



Technical information

Plastic Cover Lenses for Headlamps

Reconditioning plastic cover lenses

Vehicle lighting makes a major contribution to keeping all road-users safe. Modern vehicle systems are becoming ever more complex, which is why headlamps used for vehicle lighting meet a wide variety of requirements. Whereas previously, the lighting terms used were low beams and high beams, today, they also include city light, country road light, freeway light, curve light, cornering light and adverse weather light. This is why assessing any defects in these systems requires comprehensive know-how from fitters.

Despite the complexity of the lighting systems used, aspects that are seemingly simple and basic should not be overlooked.

Headlamps which can be subjected to environmental influences (influences caused by the elements) such as dust, water, salt and even sand, tar and impact from stones wear down over time. In addition, improper cleaning or incorrect or impermissible cleaning agents and in some cases, incorrectly fitted light sources or incompatible light sources can have a negative effect on the materials used. The cover lenses or outer lenses can then become physically damaged, thereby also impairing the operative function of the headlamp itself.

Current statistics show that more than one quarter of all individual defects on passenger cars relates to lighting and electrics. (Source: "Krafthand" 10/2015; report based on the main inspections carried out by the TÜV regulatory body in Germany)

Is there an alternative to headlamp replacement?

Example headlamp encountered in day-to-day workshop activities:





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Various "repair kits" are sold over the Internet and in aftermarket parts stores that address the physical damage caused to plastic cover lenses. According to their manufacturers, these kits are capable of restoring the original gloss and appearance of OEM headlamps that have become worn, yellowed or dull over time. These "cosmetic repairs" are also marketed as "repair solutions" that apparently present a genuine alternative to replacing headlamps altogether. Tips and tricks are also frequently provided as do-it-yourself guides in repair videos found on the Internet without pointing out the risks or dangers that practicing these methods can pose to the active and passive safety of all road users. Instead, the following key words and phrases are used:

- Expensive headlamp replacement is no longer required
- Increased resale value of the vehicle
- Weatherproof, transparent surface
- Fast and easy results
- Tiny cracks and fissures are stabilized
- Headlamp is brightened

What statutory regulations apply?

Applicable ECE regulations with respect to the requirements for plastic cover lenses and coatings are:

- ECE-R19 (fog lamps)
- ECE-R98 (GDL headlamps)
- ECE-R112 (halogen headlamps)
- ECE-R123 (AFS headlamps)

Generally speaking, the cover lens forms an integral part of the headlamp and is thus relevant from a type approval perspective. Grinding or abrasively polishing the light exit area, or applying paint or lacquer to the cover lens, represents a manipulation or modification that no longer corresponds to the type approval of the headlamp and is



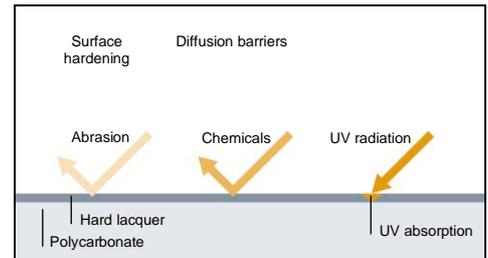
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therefore not permissible by law. Headlamps modified in this fashion are no longer regarded as "type approved" or in line with legal requirements.

What role do material components play in the production process?

It is in this context that it is important to know what role the material mix of the cover lens and the special lacquer applied play.

Plastic cover lenses for headlamps are manufactured in a multi-stage, process-aligned and actively monitored production process. They must meet high mechanical and thermal requirements. The transparent and impact-resistant plastic "polycarbonate" (PC) material is treated with a scratch-resistant coating of hard lacquer in a special refinement process that provides special protection against the yellowing effect caused by UV radiation as well as protects against environmental influences.



Repair kits – Investigated under laboratory conditions

Motivated by customer inquiries, our lighting technicians tested the extent to which the repair kits and paint systems offered for headlamps comply with the legal requirements defined for headlamp surface compositions.

The following factors were investigated by carrying out comprehensive tests in the HELLA development laboratory:

- Determine the thickness of the lacquer by taking white light interference measurements
- Determine the "haze" (visual parameter for describing the scatter effect or optical structure)
- Determine scratch resistance
- Determine media resistance (to propylene carbonate and cleansing tenside R17)

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Result:

Unlike the originally applied coating, none of the repair kits or lacquer systems tested met the relevant testing requirements. HELLA is not currently aware of any repair methods or repair sets that allow a headlamp to be reconditioned while still maintaining the applicable ECE regulations (ECE-R19, ECE-R98, ECE-R112 and ECE-R123; also see page 2 for more information) or come with a corresponding, official approval or accreditation.

Conclusions:

1. Used in a professional manner, all of the repair kits tested conditioned the surface of the cover lens in such a way that the lens visually appeared to largely coincide with the factory-new condition but was far less resistant to the effects of weather, media and wear than the OEM standard, even when the repair product was applied as directed.
2. Although when applied to weathered or scratched cover lenses, the total light output of the headlamp system can be greatly improved in isolated cases, this improvement does not last long.
3. As a result, there is no situation in which a vehicle owner would be well advised to use one of these repair kits. In the majority of cases, after such a product is applied, the plastic cover lens will age much more quickly from the effects of weather, media and abrasion than when simply left alone.
4. When one of these repair kits is used, the type approval for the headlamp in question is invalidated, and the operating permit for the vehicle becomes null and void.