



Xenon and bi-xenon headlights

By lengthening visibility distance to more than one hundred meters, xenon headlights improve night driving safety because **they make it possible for the driver to better anticipate a risk situation**. Renault has already offered this technology for several years as part of its permanent concern for safety improvement.



RENAULT COMMUNICATION

> BASIC FACTS

In night driving, the driver's ability to anticipate is directly related to headlight range. With the intense luminous flux that they deliver, xenon headlights make it possible to increase this and, consequently, to improve safety during night journeys. The use of xenon lamps makes it possible to manage the geometry and directivity of the beam of light that the headlights emit very accurately, to a degree of precision that cannot be achieved with halogen lamps. It is possible to focus their light on the critical zone while reducing dazzle for other road users. Moreover, this optimisation of focus gives xenon headlights increased range for identical power. Lastly, the light of the xenon lamps is close to that of daylight, also known as "equivalent colour temperature". This characteristic gives good colour rendering, which helps the driver identify elements of the vehicle's environment. On systems known as bi-xenon, a retractable shutter modifies the beam of light resulting from a single lamp to change the headlights from dipped mode to main-beam mode.

IN SHORT >>>

Because of their excellent output, xenon lamps deliver a luminous flux that is more intense than that of halogen lamps, for the same power consumption. The optics of the headlight play a part in determining its effectiveness. The use of xenon lamps makes it possible to improve headlight directivity.



HOW DOES IT WORK?

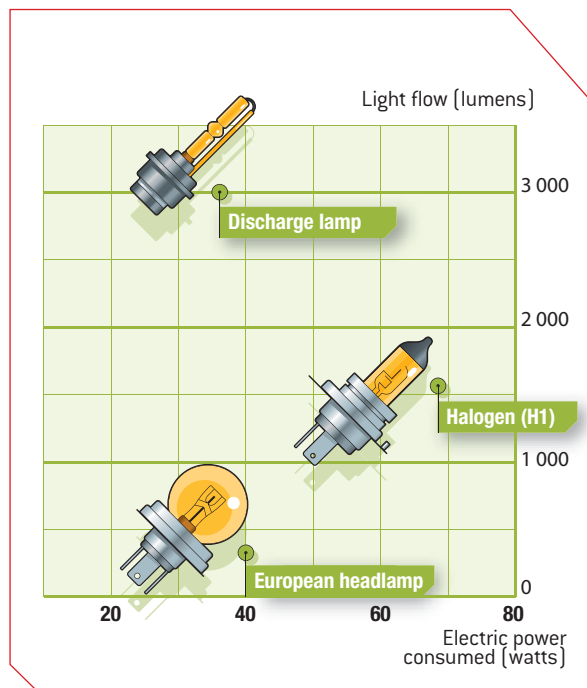
1 LAMP, REFLECTORS, OPTICS

Xenon lamps are gas-discharge lamps. They do not contain a filament. An electric arc is created between two electrodes in xenon, a rare gas, contained in a small quartz bulb, under pressure. Contrary to halogen lamps, xenon lamps cannot run directly on the 12 to 15 volts that the battery of a car delivers. To form the electric arc, it is necessary to apply a short pulse of 20,000 volts to the electrodes of the lamp. Once the arc starts, its maintenance requires perfectly stabilised power of 85 volts, which must be free from any fluctuation. Management of this, involving both the starting pulse and the regulation of operating voltage, is performed by an electronic module, often called "ballast", integrated into the headlight. Lastly, the output of xenon lamps is much better than that of halogen lamps; i.e. for equivalent electric power consumed, they deliver a much more intense luminous flux.

The headlight does not just consist of the lamp. The light the latter delivers is focused by reflectors and a set of frontal optics comparable to a magnifying glass. The geometry of these two elements determines that of the beam. But why is the focusing so much more accurate?

Like any optical element, the pair consisting of the reflectors and frontal optics only functions perfectly starting from one specific source of light, i.e. comparable to a point. With a halogen lamp, the filament emits light down all its length. This is far from being a point source. On the other hand, on a xenon lamp, the electric arc takes the shape of a tiny sphere comparable to a point source. Reflectors and frontal optics therefore work together under optimal conditions to deliver perfectly controlled geometry for the beam.

2 THE STRENGTHS OF XENON HEADLIGHTS



Range (more than 100 m) and directivity are not only the advantages of xenon headlights. The lifespan of the gas-discharge lamps is five times higher than that of halogens. Moreover, on the bi-xenon system, a progressive modification of the position of the light beam deviation shutter makes it possible to adapt its range to the speed and load of the vehicle. This feature is found on Mégane and Scenic.