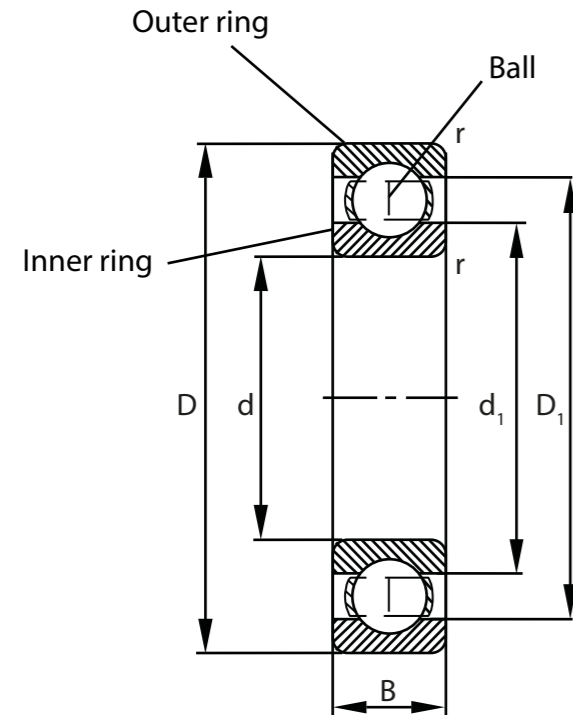




BEARINGS AND LUBRICANTS.

BEARING STANDARD



Bearings are the heart and soul of inline and roller skating. Without them, you won't be rolling anywhere and the precision and quality of bearings can significantly affect your skating performance. When it comes right down to it, the right bearing can make the difference between winning and losing the race, giving you higher top speeds and reducing the effort needed to reach peak performance.

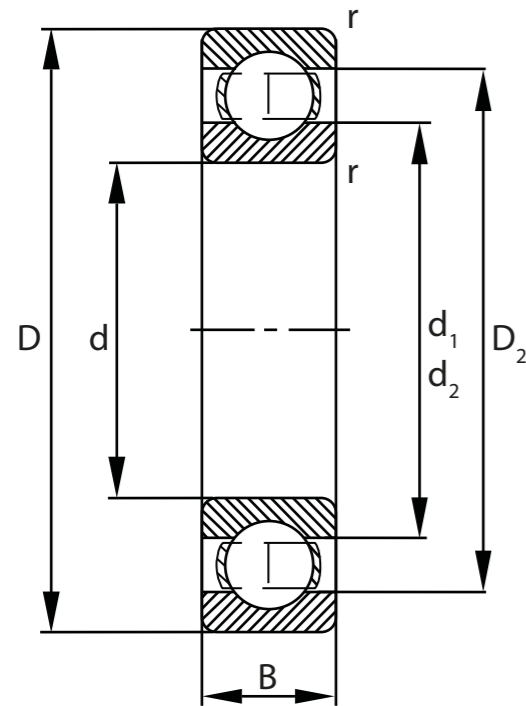
608 Standard

Arguably the most popular or even a standard for most types of inline skating, roller skating, and other roller sports, the 608 bearing is a type of deep groove ball bearing that was originally developed for industrial uses. The title 608 refers to the manufacturing process where the number 60 represents the production series and the number 8 represents the inner diameter of the bearing. 608 bearings maintain high speed for long periods of time and are easy to maintain.

As mentioned, the 608 has an 8mm inner diameter, 22mm outer diameter and is 7mm wide. It should be noted that on some quad roller skates we can still occasionally find some bearings that are 607 size. While some may believe size matters, in this case, there are no technical advantages between 607 or 608 bearings. At wicked, we focus on 608, as it is the clear standard for most inline and roller skates. Because of the popularity of 608 bearings, a wider variety of precisions, and durabilities are available, making it easier to find the perfect bearing for your needs and skating style.

d	8 mm	m	0,01 kg Mass
D	22 mm	C_r	3500 N Basic dynamic load rating, radial
B	7 mm	C_{0r}	1370 N Basic static load rating, radial
D_1	18 mm	C_{ur}	71 N Fatigue limit load, radial
$D_{a\ max}$	20 mm	n_G	47000 1/min Limiting speed
d_1	12,14 mm	n_{gr}	34500 1/min Reference speed
$d_{a\ min}$	10 mm		
$R_{a\ max}$	0,3 mm		
R_{min}	0,3 mm		

BEARING STANDARD



d	8 mm	m	0,004 kg Mass
D	16 mm	C_r	1330 N Basic dynamic load rating, radial
B	5 mm	C_{0r}	590 N Basic static load rating, radial
D_2	14,2 mm	C_{ur}	15,7 N Fatigue limit load, radial
$D_{a\ max}$	14,6 mm	n_g	53000 1/min Limiting speed
d_2	9,65 mm	n_{gr}	37000 1/min Reference speed
$d_{a\ min}$	9,4 mm	F_0	15 Calculation factor
$R_{a\ max}$	0,2 mm		
R_{min}	0,2 mm		

688 Standard

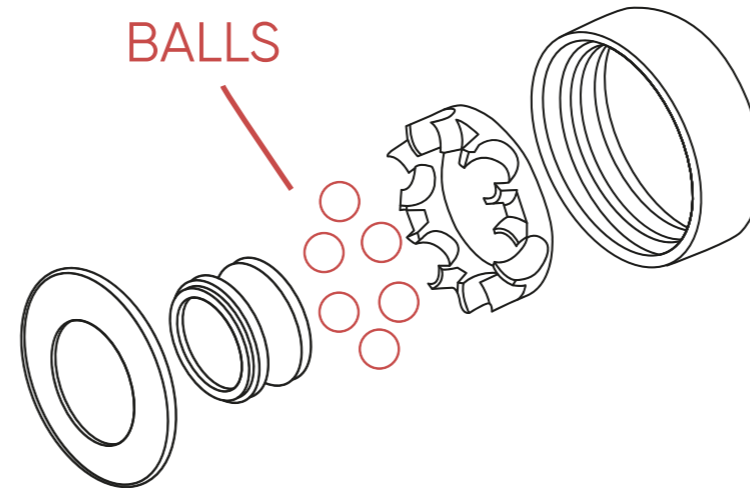
Sharing qualities of the popular 608 bearings, the 688 has a smaller outside diameter but the same inside diameter of 8mm. 688 bearings are slimmer and thinner than the 608, reducing weight drastically. The smaller bearings improve acceleration and top speed, but are more susceptible to dirt, water, and grime and so they need to be maintained carefully and more often. To properly skate with 688 bearings your wheels require special hubs or adapters to fit your regular wheel hubs.

At the beginning of the century, it was popular among skaters to use 688 bearings to save weight and some inline speed skaters use 688 bearings aka. mini bearings to this day. For a while, the 688 bearing—with an adapter and a specific space—was very popular for 80mm and 84mm setups. At the time, skates were equipped with 5 wheels, which meant more bearings and thus more weight, so the 688 helped to address the extra weight. Although the 688 is still used by some skaters, the 608 has easily become the dominant bearing as wheels increased in size. Finding the perfect bearing spacers has always been easier and more widely available for the 608 than with a 688.

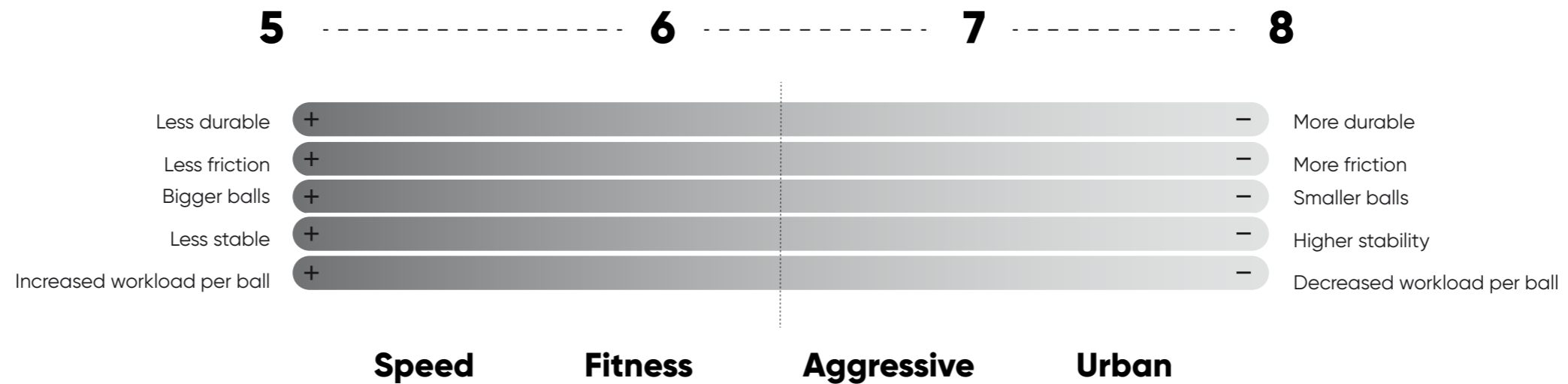
6001 Standard

The 6001 is an extra-large bearing often used in some SUV inline skates because of the larger size, air-filled 7" / 175mm or 8" / 200mm tires and demands of the sport. While the popular 608 bearing is fantastic for most types of inline skating, the 6001 is ideal for the most advanced, rugged forms of SUV skating.

BEARING CONSTRUCTION



Over the years the materials and technologies available in the bearing industry have progressed significantly. One popular development for bearings was to reduce the number of balls inside the bearing in order to reduce weight and friction. The WCD Twincam ILQ9 pro has 6 balls, compared with its little brother the ILQ7, which has 7 balls, while our Speed Bearing RECORD has 5 balls. It's common to find 7 and 8 ball bearings in the 608 bearing standard.



BEARING CLASSES



EQUIVALENT PRECISION CLASSES OF DIFFERENT STANDARDS

ABEC	RBEC	ISO	DIN
1	1	0	Normal
3	3	6	P6
5	5	5	P5
7	None	4	P4

ABEC anti-friction Bearing manufacturers association (ball bearings)
RBEC Anti-friction bearing manufacturers association (roller bearings)
ISO International organization for Standardization
DIN Deutsche industrie normen

ABEC

ABEC—which stands for Annular Bearing Engineering Committee—has become the most popular determination of a bearing’s quality and precision. ABEC is a manufacturing standard of accuracy and manufacturing tolerances of the bearings. The tolerances are based are generally categorized numerically, with ABEC 3, 5, 7 or 9 bearings being the most widely available. The higher the ABEC rating, the better the quality and precision.

Some high-end bearings including ceramic bearings and original Swiss-made bearings, and others renounce to use the ABEC rating. Instead, they are simply known for their great quality and high-performance.

To get into the specifics, the ISO5753-1 is the official international designation that references the precision of the balls and the path of a bearing. Unfortunately, most of the bearing companies have their own specific way to describe the quality of their bearings, making it difficult to determine which bearing performs best. To provide some clarity, our team members—like Bart Swings (Race) or Ewelina Czapla (Freeskate)—try all types of bearings in their different segments to determine performance and quality.

BEARING CLASSES



ILQ

ILQ is a term used by Twincam bearings for marketing purposes while ABEC is a common industrial standard that refers to the precision and tolerances of bearings.

Similar to the classic ABEC rating, the higher the ILQ standard the better the quality of the bearing. Twincam bearings are known for being high-quality bearings that spin fast.

You be the judge, test the different types of bearings to find out which ones best suit your skating style.

FREESPIN

The Freespin Technology is used in WICKED ABEC 5, 7 and 9 bearings. A special lubricant allows these high-performance bearings to spin quickly and smoothly. WICKED freespin bearings are an inexpensive alternative to pimp your skates.

Materials – Inner and Outer Ring, Balls and Raceways

A wide variety of materials are needed to produce skate bearings and their individual components. In this section, we'll delve deeper into the different materials used in the bearing production.

BEARING MATERIAL



CERAMIC

Ceramic bearings are said to offer reduced friction, lower weight, and improved longevity.

Most ceramic bearings are hybrid bearings, combining a steel inner and outer ring as well as a raceway which includes ceramic balls. Full ceramic bearings are rare simply because of the extremely high price point. High-end ceramic bearings are made of silicon nitride (Si₃N₄), which gives them a black color.

Ceramic bearings are about 30% harder than steel bearings, are rounder with a smoother surface, and have a more uniform size which guarantees a significant reduction of friction. Another benefit of ceramic bearings is they don't rust, reducing maintenance. White colored ceramic bearings are cheaper, using lower quality raw materials and don't perform as well as ceramic bearings made of black silicon nitride. It should be noted that, while full ceramic bearings don't require lubrication, hybrid ceramic bearings do.

CHROME STEEL

Steel is an alloy of iron and carbon and sometimes other materials. Chrome steel or chrome-plated steel is produced by dipping ordinary steel into an electrolyte solution containing chromium and uses electrolysis to create the outer coating.

The most common material used for the outer and inner ring as well as the balls and raceway of precision skate bearings is 52100 chrome steel. Thanks to a special heat treatment and the honed, polished surfaces of all the parts, chrome steel bearings deliver a hard surface that reduces rolling contact fatigue, allowing you to roll fast, smooth and silent.

Chrome steel is used for mid to high-end bearings. Note that contact with water should be avoided so that the material does not rust, which will affect performance.

STAINLESS STEEL

Stainless steel is a composition of a higher content of chromium (min. 10,5%) a reduced carbon content (max. 1,2%), and the addition of nickel or other elements. Stainless steel is continuously protected by a passive layer of chromium oxide that forms naturally on the surface when chromium and moisture in the air. If the surface is scratched it regenerates itself, making stainless steel bearings corrosion resistance. Stainless steel bearings are innovative, rugged bearings ideal for skating in wet conditions, like off-road skating or inline skate marathon races.

BEARING MATERIAL



CARBON STEEL

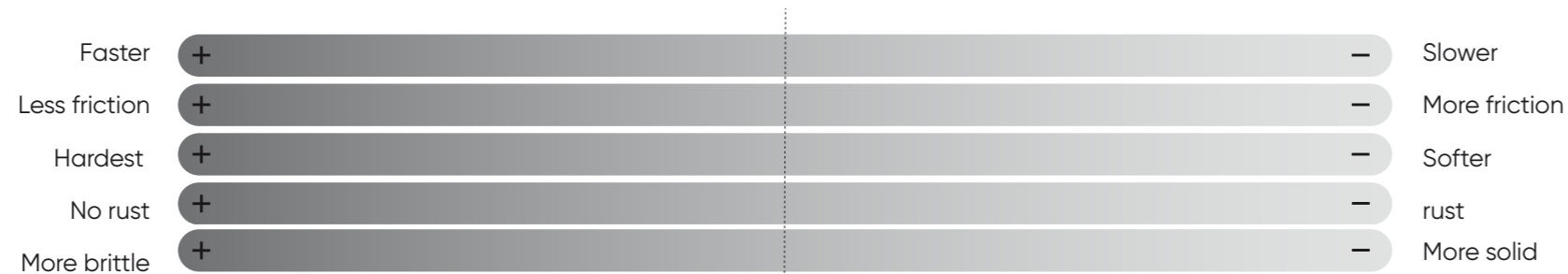
Carbon is known as a high-tech material used in the production of everything from airplanes as well Formula 1 race cars and a wide variety of high-performance sports equipment. When it comes to bearings, however, the name can be misleading. Bearings made of carbon steel can't carry high loads or operate at high speeds and they don't have corrosion resistance. The higher friction between the balls and raceway results in slower speeds and performance. Generally, they are low costs bearing offered in entry level and budget skates.

CARBON HYBRID STEEL

WICKED Carbon Pro bearings are made of a mix of chrome steel and carbon steel. The inner and outer ring and the raceways are made of harder chrome steel while the balls are made of carbon steel. These bearings offer a better and smoother roll than bearings made of only carbon steel.

	CARBON STEEL	STAINLESS STEEL	CHROME STEEL	CERAMIC
Speed	+	++	++	+++
Durability	+	++	++	+++
Rust	+	++	++	+++

Ceramic black - Ceramic white - Stainless steel - Chrome steel - Carbon steel



BEARING RETAINERS



BEARING RETAINER AKA. THE CAGE

Retainers keep the balls evenly spaced around the raceway to prevent ball-to-ball contact and allow for higher speeds. Retainers also help retain grease around the balls and raceways, providing a smooth ride and further improving performance. For greater accuracy and to prevent additional friction, it's important that the retainer is not allowed too much radial movement. To achieve this, the retainer is guided by either the balls or one of the rings.

STEEL RETAINER

Steel retainers are widely used in bearings, usually have a "crown" shape, and are guided by the inner ring. Due to the properties of steel retainers, bearings that use them have a few disadvantages: Higher weight Impacts may deform the cage; they can start to rust if carbon steel is used; and tend to be noisier than some other types of bearings.

To learn more about the different types of steel used in bearings, please refer to the topic: Materials – Inner and Outer Ring, Balls and Raceways for more information.

COMPOSITE RETAINER

Composite retainers are often made of injected reinforced nylon, but injected acetal (POM) can also be found. Other polymers like polyethylene (PE) are used in stainless steel bearings while PEEK (PK) is mainly used in ceramic bearings. The plastic crown-shaped cages are ball-guided and have better sliding characteristics than a steel cage retainers. Because of this, they produce fewer fluctuations in running torque and can increase max. speed up to 60% so they are generally used in high-speed applications.

RETAINER NYLON

Less friction
More guidance
Easy to deform
More flexible

+
+
+
+

RETAINER STEEL

+ More friction
+ Less guidance
+ Stronger
+ stays deformed

BEARING SHIELDS



Ironically, the disadvantages that were mentioned above in the steel cages section are the advantages of the composite cages.

CLOSED AND SEMI-CLOSED BEARINGS

Closed bearings are, like the name suggests, completely covered on both sides of the bearing while semi-closed bearings are covered only on one shield leaving the other side open, allowing for easy maintenance. The open side of the bearing should always be point towards the inside of the wheel to protect it from dust, water, and debris.

Advantage of a (semi-) open bearing: - Easier maintenance

- Slightly less weight

Disadvantages of a (semi-) open bearing: - Contamination from dirt and water

- Lubricant evaporates quickly

- Shorter intervals for maintenance

ZZ : Metal shields / non removable

These are bearings covered on both sides by non-removable, non-contact metal shields retained in the outer ring via crimping or pressing. This type CANNOT be removed once assembled. This also means that you can't maintain the bearing, just clean the outside surface, and dry the bearings after skating in the wet to avoid rust and corrosion on the outside surface. This type of bearing is often used in low-end skates.

ZZS / ZS : C-ring / Metal shields removable

These bearings are covered on both sides by removable non-contact metal shields retained in the outer ring with a snap wire AKA. a C-ring. Since there is no contact made with the inner ring there is no appreciable impact on torque or speed. The code for a single shield bearing is ZS.

Advantages of C-ring shields:

- Non-contact shields

- No additional friction

- No additional increase in temperature

- Up to the speed limit applicable

- Good seal against leakage of lubricants (ZZS version) - Long term maintenance-free

Disadvantages:

- Limited protection against contamination of dust, debris, and water (especially Z2 version)

BEARING SHIELDS



2RS / RS : Rubber shields removable

These are molded, non-contact rubber seals made of nitrile rubber (NBR) and bonded to a steel insert. The seal is fixed into a groove in the outer ring. This type of seal can be removed but care must be taken to not bend or cut the seal lip. Rubber-coated seals have contact with the inner ring, offering better protection against contamination of dust and water than a metal shield. On the downside, it results in higher torque and reduces the maximum speed capability of a bearing. Certain lubricants and chemicals react with rubber, so watch out which cleaning supplies and lubricants you use. The code for a single rubber-coated bearing is RS.

BEARING LUBRICANTS



Lubricants

Lubrication provides a thin film between the contact areas of the bearing to reduce friction, dissipate heat, and inhibit corrosion of balls and raceways. The lubricant will affect the maximum rolling speed and temperature, torque level, noise level and, ultimately, bearing life.

Teflon

Teflon is mixed as an additive with other lubricants because of its many benefits, including inhibiting rust and corrosion, and improving the operating characteristics of standard grease lubricants.

Mineral or synthetic-based lubricants (Oil)

Mineral and synthetic-based lubricants are the most used lubricants for bearings designed for high-speed use. Many types of synthetic oils can be found on the market and each top inline speed skater has their own "secret weapon" that gives them confidence and ultimate performance. Some athletes even race without the use of any lubricant. Mineral or synthetic lubricants can differ in their viscosity.

In general, you can say a low-viscosity lubricant:

- is easier to spread throughout the bearing
- creates less friction (bearing runs faster)
- evaporates faster, resulting in more frequent maintenance intervals compared to standard grease lubricants

Silicon lubricants

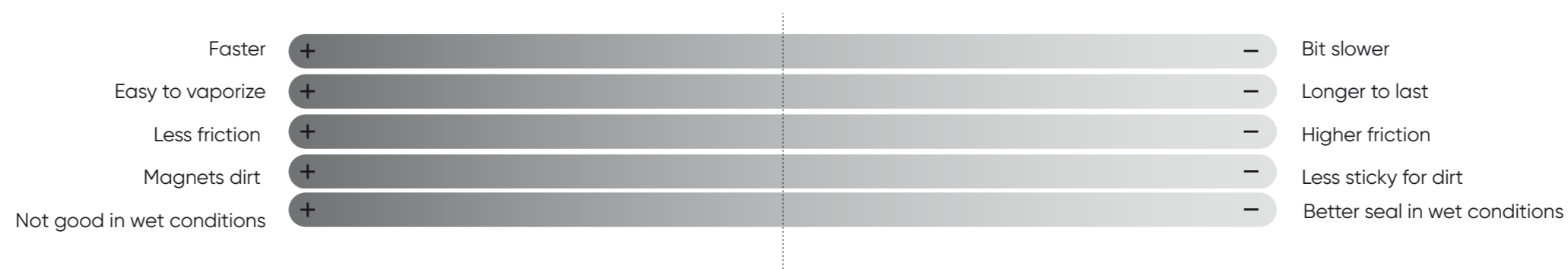
With silicon lubricants, the viscosity changes less with temperature and can operate in a wider temperature range than other lubricants. Silicon lubricants have water-resistance properties and great for wet conditions, but have a limitation where they are not suitable for high speeds.

Greases

Greases are simply oil mixed with a thickener that helps longer inside the bearing compared to some other lubricants. They have the advantage of giving constant lubrication over a longer period of time without maintenance.

Too much grease has a negative effect on the bearing performance. A high grease fill results in higher rolling resistance (higher torque). The space in a bearing is important in allowing the heat to radiate away from the contact area between balls and raceway. Too much grease is counterproductive in this case.

Teflon - Oil - Silicon - Light grease - Grease



BEARING MAINTENANCE



If you're beginning to hear more noise from your bearings while you're skating, you're not rolling as far between strides, or you find it takes more effort to complete a stride and get up to top speed, it's likely time to maintain your bearings. It's easier than you think to maintain your bearings and save money in the process.

MAINTAIN YOUR BEARINGS REGULARLY BY FOLLOWING THESE SIMPLE STEPS:

- Disassemble the wheels from the frame
- Open the shields (if possible) with a needle
- Place the open bearings in a small container (e.g. WICKED Wash) that is filled with citrus cleaner or other cleaning liquids
- Clean bearings carefully with a toothbrush
- Dry the cleaned bearings on a towel
- Lubricate the dry bearings with synthetic oil, grease, or other lubricants
- Close the bearings again
- Insert the bearings into your wheels and start rolling

HOW OFTEN DO I HAVE TO MAINTAIN MY BEARINGS?

There is no specific rule on when to maintain your bearings, it's really up to your skating conditions, terrain, and skating style.

Every skater is different. Some maintain their skates and bearings almost daily, while some wait until they lose performance and some just exchange parts altogether and don't bother maintaining bearings. It's really up to you and what you're comfortable with.

Dust, water, and dirt can damage the honed and polished raceways and balls of a precision bearing, which have an influence on the performance of the bearing and, in the end, on the speed of your skates. You can extend the life of your bearings through regular maintenance.

A nice side effect of regularly maintaining your bearings is you save money. It should be noted that rustproof bearings need to be maintained as dust and dirt also damage the raceways and balls of the bearing. And remember: always immediately maintain your bearings after skating in wet conditions.

WICKED

PRECISION BEARINGS



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