

CPI's CPI192 Piston & Packing Rings combined with EMISSIONGUARD™ WR⁴ Wiper Rings restore sealing performance on a high-pressure hydrogen compressor



The Challenge

Our customer, a **Refinery in The Netherlands**, was experiencing a series of recurring performance issues on their **Burkhardt** reciprocating compressor handling **hydrogen (H₂)**. Of the three stages, the **3rd stage** — operating at a **discharge pressure of 189.17 barg** — was by far the worst performing, suffering from poor sealing, elevated leakage and unpredictable component life. The 1st and 2nd stage stuffing boxes were also showing inconsistent sealing behaviour, and the original oil scraper arrangement was unable to control crankcase oil migration adequately. The customer needed a structured, stage-by-stage improvement programme to bring the compressor back to a reliable operating condition, with an additional **urgent requirement for the oil scraper ring set**.

The Solution

CPI engineered a **phased upgrade**, addressing the worst-performing components first and then rolling the improvements out across the full machine:

- **3rd stage piston rings** were replaced with rings in **CPI192** material to improve sealing and reduce blow-by at the demanding 189.17 barg discharge condition.
- **3rd stage packing** in the stuffing box was upgraded to a complete **Type 211 ring set in CPI192**, ensuring a matched, high-performance seal for the high-pressure stage.
- **1st and 2nd stage packing** were then aligned to the same standard with full **Type 211 / CPI192** ring sets, providing balanced sealing performance across all three stages.
- The oil scraper was upgraded with a **CPI EMISSIONGUARD™ WR⁴ Wiper Ring set**, installed directly into the existing oil scraper housing.

Despite a very tight customer deadline, the **WR⁴ ring set was delivered one day ahead of the requested date.** Through strong cross-site collaboration between CPI NL and CPI France, CPI France provided rapid technical and logistics support, arranging shipment to **CPI Zuidland, NL** within a few days so installation could proceed without delay.

The Outcome

Following the staged installation of the new CPI192 piston rings, the complete Type 211 / CPI192 packing ring sets across all three stages, and the WR⁴ wiper ring set, the **302C06 compressor is now running successfully with the full CPI solution.** Sealing performance on the critical high-pressure 3rd stage is restored, sealing is balanced across the 1st and 2nd stages, and crankcase oil carry-over is controlled by the WR⁴ wiper rings. This case demonstrates how a **step-by-step application of CPI technologies — combined with responsive multi-site collaboration can resolve long-standing compressor performance issues and deliver measurable reliability and emissions benefits to the customer.**

