

# **Tribological characterization of high-performance polymer composite (HPPC) for compressor piston rings in hydrogen environment**

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The global transition to renewable energy depends heavily on the utilization of hydrogen. Since hydrogen is of low density and gaseous, it must be compressed to pressures exceeding 500 bar to achieve practical energy density for efficient storage and transport. This demands compressors with long service life and high efficiency. To achieve this, reciprocating piston compressors rely on advanced fiber-reinforced polymer based sealing solutions for piston and rod packing rings. However, future regulatory restrictions on fluorinated polymers, widely used in tribological applications, pose significant challenges to this industry. The focus of this study was the development of application oriented and model tribometer tests in different gas atmospheres for efficient characterization and screening of high-performance polymer composites (HPPC), tailored for compressor piston rings and other components in high-pressure hydrogen applications.

**Authors:** NEVOSAD, Andreas (AC2T research GmbH); Mr PÖLLINGER, Alexander (Leobersdorfer Maschinenfabrik GmbH); Dr SEICHTER, Sandra (Leobersdorfer Maschinenfabrik GmbH); Dr SCHÖBEL, Michael (X-Ray Center, Technische Universität Wien); Mr KRENN, Stefan (AC2T research GmbH)

**Presenter:** NEVOSAD, Andreas (AC2T research GmbH)

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