

# Preventative product-related services



To ensure the reliability and performance of vacuum systems, regular service is essential. Precautionary, preventative maintenance and adherence to the intervals recommended by the manufacturer are thus important measures. Insufficient or faulty maintenance can lead to the failure of vacuum systems and to production downtimes. To avoid this, Pfeiffer Vacuum provides precise information on the correct use of products in its operating instructions, gives tips for simple but effective inspection options, and provides guidelines for service that can be done independently, such as, for example, filter or operating fluid replacement.



Figure 1: Service of a rotary vane pump

### Matching maintenance for different market requirements

The following markets make use of different strategies and have varying service requirements. The primary differences have to do with the scope of services and the selected maintenance intervals. Pfeiffer Vacuum supports the customer in defining an optimum preventative service strategy, and offers a number of solutions.

#### ■ Semiconductor, flat panel, solar, and coating industries

In the semiconductor, flat panel, solar, and coating industries, plant standstills can produce high downtime expenses. For this reason, preventative replacement of products in need of maintenance takes place most frequently in these markets. For seamless, quick replacement, a contact person in the near vicinity is needed. With over 60 service locations worldwide, the experts at Pfeiffer Vacuum ensure on-site support in service and product use.

**Precautionary, preventative maintenance and adherence to the service intervals recommended by the manufacturer are important measures.**

#### ■ Industrial applications

In industrial applications such as metallurgy and (freeze) drying, plant operators often have a stock of replacement products ready. This service strategy allows for quick reaction times in the event of damage or necessary maintenance. Besides independently stocking up on replacement products,

there is also the option of access to Pfeiffer Vacuum's pool of replacements. This includes a variety of refurbished and tested products. In this way, one can get fast help for upcoming maintenance or sudden, unexpected defects.

Aside from the replacement trade, more and more users rely on field service technicians. Under the premise that the products to be serviced are free of toxic pollution and flammable or explosive gases, the necessary work can be carried out directly on site. This can save time and costs. In certain cases, it is also possible to forgo the removal of products from the vacuum system.



Figure 2: Turbopump rotor replacement

- Analytics

Instrument manufacturers in the analytical market prefer the strategy of replacing products completely. Therefore, individual solutions between the customer and Pfeiffer Vacuum can be developed. These may include custom-made service concepts for independently-managed replacement depots or replacement programs overseen by Pfeiffer Vacuum. Pfeiffer Vacuum's worldwide service network can be used for this purpose.

- Higher education and research institutes

With the annual planning of the available budget, higher education and research institutes are always confronted with the challenge of scheduling necessary maintenance work. For better planning, individual maintenance contracts can be implemented in close cooperation with institutes. These customer-specific solutions ensure necessary preventative service of the products used, from Pfeiffer Vacuum or other manufacturers.



Figure 3: Service of a vacuum system



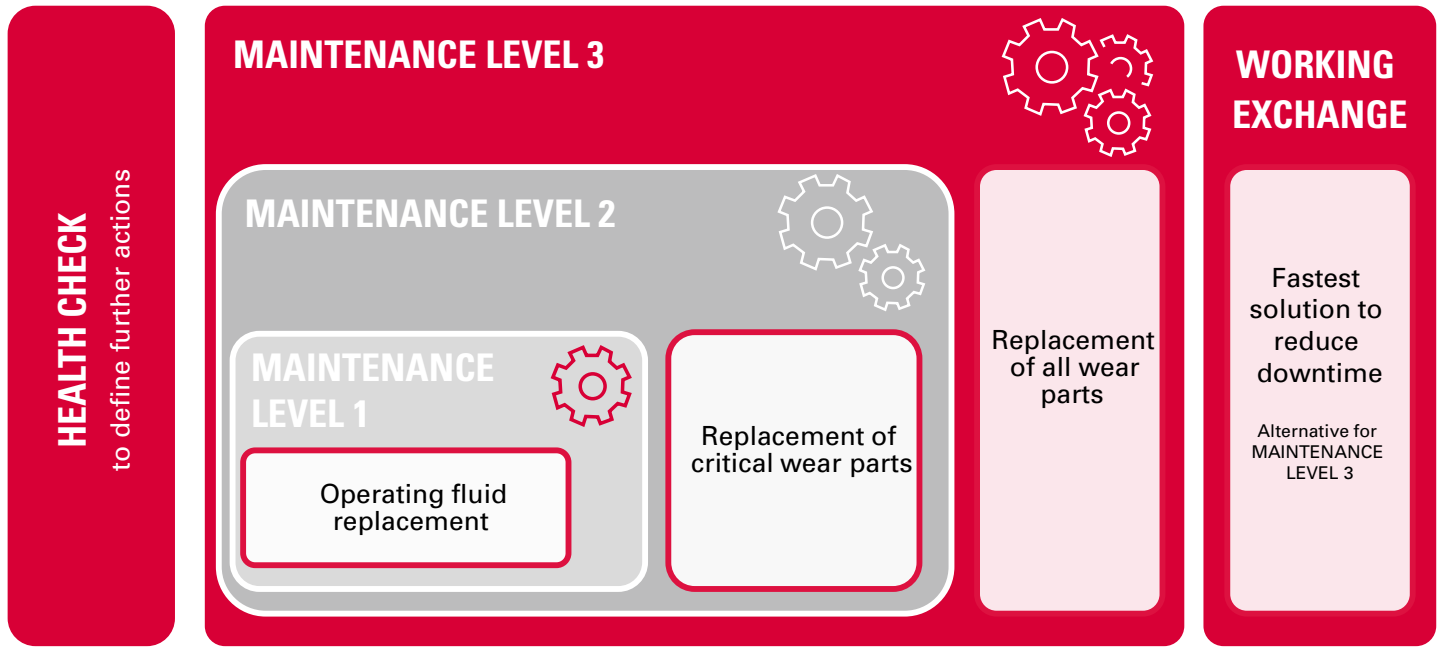


Figure 4: Overview of the concept for preventative product-related services

**The product-related service concept of Pfeiffer Vacuum**  
Pfeiffer Vacuum has fundamentally revised its service concept in order to better meet customer requirements in after-sales service. A detailed product analysis allows for custom-made services for current as well as older product lines. In the following, the new concept will be described in more detail.

**Inspection – the pump’s “health check”**  
Inspections include routine monitoring activities for determining the condition of the product. This ensures proper and, above all, safe operation. With incorporation of Pfeiffer Vacuum’s field service, required action can be determined early and necessary measures can be initiated.

The risks of unplanned machine standstills as well as potentially cost-intensive consequential damage to the vacuum systems used can be minimized with routine inspections.

**Maintenance – precautionary measures for a long product life**

**Level 1 – Changing the operating fluid**  
The core component of this service is the change of the product’s operating fluid. Additionally, depending on the product, externally accessible components are checked and cleaned. Finally, proper functionality of the product is tested.

**Level 2 – Replacement of relevant wear parts of the product**  
Wear parts are subject to different stresses. For cost-optimized maintenance, Pfeiffer Vacuum offers specific replacement of the wear parts under most stress. Material consumption and working times can be optimized by partial disassembly of the product and identification of the wear parts affected. This service also includes the contents of maintenance level 1.

**Level 3 – Complete overhaul of the product**  
Preferably, this type of service is to be carried out in qualified Pfeiffer Vacuum service centers. All wear parts of the product are replaced so that the product continues to meet the technical requirements. It is completely disassembled, cleaned, re-assembled, and tested. After a successful output inspection, the product is sent back to the customer with a warranty on the performed operations.

**Product-specific service concepts**  
The following tables show the defined contents of service and intervals of individual preventative product-related service depending on the product types considered: turbo, rotary vane and Roots pumps. The maintenance intervals listed are manufacturer recommendations assuming the use in clean working environments and processes (no increased particle load, no process deposits). If the customer application deviates from these presumptions, it should be noted that this can lead to a shortening of the intervals. The intervals listed in the following refer to the most current product lines. Older products and increased process requirements lead to different maintenance intervals.

## Maintenance of hybrid bearing turbopumps

### Hybrid bearing turbopumps

Service	Inspection	Maintenance		
		Level 1	Level 2	Level 3
	annually	depending on the application, every 4 years		
<b>Testing</b>				
Optical-acoustic pump testing				
Readout and analysis of pump data <sup>1)</sup>				
Optional software-update <sup>1)</sup>				
Creation of a recommendation for action <sup>1)</sup>				
Vibration measurement (only in-house)				
<b>Disassembly</b>				
Operating fluid reservoir				
Bearing housing				
Complete disassembly				
<b>Operating fluid replacement</b>				
Checking of operating fluid for discoloration and anomalies				
Replacement of operating fluid (reservoir)				
<b>Replacement of wear parts</b>				
Bearing/bearing socket				
Replacement of o-rings and seals				
<b>Cleaning of casing/lower casing</b>				
External cleaning/cleaning of lower part				
Complete cleaning				
<b>Assembly</b>				
Adjustment of bearing clearance				
<b>Output test</b>				
Extensive functional test				
Leak testing (only in-house)				
High-voltage test (only in-house)				
Vibration test (only in-house)				

<sup>1)</sup> when conducted by Pfeiffer Vacuum customer service

Table 1: Maintenance concept for hybrid bearing turbopumps



Figure 5: Maintenance kit for a HiPace 80 turbopump (Maintenance Level 2)

## Maintenance of rotary vane pumps

### Rotary vane pumps

Service	Inspection	Maintenance		
		Level 1	Level 2 <sup>2)</sup>	Level 3
		depending on the application		
	annually	annually	every 2 years	every 4 years
<b>Testing</b>				
Optical-acoustic pump testing				
Checking of operating fluid level and leak tightness				
Testing of accessories (according to the respective operation instructions)				
Creation of a recommendation for action <sup>1)</sup>				
<b>Disassembly</b>				
Gas ballast valve				
Drive + coupling				
Cap + pumping system of support/stand				
Pumping system				
<b>Operating fluid replacement</b>				
Checking of operating fluid for discoloration and anomalies				
Replacement of operating fluid (excl. material)				
<b>Cleaning</b>				
External cleaning				
Silencer <sup>3)</sup>				
Gas ballast valve				
Cap				
Pumping system				
<b>Replacement of wear parts</b>				
Gas ballast valve wear parts				
Radial shaft seal ring <sup>2)</sup>				
Coupling, motor side/protective sleeve <sup>2)</sup>				
O-rings and seals			Optional	
HV valve wear parts			Optional	
Sightglass			Optional	
Vane springs			Optional	
Vanes				
<b>Output test</b>				
Functional test				
Leak testing (only in-house)				

<sup>1)</sup> when conducted by Pfeiffer Vacuum customer service <sup>2)</sup> not valid for pumps with magnetic coupling <sup>3)</sup> if accessible externally

Optional: Provision of the appropriate spare parts package for the extended maintenance level 2 necessary work is to be done by the customer with trained personnel

Table 2: Service concept for rotary vane pumps

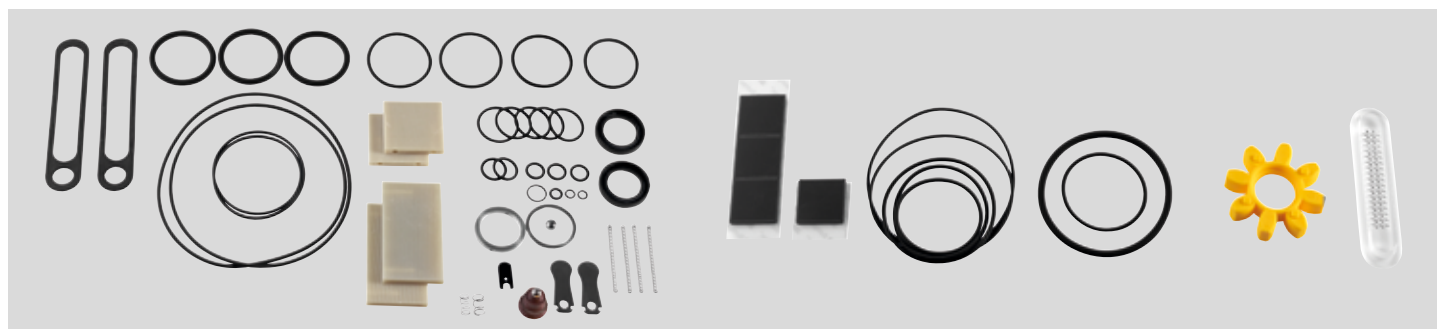


Figure 6: Maintenance kit for a Duo 35 rotary vane pump (Maintenance Level 3)

## Maintenance of Roots pumps

### Roots pumps

Service	Inspection	Maintenance		
		Level 1	Level 2 <sup>2)</sup>	Level 3
	annually	depending on application		
		annually	every 1.5 years	every 3 years
<b>Testing</b>				
Optical-acoustic pump testing				
Checking of operating fluid level and leak tightness				
Creation of a recommendation for action <sup>1)</sup>				
<b>Disassembly</b>				
Drive + coupling				
Cap/lantern				
Plates				
Pistons				
<b>Operating fluid replacement</b>				
Checking of operating fluid for discoloration and anomalies				
Replacement of operating fluid (excl. material)				
<b>Cleaning</b>				
External cleaning				
Overflow valve				
Suction and gear chambers				
Pistons				
<b>Replacement of wear parts</b>				
Radial shaft seal ring <sup>2)</sup>				
Protective sleeve <sup>2)</sup>				
Crown gear of coupling <sup>2)</sup>				
Bearings				
O-rings and seals				
<b>Assembly</b>				
Synchronization of pistons				
<b>Output test</b>				
Functional test				
Leak testing (only in-house)				

<sup>1)</sup> when conducted by Pfeiffer Vacuum customer service <sup>2)</sup> not valid for pumps with magnetic coupling

Table 3: Service concept for Roots pumps



Figure 7: Maintenance kit for an Okta 1000 Roots pump (Maintenance Level 2)



Figure 8: Service of a turbopump

### Conclusion

As a general rule, the recommended maintenance intervals only give the customer an indication with which the scope of future maintenance work can be defined. The wide range of uses in different industries and applications makes it impossible to specify universally applicable intervals. These should be set by Pfeiffer Vacuum on a case-by-case basis. Particle accumulation, corrosion and condensation of corrosive media in the Pfeiffer Vacuum products are particularly important to look out for. Failure to observe the maintenance intervals specified by Pfeiffer Vacuum may result in unpleasant consequences: In addition to premature production stoppages and costs for replacements or new products, in the worst case, plant downtimes and production shutdowns may occur. The costs that result from this exceed those of maintenance or repair many times over. For these reasons, compliance with the maintenance intervals specified in the operating manuals is recommended, as well as use of Pfeiffer Vacuum's product-related services. Pfeiffer Vacuum employees will be happy to advise you on individual solutions.

Errors excepted. All data subject to change without prior notice. PI0462PEN (February 2017/0)

## VACUUM SOLUTIONS FROM A SINGLE SOURCE

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