

API First Edition

API RP 1170: Design and Operation of Solution-mined Salt Caverns for Natural Gas Storage

First Edition

1. INTRODUCTION AND PURPOSE

This Recommended Practice (RP) outlines functional recommendations for salt cavern facilities specifically designed for natural gas storage. It consolidates knowledge and experience from geologists, engineers, and other professionals within the petroleum and gas storage sectors to establish comprehensive design guidelines that prioritize public safety.

2. SCOPE OF APPLICATION

This RP addresses the cavern well system, encompassing the wellhead, wellbore, and the cavern itself, from the emergency shutdown (ESD) valve down to the cavern. It also covers facilities that significantly impact the safety and integrity of the cavern system. This document may be applied to existing facilities at the discretion of the user.

Exclusions: This RP does **not** apply to:

- Caverns used for the storage of liquid or liquefied petroleum products.
- Caverns used for brine production or waste disposal.
- Mechanically mined caverns.
- Depleted hydrocarbon or aquifer underground gas storage systems.

3. DESIGN GUIDELINES AND SETUP

The design phase emphasizes the critical need for in-depth, site-specific geomechanical assessments. This is crucial due to the inherent diversity of subsurface geological conditions, with the primary objective of ensuring long-term facility integrity and safety.

3.1 Geomechanical Assessments

Conduct thorough evaluations of geological formations to understand their stability, stress conditions, and suitability for cavern development. This includes analyzing rock mechanics, hydrology, and potential seismic activity.

3.2 Cavern Well Design and Drilling

Design wellbores to withstand operational pressures and geological stresses. Drilling procedures must adhere to best practices to ensure well integrity and prevent environmental impact. Considerations include casing design, cementing, and wellhead equipment selection.

4. OPERATING PROCEDURES AND SOLUTION MINING

This section details the techniques and operational aspects of solution mining and subsequent natural gas storage.

4.1 Solution Mining Techniques

Implement controlled dissolution processes to create the salt cavern. This involves injecting fresh water and extracting brine, carefully managing cavern shape and volume to meet storage requirements.

4.2 Operational Practices

Establish protocols for gas injection and withdrawal, pressure management, and inventory control. All operations must comply with safety standards and environmental regulations.

5. MONITORING AND MAINTENANCE

Continuous monitoring and regular maintenance are essential for ensuring the long-term integrity and safe operation of salt caverns.

5.1 Monitoring Practices

Implement systems for monitoring cavern pressure, temperature, and volume. Geomechanical monitoring, including subsidence and microseismic activity, should be conducted regularly to detect any potential issues early.

5.2 Maintenance Practices

Develop and adhere to a comprehensive maintenance schedule for all components of the cavern well system, including wellheads, valves, and associated surface facilities. This includes routine inspections, repairs, and preventative measures.

6. ADDRESSING DEVIATIONS AND ENSURING INTEGRITY

In the event of operational anomalies or monitoring data indicating potential issues, established procedures for assessment and corrective action must be followed. This includes re-evaluating geomechanical models and adjusting operational parameters to maintain cavern integrity and safety.

7. SPECIFICATIONS

- **Publisher:** API
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8. IMPORTANT CONSIDERATIONS

This document serves as a technical reference for the development and operation of solution-mined salt caverns. It is not intended to represent or reflect any Federal, State, or local regulatory requirement. Depending on the project's location and nature, the recommended practices herein may conflict with some regulatory requirements. In such cases, the regulatory requirement supersedes this recommended practice unless an appropriate waiver or variance is granted from the issuing agency. A thorough review of applicable Federal, State, and local rules and regulations is mandatory prior to the design of solution-mined natural gas storage caverns.

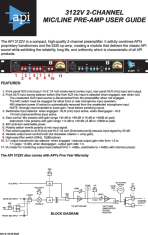


9. SUPPORT AND FURTHER INFORMATION

For inquiries regarding this Recommended Practice or for additional support, please contact the American Petroleum Institute (API) directly. Information on purchasing additional copies or related publications can be found on the official API website.

10. WARRANTY DISCLAIMER

This Recommended Practice provides guidelines and best practices based on industry knowledge. It does not constitute a warranty or guarantee of specific outcomes, performance, or compliance with all applicable laws and regulations. Users are responsible for ensuring their operations meet all relevant standards and legal requirements.

Related Documents - First Edition

	<p>API 3122V 2-Channel Mic/Line Pre-Amp User Guide</p> <p>User guide for the API 3122V, a compact, high-quality 2-channel preamplifier featuring API's proprietary transformers and 2520 op-amp. Details features, specifications, and block diagram.</p>
	<p>API 2500+ Stereo Bus Compressor Operator's Manual</p> <p>Discover the features and operation of the API 2500+ Stereo Bus Compressor. This manual provides detailed information on its controls, functions, and applications for professional audio engineering.</p>
	<p>API Select SR22 Dual Channel Compressor User Manual</p> <p>Detailed user manual for the API Select SR22 Dual Channel Compressor, covering its features, controls, technical specifications, and warranty information.</p>

Model	Capacity	Weight
1.00-1.00	1.00-1.00	1.00-1.00
1.00-1.00	1.00-1.00	1.00-1.00
1.00-1.00	1.00-1.00	1.00-1.00

[API Spider Specifications and Load Ratings](#)

This document outlines the specifications and rated loads for API spider models, including applicable pipe diameters.

Model	Capacity	Weight
1.00-1.00	1.00-1.00	1.00-1.00
1.00-1.00	1.00-1.00	1.00-1.00
1.00-1.00	1.00-1.00	1.00-1.00

[API Specifications: DD-150, DD-250, DD-350 Models](#)

Technical specifications for API models DD-150, DD-250, and DD-350, detailing pipe sizes and rated capacities.

Model	Capacity	Weight
1.00-1.00	1.00-1.00	1.00-1.00
1.00-1.00	1.00-1.00	1.00-1.00
1.00-1.00	1.00-1.00	1.00-1.00

[API Schedule A License Agreement: Kenzol Multi Industries FZC Engine Oil Certifications](#)

Official API Schedule A license agreement detailing Kenzol Multi Industries FZC's authorized use of API Service Symbols and product classifications for engine oils, valid until March 31, 2026. Includes SAE grades, categories, and classifications.