DVN
Lighting

Regulatory Report

November 2024

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About the Authors

Eric Blusseau made most of his career at Valeo Lighting. He spent more than 30 years in Optics and Regulations. He started in research and developments at Bobigny for 13 years in the development of complex shape reflectors and elliptic modules. He was a key player in the development of HID lights in the ’90s, and was appointed optical expert in 1997 and senior expert in 2000. In 2001, he moved to Angers to create the Optical Development Department.

His work entailed hiring and training optical engineers; implementing design and simulation tools; creating the 25-metre dark room and the optical laboratory, and managing the approval of new lamps. In 2009, he took responsibility for the regulation and approval department of Valeo Lighting. He created and managed the regulation network inside Valeo Lighting Systems with one Regulation Manager in each development centre: Angers, France; Martos, Spain; Le Hainault, Belgium; Seymour, Indiana, USA; Wuhan, Foshan, China; Pianezza, Italy; São Paolo, Brazil; Queretaro, Mexico; Chennai, India; and Isehara, Japan. He was a French Delegation Expert at GTB, and a member of the GTB delegation at GRE. In 2017, he was appointed Chair of the GTB Front Lighting Working Group. Along all his career, he was inventor or co-inventor of 48 patents.

Paul-Henri Matha DVN CEO & General Editor Lighting

Graduated from Ecole des Mines Saint Etienne in 2000. 18 years’ experience in Renault France in the lighting department, from project leader position to lighting expert. 5 years’ experience in Volvo cars Sweden as exterior lighting, technical leader. Member of SAE lighting expert group. Former Member of GTB, chairman of working Group installation and co-chair of working group Strategy. President of SIA VISION Congress. Member of IFAL organization committee. Member of ISAL organization committee.Paul Henri joined DVN in August 2023 and has been appointed CEO in august 2024.

About Driving Vision News:

DVN is the vehicle lighting and ADAS industry's journal of record, dedicated to keeping the community informed and communicating about the latest progress and developments. DVN's three pillars are:

• **Technological watch** on new emerging technologies, with weekly electronic newsletters bringing news, analysis, and crucial information on innovation in lighting, ADAS, and smart car interiors; there are also monthly technical reports with sharp focus on cutting edge technologies, company profiles, regulatory matters, and other relevant content available only from DVN

• **Networking** of high-level decisionmakers, researchers, innovators, practitioners, academics, and regulators to make new business connections with two workshops per year in rotating locations throughout America, Europe, China, Japan, India, and Korea. DVN Workshops gather over 300 participants.

• **Promotion of innovations** from DVN's 150 member companies—we facilitate the promulgation of knowledge of innovation, which in turn paves the way for commercialisation, enabling to build new relationships through DVN Community to forge new business worldwide. The DVN Gold membership roster includes 180 companies including automakers; lighting and ADAS tier-1 and -2 suppliers, and a wide variety of universities; research outfits, and consultants. DVN Gold members receive all publications and attendance privileges at all DVN Workshops.

The United Nations Economic Commission for Europe (UNECE)

The United Nations Economic Commission for Europe (UNECE) was set up in 1947 by ECOSOC (Economic and Social Councils of the United Nations). To know more about ECOSOC: Link. It is one of five regional commissions of the United Nations.

UNECE's major aim is to promote pan-European economic integration and to help rebuild Europe after World War II, develop economic activity, and strengthen economic relations both amongst European countries and between Europe and the rest of the world.

UNECE includes 56 member States in Europe, North America and Asia. However, all interested United Nations member States may participate in the work of UNECE. Over 70 international professional organizations and other non-governmental organizations take part in UNECE activities.

As a multilateral platform, UNECE facilitates greater economic integration and cooperation among its member countries and promotes sustainable development and economic prosperity through:

- policy dialogue,
- negotiation of international legal instruments,
- **development of regulations and norms**,
- exchange and application of best practices as well as economic and technical expertise,
- technical cooperation for countries with economies in transition.

UNECE contributes to enhancing the effectiveness of the United Nations through the regional implementation of outcomes of global United Nations Conferences and Summits. It gives focus to the United Nations global mandates in the economic field, in cooperation with other global players and key stakeholders, notably the business community.

UNECE also sets out norms, standards and conventions to facilitate international cooperation within and outside the region.

UNECE Inland Transport Committee

The Inland Transport Committee (ITC) is the UN platform for inland transport to help efficiently address global and regional needs in inland transport. The main goal is to develop efficient, harmonized and integrated, safe and sustainable inland transport systems. To know more about the activity: link

UNECE Global Forum for Road Traffic Safety (WP.1)

The UNECE pioneered road safety activities in the United Nations system with the establishment of an Ad Hoc Working Group on the prevention of road accidents in 1950. In 1988, the Working Party on Road Traffic Safety (WP.1), an intergovernmental body, was established. The Working Party changed its name to "**Global Forum for Road Traffic Safety (WP.1)**" in 2017.

Today, Global Forum for Road Traffic Safety remains the only permanent body in the United Nations system that focuses on improving road safety. Its primary function is to serve as guardian of the United Nations legal instruments aimed at harmonizing traffic rules. To know more about WP1: Link

UNECE World Forum for Harmonization of Vehicle Regulations (WP.29)

The UNECE World Forum for Harmonization of Vehicle Regulations (WP.29) is a unique worldwide regulatory forum within the institutional framework of the UNECE Inland Transport Committee.

Three UN Agreements, adopted in 1958, 1997 and 1998, provide the legal framework allowing Contracting Parties (member countries) attending the WP.29 sessions to establish regulatory instruments concerning motor vehicles and motor vehicle equipment:

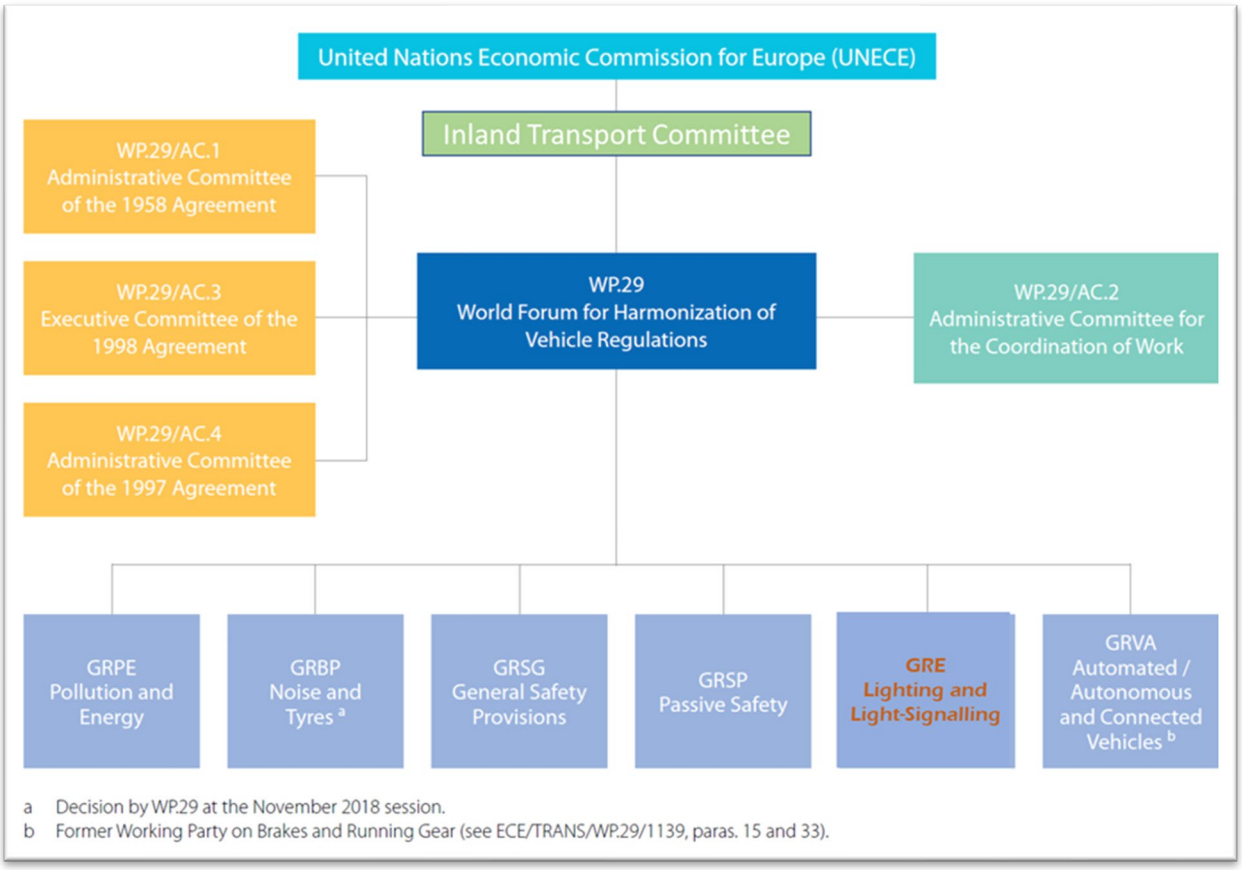
1. UN Regulations, annexed to the 1958 Agreement.
2. United Nations Global Technical Regulations (UN GTRs), associated with the 1998 Agreement; and
3. UN Rules, annexed to the 1997 Agreement.

UN Regulations contain provisions (for vehicles, their systems, parts and equipment) related to **safety and environmental aspects**. They include **performance-oriented test requirements**, as well as **administrative procedures**. The latter address the type approval (of vehicle systems, parts and equipment), the conformity of production (i.e. the means to prove the ability, for manufacturers, to produce a series of products that exactly match the type approval specifications) and **the mutual recognition of the type approvals granted by Contracting Parties**.

UN GTRs contain globally harmonized performance-related requirements and test procedures. They provide a predictable regulatory framework for the global automotive industry, consumers, and their associations. They do not contain administrative provisions for type approvals and their mutual recognition.

UN Rules concern periodical technical inspections of vehicles in use. Contracting Parties reciprocally recognize (with certain conditions) the international inspection certificates granted according to the UN Rules.
WP.29 established six permanent Working Parties (GRs), i.e. subsidiary bodies that consider specialized tasks, consisting of people with a specific expertise:

- Noise and Tyres (GRBP)
- **Lighting and Light-Signalling** (GRE)
- Pollution and Energy (GRPE)
- Automated and Connected Vehicles (GRVA)
- General Safety Provisions (GRSG)
- Passive Safety (GRSP).



Three UN Agreements adopted in 1958, 1997, and 1998 provide a legal framework allowing Contracting Parties to establish internationally harmonized regulatory instruments concerning the approval of motor vehicles, their equipment and parts, and rules for technical inspections of vehicles in use. The regulatory framework developed by the World Forum allows broad, large-scale commercialization of innovative vehicle technologies while continually improving global vehicle safety, energy efficiency and environmental performance.

Countries joining the World Forum benefit from a global platform wherein state-of-the-art technical regulations are regularly discussed and adopted, reducing the administrative burden for contracting parties, and offering harmonized technical specifications for faster deployment of vehicle technologies aiming at achieving sustainable mobility.

Under the aegis of WP.29 are six Working Parties (GRs, for "Groupe des Rapporteurs"), mainly one of which is directly relevant to vehicle lighting.

Working Party on Lighting and Light-Signaling (GRE)

The GRE (Working Party on Lighting and Light-Signaling) is the subsidiary body of the World Forum for Harmonization of Vehicle Regulations (WP.29) that prepares regulatory proposals on active safety to WP.29, specifically regarding vehicle lights, signals, and reflectors and the installation rules on different type of motor vehicles (cars, buses and trucks, motorcycles and agricultural vehicles) . This group of experts conducts research and analysis to develop lighting requirements for vehicles.

GRE convenes officially twice a year and entrusts informal groups with specific problems that need to be solved urgently or that require special expertise. More than 80 experts participate at the sessions of GRE.

The Working Party is open to the governmental experts from any member country of the United Nations, and to any regional economic integration organization set up by member countries of the United Nations, and to experts of governmental organizations. Experts of non-governmental organizations (NGOs) may participate in a consultative capacity. Final decisions are taken by government representatives by vote at the World Forum WP.29 level.

The work of GRE experts is transparent: All agendas, working documents and reports are openly **accessible** on the internet.

The UNECE Agreements and Who Applies Them

The 1958 Agreement (Reciprocal Recognition of Approvals)

Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and /or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, of 20 March 1958

The 1958 Agreement currently has 61 Contracting Parties:

E 1	Germany	E 23	Greece	E 47	South Africa
E 2	France	E 24	Ireland	E 48	New Zealand
E 3	Italy	E 25	Croatia	E 49	Cyprus
E 4	Netherlands	E 26	Slovenia	E 50	Malta
E 5	Sweden	E 27	Slovakia	E 51	Republic of Korea
E 6	Belgium	E 28	Belarus	E 52	Malaysia
E 7	Hungary	E 29	Estonia	E 53	Thailand
E 8	Czech Republic	E 30	Republic of Moldova	E 54	Albania
E 9	Spain	E 31	Bosnia and Herzegovina	E 55	Armenia
E 10	Serbia	E 32	Latvia	E 56	Montenegro
E 11	United Kingdom	E 34	Bulgaria	E 57	San Marino
E 12	Austria	E 35	Kazakhstan	E 58	Tunisia
E 13	Luxembourg	E 36	Lithuania	E 60	Georgia
E 14	Switzerland	E 37	Türkiye	E 62	Egypt
E 16	Norway	E 39	Azerbaijan	E 63	Nigeria
E 17	Finland	E 40	North Macedonia	E 64	Pakistan
E 18	Denmark	E 42	European Union	E 65	Uganda
E 19	Romania	E 43	Japan	E 66	Philippines
E 20	Poland	E 45	Australia	E 67	Viet Nam
E 21	Portugal	E 46	Ukraine	E 68	Kyrgyzstan
E 22	Russian Federation				

The UN Lighting and Light Signaling Regulations (1958 agreement)

Approval and mutual recognition

The 1958 Agreement operates on the principle of reciprocally recognized type approval. Any country that ratifies the 1958 agreement has authority to test and type-approve any regulated vehicle or item of vehicle equipment, regardless of country of manufacture or destination. Each design from each manufacturer is a type. Every acceding country is obliged to honor each type approval granted by any other acceding country. Once a type approval is granted, every acceding country applying the specific regulation applicable to that type approval shall honor it, i.e., regard the type-approved vehicle or component as legal for import, sale and use.

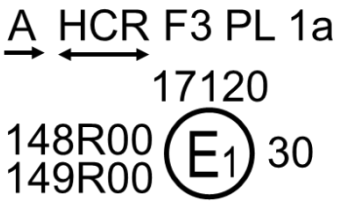
Approval procedure.

Before mass production of a lamp, the device must be approved by an authority that ratified the 1958 Agreement.

The samples and the attached technical file which describes in detail the devices, are sent by the manufacturer to an official laboratory which performs all the relevant tests on the lamp (photometry, reliability) to make sure that all the requirements of the regulation are met. . The laboratories accredited by the Contracting parties are listed in the document **ECE/TRANS/WP.29/343/** (link) which gathers the lists of the accredited labs and for which regulations. When the tests are over and OK the test report is sent to the National authorities that release the approval certificate.

Approval marking:

Type-approved vehicles and equipment are marked with an "E" and a number, within a circle—this approval marking is specified in each regulation. The number in the circle indicates which country's type approval authority issued the type approval (1: Germany, 2: France… see the table above, listing the contracting parties) , and nearby letters and digits indicate the lighting and signaling functions, the regulations that the device meets and the type approval number, respectively.



Conformity of Production Initial assessment and follow-up.

The approval authority of a Contracting Party verifies - before granting UN type approval - the existence of satisfactory arrangements and procedures for ensuring effective control so that vehicles, equipment, or parts when in production conform to the approved type. Guidance for conducting assessments may be found in the international standard ISO 19011:2011 - Guidelines for auditing management systems.

The reference documents are ISO: 9001 or IATF: 16949.

The manufacturer may submit the ISO or IATF certificate for the Conformity of Production. Otherwise, the initial assessment certification may be performed by the accredited test house.

The approval authority must verify the existence of adequate arrangements and documented control plans, to be agreed with the manufacturer for each approval, to carry out at specified intervals those tests or associated checks necessary to verify continued conformity with the approved type, including tests specified in the said Regulation.

The holder of the approval must ensure the existence of procedures for effective control of the conformity of products, have the relevant testing equipment for checking the conformity to each approved type. He ensures that test results' data are recorded and remain and available, in order to verify and ensure the stability of the product characteristics. He ensures that for each type of product, at least the checks and the tests prescribed in the Regulation are carried out. He ensures that any set of samples giving evidence of non-conformity, all the necessary actions must be led to restore conformity of the production.

The main topics which are checked during the CoP audit are:

- Management of the documents: Monitoring plan, procedures, test methods,....
- Management of the Approval documents: Update of the applicable regulations in force, follow up of the evolution of the texts including the impact analysis. Storage and availability of the documents.
- Managements of the modifications. Impact of modifications on product compliance and approval.
- Skills of the teams: job description, skills matrix, validation of the skills of the employees.
- Monitoring plan: Schedule of the tests, type of checks and their application. Frequency of measurements, registers of measurements, results,
- Mastery of purchased materials and components,
- Control of production. Instructions, respect of tolerances process parameters, storage of follow up measurements' reports, …
- Control of the non-conformities: detection of NCs, action plan, information for the authorities, control of corrective actions,
- Storage handling of parts or components,
- Monitoring and the measurement equipment. Calibration, maintenance, …
- Marking of regulatory products, (approval numbers, identification of materials…).

At the end of the audit, the manufacturer receives the Audit report, with observations and the certificate of Compliance.
In case of identified nonconformity, the manufacturer shall submit the action plan within 3 weeks and the action plan shall be closed within six months.
This audit is renewed every two years.

List of UN Lighting and Light Signalling Regulations

The regulations managed by GRE are:

UN Device Regulations – Under responsibility of GRE		
148	Light Signalling Devices	Replaces UN Regulations 4, 6, 7, 23, 38, 50, 77, 87, 91
149	Road Illumination Devices	Replaces UN Regulations 19, 20, 98, 112, 113, 119, 123
150	Retro-Reflective Devices	Replaces UN Regulations 3, 27, 69, 70, 104

UN Installation Regulations – Under responsibility of GRE	
48	Installation of lighting and light-signalling devices
53	Installation of lighting and light-signalling devices for L3 vehicles
74	Installation of lighting and light-signalling devices (mopeds)
86	Installation of lighting and light-signalling devices for agricultural tractors

UN Light Source Regulations - Under responsibility of GRE	
37	Filament lamps
99	Gas-discharge light sources
128	Light Emitting Diode (LED) light sources
R.E.5	Consolidated Resolution on the common specification of light source categories

Other UN Regulations - Under responsibility of GRE	
10	Electromagnetic compatibility
45	Headlamp cleaners
65	Special warning lamps
88	Retroreflective tyres for two-wheeled vehicles

The 1997 Agreement.

The Contracting Parties shall establish rules applicable to technical periodic inspection of wheeled motor vehicles registered in their territory and the checks carried out in accordance with the rules which are mutually recognized.

The 1998 Agreement (Global Technical Requirements for adoption into national regulatory systems).

The "Agreement concerning the Establishing of Global Technical Regulations for Wheeled Motor Vehicles, Equipment and Parts which can be fitted and/or be used on Motor Wheeled Vehicles", or 1998 Agreement, is a subsequent agreement. Following its mission to harmonize vehicle regulations, the UNECE solved the main issues (Administrative Provisions for Type approval opposed to self-certification and mutual recognition of Type Approvals) preventing non-signatory Countries to the 1958 Agreement to fully participate to its activities.

The 1998 Agreement is born to produce global regulations called **Global Technical Regulations (GTR)** without administrative procedures for type approval and so, without the principle of mutual recognition of Type Approvals. The 1998 Agreement stipulates that Contracting Parties will establish, by consensus vote, United Nations Global Technical Regulations (UN GTRs) in a UN Global Registry. The UN GTRs contain globally harmonized performance requirements and test procedures. Each UN GTR contains extensive notes on its development. The text includes a record of the technical rationale, the research sources used, cost and benefit considerations, and references to data consulted. The Contracting Parties use their nationally established rulemaking processes when transposing UN GTRs into their national legislation.

Twenty-four UN GTRs have been established into the UN Global Registry. The most famous one is Worldwide harmonized Light vehicle Test Procedures (WLTP).

None deals with lighting and signaling regulation.

Manufacturers and suppliers cannot directly use the UN GTRs as these are intended to serve the Countries and require transposition in national or regional law.

The 1998 Agreement currently gathers 39 Contracting Parties:

Australia, Azerbaijan, Belarus, Canada, China, Cyprus, European Union, Finland, France, Germany, Hungary, India, Italy, Japan, Kazakhstan, Lithuania, Luxembourg, Malaysia, Netherlands, New Zealand, Nigeria, Norway, Republic of Korea, Republic of Moldova, Romania, Russian Federation, San Marino, Slovakia, Slovenia, South Africa, Spain, Sweden, Tajikistan, Tunisia, Turkey, Uganda, United Kingdom of Great Britain and Northern Ireland, United States of America, Uzbekistan.

link

The European Union:

The European Union adopts all the UNECE regulations. Thus, as soon as a regulation is adopted or amended by the UNECE, it comes into force in the E.U.

Furthermore, the EU has its own regulations or directives which apply to the road motor vehicles.

The most important are:

- Directive 2000/53 EC **on end-of life vehicles**: It prohibits the use of hazardous materials in the manufacture of motor vehicles. These prohibited materials are lead, mercury, cadmium or hexavalent chromium. As it applies to the vehicle, it applies to the different components including lamps.

- Regulation 2019/2144 : pedestrian protection which applies to the front end of the vehicles . This regulation is applied to the vehicle. The vehicle manufacturer defines the technical requirements for the parts which are fitted on the front end. Thus, this regulation has an impact on the design of the headlamps.

- Regulation 2018/858: Market surveillance.

  Each state member of the European Union must put in place means to check the compliance of the vehicles sold on its own market.

  Every 40,000 vehicles sold on its market; the Member State must verify the conformity of a vehicle. However, the rule is to do 5 different tests spread over one or more vehicles randomly taken from the fleet. The official test house accredited by the authorities (eg: UTAC in France) performs the tests and send the report to the Authorities. In case of non-conformity, the authorities contact the manufacturer and the foreign authorities who released the approval in case of misinterpretation of the regulation.

THE USA:

Federal Motor Vehicle Safety Standard 108 (FMVSS 108) regulates all automotive lighting, signaling and reflective devices in the United States. Like all other Federal Motor Vehicle Safety Standards, FMVSS 108 is administered by the United States Department of Transportation's National Highway Traffic Safety Administration (**NHTSA**). The lighting and light-signaling regulatory process in the USA is currently static and locked in the outdated provisions of FMVSS 108. The US administration working on automotive regulation NHTSA is a regulatory island out of

step with the rest of the world because aside from having its own self-certification and enforcement system.
It does not recognize or accept the technical requirements of the UN Regulations. One reason for this is because some of the test procedures in UN Regulations do not satisfy the objective-test requirements called for by the US laws applicable to regulation of motor vehicles and are the basis of a self-certification approach.

Evolution of the regulation

The regulation dealing with lighting has been almost frozen for decades. The previous significant technical evolution occurred in 1997 with the introduction in the regulation of the optically aimable passing beam and the i the straight and sharp cut-off line of the beam.
During the last ten years, the main lighting-related activity of NHTSA was to address the pressure from industry to allow ADB (adaptive driving beam). At NHTSA's request, SAE developed the J3069 technical standard that defines an objective test procedure for ADB, but NHTSA then chose to substantially depart from J3069 in the ADB rules the agency proposed in late 2018.
On February 22nd, 2022, NHTSA released the new rule introducing the Adaptive Driving Beam and defining the test procedure for the vehicle based on tests and measurements on track in different configurations including oncoming and preceding vehicle (Car/truck, motorcycle) on a straight road or on a curve. On the other hand, additional tests are conducted on headlamp on the front lighting system.

FMVSS / SAE Standards

FMVSS108 describes the lighting and signaling devices which must be installed on the vehicle . However, any lamp may be installed on the vehicle if it does not impair the effectiveness of the regulated devices.

(FMVSS108*: S6.2.1 No additional lamp, reflective device, or other motor vehicle equipment is permitted to be installed that impairs the effectiveness of lighting equipment required by this standard*).

Thus, we can design and install on the vehicle additional lamps such as ornamental lamps, front or rear fog lamp, cornering lamp. In this case the device shall be compliant with the relevant SAE standard.

Procedure for Approval.

In the USA, there is no procedure for approval for the lighting and signaling devices. It is a self-certification. The car manufacturer is responsible of the conformity of the parts which are present on the vehicle. However, although there is no approval, nothing prevents NHTSA from picking up randomly on the US market, parts and to have them tested against the requirements of the regulation. If the part does not meet a requirement of the regulation, the car manufacturer is informed of the noncompliance. Then, the manufacturer must present evidence that the lamps is designed to comply and of his good faith. In this case, he asks the part supplier to present all the evidence

(e.g: test reports, production monitoring measures, simulations, ...) . Some car manufacturers want the part supplier to have the parts tested by an accredited laboratory (eg: Intertek, Calcoast, Idiada,…).

SAE standards.

FMVSS108 defines the requirements of the lamps which must be installed on a motor vehicle in the USA. However, FMVSS108 allows the installation of additional lamps which does not impair the effectiveness of the lamps required by the regulation. (*6.2.1 No additional lamp, reflective device, or other motor vehicle equipment is permitted to be installed that impairs the effectiveness of lighting equipment required by this standard*). Thus, FMVSS108 does not consider some lamps such as front and rear fog lamp, cornering lamp,…). However, it does not prevent the vehicle manufacturer from installing additional devices. To make sure that the additional lamps does not impair the regulated ones, they are designed according to the relevant SAE Standards which are recognized as the “state of the art”.

Canada:

Canada applies its own regulations:

Technical Standards Documents (TSD) are documents that reproduce an enactment of a foreign government or material produced by an international organization (typically Federal Motor Vehicle Safety Standard (FMVSS) published in the U.S. *Code of Federal Regulations* Title 49, Part 571). These documents have adaptations or modifications for the Canadian context.

Thus, for lighting regulations, there is a major deviation from this norm since AFS and ADB according to UN Regulations 48 and 123 have been permitted in Canada since 21 April 2018. That's when the newly revised Canada Motor Vehicle Safety Standard № 108 (CMVSS 108) was published in the Canada Gazette, which makes it official as a final rule, an adoption of the regulatory amendment. The new CMVSS 108 also contains upgrades to Canada's DRL requirements and other improvements (link).
Canada also permits ADB according to the North American SAE J3069 technical standard which, like all other SAE J-documents, is in itself not a regulation and does not carry force of law except to whatever degree it is adopted or referenced by a government. Canada has chosen to do so.
One second major difference between US FMVSS108 and TSD108 is that the daytime running lamps are mandatory in Canada whilst are optional in the USA.

Procedure for Approval.

As in the USA, there is no approval procedure in Canada .

A company that imports or makes vehicles in one province and sells them in another province certifies that these new vehicles meet all applicable safety regulations and

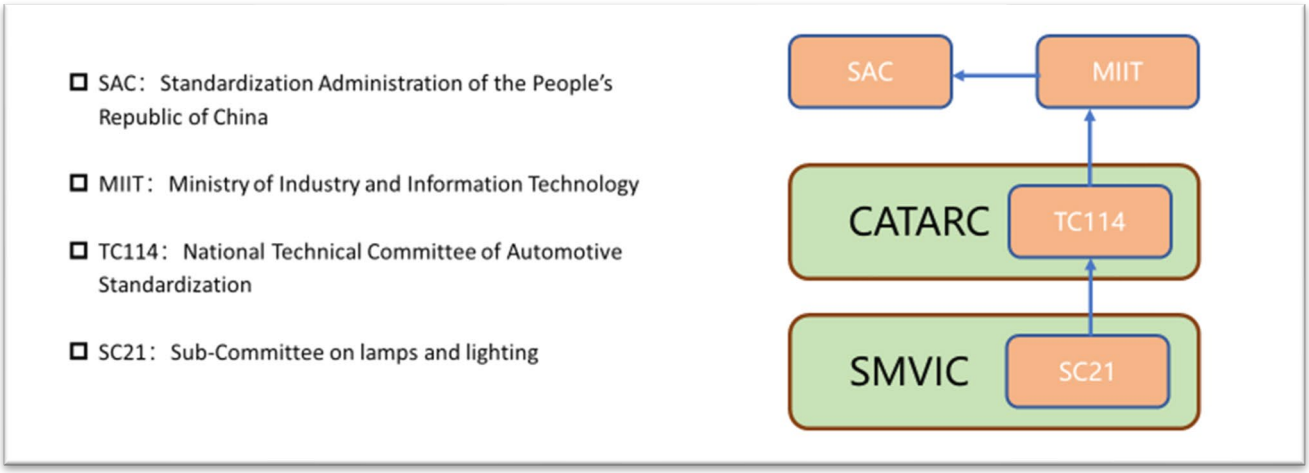
standards. Transport Canada may at any time pick up randomly a part or a vehicle in the market to check its compliance with the requirements of the applicable regulation. In such a case the procedure is similar to the one applied in the USA.
As in the USA, the lamps which are not defined in the regulation may be installed on the vehicle provided that it does not impair the effectiveness of lighting equipment required by this standard. These lamps should be compliant with the relevant SAE Standards

PR China:

The GB Standards

China operates a regulatory system based on certification of compliance to mandatory and voluntary GB Standards. The standards are developed according to ISO procedures. The system is managed as follows—the information presented here is extracted from the presentation of Bu WeiLi (SMVIC) at the DVN Shanghai 2019 Workshop:

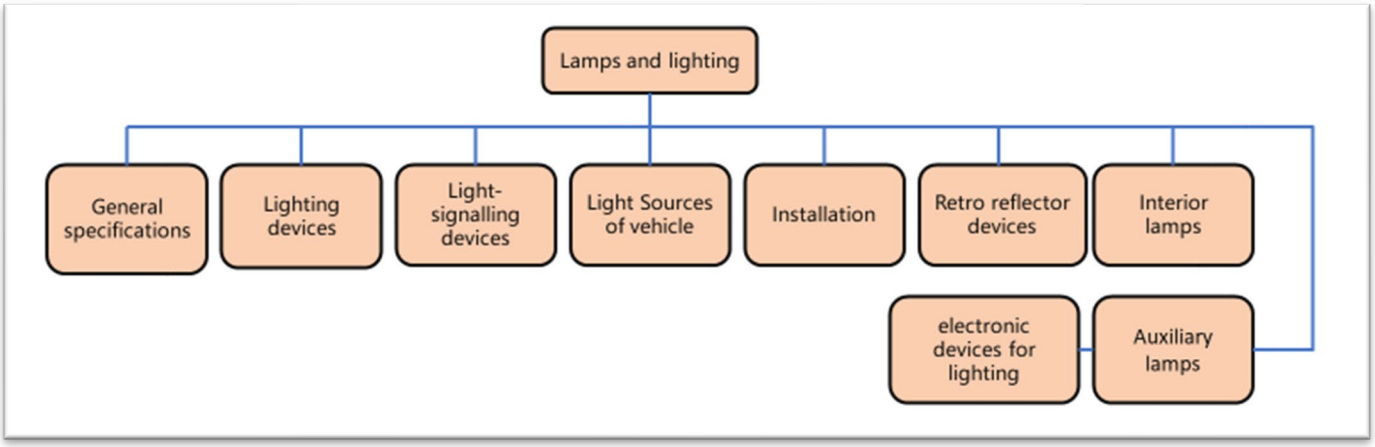
The role of SAC/TC114/SC21 in the drafting of the GB lighting standards



The China Automotive Technology and Research Centre Co. LTD (CATARC) - Auto Standardization Research Institute (ASRI) provides the secretariat of the National Technical Committee of Auto Standardization (SAC/TC114) and is officially nominated by MIIT (Ministry of Industry and Information Technology) to act as secretariat and convenor of the Chinese delegation to WP.29 and GRE.

The Shanghai Motor Vehicle Inspection Certification & Tech Innovation Centre (SMVIC) - Shanghai Automotive Lighting Research Institute provides the secretariat of Sub-Committee 21 on Lamps and Lighting of National Technical Committee of Auto Standardization（SAC/TC114/SC21）

SAC/TC114/SC21 is responsible for the standardization works of definitions, graphical symbols, size and performance for external & interior lighting & light-signalling lamps for vehicles. It is organized as follows:



The Chinese GB Standardisation Process

SAC/TC114 Procedure and the role of Sub Committee 21

The sub-committees of SAC/TC114 (e.g. SC21) organise their members to develop and vote on a proposal for a new standard or a revision to an existing standard.

The proposal can only continue under the premise that more than 3/4 of committee members agree

Following the technical Review at Step 4 the proposal may be returned to Step 2 for further development.

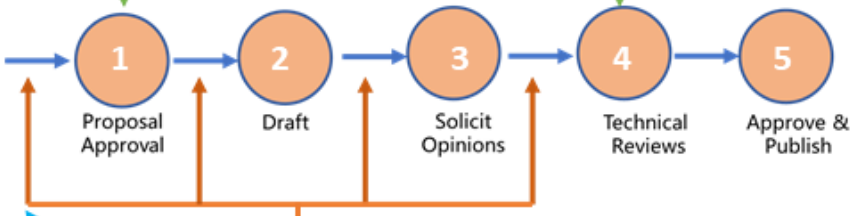


Figure 1 – The Standardisation Procedure

For each of the procedural steps: 1, 2, 3 .... There is a sub-process to be followed by the SC21.

As an example, the steps to develop an initial proposal are as shown below in Figure 2.

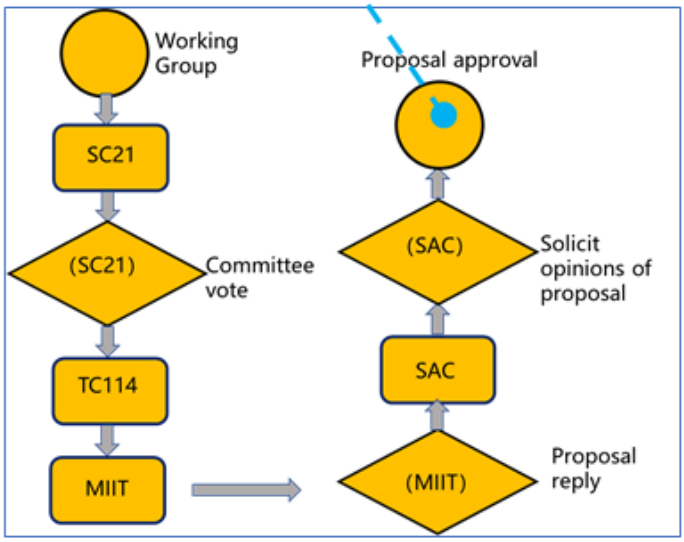


Figure 2 – The sub-process steps

The process of developing the GB standards was significantly changed in 2018. The four orange arrows in figure 1 mean that these processes are to be followed by SC21. The green arrows mean that these processes are very important because they are subject to voting by SC21.

Figure 2 shows the detailed procedure to develop the proposal that is subject to voting by SC21 at the step1.
There are also sub-processes between steps 2-3 and 3-4 but as this process is new and under development their details will only be confirmed after three simplified GB standards have been processed.

Current Development of the GB Standards for Lighting of Power-Driven Vehicles: Simplification of Lighting regulations.

In parallel with UNECE, PR China has worked on the simplification of the lighting signaling regulations in China.

The target is more or less the same as UNECE's one. SAC gathers

- all the requirements for Headlamps, AFS, Front fog lamp and cornering lamp in one single regulation: **GB 4599-2024**, Road illumination devices, corresponding to the UNECE R149 Series 01,
- all the requirements for light signaling functions **GB 5920-2024**,Light Signaling Devices, corresponding to UN R148 series 01 and
- all the requirements for reflexive devices in a third one: **GB 11564-2024** Reflex reflector devices, corresponding to UN R150 series 01.

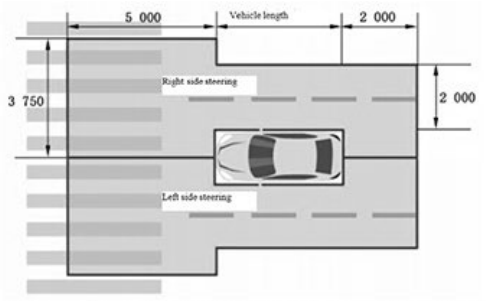
The main differences between UNECE and China's scope is that currently China does not include in the scope the two wheelers lighting functions. Furthermore, the AFS system includes only basic passing beam and motorway passing beam, driving beam and adaptive driving beam.

The new Chinese regs will enter force progressively from 1 July 2025 (fog, cornering, and position lamps) and will become **mandatory on all new registered vehicles on 1st July 2028**.

The change will dramatically affect the design of vehicles and their lights and may request a re-design of some lamps already on the markets. For example, all headlamps will have to fulfil the new photometric grids, similar to UN R149/01, all rear main stop lamps will have to have at least **15 cm²** lit surface, and reversing lamps will **have new requirements at 30° Down**. The "n-1" light source failure rule has also been changed, **incorporating the visibility angles**.

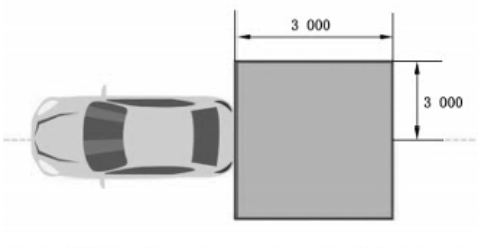
Aside from new constraints, there are also new possibilities:

Road projections have been added in the regulation, without limitation. There is no restricted list as in UN Regulations—and signaling road projections are allowed.



Schematic Diagram of Projection Symbol Position of the Direction-indicator Lamp

In millimeters



Schematic Diagram of Projection Symbol Position of Reversing Lamps

Upcoming Developments for 2025 2027.

Installation on vehicles now has to be clarified, because GB 4785 (corresponding to UN R48) has not yet been updated accordingly.

There is no clear outlook of the upcoming evolutions of the regulations after the introduction of these new regulations in PR China. The upcoming topic to be addressed should be the evolution of lighting functions for two wheelers (which is already in the scope of simplification in UNECE and not in PRC).

Approval procedure.

In 2019, the Certification procedure changed mode for **CCC Self declaration: CNCA-C11-01:2020**

There are 2 options.

Option 1

The manufacturer manages the approval procedure and is responsible for the submission of the tests report which are uploaded on the Government website.

Regarding the factory audit, the manufacturer manages its own audit based on the topics required by the authorities (quality insurance, capabilities,..)

Government can make some sampling of parts on the market to check the compliance.

Option 2

CCC Self Declaration can be converted by CQC mark certificate. In this case, CQC will arrange the testing and draft the test report.

The new products shall be approved by submitting the samples to an accredited Test house (eg CCIC EU) which will perform the tests and draft a test report which will be uploaded on the CQC website.

The factory audit shall be performed **every year** by a company accredited by CQC. The audit covers parts of ISO 9001

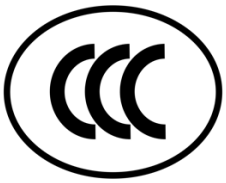
The 3 main points which are addressed are:

- Control of Key components, assembly, and materials
- Control of the general production process
- Final inspection and COP Testing.

For both options, a Chinese representative in PRC is requested. He is responsible in front of the authorities in case of any non-conformity.

Marking:

As soon as the device has been approved by the Authorities, the device shall bear the CCC marking and can be put on the market in PR China.



Market inspection:

The authorities can check the compliance by picking up randomly parts on the market.

Japan:

Japan has its own regulation dealing with lighting and signaling: **Automobile Type Approval Handbook for Japanese Certification ("Blue Book").** It is applicable only in Japan and is not recognized elsewhere.

On the other hand, Japan plays a major leading role in the UNECE World Forum for Harmonization of Vehicle Regulations (WP.29) and has a strong record of promoting global harmonization along with the European Union and the USA.

JASIC (the Japan Automobile Standards Internationalisation Centre) was founded in 1987 and has actively supported cooperation between the Japanese government and industry for the internationalization of automobile regulations and certification systems by the government. As a member of WP.29, JASIC has been involved in the establishment and amendment of UN Regulations, the promotion of mutual recognition of approvals based on the UN Regulations, and the internationalisation of Japanese vehicle regulations and type approval systems.

Japan became a signatory to the UNECE 1958 Agreement (Reciprocal Recognition of Type Approvals) in November 1998 and a signatory of the UNECE 1998 Agreement (Global Technical Regulations) in August 2000. At the United Nations, to support the activities of the Japanese government, JASIC regularly sends experts to meetings of WP.29 and its six "GR" working parties.

In addition, JASIC is involved in the establishment of vehicle regulations and type approval systems in Asia and cooperation for internationalization of these regulations and systems. JASIC supports activities of Asian countries/economies towards acceding to the 1958 Agreement and promoting the adoption of UN Regulations (eg: Indonesia, Laos, Thailand, Philippines,…).

Having become a contracting party of the UNECE 1958 Agreement (Reciprocal Recognition of Type Approvals) in November 24th 1998, the Japanese MLIT (Ministry

of Land, Infrastructure and Transport) **gradually adopted the UN vehicle lighting and signaling regulations** including the new simplified regulations (regulations 148, 149 & 150) (see table here below) .

Japan signed the application of the new simplified regulations (Regulations 148, 149 and 150) as soon as they entered into force in November 2019.

That means **that Japan reciprocally accepts all the UN approval granted by other administrations for all lighting signaling regulations it applies**.

Date of application of the UNECE lighting & signaling regulations in Japan:

Date	Regulations	topics
24/11/1998	3, 7, 19	Reflex, Stop, position, Front fog lamp
31/03/2000	6, 23, 38	Direction indicator, reversing and rear fog
30/06/2001	77	Parking lamp
01/10/2004	48	Installation on vehicles
06/04/2005	119	Cornering lamps
11/06/2007	123	AFS
01/10/2009	98, 112	Passing & beam driving beam
21/07/2015	4, 37, 50, 99, 113, 128	Registration plate lamp, light sources, installation on motorbikes, symetrical passing beam
16/01/2017	87	DRL
19/07/2018	0	International Whole Vehicle Type Approval
15/11/2019	148, 149, 150	New simplified regulations
25/09/2020	53	Signaling for motor bikes

Taiwan:

Vehicle or parts manufacturers who wish to export to the Taiwanese market must demonstrate that their vehicles/components comply with regulation from the Taiwanese Vehicle Safety Certification Center (VSCC). The process is similar to UNECE's one and requires that all tests be conducted by an accredited technical service provider at their own laboratory, or at a witness laboratory which is approved by the Taiwanese Ministry of Transportation and Communications (MOTC).

Taiwan has its own approval procedure for vehicles and components. It is defined by the Ministry of Transportation And Communications (MOTC). **VSCC** (Vehicle Safety Certification Center) is the organization responsible for the approval of vehicles and vehicle components in Taiwan.

For import into Taiwan, it must be proven that the imported products meet Taiwan's safety and quality standards. The test standards published by the VSCC called the "Vehicle Safety Test Directions" (VSTD) apply.

For lighting and signaling devices the applicable regulations are similar to the UN ones with a delay of roughly 6 months.

Approval procedure:

VSCC certification of vehicle components requires product testing in a VSCC-accredited test laboratory. No factory inspection is required at the time of initial certification but it must be conducted several years after the initial certification. This allows the process to be initiated and completed quickly.

In context of the VSCC certification, the certificate for vehicle components (**Examination Report)** contains information:

- Control plan (COP plan) or ISO certificates
- Evidence from the manufacturer on address, management and registration
- Authorisation letter to local representative
- Logo of the manufacturer,
- Data sheet of the product to be certified.
- Clear descriptions of variants, if available
- Product images

- Marking information

and the test report, the test laboratory, applicable VSTD and the scope of certification. There is no expiration date. However, to maintain the validity of the Examination Reports, regular Conformity of Production (CoP) tests must be carried out in accordance with VSTD, which are checked in the audit. The application

In addition, documents demonstrating continued compliance must be submitted to the VSCC each year.

A factory inspection is performed every three years. The first factory inspection is requested by the Vehicle Safety Certification Center (VSCC) in the 3rd year from the initial application.

Marking:

No specific VSCC marking is required for lighting and signaling devices.

Evolution of the Lighting signaling regulations:

Taiwan has recently adopted the original (00) series of the simplified UN Regulations Nos. 148, 149 and 150. The Taiwanese Regulations No. 91 (LSD), 92 (RID), 93 (RRD) - referring to the 00 series of amendments - should enter into force on 1 Jan 2025 and cannot be used before that date.
The 01 series will be for public hearing before end of 2024 and will be submitted to DOT Taiwan middle of 2025 for review and approval. Currently there is no planned date for publication nor implementation either.

India:

Regulation and Approval:

India operates a type-approval system based upon Automotive Industry Standards (AIS) and Central Motor Vehicle Rules (CMVR) Type Approval Certification.

The most relevant AIS standards dealing with automotive lighting and signaling are:

AIS-008 (Rev.2): “Installation Requirements of Lighting and Light - Signalling Devices for Motor Vehicle having more than Three Wheels” which is more or less equivalent to the UN Regulation 48.

AIS-012: Performance Requirements of Lighting and Light-Signalling Devices for Motor vehicle having more than Three-Wheels

AIS-010 (Part 1) (Rev.1): Provisions concerning the Approval of Headlamps emitting an Asymmetrical Passing Beam or a Driving Beam or both and equipped with Filament Lamps and/or LED Modules.

The most important differences between AIS-008 and UNECE R 48 are that the Rear Fog Lamp and the Daytime Running Lamp are optional.

The levelling device must automatic for dipped-beam headlamps with a light source or LED module(s) having an objective luminous flux which exceeds 2,000 lumens.

The lamp are tested by an accredited laboratory (eg: ARAI). The test report is sent to the authorities (Ministry of Road Transport and Highways) for approval.

There is no equivalence with an UNECE approval. An UN Certificate is not accepted by India and the tests must be performed by a lab accredited by the Ministry of Road Transport and highways. However, as the UN regulations are changing often, upon request of the manufacturer, the tests may be performed based on the latest UNECE regulation on case-to-case basis after due approval of AISC (AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE) Chairman.

CoP Certificates and Market surveillance.

The CoP certificate must be renewed every 2 years. It is a self-assessment made by the manufacturer and he can join to the file any UNECE approval document.

Evolution of the regulations:

Although India is not a signatory to the UN 1958 Agreement, India has signed the 1998 agreement and is active at WP.29 and sends a delegation of experts to GRE with a keen interest in the development of the technical requirements for lighting and light-Signalling. This participation in GRE is enabling India to align its local requirements to those in the UN Regulations, and they have been actively contributing to the GRE Informal Working Group on Simplification of the UN Regulations (GRE IWG-SLR).

In general, India takes the latest technical provisions of the UN Regulations and applies them in the Automotive Industry Standards (AIS). More information relating to the AIS and CMVR Type Approval Certification can be found on the website of the ARAI (Automotive Research Association of India), the research institute of the Indian automotive industry with the Indian Government's Ministry of Heavy Industries & Public Enterprises.

Currently the AIS regulations for lighting and signaling are changing in a similar manner as the UN ones. Gathering of the different current regulations in 3 new texts Road illumination devices (Draft AIS-199 / DF1 /Nov. 2023), light signaling devices (Draft AIS-198 /DF/Dec 2023) and reflex reflector devices (Draft AIS-200 / DF /Nov. 2023).

The proposed requirements for lighting signaling in AIS are aligned to UNECE ones based on the text adopted by GRE (Series00 of R148, R149 & R150).
The texts are frozen and should be published in the upcoming months.
The 2nd step gathering requirements for new regulations and optimizing them to ensure technological neutrality (similar to Series 01 of R148, 149 & 150) are part of the agenda. However, specific timelines for these developments are not yet finalized,

Regarding the introduction of road projections and lighting/signaling devices in India, there are preliminary discussions, but concrete decisions have yet to be made. It's an area of growing interest, and further developments are expected in the near future.

Republic of Korea:

Approval:

Korea has its own lighting signaling regulation KMVSS (Korean Motor vehicle Safety Standards very similar to the UNECE Regulations. However, it requires at least 12 months following the publication of the latest version of the UN Regulation to include the technical requirements in the KMVSS. For that reason, for the vehicles imported from the European Union, UNECE compliant vehicles are accepted. (EU Korea Free trade agreement in force since Dec 2015). Nevertheless, the last update of the EU R.o Korea Free Trade Agreement (link) does not include the new simplified regulations R148, R149 and R150 (see Annex 2-C table 1 of appendix 2-C-3) . Thus, it means that the lamps which are compliant with the series 01 of these regulations are not covered by the free trade agreement.

Korea has signed a free trade agreement with the USA. If a US manufacturer sells not more than 50000 vehicles in Korea during the previous year , FMVSS compliant vehicles are accepted.

In Korea, there is no approval procedure. The lamps are self-certified by the manufacturer. But the market surveillance is active.

KC Marking:

KC certification, or Korea Certification, is a product certification which ensures the conformity of products to Korean safety standards. The KC Certification is a compulsory safety mark which applies to a range of products imported and sold/used in the Korean Market.

Consumer products which might be harmful to the health or safety of the consumer during their use or through their characteristics, or if they pose a pollution risk to the environment need to get a KC Mark certification.

Some automotive spare parts are required to have the KC Mark and in particular:

- Headlamps (UNECE Reg. 98, 112, 123,)
- Retro-Reflecting Devices (UNECE Reg. 3).

KC Marking:

CoP and Market surveillance.

The government conducts compliance tests. The authorities (**Korea Transportation Safety Authority**, KOTSA) can randomly pick up four parts in the market and check their conformity. Of the four parts analyzed, at least one must comply with the approval values and the other three at least with the CoP values. The authorities can order a recall if there is an item that does not meet the safety standards.

However, in December 2023, Korean government announced a draft which allows that all 4 parts comply only CoP value, not the approval value. The entry into force of this text initially expected at the end of 2024 should be delayed by one year and enforced at the end of 2025 .

Evolution of the Regulations:

KATRI has worked on drafting an updated KMVSS regulation based on Regulation R 148 & R149 Series 00 since 2022. KATRI has worked as well on the introduction in KMVSS of the new technologically neutral requirements as defined in the UNECE simplified regulations R148, 149 and 150 **Series 01,** since 2023. The validation of the draft should be done in 2025 for an enforcement of the updated text in 2026 at the latest.

Brazil:

Brazil has its own regulations (CONTRAN) and approval procedures. CONTRAN (Conselho Nacional de Trânsito, National Traffic Council) is the Brazilian National Traffic Board and is the highest regulatory and advisory entity of the National Traffic System. It establishes the regulatory standards for automotives and parts.

Inmetro: The National Institute of Metrology, Quality and Technology (INMETRO) is a Brazilian regulatory agency that evaluates compliance requirements for products manufactured in or exported to Brazil. Amongst others, INMETRO covers many consumer and industrial products, including automotive components such as luminaires. Manufacturers and suppliers need to have their products tested and certified by a recognized Certification Body. The INMETRO certification scheme serves to establish a minimum standard of quality and safety for a comprehensive list of components, which is constantly evolving as new regulations are released and current ones are updated.

Regulations:

The regulations dealing with Lighting signaling devices and their installation are Contran 227/2007 amended by Contran 294/2008 and Contran 383/2011 and superseded by Contran 667/2017 and 761/2018.

Resolution 667/2017 Technical requirements (link)

This document establishes the characteristics and technical specifications of the signaling systems, lighting and their devices applicable to motor vehicles and trailers. It is applicable for local or imported vehicles.

The main difference between the requirements of Brazilian regulation and UNECE R48 is that the Rear Fog Lamp is optional. The Daytime Running Lamp, the side direction indicator and the emergency stop signal have been mandatory for the new vehicle types since Jan 1st 2021 and for all new vehicles since Jan 1st 2023.

An important article has to be considered in this document. The article 8 says: “Alternatively, to demonstrate the performance of the mandatory systems covered by this resolution, test results shall comply with the United Nations Technical Regulations (UN/UNECE) or the Federal Motor Vehicle Safety Standards (FMVSS) of the United States, as applicable”. Thus, any lamp which is compliant with UNECE or FMVSS 108 regulations is accepted in Brazil.

Gulf Cooperation Council:

The Cooperation Council for the Arab States of the Gulf also known as the **Gulf Cooperation Council (GCC)** is a regional, intergovernmental, political, and economic union comprising Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

The GCC Standardization Organization (GSO) is a standards organization for the member states of the Gulf Cooperation Council and Yemen. It was established under the authority of the Gulf Cooperation Council.

GSO released several Technical Regulations for Motor Vehicles which apply to automotive industry. The list is available here.

There is only one standard which deals with lighting signaling devices: GSO 1503:2010, Motor Vehicle headlamps Safety Requirements. The document defines the installation rules of lighting and signaling equipment on a motor vehicle (like UNECE R48). One point has to be pointed out. The lower beam must be provided by the uppermost and/or the most outboard lamp. (similar to the requirements in the FMVSS108 S6.1.3.5).

There is no technical requirement on the performances of the lighting signaling devices and no approval of the devices. UNECE or FMVSS108 compliant lamps are accepted in this area.

List of the main DVN monthly reports

Main reports launched in 2008-2020

Koito company profile
China lighting market
The Wonderful World of Passenger Car lighting
Tier 2 and 3 contribution on automotive lighting
ZKW company profile
Simulations in automotive lighting
Mercedes-Benz profile
LED technologies in automotive lighting
LEDs Thermo-Electrics
Interior Lighting
BMW and lighting
Lighting and ADAS
Materials in lighting
Laser Head lighting
Automotive lighting Regulations worldwide
Israeli Startups
Jaguar Land Rover and lighting
Engineering companies involved in lighting
Japanese lighting market
Status of w/w Regulations
Korea Lighting Market
SL Corp profile
ADB/Matrix Beam
India Car Industry and Lighting Market
Vision of lighting 2025-2030
Automotive lighting Regulations worldwide
Vehicle Lighting in USA
New ADB technologies
Interior Lighting
Camera technologies
Varroc profile
Volkswagen profile
US automotive lighting industry
Materials in Vehicle Lighting
The Future of Exterior Lighting
IAA Frankfort Autoshow
DVN Munich WS
GENEVA Autoshow
US Lighting
Marelli AL Profile
50 years Light Styling
ADAS and Lighting

Main reports launched in 2021

Evolution of LEDs
New Models July-October 2020
Audi Lighting & ADAS
Lighting in development countries
ADB Update
DVN Shanghai WS
Innovations in Rear Lighting
Global Landscape of Automotive LED Suppliers

Reports launched in 2022

Technologies presented in CES 2022 Laser
light automotive lighting
ISAL report
DVN US workshop
Worldwide Demographic Development
Models launched May to August
DVN Shanghai report
VISION congress
Paris Autoshow + last Vehicle models
L.A. Autoshow

Reports launched in 2023

CES Report
TU Darmstadt Lighting Institute
DVN Paris Workshop
Universities and Lighting
MLA Technology
Models launched in H1-2023
DVN Tokyo Workshop
ISAL Report
DVN US Workshop
Osram Company Profile
DVN Shanghai Workshop

Reports launched in 2024

CES
New cars of the semester
DVN Munich Workshop
OLED Technology
Beijing Autoshow
Display Week 2024
DVN Detroit Workshop
ALE, June 2024
Indian vehicle lighting market
DVN Pune Workshop summary
New cars 2024
Nichia company profile
Test houses
Shanghai DVN event summary

Reports to be launched in 2025

Lighting Market analysis Mexico
Lighting Market analysis China
Welding technology
Tooling status for lighting Techology
Condensation
Semiconductors
Test houses
Shanghai DVN event summary

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Ferrari
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Jaguar-Land Rover
Kia
Lotus cars
Lucid Motors
Mazda
Mercedes-Benz
Mitsubishi Motors
Nio
Nissan
Renault
Rivian
Seat
Stellantis
Subaru
Toyota
SAIC Volkswagen
Volvo Cars
Zoox (Amazon subsidiary)

System Suppliers and Tier 1s
Adient
Anrui
Appotronics
Aspöck Systems
Chongqing Rebo
Creat
Diode Dynamics
Elba
F2J Industry
Feka
Fiem Industry
Flex-N-gate
Forvia
GHSP
Grupo Antolin
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Ichikoh
J.W. Speaker
Keboda
Koito
Lightworks
Lumax
Luxit
Magna
Marelli AL
Mind
Mobileye
Mobis
Nordic Lights
Odelo
OPmobility
Panasonic
Prettl
SL Corporation
SMR Automotive
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Toyota Boshoku
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Varroc
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Light Source Suppliers
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Univ., labs, Consultants
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Capgemini
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Endego
FEP, Franhaufer
Fudan university
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Institut d'Optique
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Rensselaer university
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S&P Global Mobility
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Tier 2s
A2Mac1
Ascorium
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Ansys
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ASYST Technologies
Auer Lighting
BASF
Braslux
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Brightview Technologies
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Ceres Holographics
CLM Search
Coindu
Continental
Covestro
Dajac
DBM Reflex
Delo
Die haptiker GmbH
Docter Optics
Dow
EcoGlass
Edag
Elmos
Ennostar
Euro Moulders
EV Group
Focuslight
Grewus
Hitachi
HJ Optics
Huawei
Idemitsu
Infineon
Inova Semiconductors
Instrument Systems
Integrity
Joysonquin
Leonhard Kurz
Less
LMT
Luminus
Marquardt
Mektec
Microvision
Maxell Frontier
MD Group
Melexis
Microchip
Microrelleus
Mitsui Chemicals
Mocom
Muth Mirror Systems
Nalux
Novem
NBHX Trim
Oerlikon
ON Semiconductor
Polycontact
Polyrise
Preh
Ray Group
Rehau
Sabic
Seaborough
Seoyoneh-Ewha
Shihu
SP3
Sunny Automotive Optech
Synopsys
TechnoTeam
Toshiba lighting
TQ Technology
Uni Tooling
Vangest SA
Ventura
Weidplas CH
W.L. Gore & Associates
WLOPT
X2F
Xunchi
Zollner