High Vacuum – High Temperature – Testing

This device was developed to determine friction factors under vacuum/high vacuum and high temperature conditions up to 700°C for lifetime tests and benchmarking of different materials.

The sample temperature is measured on-line, the torque measurement is done punctual (individual interval 10 <> 120 s) using following method: the rotation is done CW and CCW for a defined number of rotations, then a difference measurement is done. This is necessary for piezo sensors which are not usable for on-line measurement due drifting of the signal.

Post-Analysis may cover measurement of wear by topographic means. Investigation of surface morphology or material transfer is possible using SEM/EDX. Changes in the subsurface microstructure can be analysed locally resolved by EBSD (Electron Back Scattering Diffraction).

The device is fully PC-controlled. On-line-data acquisition offers to post-process data, e.g. for automatic calculation of friction coefficients in running-in or steady state, as well as benchmark of different materials under high vacuum and high temperature conditions.

Measurement of

- Friction force / coefficient (punctual, individual interval 10 <> 120 s)
- Temperature (on-line)
- Wear (geometric or mass loss)
## Specifications

<table>
<thead>
<tr>
<th>Test</th>
<th>Measurement of</th>
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<tbody>
<tr>
<td></td>
<td>Friction force / coefficient (punctual, defined interval 10 &lt;&gt; 120 s)</td>
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<tr>
<td></td>
<td>Temperature (on-line)</td>
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<tr>
<td></td>
<td>Wear (geometric or mass loss)</td>
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<tr>
<td>Temperature</td>
<td>from RT up to + 700°C</td>
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<tr>
<td>Load (contact pressure)</td>
<td>3 to 30 N (50kPa &lt;&gt; 300kPa for Cone-ring-on-disk, higher hertzian pressure up to MPa range possible depending on radius of pin-on-disk)</td>
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<tr>
<td>Speed / Motion</td>
<td>0.001 &lt;&gt; 0.2 m/s (1 &lt;&gt; 150 rpm)</td>
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<td>Environments</td>
<td>Vacuum to high vacuum (10^3 &lt;&gt; 10^5 mbar depending on outgassing behaviour of sample)</td>
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<tr>
<td>Samples</td>
<td>Cone-ring-on-disk, pin-on-disk</td>
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<tr>
<td>Accuracy</td>
<td>Torque 10 Nm max (piezo)</td>
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<tr>
<td></td>
<td>Sample temperature ± 10 °C</td>
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<td>Load ± 0.1 N</td>
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