

ASME PTC 53-2023

Performance Test Code for Mechanical and Thermal Energy Storage Systems

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Thermal – Mechanical - Chemical Energy Storage Workshop

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- ASME PTC 53 is a Performance Test Code for Mechanical and Thermal Energy Storage Systems
- Initial date of issuance – August 4, 2023
- PTC 53 is an American National Standard®
- PTC 53 is currently undergoing its first required revision cycle

ASME PTC 53-2023

Mechanical and Thermal Energy Storage Systems

Performance Test Codes

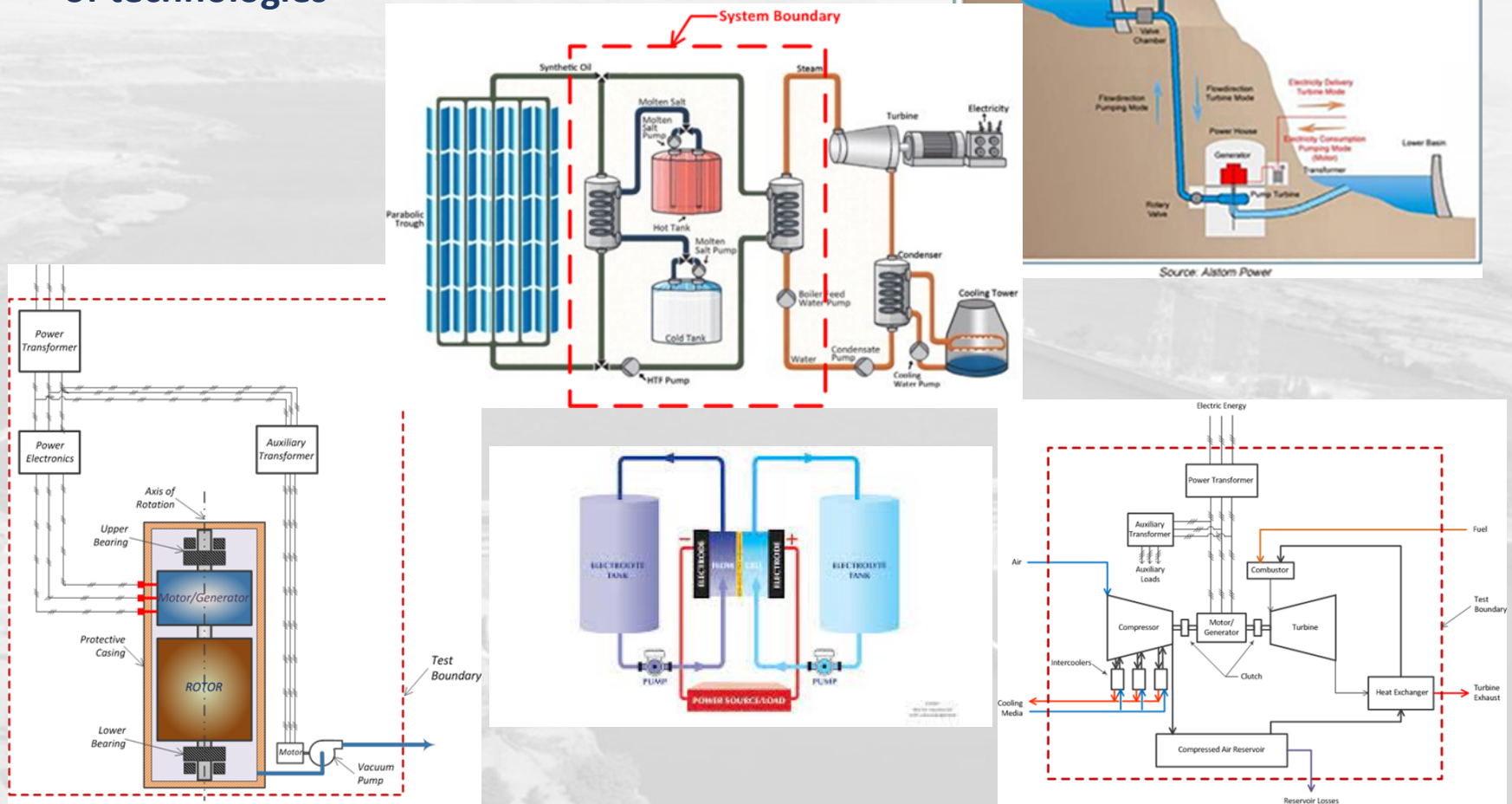
AN AMERICAN NATIONAL STANDARD



Two Park Avenue • New York, NY • 10016 USA

PTC 53 Scope

PTC 53 is intended to cover a broad range of technologies



PTC 53 Committee

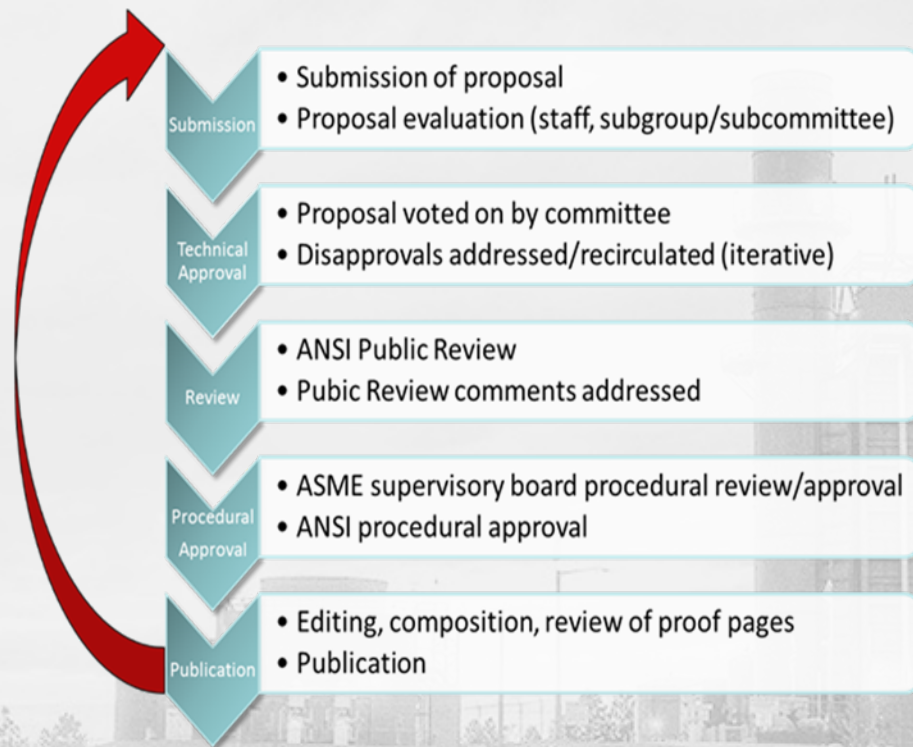
- 16 members
- 3 contributing (non-voting) members

PTC 53 Charter

“To provide uniform test methods, procedures and quantifiable methods for assessing, determining and reporting the performance of mechanical or thermal energy storage systems across varying technology platforms. This applies to systems including but not limited to compressed air, fly wheels, molten salts, or pumped hydro for storing energy mechanically or thermally from any source.”



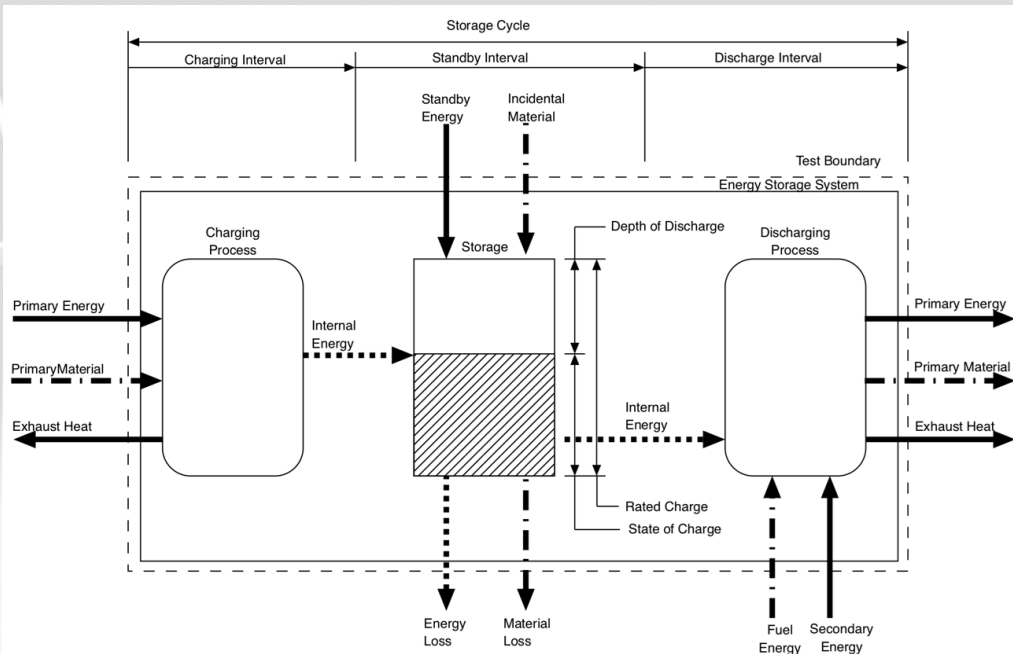
Development of PTC 53 – Approval Process



PTC 53 Contents

- Section 1 Object and Scope**
- Section 2 Definitions and Descriptions of Terms**
- Section 3 Guiding Principals**
- Section 4 Instruments and Methods of Measurement**
- Section 5 Computation of Results**
- Section 6 Reporting**
- Section 7 Uncertainty**
- Nonmandatory Appendices**

Definition of ESS Test Boundary and Key Definitions



Energy Flows across Boundary

- Primary Energy Rate
- Secondary Energy Rate
- Charge Energy
- Charge Power
- Discharge Power

Energy Parameters Inside Boundary

- State of Charge
- Energy Loss

Efficiency Metrics

- Primary Energy Rate
- Secondary Energy Rate
- Stored Energy Rate
- Fuel Heat Rate
- Overall Efficiency

Correction Factors

- Additive
- Multiplicative

- **Section 5, Computation of Results, is being reviewed to improve definitions of “Internal Energy Storage” and “Potential Energy Storage.”**
- **Section 7, Test Uncertainty, is being revised to allow analysis using Monte Carlo methods.**
- **An additional Non-Mandatory Appendix is being creating illustrating sample calculations for an advanced Compressed Air Energy Storage System (CAES).**
- **We will add additional examples to the appendix in future releases**
- **We invite comments from the general public.**

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