Lens Markings Decoded

The lens markings on lighting and signalling are meaningful if you know how to decode them. Depending on the device and the regulations to which it complies, the markings indicate what functions the device provides, which side of the car it belongs on, what kind of light source it uses, and more. There are two main sets of lighting standards: SAE, used primarily in North America, and ECE, used throughout the rest of the world. The two sets of standards require different markings.

International ECE markings

ECE/EEC marking: Country of Approval

Firstly, what are those numbers that come after the "E" in the circle or the "e" in the box? What makes a lamp marked (E6) [e6] different from a lamp marked (E1) [e1]?

The uppercase "E" in a circle means the device is type approved to an ECE Regulation, while the lowercase "e" in a box indicates the device is type approved to an EEC Directive. It's rare to find one marking without the other, since the requirements are essentially identical. The number after the "E" or "e" signifies the country in which approval was granted. This doesn't necessarily indicate anything about the quality or performance of the device, though some countries' test-and-approval labs have reputations for being much stricter and others have reputations for being quite lax. The number also doesn't indicate where the device was designed or manufactured. Under ECE and EEC regulations, an item of motor vehicle equipment type approved in any ECE or EEC member country is acceptable for use in any other country that permits or requires vehicles and vehicle components conforming to ECE or EEC safety regulations. Here is a breakout chart of the numbers:

- 1 Germany
- 2 France
- 3 Italy
- 4 Netherlands
- 5 Sweden
- 6 Belgium
- 7 Hungary
- 8 Czecheslovakia
- 9 Spain
- 10 Yugoslavia
- 11 United Kingdom
- 12 Austria
- 13 Luxembourg
- 14 Switzerland
- 15 (currently vacant)
- 16 Norway
- 17 Finland
- 18 Denmark
- 19 Romania
- 20 Poland
- 21 Portugal
- 22 Russia
- 23 Greece
- 28 Belarus
- 29 Estonia
- 30 (currently vacant)
- 31 Bosnia-Herzegovina
- 32 Latvia
- 33 (currently vacant)
- 34 Bulgaria
- 35 (currently vacant)
- 36 (currently vacant)
- 37 Turkey
- 38 (currently vacant)
- 39 (currently vacant)
- 40 Yugoslavia-Macedonia
- 41 (currently vacant)
- 42 Special EC
- 43 Japan
- 44 (currently vacant)
- 45 Australia
- 46 Ukraine
- 47 South Africa

- 24 Ireland
- 25 Croatia
- 26 Slovenia
- 27 Slovakia

Lamp Function Markings

There are letters, numbers and symbols on the lens or housing that indicate various aspects of the lamp's function and performance. The North American SAE and rest-of-world ECE regulations indicate the various functions with different markings. The two systems use some of the same markings for different functions.

ECE/EEC Device Function Markings:

Signal Lamp Markings, Front and Rear

- **A** Parking lamp (also called "position lamp", "city light", "sidelight")
- **AR** Reversing (backup) Lamp
- **F** or **B** Rear Fog Lamp
- **IA** Retroreflector
- **R** Tail (rear position) Lamp
- **S1** Brake (stop) lamp
- **S3** Centre High Mount Stop Lamp (3rd brake light)
- **1** Front Turn Indicator for use more than 40mm away from low beam headlamp axis
- **1a** Front Turn Indicator for use more than 20mm and less than 40mm away from low beam headlamp axis
- **1b** Front Turn Indicator for use less than 20mm away from low beam headlamp axis
- **2a** Rear Turn Indicator
- **5** Side Turn Signal Repeater
- **SM1** Sidemarker lamp
- **SM2** Sidemarker lamp
- **RL** Daytime Running Lamp (DRL)

Forward Illumination Lamp Function Markings:

- **B** Fog lamp
- **C** Low (dip) beam headlamp, tungsten filament
- **R** High (main) beam headlamp or driving lamp, tungsten filament
- **CR** Low/high (dip/main) beam headlamp, tungsten filament
- **HC** Low (dip) beam headlamp, halogen
- **HR** High (main) beam headlamp or driving lamp, halogen
- **HCR** Low/high (dip/main) beam headlamp, halogen
- **DC** Low (dip) beam headlamp, gas discharge (HID Xenon)
- **DR** High (main) beam headlamp or driving lamp, gas discharge (HID Xenon)
- **DCR** Low/high (dip/main) beam headlamp, gas discharge (HID Xenon)
- **A** Front position lamp ("parking lamp", "city light", "sidelight")
- **RL** Daytime Running Lamp ("DRL")
- **PL** Plastic lens (may occur with any of above markings)

These markings may occur in variant forms. For instance, HCR may or may not be surrounded by a box, and may occur as HC/R. Markings may also occur together. For example, a front lamp cluster that incorporates a low beam headlamp and a high beam headlamp, each with its own halogen bulb and reflector, would be marked HCHR, while a front lamp cluster incporporating a Xenon HID low beam headlamp and a halogen high beam would be marked DCHR.

ECE/EEC Marking: Headlamp Suitability for Traffic Direction

This is a very important marking. All low ("passing", "lower", "dipped") beams are an asymmetrical distribution of light to give maximum seeing in the direction of travel while controlling glare light directed towards oncoming traffic. A headlamp intended for use in traffic that flows on the right side of the road must never be used on the left side

of the road, nor must a left-traffic headlamp ever be used on the right side of the road. A wrong-side-of-road headlamp does not provide adequate illumination for the driver to see what he needs to see in order to drive safely, and severely blinds oncoming traffic. This **cannot** be corrected by adjusting the aim of the lamp, because traffic-handedness is intrinsic in the optics of the lamp. This means it is very unsafe to use UK-spec, Australian-spec, or Japanese-spec ("JDM") headlamps in the United States, Canada, Continental Europe or any other location that drives on the right side of the road. Many performance parts dealers are illegally importing and selling JDM or wrong-side-of-road ECE headlamps into North America, and touting them as a "performance improvement". They may or may not have ECE headlamp markings, but they are *not* a performance improvement -- they are a danger.

Note that the terminology involved in traffic-handedness of headlamps can be confusing. Countries where traffic flows along the right side of the road have "Right Hand Traffic" (RHT), and the cars used in these countries generally have the steering wheel on the left side of the car, which is called "Left Hand Drive" (LHD). Countries where traffic flows along the left side of the road have "Left Hand Traffic" (LHT) and mostly "Right Hand Drive" (RHD) cars. Sometimes headlamps are referred to by the position of the steering wheel in the car, e.g. "LHD headlamps" used to indicate lamps suitable for use in an LHD vehicle, i.e., on the right side of the road. This is not a wise habit; most countries permit vehicles with the steering wheel on the "wrong" side of the car, but the headlamps are still required to be of the correct traffic-handedness.

Some older reflector-type headlamp designs use a bulb holder that can be rotated through an angle of 30 degrees and the bulb locked in either a "Right Hand Traffic" or "Left Hand Traffic" position, and some modern European (ECE/EEC) projector headlamps have a similar capacity to produce either a left-traffic or a right-traffic beam by moving a lever. Such headlamps can be used on either side of the road, but only if they are shifted into the correct position for the traffic in which you intend to drive. Here is how to read ECE traffic-direction markings:

- → Low beam is suitable only for use in Left Hand Traffic (e.g., Britain, Australia, Africa, Japan)
- [NO ARROW] Low beam is suitable only for use in Right Hand Traffic (US, Canada, Continental Europe, Scandinavia, Russia, etc.)
- ↔ Low beam is adaptable for use on either side of the road (many projector lamps and older reflector high/low lamps)

The traffic-handedness marking applies only to low-beam headlamps. Arrows are also used on all ECE/EEC signalling devices, such as parking lamps, brake lamps, Daytime Running lamps, turn signals, etc., to indicate which side of the **vehicle** they're intended to fit. The specifications for signalling devices call for specific horizontal angles through which the device must be visible, so the device can convey its message to everybody who needs to see it. These visibility angles are equal but opposite for devices on the left and on the right side of the vehicle, hence the need for side-of-vehicle arrows.

Because some devices incorporate signalling functions *and* a low beam headlamp, both kinds of arrows may be found on a combination device. When in doubt about the meaning of the arrow, check which

function marking is nearest, and that's the function to which any particular arrow applies. For instance, if you find an arrow → near an 'A' mark on a front lamp cluster, it refers to the side of the car for which the parking lamp built into that cluster is approved, and not the traffic direction for which the headlamp in the same cluster is intended.

Beam Peak Intensity Reference Number

This marking is found only on ECE/EEC type approved forward lighting devices that produce a high ("upper", "driving") beam, and expresses the maximum light intensity in the beam. This marking is NOT an indicator of lamp performance or quality. It does not indicate where in the beam this maximum occurs, nor does it imply anything about the shape of the beam. The marking is a number such as 10, 12.5, 17.5, 20, 25, 27.5, 30, etc. Maximum authorized total high-beam peak intensity per a vehicle under ECE regulations is 225,000 candela at 12 Volts, and many countries that adhere to ECE or EEC regulations use this marking to determine the lighting legality of vehicles in use. 225,000 candela corresponds to a peak beam intensity reference number total of 75, so many countries stipulate that all beam peak intensity reference numbers found on all devices on a single vehicle must total up to no more than 75.

To learn the peak beam candlepower of a lamp with a standard-wattage bulb operating at 12 Volts, divide the reference number on the lamp by 37.5, then multiply the result by 112,500. But remember, a lamp with a higher reference number is not necessarily a better lamp than one with a lower number.

North American SAE Lighting and Signalling Function Markings:

- **A**Reflex reflectors
- **A2** Wide angle reflex reflectors
- **C** Motorcycle auxiliary "passing" lamp
- **D** Motorcycle turn signal lamp
- **E** Side turn signals for vehicles at least 12m long
- **E2** Side turn signals for vehicles shorter than 12m
- **F** Front fog lamp
- **F2** Rear fog lamp (fog taillamp)
- **G** Cargo lamp
- **H** Sealed beam headlamp
- **HG** Xenon HID headlamp
- **HR** Halogen replaceable-bulb headlamp
- **I** Turn signal, front
- **I3** Turn signal, front, spaced from 75mm to 99mm from low beam headlamp
- **I4** Turn signal, front, spaced from 60mm to 74mm from low beam headlamp
- **I5** Turn signal, front, spaced less than 60mm from low beam headlamp
- **I6** Turn signal, rear (also front for vehicles at least 2m wide)
- **I7** Turn signal, front, spaced less than 100mm from the headlamp, for vehicles at least 2m wide
- **K** Front cornering lamp
- **K2** Rear cornering lamp
- **L** License plate lamp
- **M** Motorcycle headlamp
- **N** Moped headlamp
- **O**Spot lamp
- **P** Parking lamp
- **P2** Clearance, Sidemarker, and Identification lamp
- **P3** Clearance, Sidemarker and Identification lamp for vehicles at least 2m wide
- **PC** Combination clearance and sidemarker lamp (trucks)
- **PC2** Combination clearance and sidemarker lamp for vehicles at least 2m wide
- **R** Reversing (backup) lamp
- **S** Stop (brake) lamp
- **S2** Stop (brake) lamp for vehicles at least 2m wide
- **T** Tail (rear position) lamp

- **T2** Tail (rear position) lamp for vehicles at least 2m wide
- **U** Supplemental high-mounted combination brake/turn lamp
- **U2** Supplemental high-mounted brake lamp for vehicles at least 2m wide
- **U3** Center high-mounted brake lamp (CHMSL) for passenger cars
- **W2** Warning lamp for school buses
- **Y** Auxiliary high beam ("driving") lamp
- **Y2** Daytime Running Lamp
- **Z** Auxiliary low beam lamp

Daniel Stern Lighting (Daniel J. Stern, Proprietor)

click here to send email