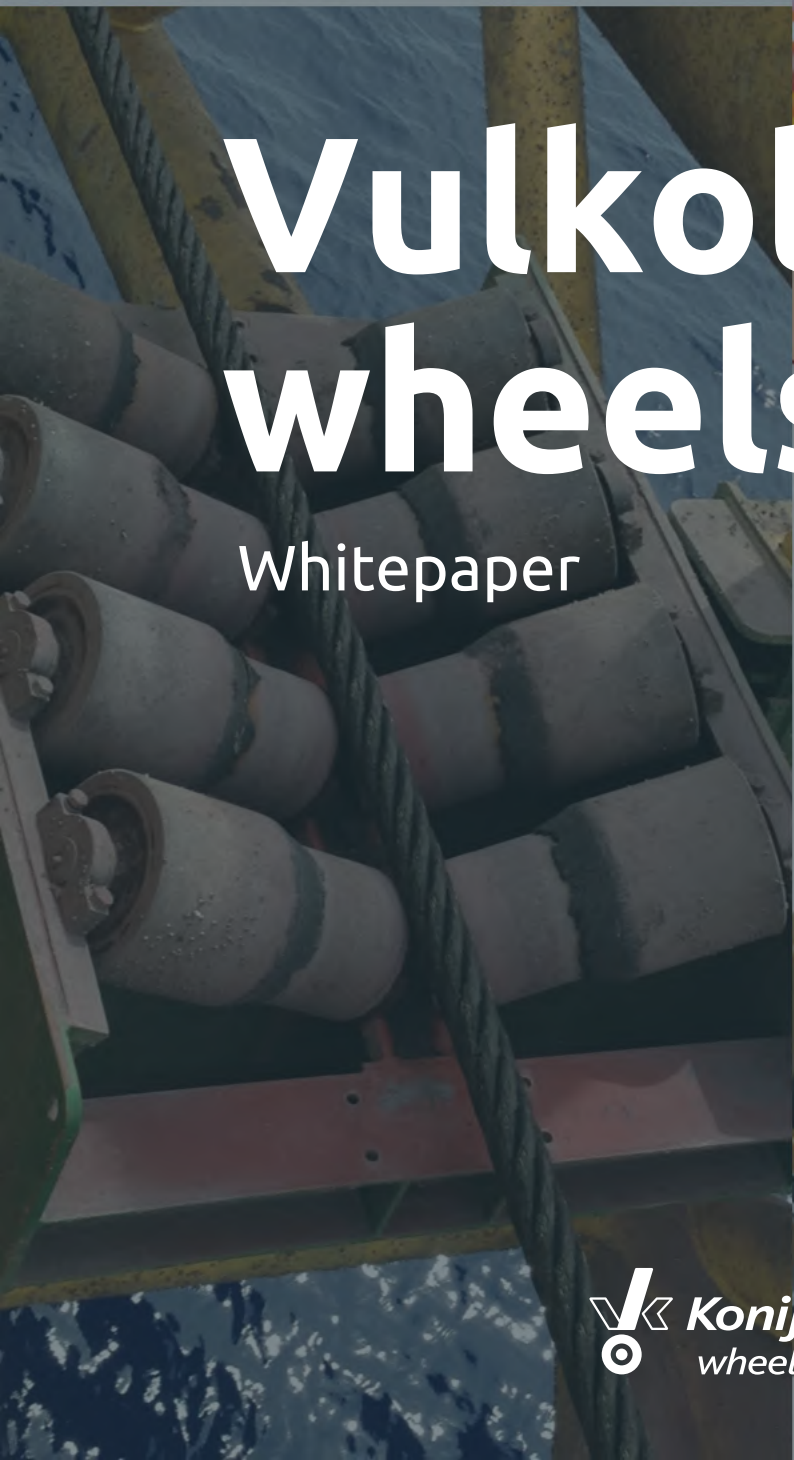


Vulkollan wheels.®

Whitepaper



Vulkollan wheels.

Moving mountains.

In this whitepaper you will read more about Vulkollan and the usage of this material in our Vulkollan wheels. What differentiates this material compared to regular polyurethane? What are the characteristics of this material? How do we produce the Vulkollan wheels?

Vulkollan is a mixture of elastomers produced by the company Covestro. It is used for many applications varying from coupling elements to sealings. Vulkollan is very suitable for the production of technical wheels. Konijnenburg offers a wide range of Vulkollan wheels. These wheels can be used for many applications from forklifts to even roller-coasters.

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Vulkollan or regular polyurethane?

What is the difference of Vulkollan compared to regular polyurethane? The largest difference compared to regular polyurethane is the unique mixture of Polyol, Desmodur 15 (naphthylene-1,5-diisocyanate) and Vernetzer. The combination of elastomers gives the wheels unique capabilities and robust properties. This mixture combines the best of two worlds: soft enough to absorb shocks and sounds, without concessions on the robust quality. Besides the following benefits, Vulkollan is odourless and tasteless, furthermore it is highly shock and sound absorbing.

Pros of Vulkollan wheels



Higher service life



Withstands higher dynamic loads



Multiple rubber load-bearing capacity



Lower rolling resistance



Higher resistance to oil, petrol, benzol and multiple acids



Better prevention to floor damage and streaking



Higher resistance against damage from metal parts



Higher notch strength



No permanent deformation under long-term heavy loading (monday morning sole)



Higher temperature resistance of -40°C till +80°C



High demanding applications

Technical wheels are the foundation of many carts, machines and other applications. Rolling the wheels in tough conditions, demands high quality. Vulkollan offers this quality in multiple ways. Read further and find out why Vulkollan offers great properties in multiple high demanding conditions:

Capable to bear heavy loads

Do you need to move or store heavy loads? In that case you are looking for high-quality wheels with enough load

Load capacity

The load capacity always depends on the specifications of the required wheel. In general, we see a much higher capacity for Vulkollan compared to other materials. In the example below, the load capacity is more than twice as high compared to rubber. *Example: 400mm diameter wheel with 80mm width and 40mm bore.*

Wheel	Load capacity
Cast iron core with rubber	1,000 kg
Cast iron core with Vulkollan 90° Shore A	2,450 kg

Standstill with heavy loads

When you expose wheels to high loads for a longer period of time without moving it, many wheels become flat on one side. This problem is called a Monday morning sole. The deformation is permanent and you will need to replace the wheels. Compared to regular polyurethane, Vulkollan wheels offers greater resistance to standstill under heavy load; under normal conditions, a Vulkollan wheel will reshape in his original shape after the wheel is used again.



High demanding applications

High resistance to challenging workspaces

Technical wheels are exposed to challenging workspaces like high temperatures, humidity or corrosive cleaning materials. Although there are limits to the Vulkollan wheels, they offer the best resistance to these challenging

Liquids

Cleaning fluids, multiple acids or oily substances: wheels are exposed to the most challenging or even corrosive liquids. A Vulkollan wheel resists much of these liquids.

(Sharp) metal parts

Wheels are driving on a variety of floors: from surgery rooms to industrial production locations. Especially in industrial locations there is a lot of dirt and filthiness on the floor: from sharp metal parts and screws to stones. Although workspaces are cleaned regularly, the wheels are exposed to everything that is laying on the ground. In combination with a heavy load this leads to damaged wheels. Depending on where you want to use the wheel, Vulkollan is available in various hardness levels. We can advise you in this consideration.

Temperature and sunlight (UV)

From freezing cold to tropical temperatures: the Vulkollan wheel can bear both low and high temperatures. However, consistent exposure to UV light will change the colour of Vulkollan, it has no influence on the material performance.

Temperature	Effect
-40°C to +80°C	Vulkollan remains elastic and shock absorbing
+80°C to +125°C	Reversibly decreases most of the properties, except for the modulus of elasticity
+125°C or higher	Permanent damage to the chemical structure of Vulkollan

Humidity

Hydrolysis is one of the biggest risks when using the wheels in humid and warm areas over a long period of time. The hydrolysis decomposes the polyurethanes. This decomposition results in a rough surface and a shorter lifetime of the wheels. To prevent this from happening, we offer Vulkollan wheels enriched with Stabaxol. The Stabaxol protects the wheels for hydrolysis and increases the durability of the polyurethane.

Electricity

Do you need the wheels to be electric conductive? In that case we can also add Printhane C. This material is conductive and has a hardness of 92° shore A.



High demanding applications

Other characteristics of Vulkollan

Besides the capability to bear heavy loads and the high resistance to challenging environments, the Vulkollan have more positive characteristics to mention.

Increased durability

Because of the high abrasion, the wheels are more durable. Compared to natural rubber, the material has up to twice as little volume loss through wear. In general, softer Vulkollan has a lower wear rate compared to harder ones because the material can deflect. However, Vulkollan can bear high temperatures (up to 80°C), a higher temperature will affect the wear resistance.

Tear resistance

Vulkollan offers a much higher tear resistance than non-reinforced elastomers. Even when the lining is damaged, the material does not break and remains functional.

No concessions on comfort and noise

You might assume that these robust characteristics will reduce the comfort and delivers you harassing noises at the workspace. Despite the high resistance, the wheels are still very comfortable. Furthermore, the Vulkollan wheels are sound absorbing.

Minimal rolling resistance

By reducing the rolling resistance, you also reduce the energy input; it is easier to move the wheels and therefore it needs less energy. Furthermore, there is less friction with the floor, which results in less risk of wear patterns.

Hardness of Vulkollan wheels

We measure the hardness with a Shore durometer. This device determines the hardness of the material. We offer wheels with a hardness of 75°, 80°, 90° and 95° Shore A (92° Shore A in case of the wheels enriched with Printhane C). The Vulkollan wheel with 90° Shore A, can be stretched to almost seven times its original length. Vulkollan combines the benefits of both rubber, plastic and metals:

	Plastic and metals	Rubbers	Vulkollan
Elongation	--	++	++
Tensile strength	++	--	++
Rigidity	++	--	++
Elasticity	--	++	++



How it's made

The production of Vulkollan wheels, is similar to regular polyurethane wheels.

01 Wheel centre
The first step is the mechanical preparation. We process the raw wheel centres into machined wheel centres. In this process the grit blasting and decreasing takes place. Furthermore, we add an adhesive primer. To improve the adhesion, we use a special surface treatment on all metal surfaces.

02 Casting Vulkollan
The wheel centre will be placed in a mould and afterwards we add the Vulkollan mixture. The Vulkollan becomes solid due to a chemical process.

03 Demoulding wheel
When the Vulkollan is cured, the wheels are removed from the mould.

04 Polymerisation
The polymerisation takes place after removal from the mould.

05 Finishing
After the finishing and painting, the wheels are ready to be stored, packaged and shipped.



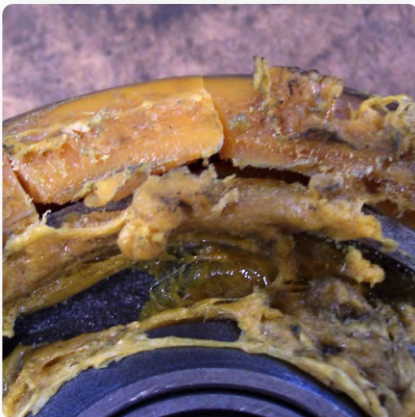
How to spot causes of damaged Vulkollan wheels.

Although Vulkollan wheels can bear many challenging influences, they are not unsusceptible to it. Read further to find out what causes the wheels to decrease in quality over time and how to avoid it.



Wear pattern

An uneven or rough floor or running surface will increase the wear speed. Also, a high rolling resistance and much friction will cause the wheels to wear faster.



Melting

There are three causes of which the Vulkollan material will melt:

- Temperature is too high (damage can occur from 80°C and higher)
- Driving and manoeuvring on a too high speed
- Load-bearing capacity



Stress cracks

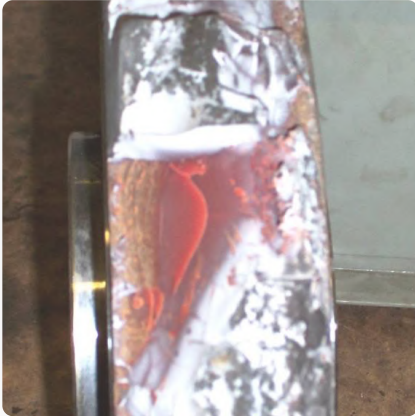
Stress cracks are the result of repeated deformation under compression, stretching, wringing or bending. Although Vulkollan is highly resistant to this, we advise to choose for Vulkollan with low shore hardness in combination with a lower tire thickness.

Three more causes highlighted on the next page →



How to spot causes of damaged Vulkollan wheels.

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Hydrolysis

Hydrolysis occurs when the tire is used in humid or wet climate conditions in combination with high temperatures for a longer period of time. Like mentioned before, the special Vulkollan tire with Staboxol has better properties to protect the wheels for hydrolysis.



Cauliflower effect or wrestling ears

The cauliflower effect (wrestling ears), is sign that the limit of the material strength is exceeded. This happens when the wheel is exposed to high speed, acceleration or driving force. In combination with a large running surface contact this leads to high temperatures of the Vulkollan tire.



Monday morning sole

A Monday morning sole is a flat side of the wheel. It occurs by long standstill under heavy load. Vulkollan offers the best resistance against a Monday morning sole and mostly returns to the original shape under normal conditions. Despite this capability, always try to avoid overload.

Two more causes highlighted on the next page →



How to spot causes of damaged Vulkollan wheels.

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Mechanical damage

Pieces of material, sharp stones or sharp steel parts lying on the road causes mechanical damage to the tire. The material will press into the tire and the tire will lose pieces of Vulkollan. A smooth surface without dirt or (sharp) materials will extend the lifespan.



Loosening of the rim

The Vulkollan material and the wheel centre are made from two different materials. With our special adhesive treatment, we improve the quality of the adhesion between these materials. However, high temperature build-up can still make the two materials get loose. This causes the loosening of the rim from the wheel centre. You can avoid high temperature build-up by avoiding excessive speed, load or friction.



About Konijnenburg

We produce wheels since 1946. Every day we strive to improve the quality of our wheels even further, offering our customers an optimal value for money. Our own production location gives us insight in the production chain. Because of this knowledge we are able to offer a wide variety of wheels. Furthermore, we offer tailor made solutions. Our experience, own production and investments in innovations makes us market leader in technical wheels.

How to request a quotation?

Did we convince you about the abilities of Vulkollan wheels for your application? We are happy to give you a non-binding proposal. Please determine your specific requirements so we can give you a realistic quotation.

Company details

Please provide us with a company name, employee name, function and phone number.

Application

General description of the application. What is the maximum acceptable diameter and width of the wheels?

** Please provide pictures, documentation, sketches or videos if possible.*

Load capacity

- How many wheels do you need?
- Maximum operation load per wheel?
- What is the maximum speed of the wheel under which load?
- What is the application cycle? (How long do you use the wheels per day/week/year)
- Are there peak loads? And if so, how much and how long?

Conditions

- What are the floor conditions? (Industrial/ unevenness/level differences)
- Do you use the wheels to drive or steer or do you use them as free-rolling wheels?
- At which speed do you normally use the wheel?
- What is the acceleration speed?
- What is the temperature (ambient temperature and running surface)?
- What is the humidity of the area (relative humidity and of the walking surface)?
- Do you currently use wheels? And if so, what are the current problems with these wheels?
- Are there any chemical influences? And if so:
 1. Which chemicals?
 2. At what concentration?
 3. What is the duration of the exposure?

Quotation request

Please send your quotation request to this e-mail adress. We will help you as soon as possible.

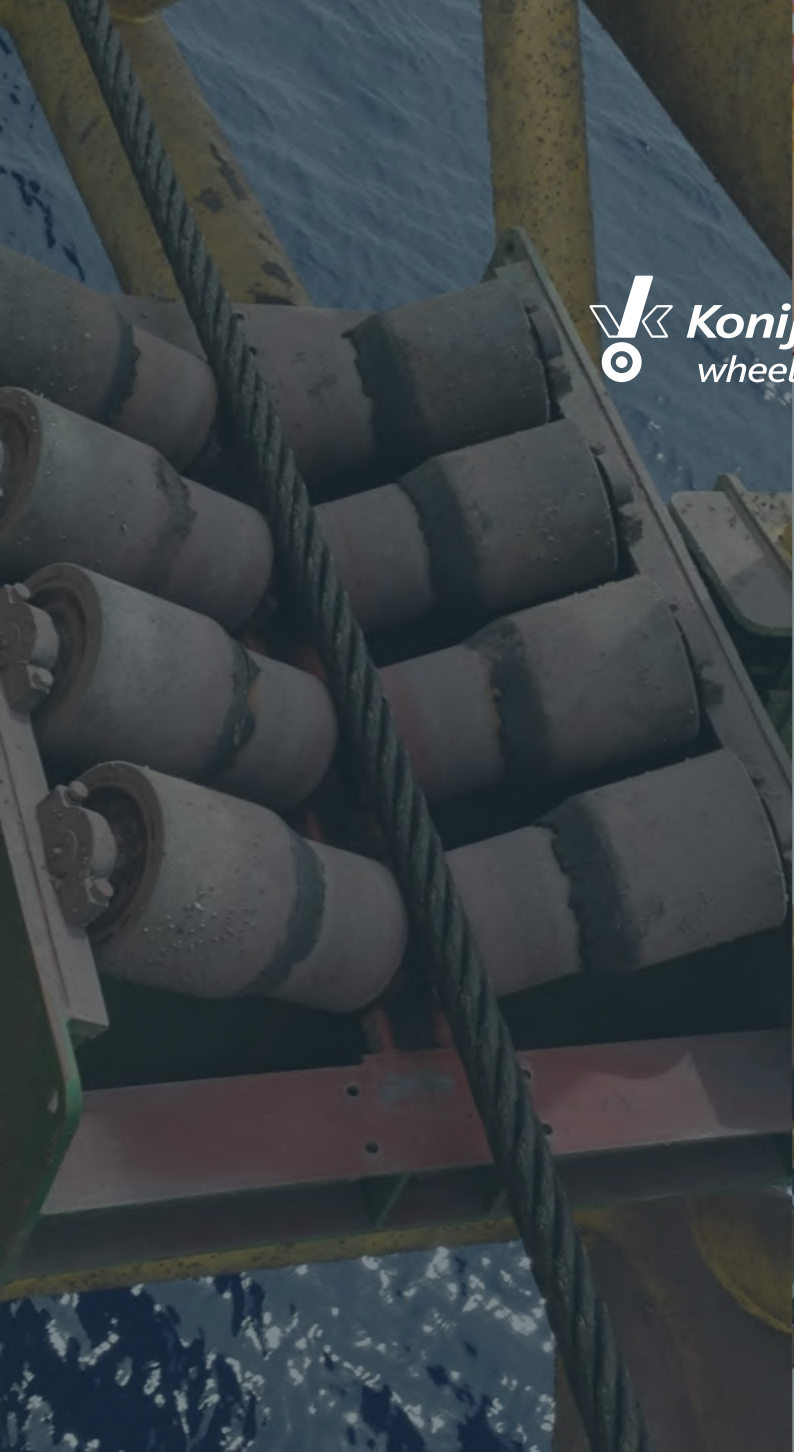
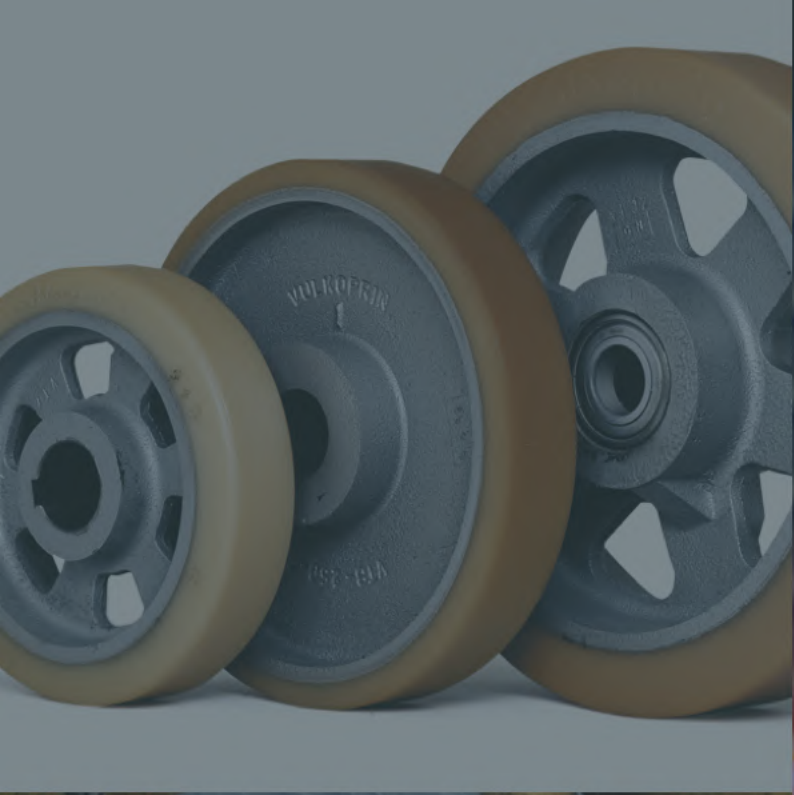
✉ service@industrialwheels.com

An other question about these wheels?
Contact a Vulkollan product specialist.

☎ +31 (0)20 - 682 1051

✉ service@industrialwheels.com





 **Konijnenburg**
wheels & castors

