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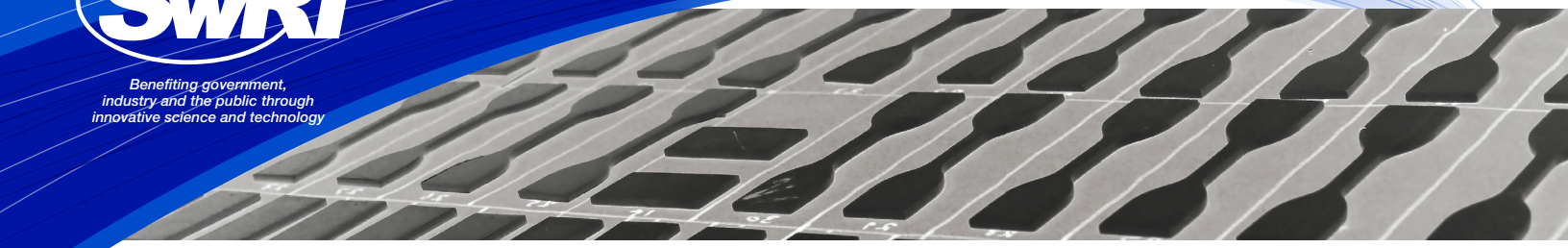
Benefiting government, industry and the public through innovative science and technology



Polymer High-Pressure High-Temperature Exposure Testing in Sour (H_2S) or Sweet (CO_2) Environments

Southwest Research Institute® (SwRI®) has a long track record of providing research and testing services to the oil and gas industry. SwRI offers unique facilities and capabilities to help oil and gas companies advance the technology required for upstream, midstream and downstream applications. SwRI is working with industry to determine material compatibility and degradation resistance of polymeric and composite materials in high-pressure hydrogen sulfide (HP H_2S) sour service environments, and has developed HP H_2S sour capabilities up to 20,000 psi and 650°F for testing in aggressive toxic environments.

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SwRI's HPHT autoclaves are used to expose different types of polymeric compounds to simulated in-service hazardous environments.

To help clients meet new emerging material performance requirements for testing of nonmetallic materials (thermoplastics, elastomers and composites) and present accurate results following high-pressure high-temperature (HPHT) exposures, SwRI uses a broad selection of standardized testing methods in compliance with API, ASTM, NACE, ISO and NORSOK standards.

High-Pressure High-Temperature Autoclave Testing

The 10,000-square-foot Autoclave Testing Laboratory has 40 autoclaves dedicated to various types of HPHT tests. SwRI engineers and technologists conduct standard and customized exposure tests to assess the performance of polymeric and composite materials after exposure to HPHT toxic environments. Some types of specimens are:

- Standardized dumbbell-shape
- O-ring
- Adhesion
- Compression button

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SwRI evaluates the effect of HPHT toxic gas or fluid environments on the mechanical properties of different types of polymeric compounds.

Test environments include chlorinated brines and hydrocarbon fluids equilibrated with $H_2S/CO_2/CH_4$ mixtures as indicated in API standard 6A. SwRI also conducts testing in a wide variety of fluids charged with an array of $H_2S/CO_2/CH_4$ mixture combinations.

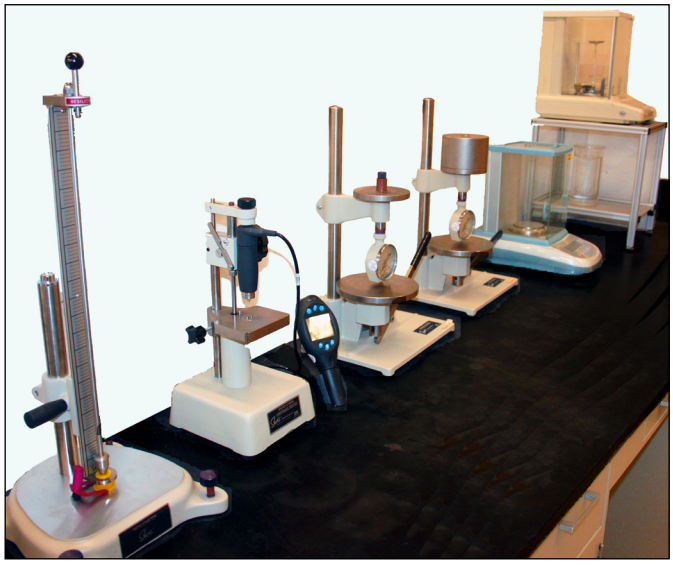
Both immersion testing and rapid gas decompression (RGD) testing can be performed and certified for nonmetallic materials in valves or drilling equipment in compliance with API standards 16C and 6A. HPHT testing of sealing material in full-size components of drilling, wellhead and Christmas tree equipment per API 6A is also available. Other tests and standards are listed at right.

Test	ASTM Standard
Changes in physical properties of rubber	D471
Changes in physical properties of rigid polymeric materials	D543
Specific gravity measurement of rigid polymeric materials	D792, Test Method A (water)
Compression set testing of rubber	D395
Compression set testing of rigid plastics	D695

Mechanical Testing

The 6,500-square-foot Mechanical Engineering Performance Laboratory has 36 load test frames dedicated to the mechanical testing of materials. SwRI engineers and technologists conduct standard and customized tests to assess the performance of polymeric dumbbell specimens before and after an exposure test. Typical tests and standards are listed below.

Test	ASTM Standard
Hardness measurement of polymeric materials using durometer scales	D2240
Tensile properties of rubber dumbbells	D412
Tensile properties of rigid polymeric dumbbells	D638
Flexural properties of rigid polymeric materials	D790
Strength of rubber adhesion to rigid specimens	D429



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Hardness measurements are evaluated on various types of polymeric specimens before and after an exposure test.

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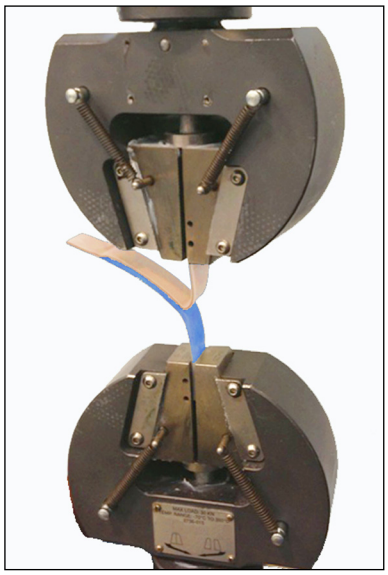
Thin polymeric and rubber specimens are 'stamped out' of flat plates with certified cutting dies for various standardized tensile specimen shapes and sizes.

SwRI evaluates the effect of HPHT hazardous environments on the mechanical properties of different types of polymeric compounds.



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We welcome your inquiries.

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Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops, and offices for nearly 3,000 employees who perform contract work for industry and government clients.

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