

## FAQ:

**1. What are the advantages of the LIQFRIC® technology?**

Limited energy consumption and therefore CO<sub>2</sub> savings in the manufacturing process, reduced fine particle emissions, the ability to integrate sensors, cost savings, weight savings, small series manufacturing capabilities.

**2. What are the CO<sub>2</sub> savings comprised of?**

The CO<sub>2</sub> savings are primarily achieved by reducing the hardening- and pressing temperatures by 100° C (212° F) – 140° C (284° F). The steel backing plates as well as the friction material do not have to be heated up to 180° C (356° F) / 240° C (464° F).

**3. Which project phases are planned?**

It is a multi-phase project that consists of a first concept phase to explore the capabilities of the new system. In a prototype phase, trials are carried out with selected partners in order to later reach series maturity through pre-series trials. Typically, such a process takes 5 – 10 years.

**4. What is the difference between organic and inorganic friction pads?**

Simply described, organic pads are a composition of phenolic resins and approx. 15 – 20 friction-active substances. Here we replace the phenolic resin with an inorganic binder.

**5. Why does it make sense to integrate sensors into friction pads?**

Today, the drivers of their vehicle know little about the brake pad safety component, as it is only monitored by a so-called wear sensor.

The driver does not know whether the brake and its lining are working properly.

In future electric vehicles, all components must be able to be reliably tested for function and be capable of self-diagnosis. This is not yet possible today.

**6. Can you also produce small series or prototypes?**

One of the great advantages of the system is the low tool mold costs. This enables the production of small series and prototypes.

**7. Does an existing production plant have to be completely renewed?**

Here we offer two strategic approaches with our system:

In the long term, brake pads should be cast to take advantage of the entire potential for savings and benefits.

In the short term, we were able to show that a modified LIQFRIC® version can be used on existing equipment, with the energy savings already opening up around 40 % of the theoretically possible potential.

**8. Is the technology only suitable for cars?**

Our previous tests have shown that this technology is also suitable for applications in commercial- and rail vehicles, as well as in clutch- and industrial brake applications.

**9. How are the fine particle emissions improved?**

Compared to organic brake pads, we have been able to demonstrate a reduction in fine particles (PM<sub>10</sub>) of up to 35 – 40 %. Our inorganic system only showed significant fine particle emissions at temperatures above 240° C (464° F). That means: In urban traffic, this system would – under normal circumstances – not emit. This is related to the higher temperature stability of the inorganic binder.

**10. Is the technology also suitable for the e-mobility market?**

Tests have shown that our products meet the requirements. Today we assume that the inorganic base shows advantages in terms of corrosion behavior, but this still has to be proved in long-term tests.

**11. How do the costs compare to traditional technology?**

We expect a net savings effect due to the numerous potential savings.

**12. What are the advantages of lighter brake pads?**

Due to the lower density of the new pads, less weight is installed in the vehicle, which leads to lower fuel consumption of the vehicle in the long term. Of course, these effects are small in relation to the vehicle. But if we consider how much additional weight the battery adds to the vehicle, every gram saved helps on the other side of the mass balance sheet.

**13. Are the materials safe?**

To ensure the safety of the new brake pads in operation, a large number of tests are carried out by us and the brake- and vehicle manufacturers before they are used in series production. Of course, this is particularly critical before a new material quality is used. All previous tests have confirmed the operational reliability for series production.

**14. Is the technology patented?**

Yes, we have also patented parts of our knowledge.

**15. How did LIQFRIC® come about?**

This goes back to our foundress, Dr. Wittig, who formulated the first ideas for a liquid system.

**16. Is LF GmbH & Co. KG a typical start-up company?**

We don't know if there are "typical" start-ups. LIQFRIC® was born from the idea of tolerating significantly less dusts in production and reducing energy consumption in a very sustainable way. We want to do something for the society and our children.

**17. How is quality assured?**

We only use high quality raw materials and control them with proven quality assurance methods based on our internal quality system.

**18. Is LIQFRIC® commercially available?**

So far, we have "only" tested the products with our project partners.

Based on the information available to us, we assume that these products will enter the market with the series release of our customers starting 2025 / 2026.

**19. Are raw materials from critical countries necessary?**

We neither use critical raw materials such as antimony and copper nor do we use raw materials that have come from war zones or through the use of child labor.

**20. For which applications is the technology suitable?**

The friction materials are suitable for use in car-, truck- and industrial brakes. Both as disc- or drum brake pads.

**21. What are the target markets?**

We would like to be in the premier class and therefore supply the brake- and vehicle manufacturers (OEMs) as well as the aftermarket in the medium term.

**22. What has changed since 2018 in terms of advancing the innovative approach to friction linings?**

We found our new test results on fine particle emission reductions particularly interesting. They show a reduction by approx. 40 % on gray cast iron discs and a reduction by 30 % on hardened discs compared to an organic reference pad.

In addition, we proved the possibility to use our materials on the established presses in today's industrial production as a new, previously unknown approach.

**23. So, you have very interested customers?**

In our project portfolio, we work with several OEMs and brake manufacturers to make this system market-ready. All these customers are fully supportive of our development program. We have already carried out test drives with the first materials to test the performance of the materials on the road.

**24. When do you expect the first "real" sales?**

We have already sold the first prototypes over the past few years. We want to launch products for series and large-scale production from 2024 / 2025. For this reason, we are planning a first round of financing to build up the necessary production capacities.

**25. How does LF GmbH & Co. KG ensure climate-neutral production?**

In addition to our environmentally friendly production process, we have been supporting an environmental initiative for natural forest reforestation in Germany since 2020.