

From Prototype to Fire - Certified Product

*A Startup's Journey Through India's Fire Safety
Certification Landscape*



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- Startup case study

FIRE SAFETY INSIGHTS

Quarterly Technical Bulletin

EN 45545

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Featured Story

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Introduction

There is a moment every product startup in India knows well. The prototype works. The investors are interested. The pilot customer is ready to sign. And then someone in the room asks the question that changes everything :

"Does it have fire certification?"

For founders building products destined for India's railway coaches, metro stations, defence vehicles, or commercial buildings, this question is not a formality. It is the gateway to every serious contract in the country. And for most startups, it is also the moment they realise they have absolutely no idea what fire certification actually involves - how long it takes, what it costs, what standards apply, or where in India they can even get it done.

This editorial is a detailed, honest account of the journey from prototype to fire-certified product in the Indian context - the stages, the standards, the setbacks, and the strategies. It is also the story of why India needed a laboratory like Prospec Labs, and what it means for Indian manufacturers that one now exists.



AGMARK
CERTIFICATION



FSSAI
CERTIFICATION



BIS
CERTIFICATION



ISI
CERTIFICATION



HALAL
CERTIFICATION

Certification Marks in India: Types & Importance

Why Fire Certification Is Not Optional

The regulatory and commercial reality facing Indian product startups today

Let us begin with a hard truth that many product founders learn too late: in India's highest-value procurement markets - railways, defence, metro infrastructure, commercial real estate - fire certification is not a value-add. It is a binary entry requirement. You either have it, or you are not on the tender.

The Research Design and Standards Organisation (RDSO), which governs all technical standards for Indian Railways, requires fire performance compliance for every material that goes into a railway vehicle - from the foam in a passenger seat to the cable conduit running beneath the coach floor. Since 2016, the European standard EN 45545-2 has become the globally accepted benchmark for railway fire safety, and India has adopted it as the reference standard for its own high-speed and metro rail projects. What this means practically is that an Indian manufacturer supplying interior components to a Vande Bharat coach, a Pune Metro trainset, or a DMRC rolling stock upgrade must have test reports from an accredited laboratory demonstrating EN 45545-2 compliance.

Until recently, there was a painful irony at the heart of this system. India had the procurement ambition - crores of rupees flowing into railway modernisation under programmes like PM Gati Shakti and the National Rail Plan - but almost no domestic testing infrastructure capable of certifying products to the standards required to win those contracts. Indian manufacturers were forced to send material samples to laboratories in Germany, France, or the United Kingdom, wait weeks for turnaround, pay in foreign currency, and then navigate the bureaucratic challenge of getting foreign test reports accepted by Indian procurement agencies.

The cost was not just financial. It was strategic. Every month spent waiting for an overseas test result was a month a foreign competitor - with a local testing lab and faster certification - could be using to build relationships, iterate on designs, and lock up the contract.

"The testing gap was costing Indian startups contracts they had every right to win."

This is the landscape into which Prospec Labs was built - not as a testing service, but as a strategic equaliser for Indian manufacturers. Founded by the ex-founders of Spectro Analytical Labs, who collectively carry over 50 years of experience in India's testing, inspection, and certification ecosystem, Prospec Labs is India's only dedicated EN 45545-2 fire testing laboratory. Its reports are recognised by Certifer France, one of the world's leading railway certification notified bodies, and it operates with RDSO approval - meaning its test results are accepted directly by Indian Railways procurement.

Key Standard

EN 45545-2 defines fire safety requirements for all materials used in railway vehicles. It covers 28 requirement categories (R1–R28) across three hazard levels (HL1–HL3), from surface materials and flooring to cables and seating assemblies.

The Anatomy of a Fire Test

What actually happens when your product enters the lab

Most founders approach fire testing with a vague mental image of a product being set on fire and someone watching what happens. The reality is considerably more systematic - and considerably more demanding. Fire testing under EN 45545-2 is not a single test. It is a family of tests, each targeting a specific performance parameter, each applicable to a specific category of material or component, and each evaluated against thresholds that vary depending on the hazard level (HL) assigned to the vehicle in which the product will be used. A material going into a commuter train that stops frequently and allows easy evacuation (HL1) faces less stringent thresholds than the same material going into a sleeper train operating through tunnels (HL3), where evacuation is slow and fire consequence is catastrophic. Understanding which tests apply to your product is the first - and often most misunderstood - step of the certification journey.



The five core test methods under EN 45545-2 — from cone calorimeter to FTIR toxicity analysis

The Core Test Categories

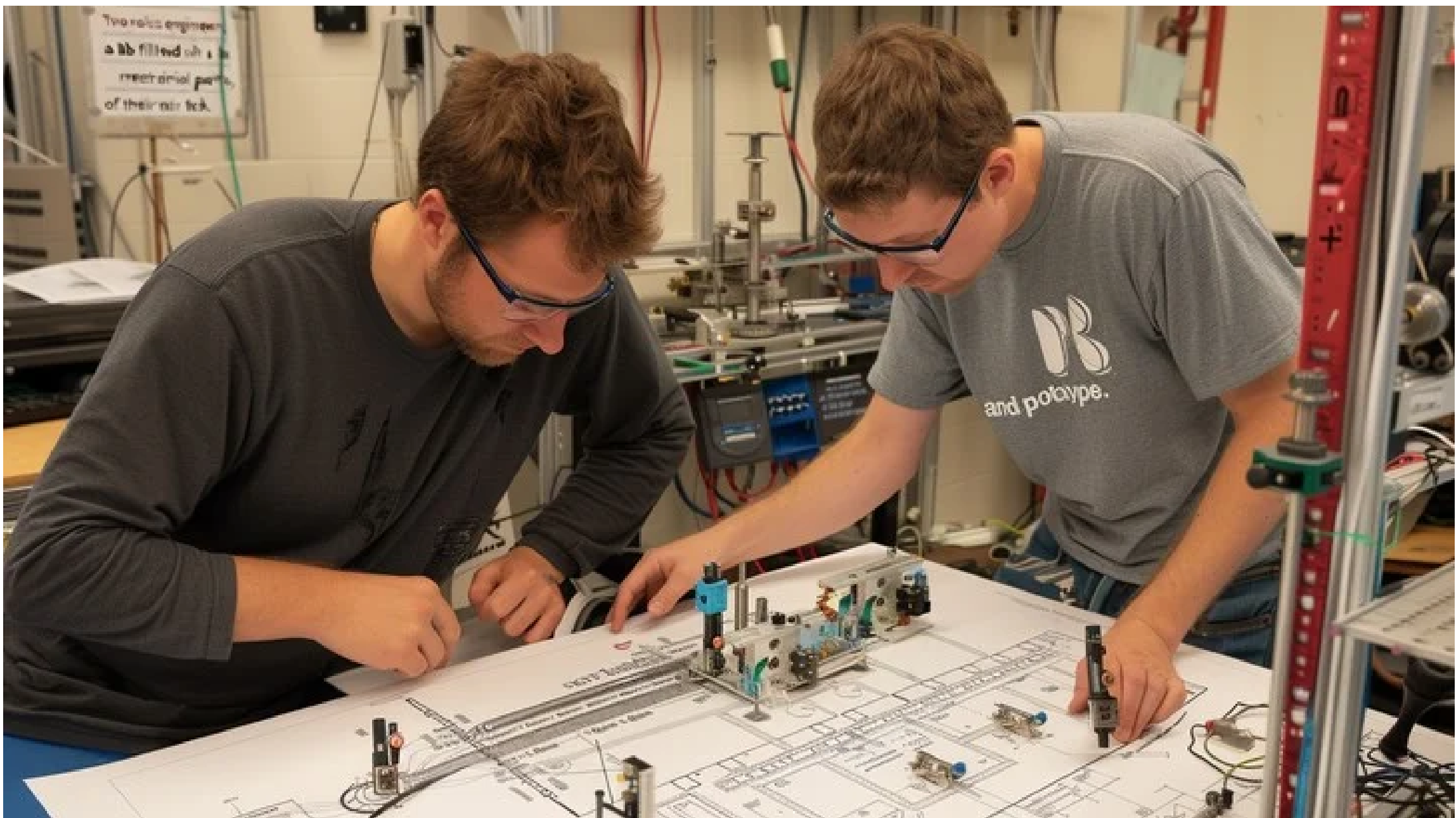
The EN 45545-2 standard organises its 28 requirement sets (R1 through R28) by product family. A startup making railway seat cushions will face a different set of requirements than one making cable management systems or flooring panels. The most commonly encountered tests include:

- **Heat release rate:** ISO 5660-1 Cone Calorimeter
- **Flooring flammability:** ISO 9239-1 Radiant Panel Test
- **Ignitability:** ISO 11925-2 Single Flame Source Test
- **Smoke density:** EN ISO 5659-2 Smoke Chamber Test
- **Smoke toxicity:** ISO 5659-2 with FTIR Analysis
- **Passenger seat assemblies:** EN 16989 Full-Scale Seat Test

Each of these tests requires specific sample sizes, conditioning periods (typically 72 hours at controlled temperature and humidity), and numbers of replicates. A startup that arrives at the laboratory with undersized or improperly prepared samples will face delays before a single test is even run.

28	HL1-3	72 hrs
Requirement sets R1-R28	Hazard levels determining thresholds	Minimum conditioning before testing

"A failed fire test is not the end of the road. But arriving with an untested formulation and expecting to pass first time is optimism the standard does not reward."



Free Engineering Prototype Development Image - Engineering,

Stage One - The Pre-Test Period

Where the real certification work happens, before anything is burned

The most expensive mistake a startup can make in the fire certification process is treating the laboratory as the starting point of the journey. It is not. The laboratory is where the journey is validated. The real work - the work that determines whether that validation succeeds or fails - happens months earlier, in the design lab, in conversations with material suppliers, and in the sometimes-uncomfortable process of stress-testing assumptions about what the product is actually made of.

Step 1: Identify Your Applicable Requirements

The first task is deceptively simple: determine which EN 45545-2 requirement numbers apply to your product. This requires knowing the product family (seat, flooring, wall panel, cable, insulation, etc.), the operating category of the vehicle it will be used in (OC1 through OC4), and the hazard level that category maps to (HL1, HL2, or HL3).

In practice, this mapping is not always obvious for a first-time applicant. A composite panel used on an interior wall might fall under multiple requirement categories depending on how it is finished and whether it faces passengers directly. Getting this mapping wrong early can result in conducting tests that are unnecessary, missing tests that are required, or - worst of all - receiving a test report that the procurement authority refuses to accept because the wrong requirements were addressed.

This is where a laboratory's expertise - its ability to advise, not just test - becomes commercially significant. Prospec Labs, working with founders from the very first enquiry, helps clients map their product to the correct requirement set before any samples are prepared. This pre-engagement advisory service saves startups weeks of misdirected effort.

Step 2: Audit Your Material Stack

Once the requirement mapping is complete, the next step is a full material audit. Every constituent of the product - the substrate, the core, the adhesive, the surface treatment, the finish coat, the fire retardant additive - must be identified, sourced, and documented. EN 45545-2 tests the assembled product as it will be used in service. This means substituting a cheaper adhesive after certification, or switching to a different supplier for the foam core, can invalidate the certification entirely.

For startups accustomed to the flexibility of iterative product development - where material substitutions are routine and documentation is informal - this requirement demands a significant shift in operating discipline. The material stack that enters the fire test laboratory must be the material stack that will be used in production. Full stop.

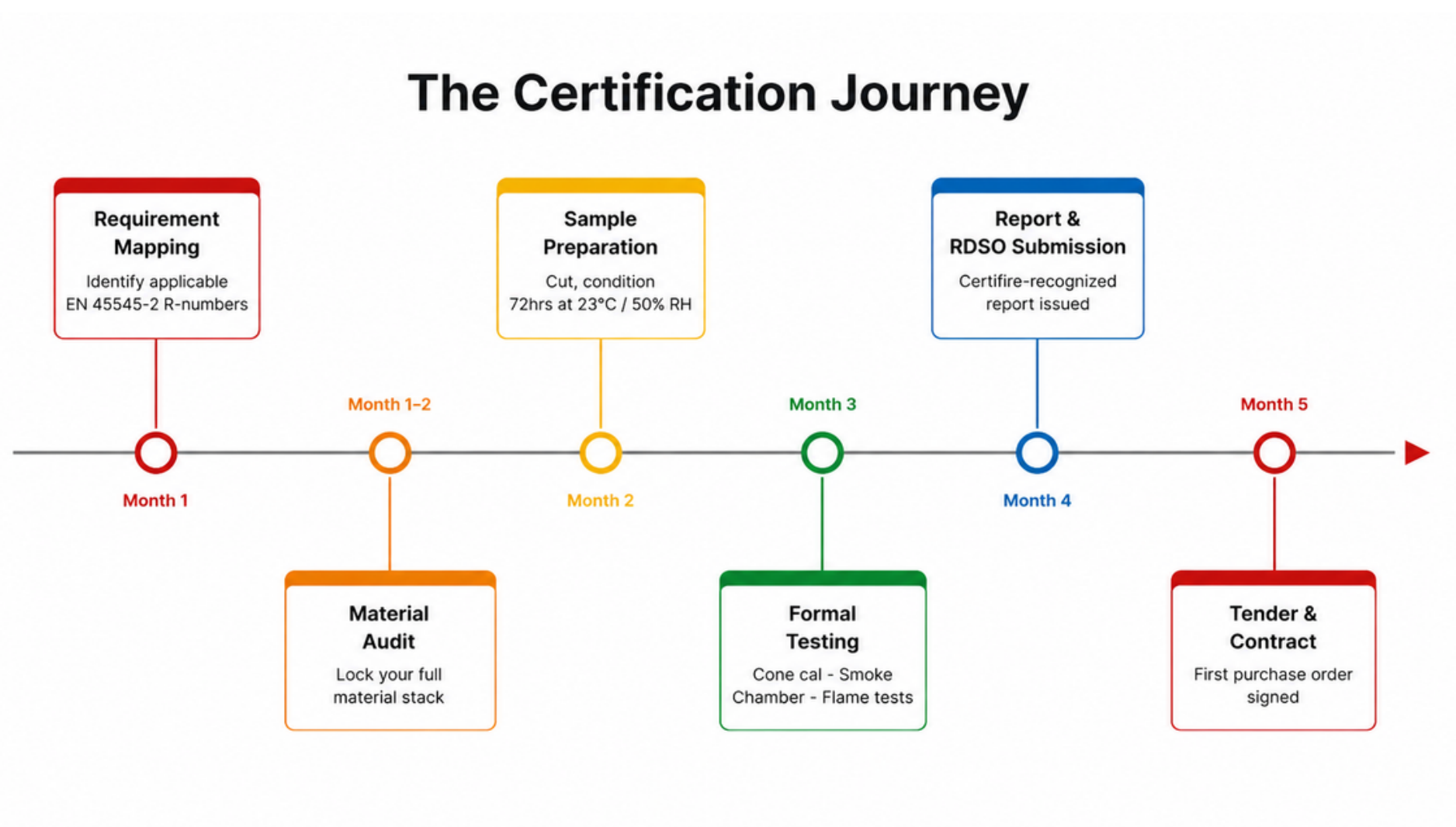
Critical Rule

Any material change after certification - even a supplier switch for the same specification material - requires a new assessment and potentially a new test. Build your supply chain before you certify, not after.

Step 3: Conduct Preliminary Screening

Before submitting for formal certification testing, experienced startups run informal screening tests - often using small-scale methods like the limiting oxygen index (LOI) or a simple Bunsen burner flame test - to get a directional sense of whether the current formulation is likely to pass or fail. These are not substitute for accredited testing, but they are useful filters that prevent wasting time and budget on a certification attempt with a formulation that is clearly inadequate.

Prospec Labs offers preliminary screening consultations precisely for this reason - to give startups honest, expert feedback on their material choices before they commit to formal testing. This is particularly valuable for founders who are new to fire retardant chemistry and may not appreciate how dramatically the addition or removal of a halogen-free flame retardant package can shift performance outcomes.



The fire certification journey - six stages from first enquiry to signed purchase order

Stage Two - Formal Testing

Inside the certification process at an accredited laboratory

The formal testing phase begins with sample submission. For most EN 45545-2 tests, this means preparing and delivering multiple specimens cut to precise dimensions - typically between 9 and 12 specimens per test method, depending on the number of replicates required and the directional nature of the material (surface materials are often tested in both the primary and secondary directions).

At Prospec Labs, submitted samples undergo an intake review before conditioning begins. The laboratory checks dimensions, surface condition, and consistency across replicates. If samples are rejected at this stage - which happens more often than founders expect - the clock resets. The turnaround time begins not from when the samples arrive, but from when they are accepted and conditioning begins.

What Conditioning Means, and Why It Matters

All EN 45545-2 specimens must be conditioned at 23°C ($\pm 2^\circ\text{C}$) and 50% relative humidity ($\pm 5\%$) for a minimum of 72 hours prior to testing. This ensures that moisture content in the material - which can dramatically affect combustion behaviour - is standardised across all samples and across different laboratories. A sample tested without conditioning may perform very differently from the same material tested after conditioning, which is precisely why conditioning is non-negotiable.

After conditioning, each specimen is tested according to its applicable standard. The cone calorimeter, for instance, exposes the sample to a controlled heat flux (typically 25, 35, or 50 kW/m² depending on the requirement) while measuring heat release rate, smoke production, and mass loss in real time. A single cone calorimeter test run takes approximately 30 minutes, but the full test series - multiple specimens, multiple conditions - can take several days.

Throughout the testing process, the laboratory maintains a detailed chain of custody - recording sample identifiers, conditioning conditions, test dates, operator names, equipment calibration certificates, and raw instrument outputs. This documentation becomes part of the test report and is what allows the report to be accepted by notified bodies like Certifer France and procurement authorities like RDSO.

When a Product Fails

A first-time pass is not guaranteed - and for startups testing an unproven formulation, it is statistically less common than founders hope. When a product fails, the question is not whether it can be fixed, but how quickly and how efficiently.

"Every week saved in a retest cycle is a week closer to being first on the tender shortlist."

Stage 3 - From Test Report to Market Acceptance

Navigating RDSO approval, Certifer recognition, and the tender process

A test report from an accredited laboratory is necessary, but it is not always sufficient. The gap between having a test report and having a product that a procurement authority will accept is where many startups lose momentum - not because their product failed, but because their documentation did not meet specific requirements.

Prospec Labs' dual recognition - RDSO approved for Indian Railways, Certifer France recognised for global markets

Understanding RDSO Acceptance

The Research Design and Standards Organisation processes vendor approval applications through a structured multi-stage review. For fire safety materials, this involves submitting test reports alongside technical specifications, quality management documentation (typically ISO 9001 certification), manufacturing process documentation, and a bill of materials confirming that the tested product matches the production product exactly.

RDSO's vendor approval process is designed to be rigorous -not obstructive, but thorough. A test report from a laboratory that is not RDSO-recognised will not be accepted, regardless of the laboratory's international reputation. This is a critical detail that has caught out a number of Indian startups that commissioned testing from reputable European laboratories only to find that their reports were not accepted by Indian procurement authorities.

Prospec Labs' RDSO-approved status removes this obstacle entirely. Test reports from Prospec Labs are accepted directly by Indian Railways' procurement machinery, without the additional step of seeking equivalence recognition for a foreign report.

Certifer France Recognition - The Export Gateway

For startups with ambitions beyond the Indian market - particularly those targeting railway projects in Southeast Asia, the Middle East, or Europe - Certifer France recognition of test reports is a significant asset. Certifer is one of Europe's leading independent railway safety assessment bodies, and its recognition of a test report signals to international procurement authorities that the testing was conducted to European standards by a competent, independently evaluated laboratory.

The ability to obtain Certifer-recognised test results from a laboratory in India - without the cost and delay of shipping samples to Europe - is a genuinely new development in the Indian manufacturing ecosystem, and one that fundamentally changes the economics of export certification for Indian startups.

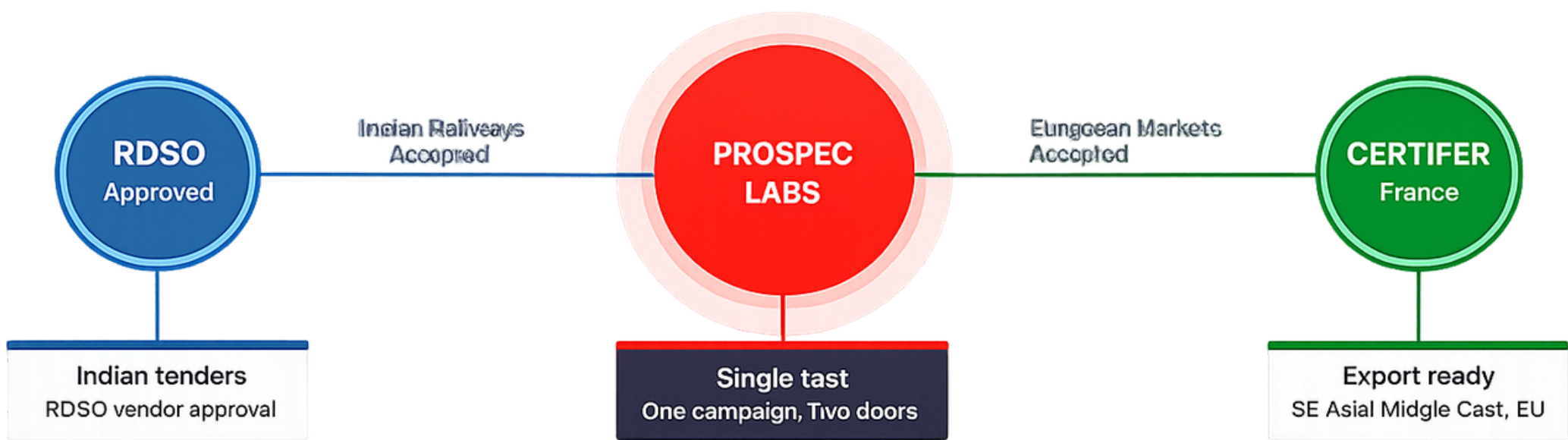
The Tender Advantage

In competitive tender situations, certification timing can be decisive. A startup that reaches fire certification three months before a competitor has three months of relationship-building, technical presentation, and customer confidence-building that the competitor cannot access. In procurement cycles that often run to 12 to 18 months from pre-qualification to contract award, being early to certification is not a luxury - it is a commercial imperative.

This is the reason why the most sophisticated product startups in India's railway supply chain are engaging with fire certification not at the point of prototype completion, but earlier - during the product development phase, when material decisions are still flexible and the cost of a formulation change is an engineering conversation rather than a certification setback.

Prospec Labs Advantage

India's only dedicated EN 45545-2 fire testing lab with RDSO approval AND Certifer France recognition - meaning a single test campaign can produce reports accepted by both Indian Railways and European notified bodies simultaneously.



Prospec Labs' dual recognition - RDSO approved for Indian Railways, Certifer France recognised for global markets

A Startup's Real Journey - Told Honestly

What the certification process actually looks like on the ground

To make the journey concrete, consider a composite sketch drawn from the kinds of startups Prospec Labs works with most frequently: a six-person company, three years old, building fire-retardant wall panel systems for railway interiors. They have a working prototype. They have a letter of intent from a rolling stock OEM. They need EN 45545-2 certification to convert the letter of intent into a purchase order.

Month 1: The Discovery Phase

The founders contact Prospec Labs. The first conversation is not about booking a test date. It is about understanding exactly what the product is, what requirement numbers apply, and what the likely performance challenges are given the current formulation. The laboratory's team identifies that the substrate is likely to pass the ignitability and heat release tests, but the decorative surface laminate - which contains a PVC component - is a smoke density risk. The recommendation: replace the PVC laminate with a halogen-free alternative before formal testing.

This advice, delivered in the first conversation, potentially saves the startup an entire retest cycle - approximately four to six weeks and the cost of an additional test campaign.

Month 2: Material Revision and Sample Preparation

The startup works with its material supplier to source a halogen-free surface laminate. The new composite is assembled and samples are prepared to the required dimensions. The founders, now aware of the conditioning requirement, build the 72-hour conditioning period into their timeline. Samples are submitted to Prospec Labs with a clear material specification document - substrate, core, laminate, adhesive - that will form the basis of the test report and the RDSO submission.

Month 3: Testing and Initial Results

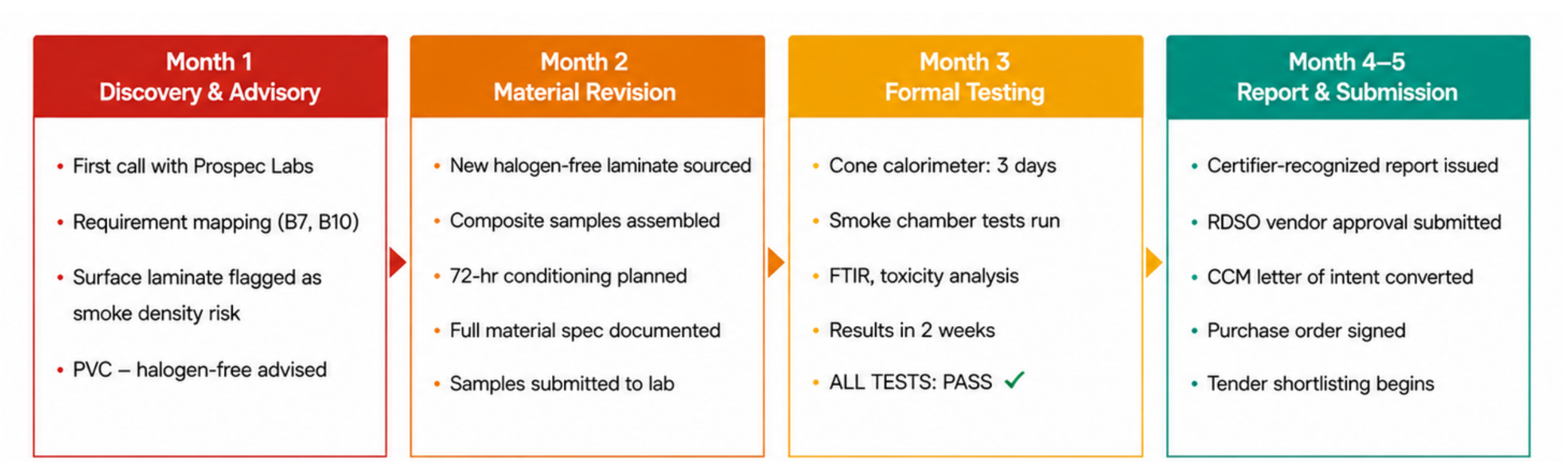
Formal testing begins. The cone calorimeter tests run over three days. The smoke chamber tests follow. Results are available within two weeks of testing completion. The panel system passes R1 (surface flammability), passes R7 (heat release from walls and ceilings), and passes R10 (smoke density). The toxic gas analysis is within acceptable limits. The product has passed its first formal fire test campaign.

"Passing is not a moment. It is the product of months of invisible work that nobody in the tender process will ever know about - or need to."

Month 4–5: Report, RDSO Submission, and Tender

The formal test report, recognised by Certifer France, is issued. The startup prepares its RDSO vendor approval submission - test report, ISO 9001 certificate, material specification, manufacturing process documentation. The submission is made. Simultaneously, the startup returns to the rolling stock OEM with the test report in hand, converts the letter of intent to a purchase order, and is shortlisted for a larger supply contract that requires RDSO vendor status.

From first conversation with the laboratory to purchase order: approximately five months. Without domestic testing infrastructure, this journey - through foreign laboratories, international sample shipping, and the additional challenge of getting foreign reports accepted - would conservatively have taken nine to twelve months. The four-to-seven month difference is not a scheduling advantage. It is a market position.



Month-by-month case study - domestic testing at Prospec Labs vs. overseas laboratory timeline

What the Best Startups Do Differently

Lessons from founders who got certification right

After working with dozens of product companies through the fire certification process, certain patterns emerge among the startups that navigate the journey efficiently. These are not secrets. They are disciplines - and they are available to any founder willing to adopt them.

They engage the laboratory early

The most efficient startups contact their testing laboratory not when the prototype is complete, but when the product architecture is being finalised. At this stage, material substitutions cost nothing. After the prototype is built, they cost money, time, and momentum. A one-hour conversation with a fire testing engineer during the design phase is worth more than any amount of crisis management during a failed certification campaign.

They build certification into the product roadmap

Fire certification is not a milestone that happens at the end of product development. It is a constraint that should inform product development from the beginning. The startups that treat certification as an afterthought - something to be arranged once the 'real work' of building the product is done - consistently take longer and spend more than those who treat it as a design requirement alongside weight, cost, and manufacturability.

They document everything before they test

A test report is only as useful as the manufacturing documentation that supports it. Startups that arrive at the laboratory with precisely specified material stacks, full supplier documentation, and a clear understanding of their production process produce test reports that flow smoothly into RDSO submissions. Those that treat documentation as an afterthought find themselves unable to use their test results - a frustrating and avoidable situation.

They treat the laboratory as a partner, not a vendor

The most productive client relationships are those in which the laboratory is treated as an extension of the product development team - a resource to be consulted, challenged, and involved throughout the process - rather than a commodity service to be engaged at the last moment and evaluated purely on price. This shift in perspective consistently produces better outcomes: faster certification, fewer retest cycles, and stronger documentation packages.

The Bigger Picture - India's Fire Safety Moment

Why this matters beyond any individual startup

Fire certification for railway and infrastructure products is not a bureaucratic inconvenience. It exists because the consequences of fire in a railway vehicle - a confined space, potentially underground, with limited evacuation options - are catastrophic. Every material that enters a train coach is a variable in the fire safety equation of that coach.



India's rail expansion programmes — the scale of the opportunity for certified Indian manufacturers

India's rail expansion programmes - the scale of the opportunity for certified Indian manufacturers

India is building 400 Vande Bharat trains. It is expanding metro networks in 27 cities. It is modernising its entire coaching fleet under the Amrit Bharat and Vande Metro programmes. The materials that will go into these vehicles - the seats, the panels, the flooring, the cable systems, the insulation - will determine the fire risk profile of India's passenger rail network for the next 30 years.

The existence of a world-class domestic fire testing laboratory is therefore not simply a convenience for Indian manufacturers. It is infrastructure. It is the institutional capability that allows India's Make in India manufacturing ambition to produce products that are not just locally made, but genuinely globally safe.

For a startup founder sitting in a workshop in Pune or a factory in Faridabad, this may feel abstract. But it is the context in which their certification journey takes place. When they get their fire certificate, they are not just unlocking a tender. They are contributing to a manufacturing ecosystem that India is building - one certified product at a time.

"India has the manufacturing ambition. It now has the testing infrastructure to match. The question for every startup in the railway supply chain is whether they will use it."

Conclusion

The journey from prototype to fire-certified product is not short, and it is not simple. It demands material discipline, process rigour, documentation thoroughness, and the patience to work through a regulatory framework that does not move at startup speed.

But it is navigable. And it is navigable significantly more efficiently than it was even two years ago, before India had a dedicated domestic laboratory capable of certifying products to EN 45545-2 with reports recognised by both Indian Railways and European notified bodies.

The startups that will define India's railway supply chain for the next decade are the ones who are engaging with this process now - who are talking to their testing laboratory before they have a prototype, building certification timelines into their fundraising plans, and treating fire safety as a design value rather than a compliance burden.

If you are building a product for India's railways, metro systems, or defence vehicles, and you have not yet had the certification conversation, the best time to start that conversation was six months ago. The second-best time is today.

PROSPEC LABS

India's Only Dedicated EN 45545-2 Fire Testing Laboratory
RDSO Approved | Certifer France Recognised | Built for Rail & Defence

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