



## Sealing System for Mini Excavator Actuators

High Sealing Performance due to Dynamically  
Active Tandem Sealing System

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**Their small size is their great strength: Thanks to their flexibility and versatility modern mini excavators perform a wealth of important tasks in construction and rehabilitation projects, up to and including clearing work after natural disasters, and much more. They often handle a Herculean workload in harshest conditions. A tandem sealing system developed by Parker Prädifa helps ensure that the little 'heavy-duty diggers' meet current and future demands in terms of loads, service life and eco-friendly operation. Body copy Utopia 10/12, flush left, black. You may choose to bold or italicize copy. This layout is based on a three column design and all body copy, illustrations, photos and charts should follow this rule.**

Compared with former so-called "disposable excavators" that were primarily utilized in landscape gardening the range of uses for modern mini excavators has considerably expanded. Together with harsher operating conditions, this leads to increased requirements for service life, performance and efficiency, as well as ease of maintenance and eco-friendly operation. The resulting high design requirements particularly affect the manufacturers of hydraulic cylinders, and thus the sealing systems used in them. The requirements for longer service intervals in the face of consistently increasing service pressures and significantly changed ambient conditions are fully transferred to sealing performance. This applies to the increasing demand for leak-free cylinders under the heading of 'clean hydraulics' as well.

### **Wiper with Integrated Dirt Shield**

As a result of increasingly sensitive elements within the hydraulic circuit the wiper function becomes ever more important as well because contaminated fluid systems are a frequent cause of total system failures that lead to high consequential costs. To prevent this, Parker Prädifa has developed the special AV wiper profile (Figure 2) with an integrated dirt shield. It is available in a wide range of materials, utilizing P5008, a polyurethane-based Parker compound with a hardness of approx. 93 Shore A, as the standard material. It excels in terms of delivering improved wear resistance and low com-

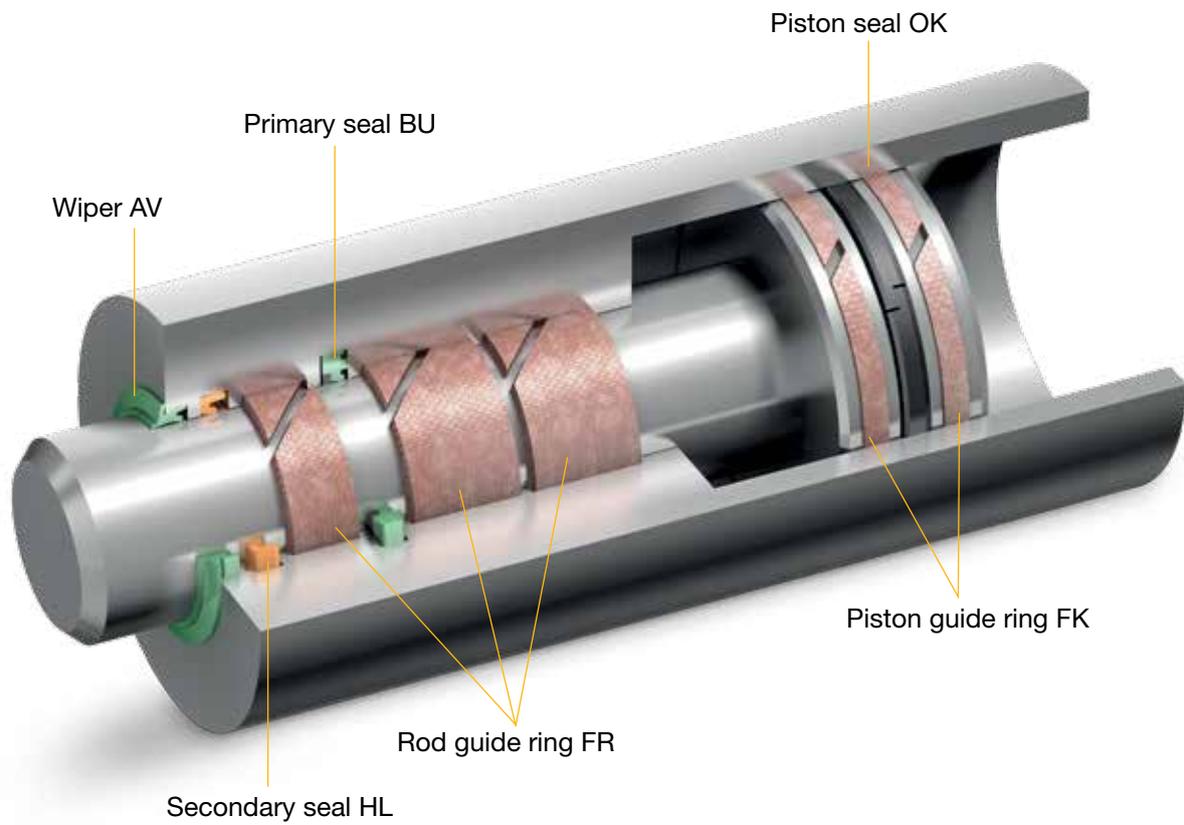
pression set compared with commercially available polyurethane grades. The sealing material can be changed to the hydrolysis-resistant P5000 polyurethane compound, depending on the field of application.

### **Compact Rod Seal as a Buffer**

The BU profile Ultrathan rod seal is a compact seal with an integrated anti-extrusion ring and is used as a buffer seal within this sealing system. Cylinders such as those utilized in mini excavators frequently operate under conditions in which pressure peaks up to 1,000 bar (100 MPa) are not uncommon. The BU rod seal is installed in front of it to isolate the load from the secondary seal. Due to its special shape the seal is able to return the pressure that can build up between the primary and the secondary seal under certain conditions to the hydraulic working system like a check valve. This prevents damage to the secondary seal due to excessive intermediate pressures and the resultant reduction of service life.

### **Low-Friction Secondary Rod Seal**

The HL profile 'secondary seal' utilized in this tandem sealing system typically operates as a non-pressurized seal. Due to the cascading dynamic sealing lips the seal is automatically controlled by the system pressure. In non-pressurized conditions, it latches on to the mating surface only with the 'tip' of the first sealing lip, thus ensuring optimal ease of movement. In the event



that the residual oil film should increase during the course of seal life due to damage or wear the HL seal intervenes and adjusts to the new working conditions. Friction is reduced to a minimum and optimum ease of movement is ensured not only in non-pressurized conditions but in all pressure ranges as well.

The advantages of this new geometry are systematically supported by the utilization of the P6030 seal compound. The material that has been specifically designed for fluid power applications delivers good media resistance and, among other things, exhibits increased temperature and wear resistance, as well as low compression set.

### **Robust Piston Seal**

The OK piston sealing set has been primarily developed for heavy-duty hydraulics and is preferably utilized in double-

acting cylinders. However, the design of the OK piston sealing set and profile properties superbly fit the requirements and operating conditions in mobile hydraulics as well. As a result, this sealing set, in addition to its extreme wear resistance, exhibits further positive properties such as insensitivity to extreme pressure peaks, maximum extrusion resistance in the case of high pressures and large gaps, short axial installation length (dimensions according to ISO 7425-1) as well as easy installation, without tools, on single-piece pistons due to the split design of the sealing ring.

### **Reliably Centric Guidance**

In mobile hydraulics, Parker Prädifa prefers guide rings based on duroplastic synthetic resins with fabric reinforcements to keep the piston rod in a centric position even in heavy-duty

operating conditions. This corresponds to the FR and FK guide rings using the Q5038 compound. The low guidance lash, due to minimal manufacturing tolerances, and the higher permissible surface compression of the guide materials ensure reliably centric guidance of the piston rod in the application. As a result, neither the surface of the piston rod nor the sealing elements are affected. Compared with thermoplastics and other guiding tape materials, duroplastic synthetic resins exhibit advantages such as very high pressure resistance, significantly higher permissible surface compression, extremely high wear resistance, improved anti-frictional properties, high resistance against aggressive media and easy snap assembly on single-piece pistons and in closed and undercut grooves. In addition, the material is also available in bulk form.

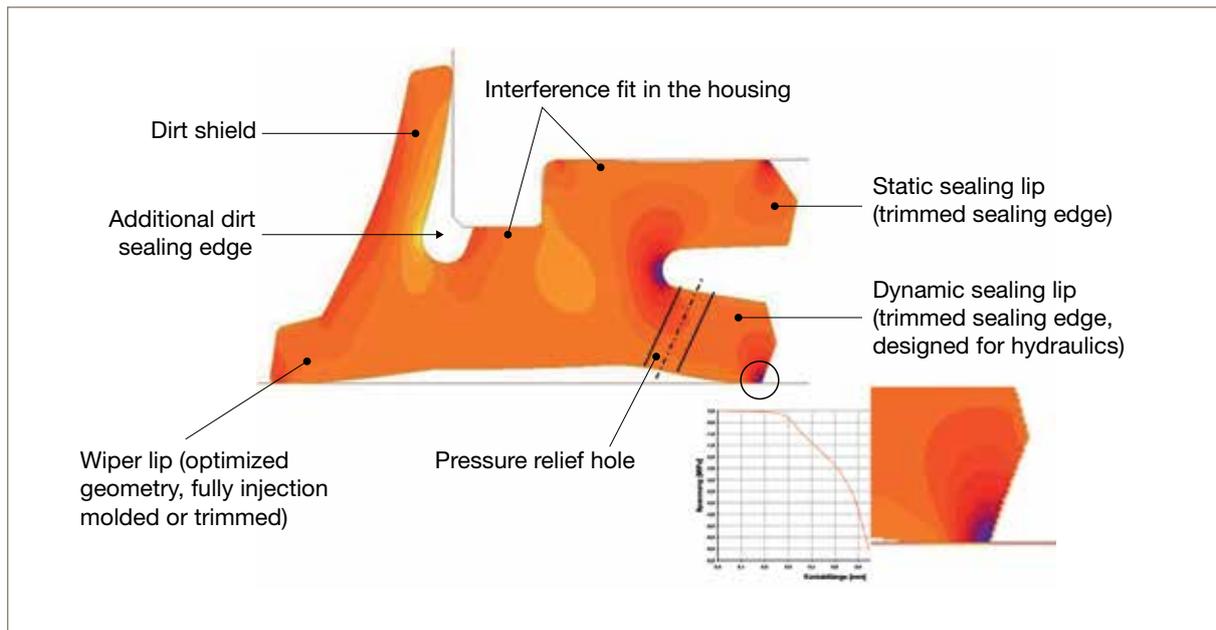


Figure 2: AV wiper product features

### Proven in a Wide Range of Applications

The Parker tandem sealing system has proven its viability in diverse applications and ambient conditions. Due to the continuous further development of the seal design and sealing materials

the sealing systems are continually modified to meet the user's requirements. In addition to the seal design, the selection of the materials satisfies the demands made by the relevant operating and application conditions, legal requirements for pressure fluids in certain regions, as well

as special climatic conditions. As a result, the Parker tandem sealing system is superbly suited to effectively support the hard work performed by mini excavators around the world through high sealing performance.