

Performance Testing of Large Centrifugal Compressors in LNG Liquefaction Applications: Insights from the Latest ASME PTC-10 Updates

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Centrifugal compressors are critical components in LNG liquefaction facilities. Given the demanding operating conditions and the wide performance envelope required in LNG applications, accurate performance testing of these compressors is essential to ensure reliability, efficiency, and compliance with contractual guarantees. The ASME Performance Test Code 10 (PTC 10) serves as the industry benchmark for evaluating the thermodynamic performance of centrifugal compressors under specified conditions.

After a quarter of a century, the ASME PTC 10 has undergone a significant revision—its first since 1997—introducing transformative changes that enhance the accuracy and applicability of performance testing. Among the most notable updates is the shift from ideal gas assumptions to real gas modeling, allowing for more precise representation of actual operating conditions. Additionally, the revised code now consistently applies a polytropic process model throughout, and introduces new, standardized methods for calculating polytropic work and polytropic efficiency.

This paper provides an in-depth review of performance testing practices for large centrifugal compressors in LNG applications, with a focus on how the revised ASME PTC 10 addresses longstanding challenges and improves performance evaluation. Drawing on the perspective of the committee chair responsible for the revision, the discussion highlights the technical rationale behind the code changes, their implications for test planning and evaluation, and their impact on both OEMs and end-users. The paper also explores how the revised standard supports a more rigorous and transparent testing process, enabling operators to make better-informed decisions regarding compressor selection, performance verification, and lifecycle management.

As LNG facilities continue to grow in scale and complexity—and as global decarbonization efforts demand more energy-efficient operations—precise compressor performance testing becomes increasingly critical. The updated ASME PTC 10 equips the industry with a more robust and future-ready framework for evaluating compressor performance in the high-demand environment of LNG liquefaction plants.

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