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North America Electrical Technical Compliance

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'Third Party Certification of products and system is mandatory… right?'

Firstly, lets level set – we will discuss generic and industrial electric systems in this piece, we are not taking about Automotive /DOT/NHTSA requirements as the compliance model is different, needless to say there may be some crossover which would need a specific review.

Also, we will not cover mechanical technical compliance requirements as those models vary per market quite significantly.

North America Electrical Compliance for Products and Systems.

From a 50000 ft. level, people will tell you that electrical compliance in North America follows the requirements of the National Electrical Codes for the US and Canada and that it is required to seek a third party who will issue you a certificate provided by a third party. This third party is impartial by following the rules set out in ISO17065 and is subsequently accredited by OSHA (The Occupational Safety and Health Administration) in the US, or the SCC (Standards Council of Canada) north of the border.

These third party labs are tightly bound by those impartiality rules and if are found to compromise them under audit, they can face serious implications from their accreditors.

You may recognize some of these impartial OSHA/SCC accredited bodies with names such as UL Solutions / UL LLC (formerly Underwriters Laboratories), ETL Intertek, CSA, FM, TUV, LC, MET Eurofins, SGS, QPS and more – its big business.

There labs are all held to account by the same group at OSHA and the SCC, so the playing field is level on who you can use.

The typical goal is a sticker, label and/or certificate from the above to let the NA consumer know that a product is safe.

So, how is it possible that a large amount of electrical equipment on the US market does not have ANY third party certification, and you probably already have some of it in your home and workplace, especially if it's something you aren't specifically looking for. This is due to the trust we have in the places we shop.

Real world examples.

Large online retailer that provides the A to Z of products.

We purchased a smart home light switch to control the lounge lighting, as I am from the industry I checked the listing 'briefly' and observed the term 'UL listed' in the description.
I got the item delivered and pulled it from the box, there was no sign of any approvals.

Revisiting the advert in detail- I find that the product had a ‘UL Listed’ plastic used in its construction that was used to claim whole item approval.

Needless to say I did not trust a high current switching item in the fabric of my family’s home so that was quickly returned…. It was a good price though….

This is a major issue with online retail at the moment as the reseller is drinking from the proverbial fire house.

Deceiving?

When you look beyond the scratching the surface you find dozens of these attempts to deceive, another example may be a high current extension cord for an EV, the listing says approved by an NRTL but when you investigate it may be just the handle or plug – the electrical safety of that 240V 50A 30 foot long extension cord may never have been looked at

Why is it happening?

The market speed is leading the reduction of prices of fast changing, high tech equipment like never before. We can obtain leading edge tech for pennies on the dollar of what it used to cost early adopters even a decade ago because of the ‘Uberization’ of the world.

Uberization is the culture of wanting an outcome fast without wondering or caring about the route to get it. The term comes from now potentially not need a personal vehicle and the associated path and costs of procuring one – transport from our door is as easy as pressing a couple of buttons on a app.

The current generation will get the blame for this but we should recognize that the previous generations set the bar for the current one so some reflection is required in the public domain for that blame shifting.

This huge tidal wave of tech and products with a super-fast manufacturing ecosystem in the east means that the retailers cannot cope with the regulatory aspects – The big brand resellers are trying very hard to put in fixes in real time, but at the moments the flood gates are bursting.

The big orange hardware store that is well respected for quality items provided us with a Level 2 40Amp charger for my PHEV, it was a great price and works well.

These big box sites even used to allow you to select the NRTL you wanted to search on their website, although with the recent wider awareness of ‘there is more than 2 NRTLs’ may of killed that feature.

So, my Level 2 charger arrived – not a single sign of a third party approval. I looked on the manufacturers Site, the reseller page… nothing.

Let’s review for clarity - A 240V 40Amp Electrical Product, off the shelf, for domestic use, by the general public with no third party NRTL listing

The big question - Is it safe?

How do I know? I don’t – I could find out (I know people) but for my $300 device versus a comparative $600- $700 am I bothered?

This brings in the concept of 'Risk vs. Cost' – Do I spend double for a device that MAY have been competently tested by an NRTL as to the risk of Electrical Fire and Electrical Shock or do I trust the manufacturer/supply chain to have managed that risk for me?

Well, after 18 months I am still trusting the manufacturer – but don't leave it plugged in overnight and I give the cables the occasional temperature test to make sure they are not getting too hot– that was the result of my dynamic risk vs. cost outcome.

Wait! – Doesn't European Electrical Safety Self Certify?

The European Economic Community (and yes the UK under UKCA rules) don't have this NRTL framework.

This market requirement is exactly what I have just described - the market trusts the manufacturer to self-certify the electrical safety of their products when placing them on the market – and there is no other alternative. Risk assessment forms a large part of this methodology.

The OEM manufacturer (or representative) is the only person who can sign for the electrical safety of the product in question.

CE/UKCA is the framework and similar concepts are prevalent across the rest of the world.

Mandated Third Party vs. Market Surveillance.

The general consensus is that North America has mandated third party involvement and Europe uses surveillance to manage the product risks.

The general public in Europe (and competitors!) can leverage a system to report non-conforming product, its online, its easy and it works very well. The cost of Non Conformance is clear with the fine amount and jail time written into the market directives which are then written into law in each country.

North America relies on the supply chain to manage the risk, alongside the threat of litigation to correct any variance that crops up down the line.

The current status for North American Third Party Certification.

The market pace relating to new product development, the technology in the products and the product lifecycles makes it difficult for industries and markets to follow the old ways.

An IIOT product OEM does not/cannot have their product sat in the engineering cubicles of third party test labs for six to eight months, the same could be said for many of our technologies in 2023 i.e. Cellphones, Chargers, Toys, EV's, Batteries

The Consumer Product Safety Commission (CPSC) is an agency charged with helping and they signpost the risks to the point of commissioning NRTLs to help them work through issues. This famously happened with the influx of unsafe 'Hoverboard' toys a few years ago that were igniting. E-bikes are a current focus.

Is the way to fix this mandating that everything goes through a third party lab? The NRTLs are hoping so but that E-Ship may have sailed.

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But the National Electrical Code / various codes mandates third party certification?

For each product area we need to take the time to review that, for instance the National Electrical Code does not actually mandate third party certification – it has a several options.

The place to be mindful of mandated requirements are in the Codes of Federal Regulations (CFR's)- this is where a direct non compliance will land you in bother in the dock in a court of law defending your 'Risk vs. Cost' approach.

Simplified – the Risk vs. Cost is an approach where all stakeholders are brought together to identify a company's Risk Appetite/Risk Tolerance against the specific opportunity and determine a basis of safety that is appropriate and is commercially viable.

Another term that could be used for 'Risk vs. Cost' is 'Due Diligence'. Other industry terms are BAST 'Best Available Safe Technique', BATNEEC – Best Available Technology/Techniques Not Entailing Excessive Cost' and there are others.

In British law, the term used is 'As Far As Reasonably Practicable' that actually does have a way of quantifying - although that's best left to the lawyers past our use of 'Sound Engineering Judgement'

A broader question is who would be in the dock in the case of a prosecution.

1- Without a third party 'sticker' – would it be the manufacturer, the reseller, the person using it that didn't know the rules, the HVAC guy that made a modification?
2- With a third party 'sticker' – The OEM who didn't know the code rules and made a small change not on stamped drawing, the user, the NRTL?

The point here is that we don't know, and its an ecosystem of risk that needs to be addressed – handing off to a third party for 3/6/18 months at a cost of $10000 - $200000 is not the silver bullet to eliminate product or system risk.

The regulators are already handling situations with leading/bleeding edge tech, they apply common sense and validate that the all parties involved in the value chain of a project are managing risk.

Example: Unlisted panel from China in a San Francisco EV facility – does it meet LOCAL Cali codes? Can you document it and show us? Yes – Permitted.

Example: CE Marked Furnace from Europe in San Diego – Risk Assessment? Electrically Safe? – Permitted.

The government will not hold up progress because of a missing label – but make very sure you can prove that risk was managed if it was to go wrong.

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What can we do to allow us to sleep soundly at night knowing due diligence has been done?

All of the above.

In this rapidly changing world of Industry 4 along with the huge skills gap bringing in a whole new type of worker with the 'outcome' frame of mind – you need to be dynamic and leverage support to value engineer the process in the terms of speed and cost.

The NRTLs are buried in a way of working that may not be dynamic enough for your project, and the term 'Risk Assessment' petrifies cube engineers who have built there careers on code compliance and knowing clause numbers inside out.

Seek out generalist consultants that understand your industry and technical compliance who can help you identify the aspects in your value chain that might be missing – it is critical to get them involved early on in the process – to make sure that the route to market is optimized and expedited.

The 1-10-100 rules applies here – the later the engagement, the costlier the correction.

Do not lead with the concern of – 'I need an NRTL sticker for North America' – think – 'What are my technical compliance options for my whole project in a specific location?

The sticker kicker – North American AHJs (Authorities Having Jurisdiction) can pick and choose from a multitude of codes and standards to manage their responsibilities – even down to not accepting a new code for a decade or more- the NRTL will not help you there…

Please reach out with your examples – we would love to hear them.

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