

ENVITEST LABORATORIES PRIVATE LIMITED

Test. Validate. Identify. Improve.

A Philosophy for Building Better, More Reliable Products

The tagline of Envitest Lab is “**Empowering Products.**” It is a strong and positive expression, but as we reflected on what we truly do, we realised that our role goes much deeper than simply empowering a product. Along with testing services; we are contributing to the engineering process that helps products become more reliable, robust and fit for their intended purpose.

Testing is often viewed as an activity performed at the end of product development—a final checkpoint before a product moves to the next stage. But testing can and should be much more than that. A test is an opportunity to understand how a product behaves under defined conditions, whether it performs as intended, where its weaknesses lie and what can be done to improve it rather than just checking compliance.

When testing is approached as an engineering tool, the value extends far beyond a pass-or-fail result. The data generated during testing can provide valuable insight into product behaviour, design limitations, material

performance, manufacturing processes and potential failure mechanisms. It can help engineers make informed decisions based on evidence rather than assumptions. This thinking led us to a philosophy that better represents what we do and, more importantly, why we do it: “**Test. Validate. Identify. Improve.**”

Four simple words, but together they describe a continuous engineering journey. Test to understand product behaviour. Validate to build confidence that the product meets its intended requirements. Identify weaknesses and areas where the product can be strengthened. And finally, Improve by turning test results and engineering insights into better design, better performance and greater reliability..

The process does not necessarily stop when a product achieves a PASS. Instead, every meaningful test result can become an input into the next stage of engineering. The objective is not simply compliance. It is better performance, greater reliability and higher confidence..

Test Better. Find Failures Before the Market Does.

Test is where the journey begins. Every product tells a story when it is tested. Whether it is exposed to vibration, temperature, humidity, shock, environmental conditions, electromagnetic interference or stress, testing helps us understand how the product responds under defined conditions. A meaningful test is not simply about following a standard. It requires understanding the product, its intended application, operating environment and boundary conditions, and then creating conditions that provide meaningful engineering insight.

Validate is about building confidence. Testing should answer a fundamental question: does the product perform as it is intended to perform? Validation provides evidence that the product meets its specified requirements and can perform reliably under defined conditions. It connects engineering design with real-world expectations and enables manufacturers to make decisions based on evidence rather than assumptions.

Identify is about finding weaknesses before they become failures in the field. A test that reveals a failure is

not necessarily a bad result. In many cases, it is the most valuable outcome of the test. Failures, deviations and unexpected behaviour provide information. They help engineers identify weaknesses in design, materials, manufacturing processes, interfaces or operating conditions. Finding these weaknesses in a controlled environment creates an opportunity to address them before they affect customers, safety, reliability or business performance.

Improve is ultimately where the real value of testing lies. The information generated through testing should go back into engineering—to modify, strengthen, redesign and optimise the product. Testing therefore becomes part of a continuous feedback loop, where every test provides learning and every learning contributes to a better product.

At Envitest, we believe our responsibility is to contribute to the engineering journey—to help our customers understand their products better, make informed decisions, solve problems and improve reliability. ...



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SPECIAL POINTS

New Salt Spray Chamber Added – Expanded Envitest Lab’s corrosion and environmental testing capability by adding 500L cyclic corrosion chamber with temperature and RH control.

First UL 50E Water Test – Successfully conducted the Automated Water Test (Method A) as per UL 50E, 1st Ed., Clause 8.4.2.1.2 on a customer sample...



Environmental & Climatic Testing of Connectors – From Compliance to Confidence

Connectors may appear to be simple components, but in real-world applications they are critical interfaces that must maintain mechanical integrity, electrical continuity and sealing performance throughout their intended life. Exposure to temperature, humidity, moisture, dust, water, fluids and repeated environmental cycles can gradually degrade connector performance and eventually become a system-level failure.

At Envitest Lab, we understand that environmental testing is not simply about obtaining a pass/fail result. Our objective is to help customers evaluate whether their connectors and products are robust enough to withstand their intended operating environment and service life.

The IEC 60512 series provides a structured framework for evaluating the mechanical,

electrical, climatic and functional performance of connectors. It covers a wide range of test methods addressing electrical continuity, contact performance, mechanical operation, climatic exposure and environmental protection. These standardised methods enable consistent evaluation of connectors from different manufacturers and provide a common basis for assessing reliability, durability and performance.

At Envitest Lab, our focus is to provide technically meaningful testing that helps customers move beyond basic compliance toward product robustness and deployment confidence.

We support customers in evaluating products against the stresses they are expected to face during their operational life, with objective results. Because the real question is “Can the connector reliably perform its intended function throughout its deployment life?”

At Envitest Lab, we help customers develop a test programme based on the actual application environment and expected mission profile, rather than simply testing against generic conditions. Test. Validate. Identify. Improve – Empowering Products...

Beyond the Test – Understanding Failure

Our approach is not limited to “test and issue a report.” Where required, environmental testing combined with appropriate electrical, mechanical and functional measurements to understand:

- ◇ What changed after environmental exposure?
- ◇ Did contact resistance increase?
- ◇ Was insulation performance affected?
- ◇ Did sealing performance deteriorate?
- ◇ Were there signs of corrosion or material degradation?
- ◇ Did mechanical operation change?
- ◇ What potential failure mechanism has been revealed?

Envitest Lab: Climatic Sequence – IEC 60512-11-1: Compliance to Deployment Confidence

Envitest Lab is technically equipped to support climatic sequence testing as per IEC 60512-11-1, as applicable to the product and test specification. Climatic exposure can reveal degradation that may not be visible during normal operation. Temperature variations, humidity and repeated environmental exposure can affect contact resistance, insulation properties, seals, materials and mechanical interfaces.

At Envitest Lab, we can support the required pre-test and post-test electrical and functional evaluations, helping customers identify whether environmental exposure has caused measurable degradation.

Sealing and Water Exposure – IEC 60512-14-7: For connectors used in automotive, industrial, outdoor, defence and other demanding applications, protection against water and environmental ingress is critical. Envitest Lab can support sealing and water-impact related testing in accordance with IEC 60512-14-7, based on the applicable product requirements.

Our approach is to evaluate not only whether water reaches the protected interface, but also whether the connector continues to meet its required functional and electrical performance after exposure.

Temperature, Moisture and Environmental Stress: Environmental qualification should not be limited to checking the highest and lowest temperatures. Products experience continuous transitions and combina-

tions of environmental stresses during their actual service life. Temperature cycling can create expansion and contraction between different materials, potentially affecting contact pressure, seals and mechanical tolerances. Humidity and condensation can accelerate corrosion and influence insulation performance. Repeated environmental exposure can progressively weaken materials and sealing systems.

Envitest Lab's environmental testing capability enables customers to evaluate these effects under controlled and repeatable laboratory conditions.

Dust, Water and Fluid Exposure: Connectors deployed in automotive, industrial, construction, mining, defence and outdoor environments may be exposed to dust, sand, water, oils, fuels, coolants and other fluids.

Such exposure can affect seals, polymers, coatings, contacts and mechanical interfaces. Environmental testing helps determine whether these materials and construction features can withstand the expected conditions without compromising product performance.

The underlying philosophy is important: A climatic sequence exposes the connector to a combination of environmental conditions to assess product response to climatic stresses. Environmental exposure can alter characteristics, and subsequent testing reveal if affect its electrical or mechanical performance....



Beyond Compliance: From Product Development to Product Survivability

Almost everyone looks at Product Lifecycle Management (PLM) as a simple sequence: **Design → Development → Process → Productivity → Cost → Delivery.** But somewhere in this journey, many organisations forget some of the most important aspects of a product's real life—reliability, sustainment, survivability. A product is not truly successful simply because it has been designed correctly, developed on schedule, manufactured efficiently, delivered at the right cost and accepted by the customer. The real test begins when the product is deployed and exposed to its actual operating environment. How long will it survive? What is its expected life? What are the predictable failure modes? What happens when an unpredictable failure occurs? Can the failure be detected before it becomes critical? Can the product be repaired, maintained, upgraded and sustained throughout its intended life? These are not questions that should be asked after delivery; they are fundamental PLM questions.

Unfortunately, testing is still often treated as the final gate—primarily to prove compliance or obtain a test report. Testing should be an engineering function that continuously feeds information back into design, development and manufacturing. Testing should help engineers understand “how, why and when a product can fail”, and what can be done to make it better. The objective should not simply be to make a product pass the test; it should be to build confi-

dence that the product will survive its intended life and operating environment.

The first field failure is often when organisations realise. Questions arise: Why did it fail? Why was this not identified during development? How many products are affected? Can the failure be reproduced? What is the corrective action? How long will it take? What will it cost? But the impact of a failure goes far beyond repair costs and schedule delays. It can affect customer confidence, engineering progress, production plans, reputation and, most importantly, trust. Once a customer experiences failures, a constant fear enters the relationship: Will it fail again? That uncertainty can be far more expensive than the original failure itself.

A mature PLM approach therefore needs to look at the complete product lifecycle—from design and development through testing, qualification, reliability, deployment, operation, maintenance, sustainment. Testing should not be positioned at the end of this chain as a gatekeeper; it should be treated as “another arm of PLM”, working alongside design, development, manufacturing. The earlier we understand the possible failure modes, their probability and their consequences, the greater our ability to prevent, predict, detect and manage them. We cannot eliminate every failure, but we can engineer products to be more tolerant, more reliable and more maintainable.

Pre-Compliance Testing Makes a Product More Deployment-Ready

Finds Problems Early: Identifies design weaknesses before certification or field deployment, when changes are still easier and cheaper to make.

Improves Product Robustness: Tests the product against vibration, shock, temperature, humidity, EMI/EMC and other real-world stresses to make it physically and electrically stronger.

Reveals Hidden Failure Modes: Helps identify failures that may not appear during normal operation but can occur under extreme or combined conditions.

Reduces Certification Risk: Pre-compliance testing highlights areas where the product may fail formal certification, reducing surprises during the final test.

Validates Design Margins: Shows how much margin the product has beyond the minimum requirement instead of simply confirming that it passes.

Improves Reliability in the Field: Simulating deployment conditions helps engineers understand how the product will behave over time and under repeated environmental stress.

Reduces Cost and Rework: Finding a problem during development is significantly easier and less expensive than redesigning a product after production or responding to field failures.

Builds Confidence Before Deployment: Ultimately, pre-compliance testing gives engineering teams greater confidence that the product is ready for certification, production and real-world deployment.....

Sine-on-Random (SoR) vs Random-on-Random (RoR)

1. Vibration Composition:

Sine-on-Random (SoR) combines one or more discrete sinusoidal tones with a broadband random vibration background, while Random-on-Random (RoR) combines narrow-band random vibration peaks with a broadband random background.

2. Real-World Simulation:

SoR is typically used to simulate rotating machinery, gear meshing, engine orders and imbalance, whereas RoR represents more complex environments such as aerodynamic buffeting, acoustic-induced vibration and multiple fluctuating vibration sources.

3. Control & Measurement:

In SoR testing, the sine component is controlled by its acceleration level while the random component is defined using PSD (g^2/Hz). In RoR, both the broadband and narrow-band components are controlled through PSD profiles.

4. Failure & Damage Potential:

SoR can create highly concentrated fatigue at specific frequencies along with broadband fatigue, while RoR produces more distributed fatigue from continuously varying narrow-band energy. Both provide a more realistic assessment of product robustness than conventional single-mode vibration testing.

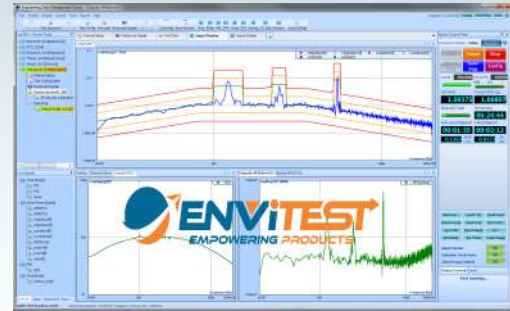
Mixed-Mode Vibration Testing – Simulating Real-World Dynamics

At Envitest Lab, we are technically equipped to perform Mixed-Mode Vibration Testing in accordance with IEC 60068-2-80, designed to evaluate product robustness under complex and realistic vibration environments.

Unlike conventional vibration testing using only sine or random profiles, mixed-mode vibration combines different vibration components to replicate the dynamic conditions experienced during actual operation. This includes Sine-on-Random (SoR), where deterministic sinusoidal components, superimposed on broadband random vibration, and Random-on-Random (RoR), where additional narrow-band random components combined with a broadband random. Such environments are particularly relevant to demanding applications such as helicopter transmissions, tracked vehicles,

aircraft and jet engines, where products experience multiple vibration simultaneously.

This testing helps identify resonance, fatigue, structural weaknesses, mounting issues and functional failures that conventional sine or random vibration testing may not reveal. At Envitest Lab, we focus on real-world vibration simulation to improve product robustness, reliability and survivability.



Quality Needs Feedback, Not Just Agreement!

At Envitest Lab, we believe Quality becomes stronger when people are encouraged to speak up, question decisions and provide honest feedback. Quality is not about everyone agreeing; it is about creating an environment where a team member can confidently say, "This is not right," "The process is not being followed," or "There is a risk here." Such feedback are welcomed. When people are afraid to question or report concerns, small deviations can be-

come bigger problems, root causes missed and opportunities for improvement lost. We encourage constructive feedback based on facts, evidence and the intent to improve. The purpose is not to find fault, but to strengthen our processes, QMS and customer confidence. At Envitest Lab, we want our team to have the courage to speak the truth—even when it is uncomfortable—because good feedback today can prevent a bigger failure tomorrow.....

QMS Is the Muscle That Makes Quality Move !

A muscle does not exist merely to look strong. Its primary purpose is to generate force and produce movement through continuous contraction and relaxation. In the same way, a QMS should not exist merely as a set of procedures, documents, forms, or certificates. Its real purpose is to generate discipline, drive action, control processes, identify weaknesses, and move the organisation towards continuous improvement.

A strong QMS creates the force required to convert quality objectives into everyday actions. It ensures that responsibilities are de-

fined, decisions are controlled, deviations are identified, problems are investigated, corrective actions are implemented, and lessons are fed back into the system. Just as an unused muscle becomes weak, a QMS that is not followed gradually loses its effectiveness. Procedures become paperwork, CA become routine, and lessons from failures are forgotten.

A healthy QMS must therefore be exercised continuously—through audits, testing, reviews, root-cause analysis, risk assessment, customer feedback, failure investigation, training, and preventive action.

The Missing Skill in Our Education System: Documentation

If one wants to become successful in professional life, one skill to develop early is documentation. Our Education System must push the documentation in curriculum.

We often focus on doing the work, completing tasks and achieving targets, but forget to document what we have done. Documentation is a powerful professional habit. Document what you worked on, what you learned, and this creates a record of your experience and helps you avoid repeating the same mistakes.

Good documentation makes contribution visible. What you document today can become a reference for you tomorrow. It teaches discipline, clarity and structured thinking. If you

cannot explain what you did, why you did it and what the outcome was, you may not fully understand your own work.

Documentation is not unnecessary paperwork, rather capturing knowledge and experience. When you document your work, you can look back and understand your decisions, identify patterns, avoid repeating mistakes and improve your performance. It also helps you explain your contribution clearly to your manager, customer or team. A good professional should be able to answer:

What did I do? Why did I do it? What was the result? What did I learn? What should I do differently next time?



If we want to build globally competitive professionals, we must teach our children not only to work, but also to record, document and communicate their work. Good work creates value; good documentation preserves, demonstrates and multiplies that value.

Gemba Walk: The Questions Were More Interesting after the Post !!

After I wrote about Gemba Walk last week, I was pleasantly surprised by the discussions that followed.

Many asked me, "Have you implemented it?" Others asked, "Who should implement it?" Some wanted to know whether someone could provide consultation for implementation, while many asked me to share the checklist.

I was genuinely happy to see these questions. It showed me something important: we Indians are hungry for knowledge and improvement. People are interested to understand how to implement it, who should own it, what to observe and how to make it work in their organisations.

If we want our organisations, processes and products to achieve global acceptance, we need to continuously learn, adapt and improve ourselves. We cannot simply adopt global practices as terminology for presentations. We need to understand the philosophy behind them and implement them meaning-

fully. However, implementation needs to be approached carefully. Gemba Walk should complement the existing QMS, not create another parallel system. If implemented without considering the existing processes, responsibilities and controls, it can create duplication, confusion and unnecessary friction.

The objective should be simple: use Gemba to strengthen the QMS and improve the way work is actually performed. A successful Gemba Walk is not merely completing a checklist. It is about going to the workplace, observing the actual process, talking to the people doing the work, identifying gaps and converting observations into meaningful corrective and improvement actions.

The enthusiasm and questions from the community are encouraging. Now the real challenge is turning knowledge into disciplined implementation and measurable improvement. Have you implemented Gemba Walk in your organisation? What worked—and what challenges did you face?

Principles of Gemba Walks

 Go to the source - Go see

 Process-Focused

 Employee Engagement

 Respect for People

  Problem-Solving



Our Services

- ◇ Climatic Simulations
- ◇ Dynamics & Vibration
- ◇ Contamination and Ingress
- ◇ Materials / Metallurgical Testing
- ◇ Aircraft Electrical Testing
- ◇ Electrical Safety Testing
- ◇ Optical Fibre Cable Testing
- ◇ Optical Fibre Connector Testing
- ◇ Telecom Interface Testing
- ◇ Electrical Cables Testing
- ◇ Electrical Connectors Testing
- ◇ International Approvals
- ◇ Customized Tests
- ◇ Engineering Services

Envitest Laboratories continues its journey with renewed energy, sharper focus, and an even stronger commitment to empowering products through reliable and precise testing.

What began in 2017 at Bangalore Electronic City as a focused testing facility has today evolved into a multi-location organization, serving industries with agility, scale, and deep technical expertise.

Operating across three strategic locations, Envitest is now better positioned than ever to support customers with faster turnaround times, enhanced capacity, and a wider spectrum of testing capabilities. This expansion reflects not just growth in infrastructure, but our intent to stay closer to our customers and their evolving needs.

In a world where products are becoming smarter, more connected, and more demanding, testing can no longer be generic. At Envitest, we align our capabilities with real-world application needs—whether it is electronics, telecom systems, or complex environmental validation. From optical fiber and connectors to advanced telecom systems and rugged industrial products, we ensure performance, reliability, and compliance across diverse domains.

Our environmental testing capabilities continue to push boundaries—simulating real-life conditions through vibration, thermal cycling, humidity, ingress protection, corrosion, and more. Every test we conduct is driven by one goal: to ensure that products don't just pass standards, but perform in reality.

What sets Envitest apart is not just infrastructure, but mindset. A customer-first approach, attention to detail, and commitment to quality define everything we do. As we move forward, we remain focused on enabling industries to launch safer, more reliable, and high-performing products.

This year, we don't just aim to grow—we aim to raise the standard.

Empowering Products. Elevating Standards. Enabling Confidence.

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- ⇒ TEC Recognised Lab – Certificate # TEC/MRA/CAB/IND-D/91