Vehicle Standard (Australian Design Rule 101/00—Light Emitting Diode (LED) Light Sources) 2025

Made under section 12 of the *Road Vehicle Standards Act 2018*

Draft for Consultation
Explanatory Statement

Approved by the Hon XXX, XXX

XXX 2025

CONTENTS

1. LEGISLATIVE AUTHORITY

1.1. National Road Vehicle Standards

The Vehicle Standard (Australian Design Rule 101/00 – Light Emitting Diode (LED) Light Sources) 2025, which may also be cited as the Australia Design Rule 101/00 – Light Emitting Diode (LED) Light Sources or ADR 101/00, is made under the *Road Vehicle Standards Act 2018* (RVSA).

The RVSA enables the Australian Government to establish nationally uniform standards that apply to road vehicles or road vehicle components when they are provided to the market in Australia for the first time. The RVSA applies to vehicles or components whether they are manufactured in Australia or imported.

The making of the vehicle standards necessary for the RVSA's effective operation is provided for in section 12, which empowers the Minister to "determine standards for road vehicles or road vehicle components". These standards are also referred to as the Australian Design Rules (ADRs).

1.2 Exemption from Sunsetting

ADR 101/00, is exempt from the sunsetting provisions of the *Legislation Act 2003.*

Source of the exemption

A standard made under section 12 of the RVSA is not subject to the sunsetting provisions of section 50 of the *Legislation Act 2003* through section 12 of the Legislation (Exemptions and Other Matters) Regulation 2015 (table item 56C). A similar exemption was previously granted in respect of national road vehicle standards made under section 7 of the *Motor Vehicle Standards Act 1989* (MVSA) (item 40, section 12 of the Legislation (Exemptions and Other Matters) Regulation 2015). This exemption is important to ensure that ADRs, including ADR 101/00, continue to remain in force, and available to regulators, industry and the public.

Intergovernmental dependencies

The exemption concerns ADRs that facilitate the establishment and operation of the intergovernmental vehicle standard regime that Commonwealth, state and territory governments rely on to regulate the safety of vehicles on public roads.

The Commonwealth uses the ADRs as the basis on which approvals to supply types of road vehicles to the market are granted under the Road Vehicle Standards Rules 2019. States and territories and the National Heavy Vehicle Regulator use the ADRs as the primary criteria on which vehicles are assessed for road worthiness. This 'in-service' aspect is dependent on the date of manufacture, which determines the applicable version of the ADRs against which the vehicle can be assessed. The ability to rely on national standards is particularly relevant given the long service life of vehicles – the average age of vehicles in Australia is over 10 years.

While the ADRs are regularly updated to reflect changes in technology, it is generally not possible to apply these new standards retrospectively to vehicles that are already in use. With former ADRs kept on the Federal Register of Legislation, state and territory governments can use them to ensure vehicles continue to comply with the ADRs that were in force when they were first supplied to the market.

In the event that the Commonwealth could not justify the maintenance of the ADRs, state and territory governments would be compelled to create their own vehicle standards. Whilst this

could mean adopting the substance of the lapsed ADRs as an interim measure, the differing needs and agendas of each state and territory government may result in variations to in-service regulations. Having different vehicle standards across the states and territories would make the scheme operate contrary to the underlying policy intent of the RVSA which is to set nationally consistent performance-based standards.

Commercial dependencies

The effect on vehicle manufacturers to redesign existing models to comply with new ADRs would present a burden and be a costly and onerous exercise. Manufacturers should not be expected to continually go back to redesign existing vehicles. Furthermore, ongoing product recalls to comply with new ADRs would undermine consumer confidence with significant financial impact to manufacturers. This exemption allows vehicle manufacturers to focus their efforts to ensure new models supplied to the market continue to comply.

Reviews of Australian Design Rules

ADRs are subject to regular reviews, as resources permit, and when developments in vehicle technology necessitates updates to requirements. Reviews of the ADRs ensure the ongoing effectiveness of a nationally consistent system of technical regulations for vehicle design, which are closely aligned, wherever appropriate with leading international standards such as United Nations (UN) regulations. This method facilitates the rapid introduction of the latest safety devices and technological advances into the Australian market, while also contributing to the industry's cost competitiveness in the domestic market. Where a review results in a new or amended ADR, these changes are subject to full parliamentary scrutiny.

1.3 International Harmonisation

A majority of Australian road vehicle standards, including ADR 101/00, are closely harmonised with internationally based UN regulations, which are developed by the UN World Forum for Harmonization of Vehicle Regulations. Harmonisation ensures that vehicles built to most recent safety, environmental and anti-theft standards are supplied to the Australian market at the least cost and that Australia has access to the latest vehicle technologies. In contrast, more Australian specific standards would require vehicles to be designed, developed and produced specifically for the relatively small Australian market. Unless needed to achieve legitimate policy objectives, a market specific standard would generally result in a significantly lower net benefit and benefit-cost ratio, than if costs were amortised over a number of markets, such as occurs with UN regulations.

2. PURPOSE AND OPERATION

2.1. Overview of the Regulatory Framework

The RVSA establishes a framework to regulate the importation and first provision of road vehicles to the market in Australia. The core principle of this framework is that vehicles that comply with appropriate standards are suitable for provision to the market in Australia. The ADRs have set out those standards since the early 1970s. At that time, they were applied cooperatively by the Australian Motor Vehicle Certification Board representing the Commonwealth and state and territory governments. In 1989, this arrangement was replaced by the MVSA and the Australian Design Rules were determined as national standards. The RVSA commenced in full and replaced the MVSA on 1 July 2021. A two-year transition period was provided between 1 July 2021 and 30 June 2023.

Under the RVSA, the ADRs are national road vehicle standards intended to make vehicles safe to use, control the emission of gas, particles or noise, secure vehicles against theft, provide for the security marking of vehicles and promote the saving of energy. The ADRs are applied to vehicles as criteria for approval under various regulatory pathways set out in the Road Vehicle Standards legislation. Vehicles approved under these regulatory pathways can be provided to the market in Australia for use in transport.

2.2. Overview Of ADR

The purpose of ADR 101/00 is to specify the dimensional, electrical and photometric requirements for LED light sources in lighting devices, of power-driven vehicles and their trailers. The new ADR 101/00 forms part of a restructure of lighting requirements and does not increase stringency or in other ways change the technical requirements. Industry groups fully supported this proposal and preferred this new ADR be made as soon as possible. This is because the new ADR will reduce regulatory burden and certification times. The impact on industry would be greater by not making the new ADR and therefore making the regulatory framework for vehicles in Australia less efficient.

LED lights use light-emitting diodes which utilise semiconductors to emit light when a potential difference (voltage) is applied across their positive and negative terminals. LEDs used in lighting and light signalling devices are fundamental vehicle safety features. Lights play a critical role in improving visibility for drivers, especially at night or in adverse weather conditions, and help other road users identify vehicles and understand their intentions. Lighting and signalling devices, such as headlamps, turn signals, and reflectors, enable drivers to navigate safely, particularly in low-light conditions, and help reduce accidents by enhancing conspicuity and communication between road users.

Clause 3 clarifies that lamps fitted with LED lights sources must comply with ADR 101/00. Only lamps fitted with LED light sources need to comply with ADR 101/00. The circumstances under which lamps (all types of lamps) are mandatory, optional, or prohibited are set out in either ADRs 13/…, 19/… or 67/….

Clause 4 establishes where defined terms are to be found.

Clause 5.1 determines that replaceable LED light sources meet the technical requirements set out in Appendix A of this standard, as varied by Clause 6 (Exemptions and Alternative Procedures) or clause 7 (Alternative Standards), shall be accepted as complying with this rule. Appendix A is the UN Regulation No. 128 – UNIFORM PROVISIONS CONCERNING THE APPROVAL OF LIGHT EMITTING DIODE (LED) LIGHT SOURCES FOR USE IN APPROVED LAMP UNITS OF POWER-DRIVEN VEHICLES AND THEIR TRAILERS. Manufacturers have the flexibility to demonstrate compliance to ADR 101/00 through clause 5 and Appendix A as varied by clause 6 (Exemptions and Alternative Procedures), or through clause 7 (Alternative Standards).

Clause 5.1.2 clarifies from 22 June 2017 onwards, Appendix A Annex 1 sheets for LED light sources, the list and group of light source categories with restrictions on the use of this category and their sheet numbers are also incorporated in Resolution R.E.5(ECE/TRANS/WP.29/1127). Manufacturers seeking to comply with this standard can use the sheets for LED light sources in Annex 1 of Appendix A or R.E.5.

Clause 6 creates exemptions from the requirements of Appendix A (UN R128) which pertain to gaining a UN Type Approval for UN R128. This is because it is not a requirement to gain a UN Approval for vehicle supply to the Australian market where the Commonwealth

administers approvals through the RVSA and the ADRs. Consequently, manufacturers supplying new vehicles to Australia are exempt from most administrative (non-technical) requirements of UN R128.

Alternative Procedures

Alternative Standards

Clause 7 states that, the technical requirements of the United Nations Regulation No. 128 – UNIFORM PROVISIONS CONCERNING THE APPROVAL OF LIGHT EMITTING DIODE (LED) LIGHT SOURCES FOR USE IN APPROVED LAMP UNITS OF POWER-DRIVEN VEHICLES AND THEIR TRAILERS, incorporating all amendments, are deemed to be equivalent to the technical requirements of this standard.

Paragraph 3.1 of Appendix A: This paragraph states that the definitions in Resolution R.E.5, or its succeeding revisions at the time of approval, shall apply.

Referencing the most current version of Resolution R.E.5 allows for the use of the most up-to-date sheets for LED light sources.

Paragraph 3.2 of Appendix A: This paragraph sets out the general specifications for LED light sources regarding their reliability, safety, and design is in accordance with regulatory standards. The intent of these provisions is to establish fundamental design and manufacturing requirements, to make certain that LED light sources function as intended under normal use without defects that could compromise performance.

The requirements cover both structural integrity and optical efficiency to ensure that LED light sources remain effective and ensure compatibility with light source holders specified in IEC Publication 60061. IEC Publication 60061 contains the recommendations of the IEC in regard to lamp caps and holders in general use, together with relevant gauges, with the object of securing international interchangeability.

Paragraph 3.3 of Appendix A: This paragraph sets out the testing requirements for the LED light sources. They outline procedures for aging, measurement conditions and instrument accuracy to verify electrical and photometric properties. Before testing, LED light sources must undergo a 48-hour aging process at the specified test voltage.

This aging process is to allow sufficient time for the stabilisation of light output and normalising of thermal effects on the lamp and assembly.

Paragraph 3.4 of Appendix A: The requirements in this paragraph outline the specifications for the position and dimensions of the light-emitting area of an LED light source.

The intent of this requirement is to set the parameters of the light emitting area which is essential for having consistent light distribution for testing against the technical requirements.

Paragraph 3.5 of Appendix A: This paragraph states that the luminous flux of the LED light source shall meet the specified limits outlined in Annex 1 of Appendix A.

Luminous flux is the total visible light a source emits and can be referred to as the brightness of the light source and is measured in lumens. Luminous intensity is a measure of how much light a source emits in a specific direction and is measured in candelas. These measurements

are used to set technical requirements for the brightness and intensity of light sources to ensure they perform as intended for lighting or signalling functions without causing interference with other lighting functions or undue glare.

Paragraph 3.6 of Appendix A: Normalised luminous intensity distribution is the luminous intensity divided by the luminous flux of the LED light source. Normalised luminous intensity distribution is a way of representing how a light source distributes light. This allows for easier comparison/measurement of different light sources independent of luminous flux.

The cumulative luminous flux distribution is the luminous flux emitted by the light source under operating conditions, within a defined area, i.e. a cone enclosing a specified solid angle and centred on the reference axis. The cumulative luminous flux is a way to quantify the total visible output of a light source. These measurements can be used to ensure light sources meet performance requirements and do not interfere with other light sources or cause undue glare.

This paragraph states that the normalised luminous intensity distribution and the cumulative luminous flux distribution shall be within the limits and test requirements outlined in the relevant data sheets of Annex 1 of Appendix A. The cumulative luminous flux distribution test in Annex 1 of Appendix A is intended to determine the cumulative luminous flux within defined solid angles of the luminous intensity distribution.

Paragraph 3.7 of Appendix A: This paragraph states that the colour of light emitted by LED light sources shall be specified in Annex 1 of Appendix A and align with the definitions provided by Regulation No. 48 (ADR 13/00). This is to ensure there is an accurate and consistent method for defining colour.

The colour of light emitted is measured according to the method described in Annex 4 in Appendix A.

The intent of this paragraph is to prevent discrepancies in lighting colour that could lead to reduced performance or confusion for other road users.

Paragraph 3.8 of Appendix A: This paragraph describes the technical requirements of the UV radiation that LED light sources shall emit to meet low UV specification. Excessive UV radiation can degrade materials over time and pose potential health risks.

To demonstrate compliance with these requirements, UV emissions are measured and weighted according to the value indicated in the Table in Paragraph 3.8 Appendix A. The values must remain within the established safety limits, ensuring the LED does not emit harmful levels of UV radiation.

The intent of this paragraph is to protect vehicle components, such as lenses from degradation while also minimising potential health risks associated with prolonged UV exposure.

Paragraph 3.9 of Appendix A: This paragraph identifies the additional requirements for standard (etalon) LED light sources, where used.

A standard (etalon) LED light source is a special LED light source used for the testing of lighting and light-signalling devices. It has reduced tolerances for dimensional, electrical and

photometric characteristics as specified on the relevant data sheet. Standard LED light sources are specified in only one voltage rating for each category.

Paragraph 3.10 of Appendix A: This paragraph describes the technical requirements for test data measured at elevated temperatures, where they are described for specific light types as specified in the relevant data sheets of Annex 1 Appendix A.

Not all light types have maximum temperatures specified in their data sheets. Where they are specified this is to ensure that LED light sources maintain the specified technical performance at all operating temperatures.

The testing process includes measuring luminous flux and colour variation under elevated temperatures, followed by a 1000-hour endurance test under continuous operation. After testing, the LED's performance is re-evaluated to ensure it remains within acceptable limits.

The intent of this paragraph is to confirm that LEDs will function reliably in real-world conditions, minimising failures or changes in brightness and colour outside the technical specifications, due to temperature variation.

Paragraph 3.11 of Appendix A: This paragraph specifies the position, size, and brightness uniformity of the LED's light-emitting area to ensure a controlled and effective light source output. A precise luminance contrast and cut-off pattern is essential for ensuring effective performance of the light source.

These technical specifications, the luminance characteristics—including surface ratios, contrast, and deviation—are measured using the method specified in Annex 9 of Appendix A.

Paragraph 3.12 of Appendix A: This paragraph establishes specific technical requirements for LED substitute light sources where they are used in place of LED light sources, such as filament globes. These substitute light sources must be electrically compatible with existing vehicle systems and must not interfere with other electronic components.

The electrical current of the substitute light source is measured under controlled conditions to ensure stability. Additional requirements include compliance with electromagnetic compatibility (EMC) regulations, prevention of unintended light flickering, and proper mechanical fitment to avoid misuse.

The intent of this paragraph is therefore to ensure that LED substitute light sources where designed to do so, can be safely integrated into vehicles without causing electrical issues or compromise in the performance of the light source.

Annex 1 in Appendix A lists the sheets for LED lights that describe the dimensions and electrical characteristics of LED light sources.

United Nations Regulation Resolution 5 (R.E.5) lists up-to-date sheets for LED light sources that can be used to demonstrate compliance with this standard instead of Annex 1 Appendix A.

Annexes 5 and 6 of Appendix A specify the requirements manufactures must meet and document to show compliance with this standard. It includes quality procedures, sample size

and non-compliance limits, to help ensure LED lights produced meet minimum acceptable quality standards.

Annex 4 of Appendix A outlines the method to measure the electrical and photometrical characteristics of LED light sources.

Annex 9 of Appendix A outlines the method to measure luminance contrast and luminance uniformity of the light emitting area

3. MATTERS INCORPORATED BY REFERENCE

3.1. Other Legislative Instruments

Clause 3.2 includes a reference to ADRs 13/…, 19/… or 67/….The circumstances under which lamps are mandatory, optional, or prohibited are set out in either ADRs 13/…, 19/… or 67/….

Clause 4.1.1 includes a reference to the Vehicle Standard (Australian Design Rule Definitions and Vehicle Categories) 2005, which may also be cited as the Australian Design Rule – Definitions and Vehicle Categories. This sets out common definitions for many terms used in the ADRs, including the vehicle categories used in ADR applicability tables.

Clause 6.2 include a reference to the Vehicle Standard (Australian Design Rule 13/00 - Installation of Lighting and Light-signalling Devices on other than L-Group Vehicles) 2005. This Australian Design Rule prescribes requirements for the number and mode of installation of lighting and light signalling devices on motor vehicle other than L-group vehicles.

In accordance with paragraph 12(2)(b) of the RVSA, these ADRs are incorporated as in force or existing from time to time.

The ADRs may be freely accessed online through the Federal Register of Legislation. The website is www.legislation.gov.au.

3.2. Other Documents

International Commission on Illumination

Paragraph 3.12.2 of Appendix A includes a footnote reference to CIE S 017/E 2011, this document specifies International Lighting Vocabulary. This standard is available for purchase from the online standards store CIE Online Store (www.store.accuristech.com). While not freely available, CIE S 017/E 2011 is readily accessible and widely used by vehicle manufacturers and test facilities as part of their professional libraries. Subject to copyright conditions, people may view a copy of CIE S 017/E 2011 at the Offices of the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts in Canberra.

In accordance with paragraph 14(1)(b) and subsection 14(2) of the *Legislation Act 2003*, each of these documents are incorporated as in force on the date this national road vehicle standard is made.

International Organization for Standardization

Paragraph 2.3.1.5 and Paragraph 4.1.5 of Appendix A, include references to ISO 7000:2019, This document specifies the graphic symbols for use on equipment.

In accordance with paragraph 14(1)(b) and subsection 14(2) of the *Legislation Act 2003*, each of these documents are incorporated as in force on the date this national road vehicle standard is made.

ISO standards are all available for purchase only from the ISO and various associated national standards bodies. While not freely available, ISO 7000:2019 is readily accessible and widely used by vehicle manufacturers and test facilities as part of their professional libraries. Subject to copyright conditions, people may view a copy of ISO 7000:2019 at the Offices of the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts in Canberra.

Section 12 of the RVSA allows the Minister to incorporate a broad range of documents, including as in force or existing at a particular time or as in force from time to time, when making national road vehicle standards. This ensures that Australia's legislative framework is well-prepared for future developments in the international road vehicle space.

International Electrotechnical Commission

Paragraphs 3.2.4 and 3.2.6, of Appendix A, and Sheet LR1/2 table 1, Sheet LW2/1 table 1, Sheet LW2/4, Sheet L3/2 table 1, Sheet LR 4/2 table 1 and Sheet L5/2 of Annex 1 Appendix A, includes references to IEC Publication 60061 – Lamp caps and holders together with gauges for the control of interchangeability and safety. IEC Publication 60061 contains the recommendations of the IEC in regard to lamp caps and holders in general use, together with relevant gauges, with the object of securing international interchangeability.

Paragraph 3.11.2.2. of Appendix A includes a reference to IEC Publication 60809 edition 4 – Lamps and light sources for road vehicles – Dimensional, electrical and luminous requirements. This document is applicable to electric light sources for use in automotive applications, for example in road illumination devices and/or light signalling devices for road vehicles.

Annex 8, table 1 of Appendix A includes a footnote reference to IEC Publication 60410 – Sampling Plans and Procedures for Inspection by Attributes. This document establishes sampling plans and procedures for inspection by attributes. These sampling plans are applicable, but not limited, to inspection of end items, components and raw materials, operations, materials in process, supplies in storage, maintenance operations, data or records and administrative procedures.

IEC standards are available for purchase only through the International Electrotechnical Commission. While not freely available, these IEC standards are all readily accessible and widely used by vehicle manufacturers and test facilities as part of their professional libraries. Subject to copyright conditions, people may view a copies of IEC Publications 60061, 60809 and 60410 at the Offices of the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts in Canberra.

In accordance with subsections 14(1)(b) and 14(2) of the *Legislation Act 2003*, each of these IEC standards are incorporated as in force on the date this national road vehicle standard is made.

United Nations

Clause 7.1 includes a reference to the 00 series of UN Regulation No. 128 – UNIFORM PROVISIONS CONCERNING THE APPROVAL OF LIGHT EMITTING DIODE (LED) LIGHT SOURCES FOR USE IN APPROVED LAMP UNITS OF POWER-DRIVEN

VEHICLES AND THEIR TRAILERS. This is an international standard for Specific Requirements for the light emitting diode light sources for use in approved lamp units of power-driven vehicles and their trailers.

Paragraph 2.4.4.1of Appendix A, includes a footnote reference to the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.2. This resolution outlines the recommendations of the Consolidated Resolution on the Construction of Vehicles and provides information on the legal texts under the framework of the 1958 Agreement (UN Regulations, Rules and specific requirements) applicable in the vehicle design, aiming the improvement of safety and the protection of the environment.

Clause 5.2 of ADR 101/00 and paragraph 3.1 of Appendix A include a reference to Consolidated Resolution on the common specification of light source categories (R.E.5), document ECE/TRANS/WP.29/1127. This Resolution contains the specifications of light source categories and/or information on which light source categories are applicable or excluded for use in particular lamps.

In accordance with paragraph 14(1)(b) and subsection 14(2) of the *Legislation Act 2003*, each of these UN documents are incorporated as in force on the date this national road vehicle standard is made.

UN Regulations and Resolutions may be freely accessed online through the UN World Forum for the Harmonization of Vehicle Regulations (WP.29). The WP.29 website is www.unece.org/trans/main/welcwp29.html.

4. CONSULTATION

4.1. General Consultation Arrangements

It has been longstanding practice to consult widely on proposed new or amended vehicle standards. For many years, there has been active collaboration between the Commonwealth and the state and territory governments, as well as consultation with industry and consumer groups. Much of the consultation takes place within institutional arrangements established for this purpose. The analysis and documentation prepared in a particular case, and the bodies consulted, depend on the degree of impact the new or amended standard is expected to have on industry or road users.

Proposals that are regarded as significant need to be supported by an Impact Analysis (IA) meeting the requirements of the Office of Impact Analysis (OIA) as published in the *Australian Government Guide to Policy Impact Analysis* or the *Regulatory Impact Analysis Guide for Ministers' Meetings and National Standard Setting Bodies.*

4.2. Specific Consultation Arrangements

[To be completed after public consultation]

5. REGULATORY IMPACT

Preliminary Impact Analysis was submitted to the Office of Impact Analysis (OIA) and it was determined that a detailed analysis is not required under the Australia Government's Policy Impact Analysis Framework. The OIA reference number for the IA is OIA24-07660.

6. STATEMENT OF COMPATIBILITY WITH HUMAN RIGHTS

The following Statement is prepared in accordance with Part 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011.*

6.1. Overview

ADR 101/00 prescribes the performance characteristics for LED light sources in appropriate lighting devices, installed on power driven vehicles and their trailers.

6.2. Human Rights Implications

ADR 101/00 does not engage any of the human rights and freedoms recognised or declared in the international instruments listed in section 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011*.

6.3. Conclusion

ADR 101/00 is compatible with human rights, as it does not raise any human rights issues.