

HARDNESS

to be retreaded

The internal frictions of the compound, induced by strain amplitude and frequency, generate heat and raise internal temperature of the tyre until it causes separation of casing elements.

For each Tyre service (mining, building construction), Eurorubber propose a compound with above physical properties optimized to comply with requirements of traction, load resistance and endurance in line with severity of work cycle.





- Hardness (Shore A). Compound hardness controls two fundamental performances: penetration of rock sharp edge in the rubber and abrasion resistance (higher is better). - Elongation (%). Maximum Elongation at break controls compound elasticity and cut

- Tan delta. This important parameter measures compound resistance to heat build up during strain cycle of rubber (the lower the higher the resilience and the lower the heat

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### **INDUSTRIAL** SOLID TIRES **COMPOUNDS** FOR FORK LIFT TYRES

In addition, the range of compounds for solid tyres includes Cushion (or Soft) and Base (with option of micro fibers at high reinforcing capability).

### **FORK LIFT TYRE SECTION**

#### Solid Tyre section consists of:

- -Tread compound with recipes optimized for different working conditions (high load, electrically vehicle, high cut resistance for ports and building construction sites, antistatic, resistant to oils and fuel, acid / bases, no marking)
- Cushion compound at low hysteresis, low heat generation and high resilience.
- Base or Bead at low deformability (available even with fibers at high reinforcing capabilit.



Characteristic	ENERGY Tread	HIGH LUAD Tread	NU MARKING Tread	SUF1 Cushion	BASE- SID Bead	BASE - HL Bead
Hardness (Shore A)	65	69	63	55	80	90
Rebound/ Resilience (%)	60	50	60	70	N.A.	N.A.
Chunking resistance	Alta	Alta	Alta	N.A.	N.A.	N.A.

**Net** 

LEGEND



DIFFERENT TREAD COMPOUNDS

BLACK NO MARKING / YELLOW Tyre designed to be retreaded





Last segment of products developed by Eurorubber is the range of compounds for fork lift tyres (solid tyres or superelastic) both black and colored no marking. The proposal is addressed both for retreading and new Tyre. Solid tyres compound development is carried out by expert engineers who follow product evolution in the market.

Eurorubber propose tread compounds for high load/low speed service, electrical fork lifts at high energy efficiency (low internal heat generation , low Rolling Resistance).







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