

ENVITEST LABORATORIES PRIVATE LIMITED

Envitest Lab — Testing Beyond Compliance.

The Right Test Matters More Than the Number of Tests— Test the Product, Not the Test Standard

“We want to test the product as per the full standard.”

This is something we hear quite often at Envitest Lab. It is the safest approach. After all, if a standard specifies a list of tests, why not perform all of them? But an important question is: Does the product actually need every test mentioned in the standard? Standards provide structured framework for evaluating products under defined conditions. However, products differ significantly in their design, construction, materials, intended application, installation environment and operating conditions. Applying every test blindly can result in unnecessary cost and time, while potentially missing tests that are actually important for the product.

A standard is not a checklist. A particular standard may cover different applications, environments or product configurations. Some tests may be mandatory, while others may be optional, conditional or application-dependent. A test being listed as optional does not automatically mean it is unimportant. It means engi-

neering judgement is required to determine whether that test is relevant to the product.

The Foreword, Introduction and Scope of a standard are also important. These sections often provide guidance on how the standard is intended to be applied and which requirements may need to be selected or tailored based on the product and its intended application. Therefore, before starting the test programme, it is worth asking: What does this standard actually require for our product, and which tests address the real risks associated with its use?

At Envitest Lab, we believe testing should start with the product and its application. We look at where the product will be used, the environmental and operating conditions it will experience, the stresses it will encounter and the ways in which it could potentially fail. This helps identify the tests that are essential, application-specific, required for compliance and those that can provide additional reliability information... ..

Proper Tests + Better Selection + Correct Test Severity + Accurate Evaluation = Better Engineering Confidence.

The opposite can also happen. Sometimes spend significant time and money carrying out tests that have little relevance to the product’s actual application, while missing critical tests simply because they are not mandatory under the standard.

A product used in a harsh industrial environment, for example, may be exposed to vibration, temperature changes, humidity, dust, water, corrosion or mechanical shock. But the importance of each test depends on where and how the product is installed and operated. A product exposed to continuous vibration may need a detailed vibration programme, while another product in a controlled environment may have very different priorities. Similarly, a product used outdoors may require greater attention to water, humidity, UV exposure and corrosion.

This is why understanding the product, its application and its actual operating environment is essential. The right approach is identify the actual stresses and possi-

ble failure modes and then select the tests that can effectively demonstrate its ability to withstand them.

All testing does not automatically mean better testing. A large test report containing numerous tests that have little connection to the product’s application may provide less engineering value than a focused test programme addressing the product’s key risks. Testing should not become an exercise in completing a checklist simply because the tests appear in a standard.

The objective should be to select tests that provide meaningful evidence of product performance, reliability and safety. This requires balancing compliance requirements with engineering judgement and real-world application conditions.

Ultimately, the question should not be “How many tests can we perform?” but rather “Which tests will give us the confidence that this product will perform reliably in the environment where it will actually be used?”.. ...



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SPECIAL POINTS

Participated in SIDA, connecting with many new thinkers, exchanging ideas and identifying several new business and collaboration opportunities.

Expanded our testing capabilities to support more complex products, challenging test requirements and a wider range of customer applications.

Beyond the Profile: Envitest Lab's Expertise in MIL-STD-810 Vibration



At Envitest Lab, we have developed strong expertise in understanding and applying the philosophy of MIL-STD-810 Method 514 – Vibration. For us, vibration testing begins with understanding the product and its real-life environment.

When a customer asks, “Can you test this as per MIL-STD-810 vibration?”, our first questions are: Where will the product be used? How will it be transported? How will it be mounted? What vibration will it experience during its life cycle? What are the critical operating conditions?

Based on these inputs, we identify the most relevant vibration environment and test profile. Our experience covers understanding different vibration categories, PSD profiles, frequency ranges, test durations, mounting conditions and three-axis requirements. This

practical approach helps avoid both unnecessary over-testing and inadequate testing.

What makes this capability stronger is our focus on continuous knowledge sharing. At Envitest Lab, engineers and technical teams regularly discuss test requirements, profile selection, test observations, product failures and lessons learned from actual projects. This helps convert individual experience into collective technical knowledge. We believe that expertise should not remain within us. Our engineers actively share their understanding and practical experience with peers, customers and the testing community, helping others understand to conduct a test.

For us, MIL-STD-810 is not simply a checklist of profiles. It is about understanding the product, its environment and the evidence required to demonstrate reliability.

MIL-STD-810 is a framework for understanding environmental stresses and developing a test program that represents the product's real service life. The scope specifically describes the standard as supporting environmental tailoring to achieve realistic materiel designs and test methods based on performance requirements....

The four procedures

Procedure I – General Vibration: Used for equipment subjected to vibration while installed, transported or secured to a vibration-producing platform.

Procedure II – Loose Cargo Transportation: Addresses equipment transported as loose cargo, where the item can experience a substantially different vibration.

Procedure III – Large Assembly Transportation: Addresses large assemblies where transportation vibration may need to be evaluated using actual vehicle or proving-ground conditions.

Procedure IV – Assembled Aircraft Store Captive Carriage and Free Flight: Addresses applicable aircraft-store environments, including captive carriage and free-flight conditions.

Combinations and Tailoring Possibilities in MIL-STD-810 Method 514

One of the most important aspects of MIL-STD-810 Method 514 – Vibration is that it is not designed around a single fixed test profile. The standard provides a framework from which engineers can select and tailor vibration environments based on the product's actual life cycle, transportation conditions, installation and operational environment. This makes the possible test combinations extremely broad.

The first level of tailoring comes from the relationship between procedures and environmental categories. Different categories represent different vibration environments and are associated with appropriate test procedures. For example, secured cargo transported in a vehicle represents a different environment from loose cargo, aircraft transportation or equipment operating on a platform. The test engineer therefore needs to establish the product's actual exposure before deciding which procedure and category are relevant.

The second level involves the selection or combination of vibration profiles. A product may experience several different environments during its life. Consider an electronic system that is transported by road, subsequently transported by aircraft and finally installed in a military vehicle. Each stage may expose the product to a different vibration spectrum. Rather than treating each exposure independently, engineers may evaluate the applicable environments and, where technically justified, develop an appropriate

envelope or tailored profile representing the required life-cycle exposure.

Creating an envelope should ensure selecting the best profile and combining them. The frequency range, PSD levels, duration, mounting condition and actual exposure need to be considered. An unnecessarily severe envelope may introduce unrealistic stresses and produce failure mechanisms that the product would not experience in service. Good tailoring therefore requires engineering judgement. Tailoring can become even more complex when vibration is considered together with other environmental stresses. In real service, a product experiences vibration simultaneously with temperature changes and other environmental conditions. The overall test programme be structured to represent the product's actual life-cycle.

At Envitest Lab, this is where engineering judgement becomes important. Instead of asking only “Which MIL-STD-810 profile should we run?”, we believe the first question should be: “What will this product actually experience throughout its life?”

From there, the relevant environments can be identified, evaluated and translated into a practical and technically justified test programme. The objective of tailoring is not to create the most severe test possible. It is to create the most relevant test possible—one that provides meaningful evidence of how the product will perform in its intended environment.



One Product, Infinite Stress: Why Environment and Application Define Dynamic Compliance

Why Application-Specific Qualification Matters. At Envitest Lab, we routinely observe that standardizing a hardware platform across multiple applications does not ensure consistent field performance. Reliability is determined not by the component itself, but by the operating environment and mission profile.

Consider a sealed Electronic Control Unit (ECU). In a commercial electric vehicle, the dominant stressors are low-frequency road-induced vibration, structural fatigue, and repetitive thermal cycling. Qualification testing therefore focuses on durability under prolonged mechanical and thermal loading.

When the same ECU is deployed in a tactical UAV, the environment changes significantly. The unit must withstand broad-band random vibration, launch and landing shock, and rapid temperature transitions caused by altitude variations. These conditions introduce failure mechanisms rarely encountered in automotive applications, including resonance, connector discontinuities, and shock-induced structural damage.

In stationary power and utility infrastructure, dynamic loads are largely replaced by environmental exposure. High humidity, UV radiation, condensation, contamination, and temperature extremes become the primary reliability risks. Corrosion, moisture ingress, insulation degradation, and material aging often dominate failure

analysis.

Compounding these challenges are varying industry requirements. Automotive, aerospace, defense, and utility sectors each operate under different reliability targets, safety margins, and regulatory frameworks. As a result, a qualification program that is adequate for one application may be insufficient for another.

Generic validation standards frequently fail to replicate real-world stress combinations such as multi-axis vibration, acoustic loading, thermal shock, humidity exposure, and ice or frost accretion. These untested interactions can create latent weaknesses that remain undetected until field deployment.

Effective qualification therefore requires application-specific environmental profiling rather than one-size-fits-all testing. By accurately simulating actual operating conditions, manufacturers can identify vulnerabilities early, improve design robustness, and reduce lifecycle risk.

At Envitest Lab, we believe environmental testing should go beyond compliance. True qualification is achieved only when test conditions faithfully represent the real-world stresses a product will encounter throughout its service life. This approach ensures reliable performance, minimizes operational failures, and enables confident deployment across diverse industries...

Ways Reliability Improves with Application-Specific Qualification Approach

Early Identification of Design Weaknesses: Testing against actual mission profiles exposes vulnerabilities that standard qualification often misses, enabling corrective actions before production.

Reduced Field Failures: Products validated under realistic operating conditions are significantly less likely to experience unexpected failures after deployment.

Improved Reliability and Service Life: Understanding true stress drivers allows engineers to enhance mechanical, electrical, and environmental robustness, extending product lifespan.

Higher First-Pass Qualification Success: Designing for actual environmental requirements reduces costly redesign cycles and repeated testing efforts.

Better Risk Management: Products can be engineered with safety factors tailored to automotive, aerospace, defense, or industrial requirements instead of relying on generic assumptions.

Lower Total Cost of Ownership: Reduced warranty claims, maintenance interventions, downtime, and replacement costs contribute to substantial lifecycle savings.

Improved Compliance and Customer Confidence: Application-specific validation demonstrates that the product is qualified for its intended operating environment, strengthening regulatory compliance and customer trust.

Faster Deployment Across Multiple Markets: A structured environmental profiling approach enables efficient adaptation of a common platform for different industries while maintaining reliability and performance.....

Common Standards for Temperature Rise Testing

Temperature-rise requirements appear in a wide range of international and national standards, depending on the product type, construction, intended application and applicable safety requirements. Some commonly encountered standards include:

- * **IEC 60335-1** – Safety of household and similar electrical appliances.
- * **IEC 62368-1** – Safety requirements for audio/video, information and communication technology equipment, including business and office machines, with rated voltages up to 600 V.
- * **IEC 60601-1** – General safety requirements for medical electrical equipment and systems.
- * **IEC 61010-1** – Safety requirements for electrical equipment used for measurement, control and laboratory purposes.
- * **IEC 60884-1** – Requirements for plugs and socket-outlets for household and similar applications.
- * **IEC / IEEE / IS Standards** – Product-specific requirements for electrical equipment such as transformers, switchgear, power assemblies and other high-power equipment, including relevant requirements under the IS 2026 series for transformers..

200+ Temperature Sensors. One Test. A Complete Thermal Picture.

When an electronic product operates under load, temperature can vary significantly across different components and locations. A single temperature measurement may show that one point is within limits, but not reveal what is happening in totality. So multi-point temperature measurement becomes important.

At Envitest Lab, we have the capability to measure 200+ temperature sensors simultaneously during a single test, giving engineers a comprehensive view of the product's thermal behaviour.

“Temperature Rise” testing helps verify whether components, connections, insulation, enclosures and other critical areas remain within their specified temperature limits during normal or rated operating conditions. By monitoring hundreds of points at the same time, we

can identify hot spots, temperature distribution and variations between different parts of the product. This capability is valuable for complex electrical equipment where heat is generated at multiple locations. The recorded data can also help engineers investigate unexpected temperature increases, evaluate cooling arrangements and identify areas that may require design improvement. .



Built to Last or Tested to Last?

One of my colleagues asked me: “Apple has launched the iPhone Duo. Would they have tested its durability? If yes, what is its MTBF?”

My honest answer was, “I don’t know.”

But thinking about it, I said that Apple products generally seem to last much longer than we expect. I have personally seen people still using iPhone 13, which is six years old.

So, have they tested it for durability and reliability?

I would assume yes. A product cannot consistently deliver long service life without extensive reliability engineering and validation behind it. The interesting part is real-world product life is influenced by usage, environment, maintenance, component ageing and many other factors. Sometimes, the best evidence of reliability is not a number on a test report, but a product that continues to work reliably years after it was expected to.

One Lab. One QMS. Everyone Responsible. !

QMS Is Everyone’s Responsibility. A Quality Management System is not the responsibility of Quality Department alone—it is everyone’s responsibility. In a testing lab, every activity affects quality: receiving samples, planning tests, operating equipment, recording results, preparing reports, maintaining records and communicating with customers. Everyone contributes to the effectiveness through their daily actions.

The Quality team can create procedures, conduct audits and provide guidance, but quality cannot be created by Quality team alone. All

teams must follow procedures, managers must ensure accountability, and every employee must report issues, maintain records, follow requirements and contribute ideas for improvement. For lab to prosper, the QMS must become part of our everyday culture. When everyone takes ownership of quality, the QMS becomes stronger, customer confidence grows, and the laboratory becomes stronger and more successful. When everyone owns quality, the QMS becomes stronger. When the QMS becomes stronger, the laboratory becomes more reliable, trusted and capable of growing.

Visvesvaraya Industrial and Technological Museum, Bengaluru

Every Visit, A Different Perspective. I have visited the Visvesvaraya Industrial and Technological Museum more than 50 times. For many, a science museum is a place to visit once, see a few experiments, take some photographs, and move on. For me, it has become something very different—a place I keep returning to. Every visit gives me a different perspective.

The experiments and exhibits may remain the same, but the questions in my mind keep changing. Something I looked at as a student may look completely different today. An experiment that once seemed simple can reveal a deeper principle when viewed through the

eyes of an engineer. Sometimes I look at the mechanism, sometimes the design, sometimes the failure possibilities, and sometimes I simply wonder how someone thought of building it that way. That, to me, is engineering.

Engineering is not just about knowing how something works. It is about observing, questioning, understanding, experimenting, and looking at the same problem from different angles. That is why I keep going back to this science extravaganza. The exhibits have not necessarily changed—but I have. And perhaps that is the greatest lesson of science and engineering: the more you learn, the more differently you see the same thing.

Sir M. Visvesvaraya remains a guiding light for every engineer who chooses innovation—not just showing us how to build, but inspiring us to think differently, solve boldly, and create for the progress of society.

“Listen” and “Silent”: A Lesson for Every QMS Professional !!

“Listen” and “Silent” are made from the same letters, but in a Quality Management System (QMS), both have very different and equally important meanings. Two Simple Words, One Powerful Quality Lesson

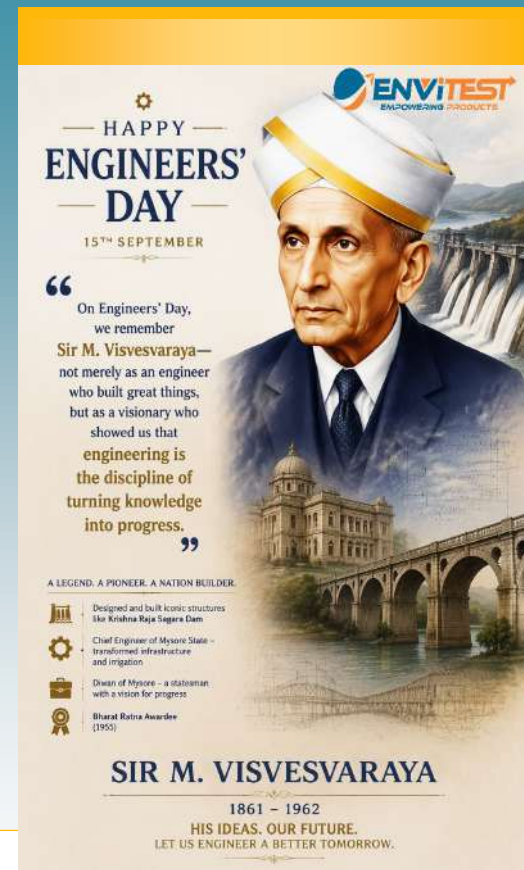
Many people think quality is about finding mistakes, giving instructions, or explaining procedures. But in reality, quality begins with listening. A quality professional must listen carefully to customers, technicians, operators, auditors, and colleagues. Every person sees the process from a different angle, and each perspective can provide valuable information. When we listen with patience and without bias, we understand the real problem instead of making assumptions.

Silence is also an important skill. Silence does not mean avoiding responsibility or ignoring issues. It means taking a moment to observe, think, and verify the facts before speaking. In many investigations, the first explanation is not always the correct one. A short pause allows us to collect evidence, understand the

situation, and make better decisions.

In QMS, emotions, opinions, and personal beliefs can sometimes influence judgment. A good quality professional learns to focus on facts and data. They understand the difference between what people think happened and what actually happened. They look beyond symptoms to find the true root cause of a problem. That is why these two words carry such an important message. We should listen to learn, stay silent to observe, and speak only when we have evidence. This approach improves communication, reduces misunderstandings, and helps teams solve problems effectively.

A strong and mature QMS is built who know when to listen, when to remain silent, when to ask the right questions, and when to speak with confidence backed by facts. In the end, quality is about discipline, patience, and understanding. The best contribution a quality professional can make is to listen more, talk less, and let the evidence speak.



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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- ⇒ NABL Accredited Laboratory – Certificate # NABL T0726KA18677 (In lieu of TC-7490)
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