



The Stauff Form Evo forming system is recommended for tube connections exposed to extreme conditions.

Images: Stauff

## Construction machinery components

# Tough and robust!

Hydraulic line systems of construction machinery need to be extremely robust. This is due to the high static operating pressures, dynamically changing pressure loads, pressure shocks and peaks, as well as to serious vibrations. The systems also need to withstand environmental factors, such as dirt and moisture, extreme temperatures or temperature fluctuations.

Vibrations put pressure on the components of hydraulic line systems and can cause loud noise. The latter is undesirable, particularly on construction sites in residential areas. Stauff NRC clamps significantly reduce annoying noise emissions from mobile operating machinery and from stationary loading systems, which can be harmful to people and the environment. Stauff Engineering developed the NRC Noise Reduction Clamps specifically for the vibration-damped, and thus also noise-absorbing fastening of tubes. A two-part elastomer insert mechanically absorbs any vibrations in the tube. The contour of

the insert is designed in such a way that there is only a small contact surface between the tube and the clamp body, very effectively reducing sound propagation along the tube. NRC clamps for high-pressure hydraulic hoses are also designed on a similar principle. The contour and elasticity of the insert on these NRC clamps are coordinated in such a way that the hoses can be securely routed, at the same time having a certain radial "freedom of movement". If conventional plastic or carbon steel fasteners are used, constant microvibrations on the contact surfaces can lead to the rubber outer covers of the hydraulic hoses melting.

## Coupling under residual pressure

At the express request of manufacturers of large demolition excavators and other construction and agricultural machinery, a new series of QRC-FG flat-face screw-to-connect couplings was developed to connect hydraulic hoses. The principle of the previous model to connect tubes and hoses that need to withstand extreme vibrations and pressure peaks, with screw-to-connect couplings in place of push-to-connect couplings, has already proved its worth on the market for a decade. The smooth face side has been retained, drip losses minimised, and the penetration of dirt particles and air into the hydraulic system has been prevented. Stauff designers have now made the most of the potential to improve the product: the new QRCFG range boasts a higher flow rate, and both sides can be easily coupled manually under residual pressure. Saving installation space and time

Stauff Multi-Line clamps enable multiple tube or hose lines to be fastened with just a single clamp. This saves installation space and reduces the number of



Multi-Line clamps can be used to fasten up to six tubes, hoses or other supply lines.

clamps needed plus all mostly metal components used to fasten them. Installation is thus less complex and the weight is reduced. Multi-Line clamps are ideal for use in large hydraulic excavators, road construction machines, tunnel boring machines, open-cast mining equipment or material handling excavators. They are available for two, three, four or six tube or hose lines with identical or different diameters. They are therefore also ideal for the

## Four hints for users

### 1 Equip the hydraulic tank with a desiccant air breather

Microparticles first need to be filtered out to prevent them from entering the hydraulic fluid when venting the hydraulic tank. Ventilating filters are used for this. They have a relatively simple design: an air-permeable, replaceable foam element is located in the hydraulic tank cap. The use of desiccant air breathers is recommended for construction machinery, which - as their name suggests - adsorb moisture as well as solids, and prevent corrosion processes. Various versions of them are available. The principle is always the same: an initial filter layer separates out the solid particles. The roughly pre-cleaned air flows through a capsule with desiccant before it is then "fine" filtered and lowered into the hydraulic tank.

### 2 Monitor fluid contamination during operation

Hydraulic fluid contamination within a pressure range up to 420 bar can be determined using particle counters. Stauff supplies a particle monitor for continuous measurement and analysis. It can be used to automatically determine the degree of contamination in the form of an 8-channel measurement to detect different particle sizes. The status of oil purity is unequivocally displayed by a colour-coded display. Corresponding particle limit values can be individually adapted and set using the software supplied. Portable laser particle counters have been developed specifically for mobile use, and have an internal data

memory for around 600 measurements. Stauff also supplies software for the targeted evaluation of the measured results. The LasPaC II-P is also available in a sturdy plastic trolley, which contains all the components needed for measurement and operation, including a printer, keyboard and battery.

### 3 Keep an eye on the condition of the filter elements

As late as possible, as early as necessary: This is the issue when replacing filter elements in the high- and medium-pressure filters of hydraulic systems. Replacing a filter too early wastes resources and generates unnecessary costs. However, waiting too long risks a loss of performance or even the failure of the hydraulic system. The clogging indicator of the Stauff HI-D-024 provides convenient monitoring of the filter elements. The display has more than just two optical signals - green (everything within the green range) and red (filter saturation reached) - and also has a yellow and orange signal. This enables the user to detect at an early stage if the differential pressure is nearing a critical value and can respond accordingly. However, the system can also be automatically switched off if 100% of the differential pressure entered should nonetheless be reached.

### 4 Fluid care pays off

As most failures of hydraulic systems are caused by hydraulic oil contamination, it is worth paying particular atten-

tion to "fluid care". This helps to avoid machine downtimes and associated costs, at the same time reducing maintenance cycles and installation work.

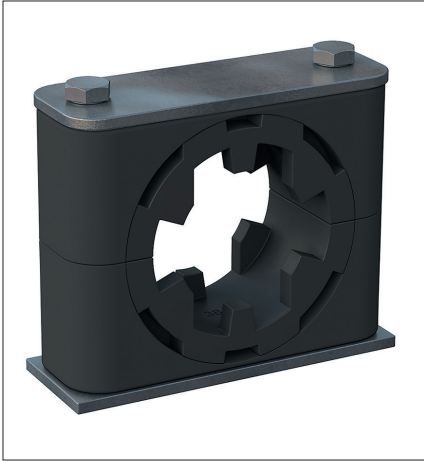
The manufacturer per se is responsible for the "initial cleanliness" of the hydraulic system:

OEMs should consider the technical cleanliness of the hydraulic components when selecting their suppliers. Among other things, they should ensure that the components are free of metallic particles from the manufacturing process. Stauff has put in place measures for every process step from production to storage and transport. The technical cleanliness of its products is guaranteed according to VDA 19 and ISO 16232, a "top cleanliness class" which is only available from other manufacturers at a surcharge.

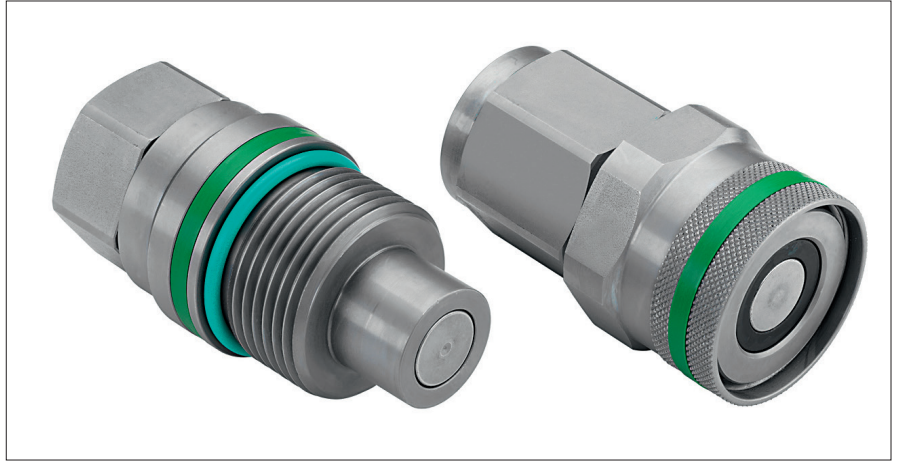
The manufacturer makes a further contribution to this by filtering the oil when filling the hydraulic system for the first time. This is because even fresh oil cannot usually be designated as pure. It is rarely fine-filtered during production and processing, and particles can additionally be introduced during filling, transfer and transport, possibly into reconditioned drums.

Stauff supplies diverse auxiliary equipment for initial filling and refilling, for example an oil drum transport trolley with offline and bypass filters for internal supply, or a compact, portable filter unit.





Right: Flat-face QRC-FG couplings are designed to connect tube and hose lines exposed to severe vibrations and pressure peaks.



Left: The two-part elastomer insert of the NRC clamp dampens vibrations and absorbs noise.

secure fastening and guidance of electrical, pneumatic and other supply lines.

### Renting instead of buying

Stauff recommends its Stauff Form Evo tube connection system for use under high pressure or when tubes are exposed to severe vibrations. Thanks to its extended digital connectivity, OEMs and hydraulic service providers now have new usage models available

for the SFO-IOT forming machine. They have the option of paying a rent price plus a fee per forming operation (“Pay Per Use”) or a flat-rate rental price. Customers can thus use the Stauff Form Evo tube connection system without having to invest in the machine. This is useful, for instance, with low or fluctuating initial order volumes, enabling them to retain full cost control at the same time. The latest generation of the SFOIOT forming machine is regarded as a pioneer in the industry in terms of its handling, service and digital connectivity. It is equipped with a communication module with a SIM card as standard. There are a number of benefits to this direct connectivity to the Stauff Technology Centre. Software updates for specific tube materials can be transmitted or machine parameters analysed and remote interventions performed.

### Rapid Prototyping

Additive manufacturing for the rapid production of models and tools has established itself in the off-highway sector. Many agricultural and construction machinery manufacturers have integrated the first additively manufactured components into their supply chains. Working in collaboration with one of the market leaders in industrial 3D printing, Stauff is now offering at short notice individual Custom Designed Special Clamps, small quantities of special catalogue items, or prototypes that have been manufactured from polyamide-based plastics using “selective laser sintering”. These components are capable of withstanding comparable stress to “traditional” injection-moulded components. Customers upload the CAD data of the component required onto the online platform set up by Stauff, receive a quotation for the requested quantity directly (instant quoting), and can then order it immediately. Production takes a maximum of three days within Germany, including the delivery time.



SDB dessiccant air breathers boast a central stainless steel tube.