

NON-LUBRICATED BALL COUPLING

Thanks to a special version of the ROCKINGER KS80 ball coupling, Agrargenossenschaft e. G. Kirchheilingen (Agricultural association) no longer needs to lubricate couplings, thus achieving more driving comfort and reduced maintenance times.



ROCKINGER Agriculture GmbH has been designing tow couplings and guiding their technical development since 1875. In 2001, it became part of the JOST Group, the world's market leader in HGV tow couplings and trailer components. With the low-maintenance special version of the KS80, which is equipped with a wear insert, ROCKINGER offers a ball coupling that requires no lubrication and therefore less maintenance. It also results in greater driving comfort for the operator. The coupling has been successfully used by Agrargenossenschaft e. G. Kirchheilingen since 2015.



Left: KS80 spoon coupling with wear insert made of iglidur high-performance plastic (source: igus GmbH)

Right: Wear insert made of iglidur high-performance plastic (source: ROCKINGER Agriculture GmbH)

Title: Ball head of the coupling being serviced with a gauge. (source: igus GmbH)

How the coupling works

At first glance, the KS80 with wear insert appears no different from the standard KS80 coupling or comparable couplings. It consists of a coupling ball and a spoon coupling installed in the tractor hitch. As is customary, the spoon coupling is positioned on the ball head from above. It is secured against unintentional decoupling with the aid of a locking mechanism, thus creating a play-free connection. The special feature of this coupling only becomes apparent on inspecting the spoon coupling. Inside it is a wear insert made of high-performance polymers (image 1). The material for this application was specially developed for ROCKINGER by igus GmbH. It means that the coupling requires no additional lubrication, thus minimising its maintenance. The KS80 with wear insert can be used, for example, in balers, loader wagons, manure spreaders, trailers and crop sprayers (image 2).

The KS80 special version was developed for one very simple reason: tow couplings actually need to be lubricated every time they're used. This takes a lot of time and costs money. "I know companies where every single bearing point on every machine has to be serviced and lubricated once a week," reports Toni Milhahn, product manager and sales engineer at ROCKINGER Agriculture GmbH. It's also important to ensure that the correct amount of grease is applied to the coupling. "Too much can result in some lubricant getting into the soil or onto the crop. Too little leads to damage to

the coupling," explains Marcus Reinländer, head of crop production at Agrargenossenschaft e. G. Kirchheilingen. This is precisely the problem the KS80 coupling with wear insert is designed to address. The wear insert eliminates the need for lubrication and avoids the high cost of regenerating the coupling. For maintenance, it suffices to check the ball and spoon coupling with a gauge (image 3). ROCKINGER recommends replacing the wear insert once per season.

Saving eight tonnes of grease per year

KS80 couplings with wear inserts are used without any lubrication also at Agrargenossenschaft e. G. Kirchheilingen. This saves maintenance time and lubricant costs. "Assuming that one third of the tractors in Germany are equipped with a KS80 and wear insert, that means there are 8,300 couplings that don't require lubrication. According to our calculations, this corresponds to total savings of around eight tonnes of grease per year. And that's with just one lubrication point per tractor," says Milhahn. With the wear insert, the KS80 also exhibits very little play. Jerking and rattling become a thing of the past. This is another reason why Agrargenossenschaft e. G. Kirchheilingen equipped most of its agricultural vehicles with this coupling. "Our drivers love the comfort and improved driving experience of the KS80 with wear insert," says Reinländer.

For the wear insert in the KS80, ROCKINGER needed a plastic



KS80 coupling with wear insert on a three-axle transfer vehicle (source: igus GmbH)

Below: Tractor and trailer equipped with ROCKINGER KS80 coupling including wear insert. (source: igus GmbH)

material that could withstand adverse operating conditions in the field. "High vertical loads, pivot angles, extreme weather conditions and dirt were in our specifications," recalls Milhahn. At a driving speed of 40 km/h, two and a half to three tonnes of vertical load presses down on the coupling and wear insert. With this in mind, igus GmbH developed a highly durable and resistant material.

The coupling becomes self-lubricating

But how does the KS80 ball coupling with wear insert actually survive without lubrication? The insert (image 4) consists of an iglidur high-performance plastic that igus developed specifically for ROCKINGER's application. It contains the same basic components as all other iglidur materials. These include solid lubricants in the form of microscopic particles distributed throughout the material. They are released in small quantities, thus lubricating the bearing point. Base polymers for wear resistance are also included. These ensure that the solid lubricants are not subjected to excessive contact pressure. "The iglidur material is reinforced with fibres and fillers to make it suitable for high forces and edge loads. That's why iglidur materials are well suited to agricultural applications like ROCKINGER's," explains Uwe Sund, product manager for iglidur heavy-duty plain bearings. The wear insert is fitted in the spoon coupling so that it sits between the spoon coupling and the ball coupling. In areas where metal would otherwise rub against metal, only the insert becomes worn.



From left to right: Kevin Buttner, field representative at igus; Marcus Reinländer, head of crop production at Agrargenossenschaft e. G. Kirchheilingen; Uwe Sund, product manager for iglidur heavy-duty plain bearings at igus; Toni Milhahn, product manager and sales engineer at ROCKINGER (source: igus GmbH)

Overcoming challenges together

ROCKINGER and igus teamed up on a project for the first time in 2012. The self-lubricating coupling concept came about when a ROCKINGER employee held a small igus ball joint sample in his hand. "We quickly got the idea that the principle of the ball joint could be transferred to our KS80 coupling," explains Milhahn. The right product was not yet available in the igus range, but the know-how for lubrication-free agricultural applications was there. So igus created the first prototypes from iglidur semifinished products and the first field tests followed in 2015. 33 vehicles from a total of 18 users were equipped with the KS80 with wear insert. "The results convinced us: The wear inserts survived a whole season with no signs of wear on the coupling," says Milhahn happily. The wear inserts also passed a fatigue test with two million load cycles, in which vertical load of 4.5 tonnes and a D-value of 97.1 kN acted on the coupling and wear insert.

At Agrargenossenschaft e. G. Kirchheilingen, the KS80 with wear insert has already proven itself several times over. Ten of the co-operative's tractors and trailers are equipped with the ROCKINGER coupling (image 5). Although it felt a bit strange at first not to need to grease them, they quickly got used to the newly acquired convenience. Since then, the couplings have been used in all weather conditions. "When it's very dry out in the field, dust affects our machines like sandpaper. That's no problem for the KS80 with wear insert, mainly because no grease is needed, so no dust can stick," says Reinländer of his practical experience.

In the future, however, Milhahn sees another challenge for ROCKINGER self-lubricating couplings: "Tractors are becoming increasingly powerful. For us, this means higher forces acting on our couplings. Every component must therefore be designed for a higher load." The igus wear insert must

therefore always be adapted to increasing requirements. Uwe Sund is confident: "Of course, we keep track of developments in the agricultural market, continuously improving our products

and developing new materials. We also want to perfect the next development steps together with ROCKINGER."

Many thanks to the company Igus (igus GmbH) for the great collaboration in this user report!

ROCKINGER

Member of JOST Agriculture

ROCKINGER Agriculture GmbH

Lauchaer Höhe 29, 99880 Waltershausen, Germany

Phone: +49 3622 20847-0

www.rockinger-agriculture.com

For more information please contact your local Quicke representative.

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