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**Technical
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Paper**



Review of the Main Mechanical Integrity Test (MIT, Tightness Tests) Techniques and Comparison of Their Uncertainties

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Abstract

Salt caverns started being produced as a by-product of the salt production industry. In the 1940s, these caverns started being used for storage of hydrocarbons. There are now 2000 salt caverns globally storing liquid, gaseous or supercritical fluids.

The necessity to test the tightness of the storage caverns came along with their development. A large variety of techniques have been proposed, varying over time, companies and countries. In addition, several acceptance criteria of these tests have been, and are still, used. While first attempts were to relate a fail/pass criteria to possible impacts, the industry rather relied on criteria that have shown their applicability and their effectiveness through a track record of a limited number of accidents when applied. This work presents all these initiatives and their historical context.

Measurements uncertainties are propagated in order to enable to compare the accuracies of the main tightness test techniques. Invented in the 1970s, the nitrogen/brine "Mechanical Integrity Test" progressively became the reference tightness test technique for salt caverns. The comparison of tests accuracies shows it is excellent.

Among massive storage options, salt caverns now have a singular property: their tightness can be tested very accurately.

Key words: Mechanical Integrity Test, MIT, tightness test, uncertainty propagation

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