

Lab Notes

Issue 1001

Understanding the Australian Design Rules (ADRs)

1.00 Introduction :

This Lab Note is one of several which will discuss the content and relevance of the Australian Design Rules for lighting on cars, trucks, motor cycles, mopeds and trailers.

2.00 Brief History :

The ADRs define the specifications required of various essential components and functions of the vehicles. These include tyres, brakes, engine emissions, body strength, seat belts and lights amongst others. There are presently about 70 different ADRs each relating to a different essential facet of a vehicle.

Vehicles were manufactured to comply with Consolidated Draft Regulations (CDRs) as of about 1979. This was a very crude system compared to the current one. The second edition ADRs were introduced in Dec 1986. They were much more comprehensive than CDRs, but still did not cover all the lights on vehicles.

The third edition was introduced on 2nd Aug 1989. This is the current edition presently being used. After much delay the timing of a "sunset" clause was extended numerous times until in 1992 the third edition became mandatory. It is a comprehensive document which is quite closely based on the European Economic Commission (ECE) Regulations.

LightLab International Pty Ltd
Unit 1, Sandown Square
56 Smith Road
Springvale, VIC, 3171
Tel: (03) 9546 2188
Fax: (03) 9562 3717
Email: lightlab@lsa.com.au
Web Page: www.lsa.com.au

The third edition consists of text taken verbatim from ECE documents which is then partially struck out where Australia's Federal Office of Road Safety (FORS) considers that the ECE requirements are not suitable for Australian conditions. Some minor additions have also been made by FORS. A new edition is currently under review. The major thrust of the changes proposed relate to increased uniformity with the ECE specifications.

Each of the ADRs listed in this Lab Note relate to a type or group of lights. Within the ADR are all the rules relating to the design, manufacture, documentation and performance of the lights. It is a legal document which is steeped in jargon, and as such is quite daunting to the uninitiated.

3.00 Vehicle Categories and Codes :

Throughout the ADRs reference is made to different types of vehicles, with each type being given a code. Table 1 below lists the Vehicle Category Code for each Vehicle Category.

Table 1

Vehicle Category Code	Vehicle Category Description
LA	Moped 2 wheels
LB	Moped 3 wheels
LC	Motor Cycle
LD	Motor Cycle & Side-car
LE	Motor Tricycle
MA	Passenger Car
MB	Forward-control Passenger Vehicle
MC	Off-road Passenger Vehicle
MD	Light Bus
ME	Heavy Bus
NA	Light Goods Vehicle
NB	Medium Goods Vehicle
NC	Heavy Goods Vehicle
TA	Very Light Trailer
TB	Light Trailer
TC	Medium Trailer
TD	Heavy Trailer

It should be noted that not all ADRs apply to all types of vehicles. Some ADRs do have relevance to all vehicles (e.g. ADR 51/00 - Filament Globes), while others are specific to a particular type of vehicle (e.g. ADR 19/01 - Installation of Lighting and Light Signalling Devices on L-Group Vehicles).

4.00 Terminology :

As earlier mentioned the ADRs are steeped in jargon. To assist the reader with the understanding of the documents some of the important terms and definitions are listed below.

ECE Regulation	United Nations Economic Commission for Europe Regulation. Regulations made by the ECC in agreement with the various ECC countries for the uniformity of vehicles.
SAE Standards	The Society of Automotive Engineers Inc. (USA) Standards.
JIS Standards	Japanese Industrial Standards (Japan).
Tristimulus Values of Light (X,Y,Z)	The amount of each of the three primary "colours" required to match the colour of a particular light. The system will be more fully explained in an upcoming Lab Note titled "Colorimetry : The Measurement of Colour".
Colorimetry	Concerning the measurement of colour.
Photometry	Concerning the measurement of qualities associated with light. Photometry may be either visual or physical :- <ul style="list-style-type: none">• Visual : Where the eye makes the comparison between two light sources.• Physical : Where measurements are made by means of a light detector device.
Lumens	The quantity of luminous flux (light) emitted by a light source within the wavelengths which stimulate the receptors of the eye.
Illuminance	The density of luminous flux (light) on a surface area. The common unit is lux (lumens per square metre).
Intensity	The full name of this unit is Luminous Intensity and it can be likened to water pressure. Luminous Intensity is the amount of flux (light) being directed in a very precise direction ie. like the jet of water from a garden hose. The unit is the candela (cd).

For a more detailed explanation of these Lighting terms, it is recommended that the reader consult a reliable Lighting textbook. For example "Lighting - Basic Concepts" by Warren Julian which is available from LightLab International.

5.00 Overview of the Principal Australian Design Rules :

This summary of the principal Australian Design Rules from the current third edition lists those ADRs which are required for the lighting and visibility aspects of motor vehicle compliance.

ADR 1/00 Reversing Lamps

The function of this rule is to specify the photometric and colorimetric requirements for reversing lamps. These lamps warn pedestrians and other road users that the vehicle is moving, or is about to move in a reverse direction. Similarly a driver will be assisted in reversing manoeuvres of a vehicle during darkness.

ADR 6/00 Direction Indicator Lamps

This Rule specifies the photometric and colorimetric requirements for turning indicators, so that road users may be warned of a driver's intention to perform a turning manoeuvre.

There are currently three categories of turn indicators in mainstream use in Australia :

- Category 1 - for front indicators
- Category 2a - for rear indicators
- Category 5 - for supplementary side markers

ADR 13/00 Installation of Lighting and Light Signaling Devices on other than L-Group Vehicles

This Rule is related to all vehicles including their trailers, except for mopeds and motor cycles. The function of this Rule is to ensure that the installation of lighting and light-signalling devices is completed in such a manner that the operation of these devices is not impaired.

The first part of the ADR sets out very precisely the positioning of the lamps, vertical and horizontal angles for geometric visibility, and the orientation. It also goes into considerable detail in defining terms. For example - The definition for a lamp is " the light source as the filament itself."

In addition it defines what is meant by Independent Lamps, Group Lamps, Combined Lamps and Reciprocally Incorporated Lamps, as well as giving the everyday description of lamps in general usage.

Similarly ADR 13/00 defines Light Technical Parameters (LTPs) such as the illuminated surface, the apparent surface, the light emitting surface, the axis of reference, the centre of reference and the angles of geometric visibility.

ADR 19/01 Installation of Lighting and Light Signaling Devices on L- Group Vehicles

This Rule covers items such as Reversing Lamp, Conspicuity Lamp, Internal Lamp, Search Lamp, Front Reflex Reflector, non -Triangular and Parking Lamp for L-Group Vehicles.

The function of this Rule is to ensure that the installation of lighting and light-signaling devices on L- Group Vehicles is such that the effective operation of these devices is not impaired.

**ADR 19/02
Installation of Lighting and
Light Signaling Devices on L-
Group Vehicles**

As per ADR 19/01, however Conspicuity Lamps not listed.

Both ADR 19/01 and 19/02 are current.

**ADR 45/01
Lighting and Light Signaling
Devices not covered by ECE
Regulations**

This Rule covers items such as Side Marker Lamps, External Cabin Lamps, Passenger Car Side Marker Lamps, Search Lamps, Internal Lamps, Rear Marking Plates, Daytime Running Lamps, Cornering Lamps and Conspicuity Lamps.

The function of this Rule is to specify the photometric requirements for lighting and light-signalling devices which will ensure adequate illumination for the driver, as well as signal to other road users the position, orientation, intention and movement of the vehicle, without producing undue glare for road users.

**ADR 46/00
Headlamps**

The function of this Rule is to specify the photometric requirements for headlamps which will provide adequate illumination for the driver of the vehicle, without producing undue glare for other road users.

Separate requirements are set down for the "passing beam" (dipped beam) and the "driving beam" (main beam).

**ADR 47/00
Reflex Reflectors**

This Rule sets out the dimensional, photometric and stability requirements for reflex reflectors, so that they can effectively warn road users of the presence of a vehicle.

**ADR 48/00
Rear Registration Plate
Illuminating Devices**

This Rule sets out the requirements for adequately illuminating the rear registration plate. A luminance test is required whereby the amount of light projected onto the registration plate is measured, rather than the amount of light emitted from a light fitting.

**ADR 49/00
Front and Rear Position, Stop
and End-outline Marker Lamps**

This rule applies to all vehicles including their trailers, with the exception of mopeds and motor cycles. The function of the Rule is to signal to other road users the position, the orientation and the movement of the vehicle, without producing undue visual discomfort.

**ADR 50/00
Front Fog Lamps**

The intention of this Rule is to specify the photometric requirements for Front Fog Lamps which will provide adequate illumination for the driver of the vehicle without producing undue glare for other road users. Not widely used in Australia.

**ADR 51/00
Filament Globes**

This is probably the most comprehensive of all of the ADRs, being 54 pages long. The Rule describes the physical dimensions and the photometric requirements for all lighting and light signalling devices using filament "globes," in all vehicles.

The terminology used in all of the ADRs is a little confusing, as it uses both "globes" and "lamps" to describe the same thing. For example in ADR 51/00, a lamp is a light source, while in ADR 13/00 as well as other places, it calls devices "Lamps" when describing Rear Registration Plate Lamps, Rear Fog Lamps etc.

Strictly speaking these devices are all "luminaires," ie. They contain a light source a "lamp," with a lamp holder, and also a light control medium such as a reflector and/or a lens system.

ADR 51/00 classifies lamps into 8 categories, each being designated by a letter of the alphabet, and in most cases further classified by sub groupings using numerical values.

The main categories are designated :
C,F,H,P,R,S,T, and W.

The sub groupings for example in Category H are :
H1, H2, H3 and H4. In each Category a Table specifies the electrical and photometric characteristic of each wattage size.

**ADR 52/00
Rear Fog Lamps**

The function of this Rule is to specify the photometric requirements for Rear Fog Lamps which will signal to other road users the position, orientation and movement of the vehicle, without producing undue glare for road users. Not widely used in Australia.

**ADR 53/00
Position, Stop, Direction
Indicator and Rear Plate
Lamps for L-Group Vehicles**

The function of this Rule is to specify the photometric requirements for L-Group vehicle light-signalling devices which will signal to other road users the position, orientation and movement of the vehicle, without producing undue glare for road users.

**ADR 60/00
Centre High-mounted Stop
Lamps**

This Standard is applicable in Australia only. Unlike most other ADRs, it is not derived from ECE, SAE or JIS Standards. The function of this Rule is to specify requirements for supplementary Centre High-mounted Stop Lamps on the rear of the vehicle, to provide an additional indication to other road users to the rear of the vehicle, that the driver of the vehicle is applying brakes.

**ADR 67/00
Installation of Lighting on
Three-Wheeled Vehicles**

The function of this Rule is to ensure that the installation of lighting and light-signalling devices on Three-Wheeled Vehicles is such that the effective operation of these devices is not impaired.

6.00 Conclusion :

It should be remembered that ADR's are Design Rules, and so only apply to newly manufactured items and new equipment. They therefore do not relate to the condition or road-worthiness of any item.

Newly made items such as lenses and light assemblies are required to conform to the appropriate ADR, but a broken or faded lens which may well have originally conformed to an ADR, will not in its present condition conform for road-worthiness or serviceability requirements.

It must be clearly noted that ADR's have no bearing upon the road-worthiness of any vehicle or component.

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