

**DAMPER SEAL COMPARISON IN A HIGH-PRESSURE RE-INJECTION CENTRIFUGAL  
COMPRESSOR DURING FULL-LOAD, FULL-PRESSURE FACTORY TESTING USING  
DIRECT ROTORDYNAMIC STABILITY MEASUREMENT (TP069)**

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**ABSTRACT**

Rotordynamic stability in high-pressure centrifugal compressors is of great concern to both the original equipment manufacturer (OEM) and the end-user, because of the potential for costly downtime should problems occur. To minimize these problems, damper seals have been developed to provide substantial damping to the rotor system. These seals are placed in the process gas at locations where large pressure differentials occur and contain relatively large lengths and diameters. Previous studies demonstrated the improvement provided by damper seals both analytically and with measurement during full-load, full-pressure testing (Moore, et al. [1]). The present study compares the damping and leakage control performance of two seal geometry, a hole pattern seal and a smooth seal. The smooth seal is intended to simulate a hole pattern seal that has "plugged up" because of contaminants in the process gas. The dimensions of the seals are identical in all other aspects. Two tests were performed using an eight-stage, back-to-back re-injection compressor as the test vehicle. The logarithmic decrement and seal leakage rates results are compared for the two seal designs. Analytical predictions are then compared with the measurements. The smooth seal demonstrates damping similar to the hole pattern design, but has a large leakage penalty.

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