GRE-AFS Working Paper No. **4-9**
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UK position on AFS

Part 1 - comments on the main open issues, that were summarised in the "Open Issues - RXXX AFS" document prepared by the AFS Chairman.

1. Safety Concept. The Annex 18 would be a useful addition to the AFS regulation. Technical Services would then have a formal basis on which to check the FMEA of the manufacturer to ensure that a particular failure in the AFS does not affect other components and that the AFS system works correctly at all times.

2. The question of light sources not approved to R37 or R99. The UK does not agree to permitting them until we have had a full analysis of the situation. The use of LEDs for headlamps is a radical change and the test points may not adequately regulate the new technology. LED have different characteristics to filament bulbs (for instance they are very directional) so the current methods of measuring headlamp beam pattern may have to be changed to ensure uniformity within the beam pattern.

3. Traffic change mode.
The UK insists on a means whereby the driver can easily adapt the beam pattern for the opposite hand of traffic without having to spend money at a dealer. The asymmetric portion of the beam must be removed (or adjusted downwards) to ensure that opposing traffic is not dazzled. At the same time an adequate amount of light on the road must remain.
When the beam is temporarily set for the opposite hand of traffic, this must be made obvious to the driver. Automatic changing should be permitted. Misuse should be discouraged by having the switching not easily accessible while the vehicle is in motion.

4. Adjustment of lighting units.
Adjustment must be possible to keep the headlamps and fog lamps correctly aligned. This must cover any unit which contributes to the beam. This would even affect a unit which is nowhere near the cut-off but aims a specific high intensity part of the beam down the road. This must be kept correctly aligned otherwise the driver can not see as the manufacturer intended. In principle the design of the vehicle should allow adjustment such that alignment of all beam contributors can remain as intended.
It may not be easy to check the alignment of all beams at periodic technical inspection. Therefore this area needs to be considered carefully.

5. EMC.
The EMC of an aftermarket part must be controlled but if the parts are only to be fitted on the vehicle in production this testing is superfluous. Because the 95/54 vehicle test will cover this situation and extra testing is unnecessary.

6. Failure provisions
When the AFS system fails in any respect, the driver must be warned so that he can rectify the situation by having the vehicle repaired. Similarly a system failure must be transparent to the inspector when the vehicle is subject to periodic testing. Therefore a warning light on the dashboard is needed - unless the failure is obvious. The loss of a light source where there is only one light source on that side of the car will probably be clear to the driver and does not require a failure tell tale. However it must be possible to indicate a software or other failure which is not apparent to the user but causes a deviation from the normal functioning of the vehicle or causes it to fall outside the type approved specification. Any fallback to a fail-safe mode must be indicated, to ensure that the driver is aware that the vehicle is not operating in the normal way and thus takes it to a dealer for repair.

A failure tell-tale should be checked by lighting up briefly when the ignition is turned on, to ensure that the bulb for the warning lamp in the dashboard has not failed. (In a similar manner to the brake failure warning light). For vehicles with a message centre it is assumed that they are self-diagnosing and would indicate any failure within the message centre which would prevent a failure in the AFS system from being displayed.

7. Photometric values – see Parts 2 and 3 of this document.

8. Cut-off line. The UK is still undecided as to whether the cut-off gradient should be measured at 25m or 10m. Or either. The cut-off line should allow the headlamp to be aimed correctly, easily and repeatably during in-service testing as well as ensure correct aim for type approval testing.

9. The question of whether there should be a new regulation ? In principle the AFS prescriptions could be added to R112 and then HID added to R112, but that might cause problems when moving to the 01 level of amendments if a significant change only affected one type of headlamp – say Halogen. However so much of the text is similar between R98, R112 and AFS RXXX that it seems burdensome to amend each regulation each time. And it gives the EU a lot more translation work.

10. We need to ensure that a person cannot interfere with the AFS or add lighting units without this being clear to the police. Markings should be clear so that drivers cannot put their fog lamps on or extra lamps and pretend it is part of the AFS. Although being realistic, it is unlikely that the police are familiar with the details of e-marks.

Part 2 – background to concerns over glare and other problems with headlamps.

The UK is concerned about glare from headlamps. A large number of complaints were received in the late 90s (and continue to be received today) by the UK Department Of Transport as projector headlamps proliferated, the use of Gas Discharge headlamps increased and unusual and distracting coloured effects appeared within the headlamp beam.

It is difficult to draw any firm conclusions but the complaints mainly concerned the colour of light, the sharpness of the cut-off and the perceived brightness of the beams. Many of the complaints and blame was attributed to Gas Discharge (HID)/"Xenon" but in fact a lot of the problems were probably caused by projector lamps.

It is still difficult to decide if HID are worse than Halogen lamps for glare or it is simply a novelty effect that will gradually disappear as more and more vehicles are produced with HID. Therefore at this stage the UK does not advocate new restrictions on headlamp design.

Nevertheless the photometric values for use in the AFS Regulation by all types of headlamp must be tightly controlled to ensure that we do not receive another wave of complaints. In addition, if possible the scope for novel colour effects on the edge of the beam (chromatic aberration) should be limited and the cut-off should not be permitted to be too sharp. The question of limiting the height of headlamps and enforcing a minimum size or area of headlamp should also be considered.

Certainly there should be no movement in a direction which might cause increased complaints, so if there is any doubt about which values to use for AFS then the values in existing regulations should be maintained until there is objective evidence to change them.

The UK proposal for AFS test points is contained in Part 3.

Other areas which may need regulation, such as eliminating novel colour effects, will be addressed later as this is applicable to all types of headlamp and not just AFS. The area of automatic levelling is already being addressed in GRE.

Part 3 – photometric values

Examination of the AFS test points shows some discrepancies with current regulations. Based on the rationale in Part 2, any change from the Headlamp Regulation 112 needs to be thoroughly justified.

All points quoted are for LHD (right hand traffic) beam patterns (continental driving).

Summary of proposal

1. Multiplier to convert test point values from 12V to rated voltage (for HID) should be 0.74 not 0.7
2. Add point 75L – maximum of 12lx.
3. 50L – limit to a maximum of 15lx. (20lx for class W beam).
4. 50R The reasons for deleting 50R are not clear and should be explained.
5, 6, 7. Sign light points should be re-introduced and values should not be decreased.
8. Zone III. Why is a relaxation to 1lx allowed for bend lighting ?
9. Segment C and D. Should these be regulated more stringently.

Rationale

1. The multiplier to convert from values measured at rated voltage (for HID) to values measured at 12V should be 0.74 which corresponds to a 35% increase for HID and not 0.7 which is ~43% increase. It is understood that there was a 35% increase in the values when R98 was introduced – compared to R112 values. Annex 10 paragraph 2.2 refers.

2. Point 75L. We are not familiar with the rationale that led to the deletion of 75L in Regulation 98 on HID. In order to have a smoother gradient within the beam and limit glare on undulating roads this point should be re-instated with a value of 12lx.

3. Point 50L is proposed to be raised to 25lx. There was apparently some controversy over this point in the discussions that led to R98. 25lx is not acceptable at this point, and in the absence of any evidence otherwise this point should be limited to 15lx as in R112, in order to prevent the possibility of glare to opposing traffic on undulating roads. 20lx may be acceptable for the class W (wet road) beam.

4. What is the rationale for deleting the 50R point ? Should it be min 12lx ?

5. Sign light. SL and SR (for all modes) have been changed from their values in R112. The reason for this is unclear. Their minimum value should be 0.1 lx and not 0.05 lx, in order to maintain a reasonably uniform luminance above the cut-off and provide some sign light.

6. Points 4 and 5 (and 6?) from R112 (at L4 U2 and V U2) should be resurrected, to provide sign light and ensure that there is some light above the horizontal to avoid excessive cut-off sharpness.

7. Point 8 from R112 (at L4 H) has been eliminated, compared to R112. This should be re-introduced with a minimum value of 0.2lx.

8. Zone III is normally limited to 0.7lx but for bend lighting it is permitted to increase to 1lx. What is the justification for this ?

9. VEDILIS research (into HID) suggested 10lx maximum for Segment D and 25 lx for Segment C. It might be advisable to introduce these maximums into AFS.

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