

# The Importance of Homologation in an Evolving U.S. Automotive Market



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**Add value.  
Inspire trust.**

White paper

## Abstract

As in all other global markets, US applicable regulations and standards must be met or exceeded by vehicles, subsystems or components to enter the national automotive market. However, the U.S. automotive market has a different approach to most other markets when it comes to vehicle homologation. Manufacturers of vehicles, subsystems and individual components must not only deal with a diverse global regulatory framework but also with different certification schemes. This white paper highlights these differences and gives an overview of the governing and standardisation bodies which influence access to the U.S. automotive market. We also discuss how U.S. manufacturers exporting to tightly regulated regions, or global manufacturers seeking to navigate the U.S. self-certification market, can access those markets more cost effectively.

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## About the TÜV SÜD expert



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Bijoy has over 17 years of extensive experience in automotive engineering and has worked on various product and service-based engineering solutions out of multiple global locations, including Germany, India, Singapore, China and the United States.

Bijoy joined TÜV SÜD in 2018 as Head of the Autonomous Vehicles Team within the Digital Services Centre of Excellence. In January 2022 he moved to the United States and took charge of the Highly Automated Driving business in the Americas region. His team of engineers specialise in autonomous vehicle (AV) testing, and includes experts in functional safety, virtual methods and cybersecurity. As part of his role, he interfaces with different stakeholders in the AV ecosystem, including researchers, regulators and developers, both locally and globally.

Bijoy is a system engineer and holds a degree in Mechanical Engineering. Prior to joining TÜV SÜD, he worked with Robert Bosch on product development and end-to-end engineering in the field of Automotive Electronic Control Systems, and has successfully executed projects across Germany, Brazil, India and China. He is passionate about innovation and has been an active contributor in three patent applications.

# Introduction

Automotive homologation is a process that seeks to certify vehicles or a particular component in a vehicle, denoting that it has successfully satisfied specific requirements set by various statutory regulatory bodies.

Homologation regulations and standards are applicable to all kinds of vehicles and are designed to drive improvement and compliance with environmental and safety requirements. Furthermore, regulatory requirements do not just apply to the whole vehicle, as they can also apply to their subsystems or individual components.

Applicable regulations and standards must be met or exceeded to enter a market. The U.S. automotive market has a different approach than most other markets when it comes to homologation. This not only includes a diverse global regulatory framework with different regulations and standards, but also different existing certification schemes.

New technologies, such as advanced driver assistance systems (ADAS)



and autonomous vehicles (AV), are playing a significant role in changes to regulations and the certification processes, as are New Energy Vehicles (powered by electricity or hydrogen cells, for example).

As today's connected automated vehicles and AVs become increasingly complex, new concerns surface and must be addressed with fresh standards and certifications. A good example is cybersecurity, as the danger of potential cyberattacks grows. To protect vehicles and

components, manufacturers must therefore focus beyond the product and create an organisational cybersecurity environment that enables the development of safe and secure products.

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**Applicable regulations and standards must be met or exceeded to enter a market.**

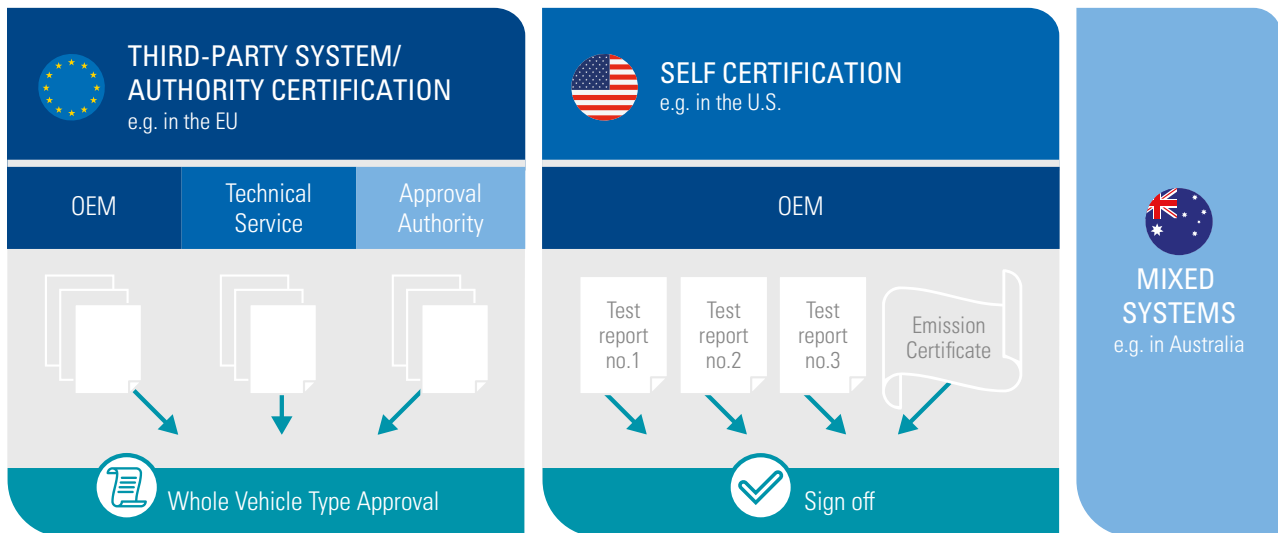
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# The U.S. approach to homologation vs. common global practices

Although the technological advances that will drive the flow of the auto industry for years to come are happening across the globe, the

approach to certification and regulation differs significantly between the U.S. and much of the rest of the world. The following certification

schemes are in place to ensure that all requirements of the respective market have been met:



In the type approval process, a manufacturer receives an approval, which certifies that a vehicle, system, or component meets the legal requirements of a particular market. The approval is handled by an approval authority within that market. Manufacturers are responsible for demonstrating compliance through tests witnessed by a technical service (such as TÜV SÜD).

In the European Union (EU), mandatory certification requirements are overseen by European type approval authorities, following the UN's World Forum for Harmonization of Vehicle Regulations. Homologation applies to virtually all essential auto components in EU member states, facilitating certifications for vehicles

and components from one country to another.

The U.S. is not a signatory to the World Forum's Agreement. Instead, the U.S. National Highway Transportation and Safety Administration (NHTSA) has developed vehicle standards intended to establish requirements for motor vehicles consistent with U.S. law. More than 50 individual Federal Motor Vehicle Safety Standards (FMVSS) address a wide variety of automotive systems and components, including air bags, seat belts and other passenger restraint systems, child passenger safety features, brakes, tyres and electronic stability control systems.

Key differences between types of homologation:

### Third-party verification

Third-party verification of conformity with automotive regulations and standards may be conducted under the auspice of the National Highway Traffic Safety Administration (NHTSA) compliance testing programme (in place since 1968). Each year, the Office of Vehicle Safety Compliance (OVSC) randomly selects vehicles and motor vehicle equipment for compliance testing by independent testing laboratories, that are under contract with the OVSC, to verify that the manufacturer's certification is valid. The OVSC compliance testing programme is a strong incentive for manufacturers of vehicles and/or vehicle equipment to institute and maintain a strong quality control/ product surveillance programme.

### Self-certification

Self-certification is the process by which a manufacturer confirms that a vehicle, system, or component meets the applicable regulatory requirements of a market. The tests performed to demonstrate compliance are not necessarily witnessed by a government agency or technical service. This makes it even more important to ensure that not only are minimum requirements fulfilled by the manufacturer, but also that due diligence is done so that broader industry standards are met.



While the U.S. market requires self-certification, this must be based on credible test data. Most original equipment manufacturers (OEMs) therefore rely on third-party testing organisations to conduct the rigorous testing necessary to verify compliance and ensure that vehicle safety (including individual component and system-related safety) is maintained. In this way, OEMs can reduce the potential liability attributable to poor

product design by considering all unique product characteristics and applying the requirements of the standard to their product. Likewise, manufacturers from outside the U.S. can benefit from similar third-party support to meet market requirements.

It's certain that changes to regulations will harmonise over time between the U.S. and EU. In the meantime, OEMs and auto industry suppliers

can commit to working with an established and globally recognised certification partner, such as TÜV SÜD, in their efforts to match and exceed homologation standards around the world. Furthermore, independent third-party service providers help to understand and identify the overlaps and evolving requirements of different regulations. This enables OEMs and suppliers to access multiple markets in an efficient matter.



# New car assessment programmes

The U.S. pioneered, government-backed and consumer-focused New Car Assessment Programs (NCAPs), established by NHTSA in 1979, facilitates crash tests on production vehicles. These tests are conducted by independent vehicle crash test laboratories according to official protocols. The test data obtained is condensed into an easy-to-understand format, allowing consumers to compare vehicle safety ratings.

In the same vein, the European New Car Assessment Programme (Euro NCAP) is a European voluntary car safety performance assessment programme based in Leuven, Belgium, which was formed in 1996 and published its first results in 1997.

Australia and New Zealand have ANCAP, which has been publishing crash test results since 1993. Korea's programme is K-NCAP, Japan's is J-NCAP, and China's is C-NCAP, which is run by the China Automotive



Technology and Research Center. Latin NCAP (which covers all of Latin America and the Caribbean) is based in Montevideo, Uruguay, and Global NCAP is based in London.

A key difference between the U.S.'s NCAP and those in other countries is that while NCAP standards in the U.S. are still technically considered "requirements," the government is not as heavily involved in their enforcement as it is in other countries.

The U.S. also has the voluntary IIHS performance rating system, which is recognised throughout the industry.

American regulators do not supervise all vehicle and vehicle component prototypes before they go to market. Instead, the self-certification system is used for most vehicle testing, with several notable exceptions, listed in the next section.

# Certifying bodies and standardisation organisations

With self-certification as the established norm across the U.S., OEMs and suppliers typically certify their compliance with certain key safety standards recommended

by U.S.-based and international governing and standardisation bodies to maximise opportunities for global automotive sales. The following is an overview of existing certification

bodies and standards organisations, although there are many other standardisation bodies in existence.

## NHTSA

The National Highway Traffic Safety Administration (NHTSA) issues and enforces the Federal Motor Vehicle Safety Standards (FMVSS), which is a set of minimum requirements that are mandatory for all manufacturers. A "self-certification" process is in place, which requires the manufacturer to certify the vehicle or equipment item as complying with the applicable FMVSS. The Vehicle Safety Act requires the exercise of "reasonable care" in issuing a certification of compliance with safety standards.

## EPA

The Environmental Protection Agency (EPA) regulates vehicle emissions submitted to and monitored by the agency, before a vehicle can enter the U.S. market.

## CARB

The California Air Resources Board (CARB) is the Californian government's "clean air agency", and one of six boards, departments and offices under the California Environmental Protection Agency. CARB focuses on California's unique air quality challenges by setting the state's own stricter emissions standards for a range of state-wide pollution sources, including vehicles, fuels, and consumer products.

## ISO AND IATF

The International Organization for Standardization (ISO) provides technical specifications for automotive sector quality management systems. The ISO was first developed in 1999 in conjunction with the International Automotive Task Force (IATF).

## ANSI

The American National Standards Institute (ANSI) administers and coordinates the U.S. voluntary standards and conformity assessment system, and is recognised for alternative fuels including CNG and hydrogen systems. ANSI is the sole U.S. representative to the ISO and, through the U.S. National Committee (USNC), to the International Electrotechnical Commission (IEC).

## ASTM

The American Society for Testing and Materials (ASTM) is an international standards organisation. It helps ensure safety standards across many industries, including automotive manufacturing. The ASTM develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.

## SAE INTERNATIONAL

The Society of Automotive Engineers, now known as SAE International, is a U.S.-based, globally active professional association and standards developing organisation. It serves engineering professionals in various industries, including automotive.

# Challenges posed by self-certification practices

## It's mandatory to comply with local and country-specific administrative requirements.

The U.S. dependency on self-certification means that liability for failures leading to accidents (and, potentially, to lawsuits with heavy civil penalties) also rests solely on the shoulders of the OEMs.

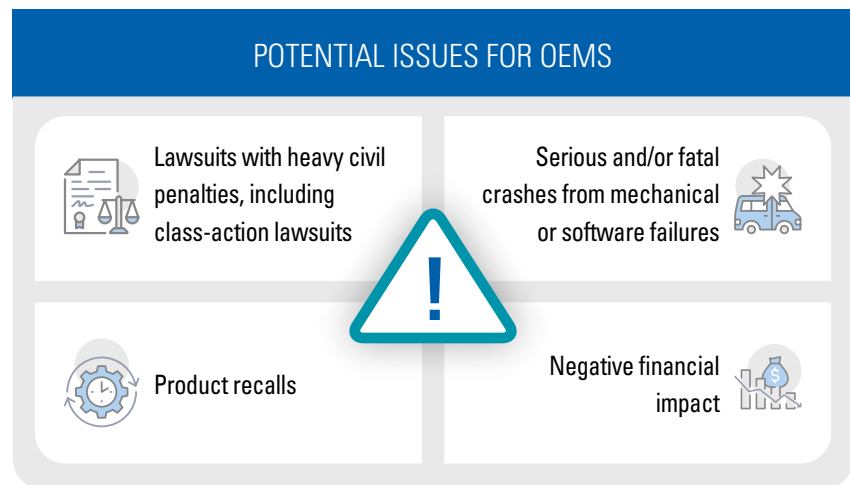
Mechanical failures or software failures can bring about serious accidents. As autonomous vehicles become more of a priority, instances could occur where onboard computing systems may be hacked, leading to catastrophic failure resulting in fatal crashes. Even though component OEMs and automakers keep a reserve of funds to help defray the costs of potential class-action lawsuits, recalls,

and other actions resulting from component/equipment failure, the financial impact can swiftly add up.

Entering global markets poses even more challenges. Besides regulatory requirements, it's imperative to comply with local and country-specific administrative requirements. These can be complex and require on-the-ground personnel in chosen markets to ensure considerations such as different

vehicle classes, state-specific requirements, types of driving licence systems, and varied vehicle taxes are also taken into consideration.

U.S. manufacturers seeking to market vehicles in tightly regulated regions such as China or the EU, or global manufacturers seeking to navigate the U.S. self-certification market, can improve their chance of success by partnering with a well-known global partner such as TÜV SÜD.



# Preparation is key to be ahead of the future



Advances in key auto and mobility technologies are emerging at what sometimes seems like a breakneck pace. There is a major focus on autonomous systems, electric vehicles, and complex navigation/driver assistance systems, as AI opens the door to smarter vehicles, and industrial opportunities take AVs beyond the roadways and into factories and fields. Also of note are less critical systems with potential for a larger market share, including onboard entertainment and e-commerce tools. Many variants of each are already in the pipeline, although they're lower on the priority list when it comes to testing and certification.

While tighter regulatory governance may still be implemented in the years ahead for U.S.-based OEMs and suppliers, there is an opportunity to advance in the realm of certification and gain ground on competitors. In the absence of Federal regulations, OEMs

should consult voluntary standards and recommended practices developed by groups such as SAE International, the American National Standards Institute, and ISO.

Cybersecurity requirements are already in development. Although the U.S. may not currently have many regulations in place for electric and autonomous vehicle technology, that will change as companies, the public, and governmental organisations explore the capabilities and ethics involved.

However, with new technology comes new risks, and the government will inevitably catch up to reality. When that happens, companies don't want to find themselves behind the curve or facing a heightened risk of costly violations concerning new regulatory mandates. Proper homologation therefore remains crucial from many angles:

- To earn public trust and support, the human factor of preserving safety will be a top priority.
- The need to avoid any negative impact on market reputation can be critical from a consumer point of view.
- The sensibility of taking proactive safety measures to prevent costly lawsuits is also significant, as it can potentially benefit the bottom line from a cost-savings perspective.

Money that might otherwise be spent on large-scale product recalls and legal costs could instead support testing during R&D. The support of an external and independent third-party, such as TÜV SÜD, which provides testing services and support during the homologation process, might therefore mitigate these potentially expensive risks.

# How TÜV SÜD can support global market access

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## TÜV SÜD has gained extensive knowledge about different country regulations in various global homologation projects.

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As an expert partner for the automotive industry, TÜV SÜD has gained extensive knowledge about different country regulations in various global

homologation projects with the world's top OEMs and suppliers. We provide an end-to-end automotive solution, from development through to production, helping our customers with their homologation needs including testing, project management, and certification. Our experts identify product requirements for market access early in the development process and streamline your various homologation processes within one project. As a single point of contact, TÜV SÜD ensures efficient project management and has access to an

international network of automotive experts with industry experience and local market knowledge.

The scope of our services includes:

- Technical advice
- Documentation review
- Preparation of technical reports
- Type approval vehicle and component testing and certification for most major markets
- Complete homologation support



## GLOSSARY OF ACRONYMS

ADAS – Advanced driver assistance systems	IEC – International Electrotechnical Commission
ANSI – American National Standards Institute	ISO – International Organization for Standardization
AV – Autonomous vehicles	NHTSA – National Highway Traffic Safety Administration
CARB – California Air Resources Board	NCAPs – New Car Assessment Programs
EPA – Environmental Protection Agency	OVSC – Office of Vehicle Safety Compliance
Euro NCAP – European New Car Assessment Programme	OEM – Original equipment manufacturer
FMVSS – Federal Motor Vehicle Safety Standards	USNC – U.S. National Committee
IATF – International Automotive Task Force	

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## Find out more about our vehicle homologation and type approval services for global market access

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### **Add value. Inspire trust.**

TÜV SÜD is a trusted partner of choice for safety, security and sustainability solutions. It specialises in testing, certification, auditing and advisory services. Since 1866, the company has remained committed to its purpose of enabling progress by protecting people, the environment and assets from technology-related risks. Through more than 25,000 employees across over 1,000 locations, it adds value to customers and partners by enabling market access and managing risks. By anticipating technological developments and facilitating change, TÜV SÜD inspires trust in a physical and digital world to create a safer and more sustainable future.

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