



Reliable tube connections are mandatory in hydraulics.

*Images: Stauff*

### Stauff Form Evo in practice

# Evolution in hydraulic tube connection technology

The forming system from the Stauff Connect tube connection range has been successfully used on the international market since 2015. Stauff Form was developed for challenging high-pressure applications in hydraulics and, since it was introduced, has proved itself in shipbuilding, offshore systems, crane systems and lifting equipment. The second generation is now available as Stauff Form Evo.

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*“The automotive industry in Slovenia prefers forming connections.”*

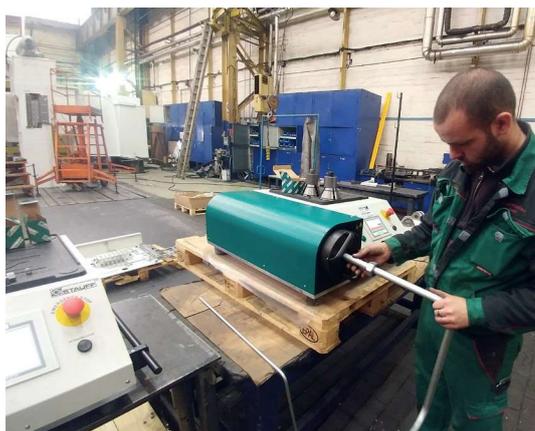
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Jernej Pisnik,  
Pisnik, d.o.o.

**T**he metallic adapter ring used up to now with a permanently bonded elastomeric seal has been replaced with a ‚simple‘ Viton sealing ring. This makes the system significantly cheaper. The Slovenian hydraulic service provider Pisnik has switched to Stauff

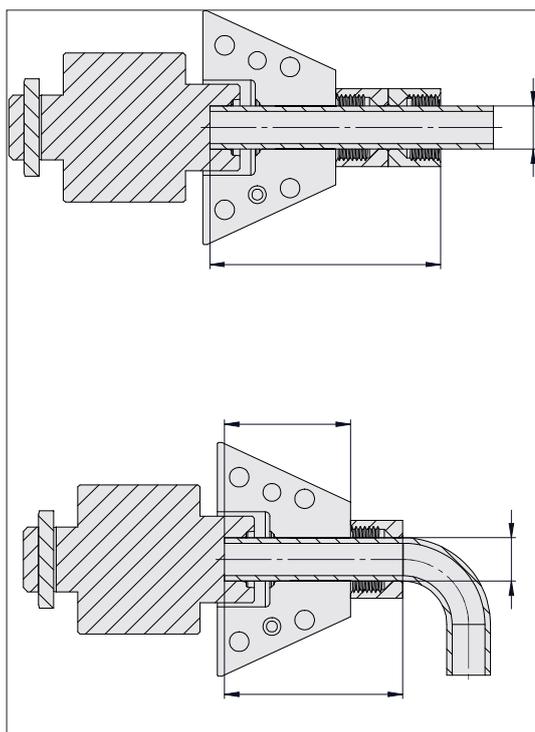
Form Evo and its customers are also benefiting from the new pricing.

Pisnik was one of the first users of the Stauff Form connection system, which was launched in 2015 – and started with a very large-scale project. According to



A contour is formed at the end of a conventional tube as the basis for the “form-fitting connection”.

*Image: Pisnik*



Clamping jaws with small insertion depths are available for even more complex geometries and smaller tube bending radii for Stauff Form EVO.

Depending on the tube dimensions and bend, the standard nut can even be pushed into the elbow of the tube so that the specified clamping lengths can be further shortened by the width of the nut.

Janez Pisnik, founder and Managing Director of the company, and his son Jernej Pisnik, the future Managing Director: “We produced and assembled the complete tubing system for a large hydraulic press – using Stauff Form on site in Canada. Since then, we have been regularly using the forming system when connecting high-pressure systems and are very satisfied with its ease of assembly and the reliability of the tube connections.”

### Ultimate sealing even under adverse conditions

The principle of Stauff Form: an electrohydraulic machine, developed by Stauff’s in-house Mechanical Engineering department, forms a contour on the end of a conventional tube to be connected. Combined with a conventional fitting body with a 24° inner taper and a union nut in accordance with ISO 8434-1, this produces a form-fitting, tight connection on the principle of ‘metal on metal’. The leak-tightness of this connection is not impaired even under adverse conditions, such as pressure shocks and vibrations. A

sealing ring is pushed onto the tube end before tightening to seal the only conceivable leakage path. In the first generation this was a zinc/nickel-coated steel ring or stainless-steel ring with a vulcanised Viton sealing ring. On Stauff Form Evo, this is replaced by a ‘simple’ Viton® sealing ring without this compromising leak-tightness.

### Safe under extreme conditions up to 800 bar

The sealing effect of the form-fitting connections is supported by the system pressure of the hydraulic system, so that Stauff Form Evo is particularly suitable for line systems exposed to high pressure loads: up to 500 bar in the Light Series, up to 800 bar in the Heavy Series, for steel and stainless-steel tubes with diameters of from 6 to 42 mm.

In these cases, users also benefit from increased tear-out strength – a clear safety advantage in view of the pressure surges and vibration loads typical in many hydraulic systems. Even the pressure peaks, which place a great strain on tube connections, do not adversely affect the permanent leak-tightness of the system.



Stauff Form EVO is based entirely on standard components, all with a high-quality zinc/nickel surface coating.

Stauff Form EVO with cost-effective Viton sealing ring is just as reliable as the first generation of the forming system.



## Objective: saving costs while maintaining the same safety levels

Why do we continue to develop products when everything is working perfectly, there are no problems, and the system is used worldwide? There was no need for technical optimisation but there was a need for economical optimisation. Jernej Pisnik reports from the day-to-day use of the products: “Of course, mechanical and plant engineering users are very aware of the safety and long service life of tube connections.

But they are also parts for which price also plays a major role – especially when hundreds of tube connections are called for with larger plants. In the past, we were often not best placed in price negotiations.”

This position has improved significantly with the introduction of Stauff Form Evo.

## Viton sealing ring replaces the combined metal elastomer product

Whereas the sealing ring in the first generation of Stauff Form consisted of a combination of two materials – the metallic adapter ring and a vulcanised elastomeric seal

– the evolved product uses a much cheaper sealing ring, as only one material is used.

Jernej Pisnik explains: “This is exactly the right step. The forming system is now significantly cheaper. The new sealing ring is several times cheaper than its predecessor. This has a very positive impact on the overall costs. At the same time, the product’s high level of safety and the long service life are fully retained, as is its ease of assembly.”

The Viton sealing ring can be used for both steel and stainless-steel connections, eliminating the need for double stock levels. It is also difficult to remove from the tube when installed, as it is slightly re-coated. Because of its identical profile, it cannot be attached back to front – all minor benefits that pay off in day-to-day assembly of hydraulic pipe systems.

## No need to replace forming machines

Another advantage from which Pisnik also benefits: machine builders, service providers and repair companies who wish to convert to the new system can continue to use the existing machines that are now used worldwide. Only two steps are needed to use Stauff Form Evo: a software update is required and there is a need to replace the tube shaper, as the forming contour has been adapted to the geometry of the new Viton sealing ring.

However, users also benefit from another advantage if the user also replaces the clamping jaws: the clamping lengths of Stauff Form Evo are considerably shorter compared to Stauff Form and other forming systems on the market. In numbers: 52 to 126 mm depending on the tube diameter.

It means that exceptionally compact tube systems with tight radii can be achieved. The extremely short assembly distances in the old and new Stauff Form system also help with this.

## Ease of assembly – reliable connection

However, both systems are as simple as they are safe to assemble. Insufficient and excessive tightening is virtually impossible. The installer tightens the union nut to the point where the force increases noticeably and completes the installation with another turn of 15° to 20° beyond this point. A clearly identifiable increase in torque signals the end of assembly, which is why assembly based on torque is also possible. The short, defined assembly path once the fixed point has

Product experts and application engineers are out on the road with the Stauff Liner to explain the further development of the Stauff Form EVO forming system.



been reached provides for intuitive installation even in tight spaces.

### A future-proof investment

In practice, the forming machines require regular software updates. This is especially straightforward with the latest generation of machines for the Stauff Form systems, as updates can be transmitted data-securely online. This is made possible by an integrated communication module with a SIM card.

### Tube installation 4.0 – networked machines

The communication capability of the forming machine offers users additional benefits. The machine history and parameters, for example, can be viewed via an online

service and analysed together with the account manager. The cause of a malfunction can be quickly identified, and the quality of the forming process maintained at a high level. Users can also work closely with the forming experts at the Stauff R&D Centre: they are able to determine the parameters in tests, which are transferred online and used for the on-site forming process.

In the interests of process safety, reports on the machined tube sets can also be created for the end customer as proof of quality assurance. Data exchange with Stauff's own cloud is encrypted in both directions, reliably protecting data against third-party access, misuse, and tampering.

*Andreas Toporowsky, Product Manager Tube Connectors, Stauff Germany*

## We have undergone a technology shift in hydraulic connections



Jernej Pisnik, future Managing Director of the hydraulic service company.

The Slovenian hydraulic service provider Pisnik, based in Vuzenica near Maribor, was among the first users of both Stauff Form and Stauff Form Evo. Jernej Pisnik talks in an interview about the development of the Slovenian hydraulic industry and his experiences with Stauff Form.

Mr. Pisnik, your company has been growing continuously for years – initially with hydraulic service, now also with your own products and assemblies and soon even with your own range of machines. Your workforce has doubled in just seven years. Is this representative of the hydraulic market in Slovenia?

We are already growing disproportionately. But one thing is right:

Slovenian mechanical engineering, including the supplier industry, enjoys a good reputation and a long tradition.

We work with many customers in Germany and especially in Austria – the border is only twenty kilometres away and Graz just fifty kilometres away. So the distances are short and there is no language barrier for us either.

You relied on Stauff Form from early on a forming tube connection – why?

We work intensively with manufacturers and users of hydraulic presses. Forming systems are mandatory. And the automotive industry also has a strong presence in Slovakia. It also prefers forming connections for reasons of safety and availability. So the decision was obvious.

... and you haven't regretted it?

No. We have really undergone a technology shift. In 2017, we were still delivering many hydraulic systems with welded joints. That's in the past now.

Forming using the Stauff Form system is cleaner and also more cost-effective. We now also frequently use this technology for the pipe connection of smaller assemblies.

Now, as we know, there are other manufacturers of forming tube connection systems. In your opinion, what sets the Stauff system apart?

We have been working with Stauff for many years and know that we can rely on their machines and every single component. The system is easy to install, and now, with the Evo version, we are totally competitive in terms of price.

We also purchase other components, such as clamps, hydraulic filters and measuring technology, from Stauff. Single-sourcing from a full-service provider is simply efficient.