

HIGH-PRESSURE TESTING SERVICES

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Maximator Test has been serving the high-pressure testing industry since 2008 by providing a full range of high-pressure testing services. We offer Proof, Leak, and Burst Testing up to 145,000 psi, Pressure Fatigue / Impulse Testing to 65,000 psi @ 15Hz, and Autofrettage to 145,000 psi.

Our mission is to provide unrivaled service to our customers and ensure we have the most competitive lead-times. We operate with the motto "under promise and over deliver".

In April of 2022, we joined the Maxpro Technologies family of high-pressure experts.

Please [Contact Us](#) today to discuss your high-pressure testing requirements.

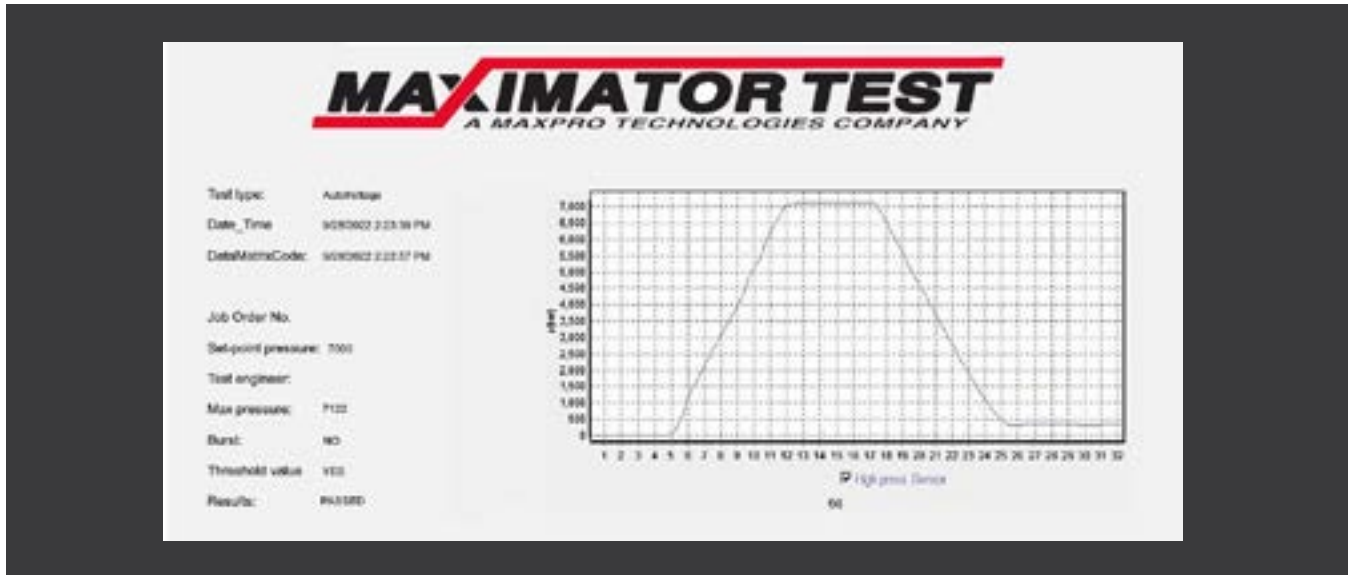
AUTOFRETTAGE – UP TO 145,000 PSI

Autofrettage is a technique used on metal components in which a calculated level of internal pressure is applied, causing the inner wall of the part to yield. This results in compressive residual stresses by the outer wall once the pressure is released. The goal of autofrettage is to increase the durability and fatigue life of the final product.



Autofrettage Applications:

The autofrettage process is widely used in industries like automotive, aerospace, defense, and medical to improve component fatigue life. The technique is commonly used in the manufacture of high-pressure pump cylinders, diesel common rails, diesel fuel nozzles, hydraulic attenuators, aerospace fuel lines, coolant and fuel distribution manifolds, and gun barrels.



Maximator Test will provide a comprehensive test report. The report will include:

- An outline of the testing objectives
- The tools and equipment used to conduct the test
- The test set-up and procedure, including photographs of how the setup was completed. In most cases, video recording of the test is also possible.
- Results, including pressure plots, data tables, comments and observations made while conducting the test
- Failure photos showing failure locations
- Calibration certificates

With our specialized testing equipment and extensive high-pressure experience, Maximator Test will expertly complete your autofrettage project.

Burst Pressure Testing – Up To 145,000 PSI

At Maximator Test, we conduct hydrostatic burst testing at pressures up to 65,000 psi using water. Burst testing to 145,000 psi using hydraulic fluid and up to 11,250 psi using inert gases (nitrogen, helium) is also offered. Testing is conducted using a plc-controlled and computer regulated test bench, or a manually operated gas booster assembly equipped with NIST traceable pressure gauge. The test bench features data acquisition in PDF or CSV format, ISO/IEC 17025 calibrated primary and secondary pressure transducers, and protective safety features. With up to 10 programmable pressure intervals, Maximator Test can assist you with all your Burst Pressure Testing needs.

Burst Pressure Testing Equipment

Programmable pressure ramp rate and maximum pressure drop offers flexibility to meet your Burst Pressure Testing needs

Burst pressure testing is a type of destructive test used to determine the absolute maximum pressure a component will burst, fail catastrophically, or begin to plastically deform when pressurized under controlled conditions. Burst pressure testing can help design engineers determine material of construction, wall thickness and component geometry.

Benefits of Burst Testing:

- Identify maximum burst pressure
- Confirm design margin
- Determine failure mode
- Find the weakest link in a component or assembly

Knowing the maximum burst pressure is a vital consideration for any component under pressure. It can help establish safety design margins and even be the key to using a component in a new application. If failure is not an option, then you must identify the maximum burst pressure.

Determining the failure mode is critical for pressurized component, especially if they are used in applications that are out in the open and exposed to employees. Knowing how a component will burst or leak is very important. Will a component crack and lose pressure or will it fail catastrophically, sending shrapnel in all directions?

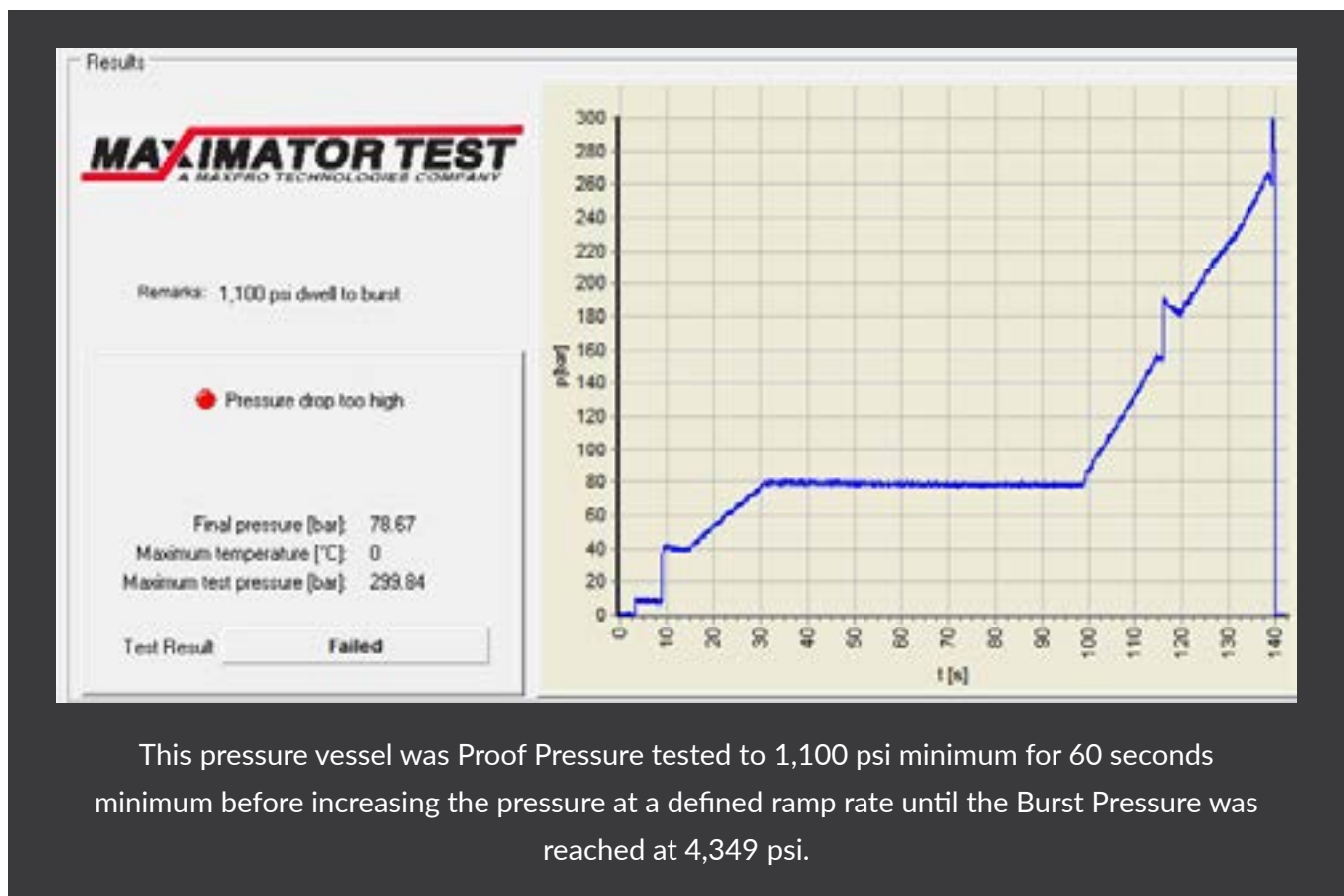


The failure mode of this component, at 50,000 psi, caused a catastrophic failure in which a waterjet-like projectile was made. Perform Burst Pressure Testing with Maximator Test today to understand the common failure modes of your components.

Burst pressure testing will identify the weak link in a component or assembly which provides valuable design information. Design improvements are not always used to remedy physical weaknesses or flaws. Sometimes, a component can be over-engineered, impacting the economy of the item. A different material of construction or features to reduce the per piece cost might be possible.

Regardless of what phase of production a component is in, burst pressure testing is a common, cost-effective way to obtain the necessary data to improve the economy of the part. Preproduction burst testing might be required to meet quality and safety standards. Sometimes ongoing lot testing is required after a component goes into production.

Burst pressure testing can also be combined with proof pressure testing. The test parameters in a combined burst/proof pressure test may require a part to be pressurized and then dwell or hold a specific pressure for a desired time interval and then continue to be pressurized until the component fails, all in a single test. The equipment we use allows a component to be pressurized and dwell up to nine pressure intervals before being pressurized until it bursts.



LEAK TESTING – UP TO 145,000 PSI

At Maximator Test, we conduct hydrostatic leak testing at pressures up to 65,000 psi using water. Leak testing to 145,000 psi using hydraulic fluid, and up to 11,250 psi using inert gas (nitrogen, helium) is also offered. Testing is conducted using a plc-controlled and computer regulated test bench, or a manually operated gas booster assembly equipped with NIST traceable pressure gauge. The test bench features data acquisition in PDF or CSV format, ISO/IEC 17025 calibrated primary and secondary pressure transducers, and protective safety features. With up to 10 programmable pressure intervals, Maximator Test can assist you with all your Leak Testing needs.

Leak testing is a versatile testing method that can be crucial in the development and qualification of your product. Leak Testing is a type of testing where the pressure is increased to a specific factor of safety and held for a length of time to determine if any leak paths form, either destructive or non-destructive. There are many methods of Leak Testing offered at Maximator Test to ensure your components are tested to industry standards and will meet the safety requirements of your customers.

Internally pressurized using water or hydraulic fluid as a medium and detecting visual evidence of leakage

At Maximator Test, we can safely perform leak testing on your components by pressurizing the internal cavities using water or hydraulic fluid as a medium and visually inspecting for evidence of 'leakage' or droplets of test fluid. The leak will also be present as a drop in pressure on our pressure versus time graph, or calibrated pressure gauge, so a leak can be detected quickly in real-time. The leak in the test assembly will then be easily identified to determine the corrective action needed to process future components successfully. With capabilities up to 145,000 psi, we can accommodate all your high-pressure Leak Testing needs.



Internally pressurized using inert gas as a medium and submerging the test component

Sometimes a liquid is too viscous to detect leaks visually or there is a concern of internal contamination on the test component. With capabilities up to 11,250 psi using inert gas, we can assist with leak testing your high-purity components.



This component was submerged in deionized water and pressurized to a safety factor of 1.5. Bubbles formed at the joint indicating a leak in the system. Using a liquid, this leak may be difficult to locate and could be missed before installation. Have confidence in the testing expertise offered at Maximator Test.

Internally pressurized using inert gas as a medium and using leak detection fluid

If internal or external contamination is a high priority, at Maximator Test, we perform leak testing on your components up to 11,250 psi using high-purity inert gas and leak detection fluid. We will test your components using appropriate materials.



This component was pressurized to a safety factor of 3. Bubbles formed at the joints where Leak Detection Fluid was applied, indicating a leak in the system. Submerging the unit could have caused harmful contamination, therefore this method of Leak Testing was chosen. After testing, the unit was dried and wiped clean.

Leak testing is conducted with the goal of improving high pressure component designs, identifying the minimum and maximum burst pressures, proving seal or component designs, and locating the source of a failure. Leak testing can show a fundamental fault in the system and high leak rates in specific areas could point to an improperly aligned gasket or valve connections that are misaligned or improperly threaded.

Reasons to Leak Test:

- Validate product design
- Qualify manufacturing methods
- Assure product safety
- Quality control of products offered

Leak Testing Applications:

- High pressure diesel fuel common rails and fuel lines, adapters, fittings
- Vessels, enclosures, ducting, hydraulic hoses, valves, tubes, and other hydraulic products
- Automobile pump brake systems or components, power steering lines
- Shells and tube heat exchangers
- High pressure and ultra-high-pressure hoses, hydraulic pressure hoses

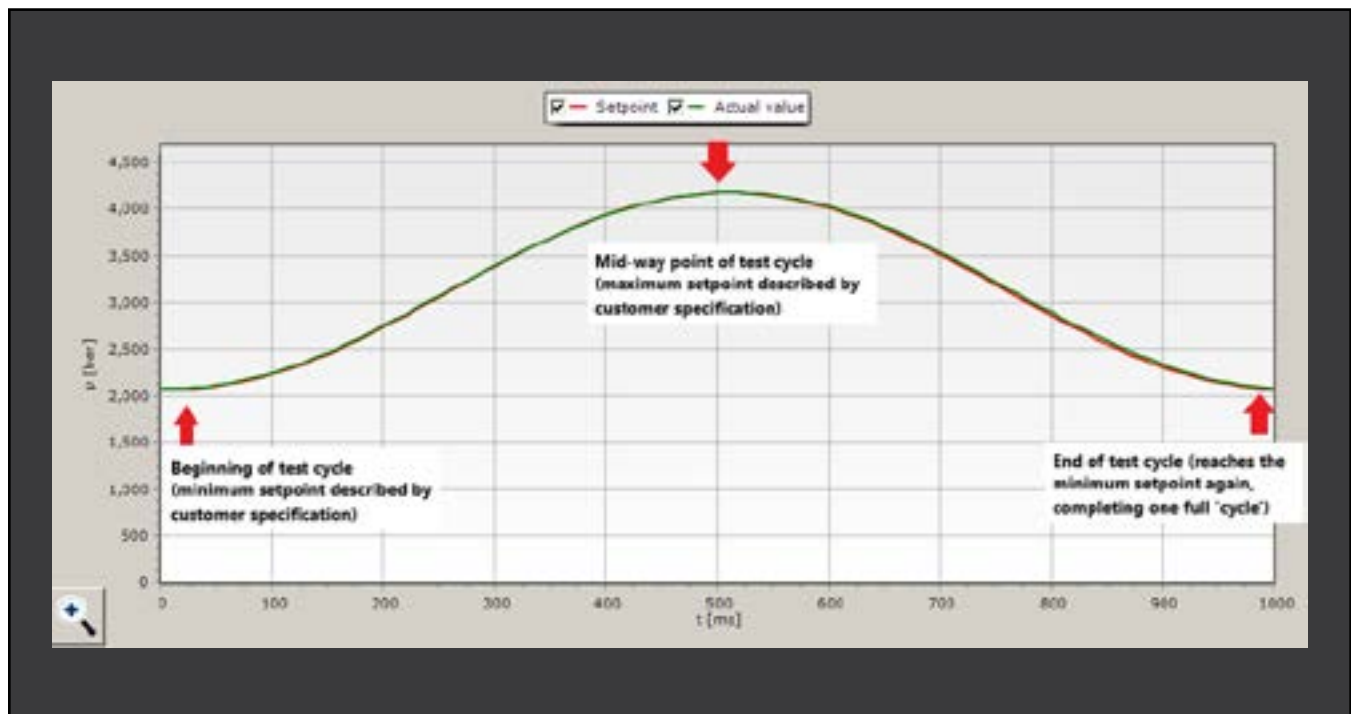


Pressure Fatigue/Impulse Testing – Up To 65,000 psi @ 15Hz

Pressure fatigue testing, also known as impulse or cyclic load testing, is a form of destructive testing where a test component is subjected to a pressure load defined by two primary pressure points. With customer-defined parameters, we can replicate what the test component will experience in a real-world setting. The purpose of pressure fatigue testing is to determine when and where the test component will fail over a period of time at operating pressure or determine if the component will survive beyond the expected life of the system where it is installed.

Pressure Fatigue/Impulse Testing Explained:

Pressure fatigue testing (aka impulse testing or cyclic load testing) is a form of typically destructive testing where a test component is subjected to a pressure load defined by two primary pressure points. The test sequence will begin at the minimum pressure setpoint (2068 bar per the diagram below), reach the maximum pressure setpoint (4180 bar per the diagram below) and then complete the test sequence by lowering the pressure back to the minimum setpoint. Once the component has been subjected to this pressure load sequence one time, we would consider this “1 test cycle”. The waveform below is a Sinusoidal Waveform applied at a frequency of 1 Hertz (Hz). One test per second.

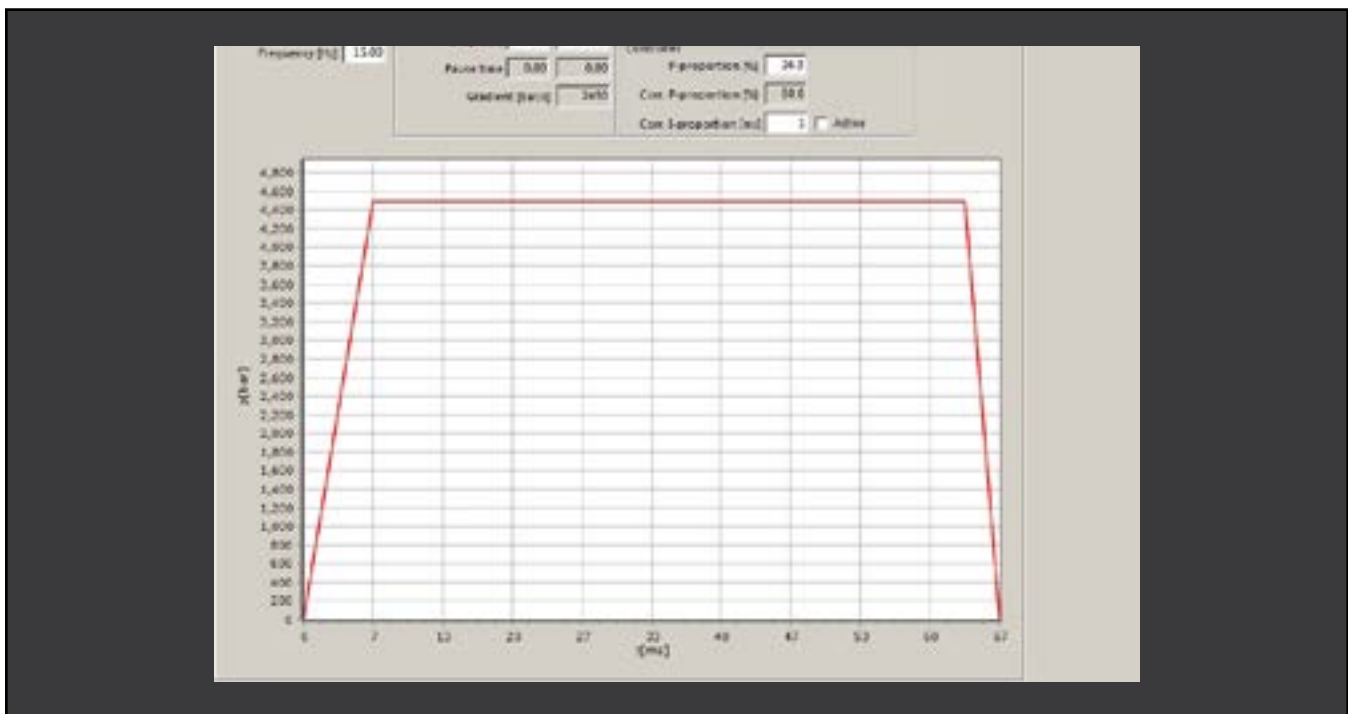


These pressures are defined by the customer and are supposed to replicate what the test component will experience in a real world setting. The purpose of fatigue testing is to determine when and where the component will fail over a long period of time at operating pressure or if the component will survive beyond expected life of the system where it is installed. Fatigue tested components do not need to burst or leak to pass a test criterion, but they should never be used in the field by a customer.

You could theoretically perform a similar test using a hydrostatic test cart, but if a customer needs to reach 10,000,000 pressure loads (test cycles), the technician would be retired before reaching 1,000,000 cycles. It would take decades.

The benefit of our impulse/fatigue bench (PN258), outside of the 65,000 psi pressure capability, is the ability to apply these test cycles at a rate as slow as 0.2Hz (1 cycle per 5 seconds) and as fast as 15Hz (15 cycles per second). This means, assuming we operate at 15Hz, we can apply 10,000,000 test cycles to a component in 185 hours or just under 8 days.

When most people think of fatigue testing or cyclic load testing, they think of a sinusoidal waveform, like above. The component just needs to be subjected to the minimum/maximum setpoints and there is not a clearly defined hold time or dwell period at the maximum pressure. However, some customers do require a dwell period at the maximum pressure. This is where a trapezoidal waveform (see below) comes into play.



The key component in a trapezoidal fatigue test is sustaining that maximum setpoint over a period of time. As we can still operate at 15Hz using this waveform, these dwell periods can be quite short (only approximately 60ms in the above diagram), but again all are defined by customer specification.

PROOF PRESSURE TESTING – UP TO 145,000 PSI

At Maximator Test, we conduct hydrostatic proof pressure testing at pressures up to 65,000 psi using water. We can also proof test to 145,000 psi using hydraulic fluid and up to 11,250 psi using inert gas such as Nitrogen or Helium. Testing is conducted using a plc-controlled and computer regulated test bench, or a manually operated gas booster assembly equipped with NIST traceable pressure gauge. The test bench features data acquisition in PDF or CSV format, ISO/IEC 17025 calibrated primary and secondary pressure transducers, and protective safety features. With up to 10 programmable pressure intervals, we can assist you with all your proof pressure testing needs.



Proof Pressure Testing Equipment

Customer Name: Maximator Test LLC
 Customer Number: Estimate Number
 Order ID: Proof Testing - Vessel
 Test No.: Sample 1

Actual No.: Serial Number: X
 Test Operator: MT
 Remarks: 65,000psi Maximum

Pressure (bar)	1	20	150	500	1800	4500			
Offset (bar)	0	5	0	10	25	200			
Pressure Rise Time	00:00:05	00:00:25	00:00:30	00:02:00	00:10:00	00:00:00			
Stabilisation Time	00:00:05	00:00:05	00:00:05	00:00:10	00:00:15	01:00:00			
Test Time	00:00:30	00:01:00	00:10:00	01:00:00	01:00:00	24:00:00			

Allowable pressure drop: 50 During Pressurization
 50 During Stabilization
 50 During Test

Test time [h:m:s]: 1 13 25 16

Program: Program No. Customer ID
 Load Program
 Save Program

Test and log data of hydrostatic test

Programmable pressure intervals offer flexibility to meet your Proof Pressure Testing needs

Proof pressure testing is a type of non-destructive pressure testing used to verify integrity, performance and fabrication of a test sample in a controlled setting. We can accommodate the common ASME, SAE, ANSI, etc. requirements and standards needed to certify your components. Samples that typically pass are not subject to deteriorating loads and the components are not intended to be pressurized until they leak or burst.

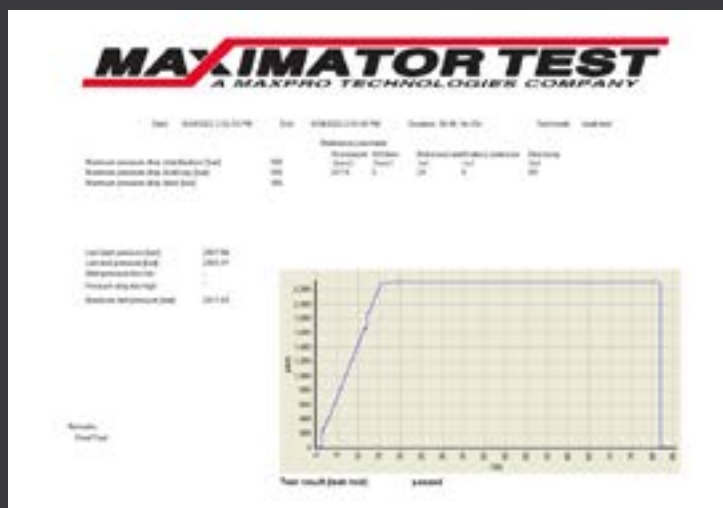
Benefits of Proof Pressure Testing:

- Non-destructive test designed to test parts without causing deformation
- Prove parts meet required factor of safety
- Confirm reliability and function of individual components or complete assemblies
- Confirm design margin of part for production

Non-destructive testing such as proof pressure testing is common in production settings that require every part to be tested prior to being distributed or used in an assembly. Aerospace, defense, automotive, and medical companies often have sensitive components that need to be tested prior to use. Proof pressure testing may give a component the seal of approval you need indicating the component can endure the required workload and will endure a pressure at or above normal operating pressure without deformation, bursting or leaking.

Our comprehensive test report includes:

- An outline of the testing objectives
- The tools and equipment used to conduct the test
- The test set-up and procedure, including photographs of how the setup was completed. In most cases, video recording of the test is also possible.
- Results, including pressure plots, data tables, comments and observations made while conducting the test
- Failure photos showing failure locations
- Calibration certificates



Here is a typical pressure versus time plot that will be provided in a test report. This test component survived the minimum proof pressure of 33,000 psi for 60 seconds without leakage or failure. This is shown in the graph through the consistently flat line at the top and the 'passed' test result at the bottom.

FIXTURE DESIGN & FABRICATION

Are you a design or quality engineer who needs to have a component burst, leak, proof or pressure fatigue tested? We work with customers across many industries including Aerospace, Automotive, Chemical, Defense, Medical and Oil & Gas, that require us to design sealing technologies. These sealing designs could be for a specific application like autofrettage of fluid ends for hydraulic fracturing, adapters that will connect your samples to our high-pressure testing equipment, holding fixtures to constrain the endpoints of a part for pressure testing, or a complete sealing fixture to burst test a component.

If your company has fabrication capabilities, we can develop the design of a sealing fixture that you build in-house, or we can have the fabrication completed by our trusted local ISO 9001:2015 registered machine shop. Here are photos of some of the fixtures designed and fabricated by Maximator Test.



About Us

We were founded in 2008 to provide specialized testing of high-pressure components. We offer Proof, Leak, and Burst Testing up to 145,000 psi, Pressure Fatigue / Impulse Testing to 65,000 psi at 15 Hz, and Autofrettage to 145,000 psi.

In April of 2022, we joined the MAXPRO Technologies Companies and are looking forward to continuing our tradition of excellence in high-pressure testing.

Contact us today to discuss your high-pressure testing requirements.



CONTACT US

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RESOURCE LIBRARY

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