

# Industrial Waxes

Rubber & Tire

# Paraffin Waxes in the rubber and tire industry

**The greatest naturally occurring threats to tires and all other synthetic and natural rubbers are ozone and ultraviolet (UV) light. Ozone is an odorless gas and part of the atmosphere. Highest levels are found in cities and industrialized centers.**

For ozone protection manufacturers add waxes to their compounds at common dose rates between 1 and 3 phr. During operation the tire bends and flexes. This activates the migration of the antiozonant wax to the surface of the tire forming a thin, protective wax film. This migration intensifies with increasing temperature. Ozone attack on rubber compounds occurs in a temperature range between 0 °C and 55 °C . Below this temperature range the ozone does not have a high enough activation energy to react with the rubber. Above it ozone levels in the atmosphere decrease to minimal levels.

Antiozonant waxes are complex and thoroughly designed blends. They consist of unbranched straight chain n-paraffins as well as branched iso-paraffins of different chain length. Compared to iso-paraffins n-paraffins with a similar number of carbon atoms have a greater migration tendency. Generally the 'solubility' of antiozonant waxes in rubber increases with decreasing molecular weight (carbon atom number). Paraffin waxes with high n-paraffin content provide rapid protection for newly produced goods. Micro waxes especially with high molecular weight iso-paraffins guarantee slow release and long lasting protection.

Antiozonant waxes with a high micro wax content are used e. g. for tire sidewall protection. Additionally antiozonant waxes may act as a transport medium for other antiozonants and antioxidants (like amines and phenolic derivates).

UV light protection of rubber goods is preferably achieved by the addition of carbon black. This gives tires the typical colour. Also some high performance chemical UV absorbers are used. UV stabilizers are generally used up while they perform their function. Tires turn from black to grey while the carbon black is loosing its function and the degradation of the rubber material takes place. This makes the rubber turn brittle and leads to the formation of cracks.

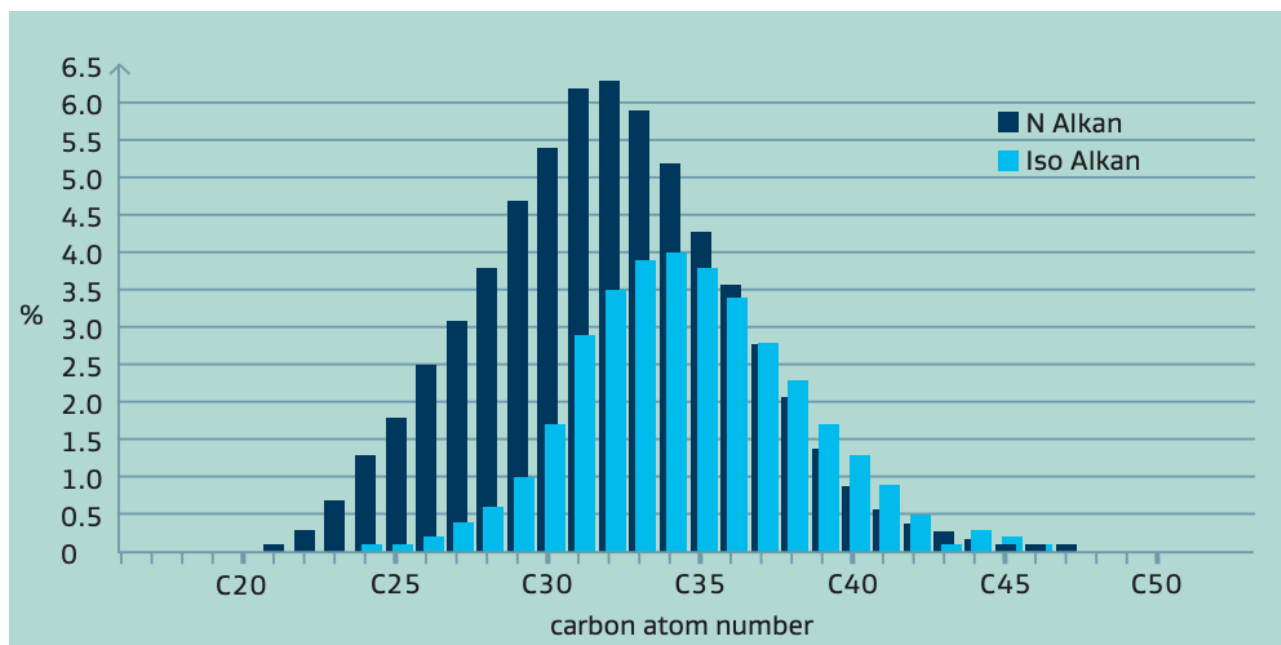
# Technical Data

## VARAZON 5998

VARAZON 5998 is the tire industries first choice when it comes to ozone protection. Especially in a temperature range of 10-50 °C the protection against ozone attack is outstanding. Additionally with its fine balance between straight and iso components an excellent migration behaviour is achieved. This ensures the formation of a thin layer of wax on the surface of the tire. Quick acting and long lasting. VARAZON 5998 features UV-protection and good processability as well as anti blocking behaviour.

	n-paraffin Content [%]	Congealing Point [°C]	Penetration at 25°C [1/10 mm]	C max	Color
VARAZON 5998	60 - 70	64 - 68	14 - 19	30 - 32	White

Typical Gas Chromatogram of VARAZON 5998



Besides that Hywax produces a wide variety of different products for the rubber and tire industry. All of these waxes combine the finest properties in their function as anti ozonants, mould release agents, plasticizers and lubricants. Additionally Hywax is able to blend waxes according to the special needs of our customers.

	n-paraffin Content [%]	Congeaing Point [°C]	Penetration at 25°C [1/10 mm]	C max	Color
VARAZON 5138	56 - 54	64 - 68	14 - 20	30 - 32	White
VARAZON 4959	55 - 74	63 - 69	16 - 21	31 - 33	Blue
VARAZON 6066	65 - 75	61 - 67	14 - 20	30 - 32	Yellowish
VARAZON 0299	42 - 50	60 - 62	50 - 60	30 - 33	Yellowish
VARAZON 2396	70 - 80	60 - 62	15 - 17	28 - 30	White
VARAZON 8080	37 - 53	70 - 74		36 - 38	Brown
VARAZON 6403		62 - 66	16 - 22		White
VARAZON 6050		59 - 61	55 - 65		White
VARAZON 5605		54 - 56	20 - 24		White

### Synthetic waxes from Hywax

Up to now anti ozonant waxes are typically petroleum based waxes. They are used to minimize cracking in tires by protecting the polymeric back bone of the rubber against ozone attack. Usually anti ozonant waxes are blended from intermediate waxes, paraffin and micro crystalline waxes to specification. Their iso alkane content may vary between twenty and sixty percent. Depending on the congealing point and the iso alkane content of the wax, blooming is more or less intense. Synthetic anti ozonant waxes are produced by synthesis from either natural gas or coal gasification products and may be blended with petroleum based waxes to gain specific properties. A variety of products have been composed with materials available at present as well as potentially available in the future. Their properties are comparable to traditional anti ozonant waxes made from petroleum based raw materials. Their performance has been confirmed independently by laboratory tests as well as industrial usage.

### New products are now available for testing:

- **VARAZON 9300** a fully synthetic wax
- **VARAZON 9302** a blend of a synthetic wax and a petro based wax
- **VARAZON 9304** a blend of a synthetic wax and a petro based wax

	Congeaing Point typical [°C]	Penetration at 25 °C [1/10 mm]	Penetration at 40°C [1/10 mm]	Viscosity at 100°C [mm <sup>2</sup> /s]
VERAZON 9300	63	16	60	4.9
VERAZON 9302	65	17	51	6.5
VERAZON 9304	60	58		6.1

All tested materials performed similarly well. With the current results at hand all combinations of synthetic wax intermediates with petro based components proofed to be suitable as anti ozonant waxes in the rubber industry.



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