

Ref.: DRAFT Reg No. xxx

Submitted by the Expert from GTB-AFS

Consolidated provisions for systems which are intended for the aftermarket only, including a reproduction (figure offset) of those provisions of Regulation No. 48, which are considered to be applicable to these systems. Revised editorial and substantial proposals (**bold characters**) have also been incorporated .

2. APPLICATION FOR APPROVAL OF A SYSTEM

2.2. *Every application for approval shall be accompanied by:*

2.2.3. bis ~~and~~, *in case of a system according to paragraph 4.1.7. below, a vehicle representative of the vehicle type(s) for which the system is intended.*

4. APPROVAL4.1. General

4.1.6. *The Applicant shall indicate in a form corresponding to the respective model in the annex 1 to this Regulation, the vehicle(s) for which the system is intended.*

4.1.7. *If approval is sought for a system which is not intended to be included as part of the approval of a vehicle type according to Regulation No.48,*

4.1.7.1. *the Applicant shall ~~demonstrate~~ submit sufficient documentation to prove the capability of the system to comply with the ~~relevant~~ provisions of section 6.20. of Regulation No.48 when correctly installed, and*

4.1.7.2. *the system shall be approved according to Regulation No.10.*

~~4.1.7.3. *In the case of a system according to paragraph 4.1.7. above, the system shall be accompanied by a copy of the form according to paragraph 4.1.4. above and instructions to enable its installation according to the provisions of Regulation No.48.*~~

5. GENERAL SPECIFICATIONS

5.11. *In the case of a system according to paragraph 4.1.7. above.*

5.11.1. *The system shall be accompanied by a copy of the form according to paragraph 4.1.4. above and instructions to enable its installation according to the provisions of Regulation No. 48.*

5.11.2. *The Technical Service responsible for type approval shall verify that*

(a) the system can be correctly installed according to said instructions;

(b) the system, when installed in the vehicle, complies with the provisions of paragraph 6.20. of Regulation No. 48; to this effect, practical tests at the discretion of the Technical Service shall be carried out.

Annex 1, COMMUNICATION

9.5. *the vehicle(s) for which the system is intended as original equipment*

9.6. *whether approval is sought for a system which is not intended to be included as part of the approval of a vehicle type according to Regulation No. 48 yes/no*

9.6.1. *if in the affirmative: information sufficient to identify the vehicle(s) for which the system is intended*

PROVISIONS OF PARAGRAPH 6.20. OF REGULATION NO. 48
(Extract of GRE-AFS working document 6-02 in its status after 5th GRE-AFS)

- "6.20. **ADAPTIVE FRONT LIGHTING SYSTEM (AFS)**
Where not otherwise specified below, the requirements for main-beam headlamps (paragraph 6.1.) and for dipped-beam headlamps (paragraph 6.2.) of this Regulation apply to the relevant part of the AFS.
- 6.20.1. **Presence** *Optional on motor vehicles. Prohibited on trailers.*
- 6.20.2. **Number** *One.*
- 6.20.3. **Arrangement** *No special requirements.*
- 6.20.4. **Position**
The AFS shall, prior to the subsequent test procedures, be set to the neutral state, emitting the basic passing beam;
- 6.20.4.1. **In width and height:**
for a given lighting function or mode the requirements indicated in the paragraphs 6.20.4.1.1. through 6.20.4.1.4. below shall be fulfilled by those lighting units which are energized simultaneously for that lighting function or mode of a function, according to the applicant's description.
- 6.20.4.1.1. *Two symmetrically placed lighting units shall be positioned at a height in compliance with the requirements of the relevant paragraphs 6.1.4. and 6.2.4., where "Two symmetrically placed lighting units" shall be understood to be two lighting units, one on each side of the vehicle, positioned such that the (geometric) centres of gravity of their apparent surfaces are at the same height and at the same distance from the vehicle's longitudinal median plane within a tolerance of 50 mm, each; their light emitting surfaces, illuminating surfaces, and light outputs, however, may differ.*
- 6.20.4.1.2. *Additional lighting units, if any, on either side of the vehicle shall be positioned at a distance not exceeding 140 mm 1/ in horizontal direction (E in the figure) and 400 mm in vertical direction above or below (D in the figure) from the nearest lighting unit;*
- 6.20.4.1.3. *None of the additional lighting units described in paragraph 6.20.4.1.2. above shall be positioned lower than 250 mm (F in the figure) nor higher than [950 /1200 /1500] mm (G in the figure) above the ground;*
- 6.20.4.1.4. **Additionally, in width:**
*for each mode of the passing beam lighting, when measured in direction of the reference axis:
the outer edge of the apparent surface of at least one lighting unit on each side of the vehicle shall not be more than 400 mm from the extreme outer edge of the vehicle (A in the figure); and,
the distance between the inner edges of the apparent surfaces of the lighting units on the right and left hand side of the vehicle (B in the figure) shall be not less than 600 mm, or, except for category M₁ and N₁ vehicles not less than 400 mm when the overall width of the vehicle is less than 1300 mm.*
- 6.20.4.2. **In length:**
all lighting units of an AFS shall be mounted at the front. This requirement is deemed to be satisfied if the light emitted does not cause discomfort to the driver either directly, or indirectly through the rear-view mirrors and/or other reflecting surfaces of the vehicle.
- 6.20.5. **Geometric visibility**
*On each side of the vehicle, for each lighting function and mode provided:
[the angles of geometric visibility prescribed for the respective lighting and light-signalling functions in paragraphs 6.1.5. and 6.2.5. of this Regulation, shall [for each direction] be met by at least one lighting unit or by the assembly of the lighting units that are simultaneously energized to perform said function and mode(s), according to the description of the applicant.]*
- 6.20.6. **Orientation** *Towards the front.*
The AFS shall, prior to the subsequent test procedures, be set to the neutral state, emitting the basic passing beam.
- 6.20.6.1. **Vertical orientation:**
- 6.20.6.1.1. *The initial downward inclination of the cut-off of the basic passing beam to be set in the unladen vehicle state with one person in the driver's seat shall be specified with a precision of 0.1 per cent by the manufacturer and indicated in clearly legible and indelible manner on each vehicle, close to either the front lighting system or the manufacturer's plate, by the symbol shown in annex 7.
Where differing initial downward inclinations are specified by the manufacturer for different lighting units that provide or contribute to the cut-off of the basic passing beam, these values of downward inclination shall be specified with a precision of 0.1 per cent by the manufacturer and indicated in clearly legible and indelible manner on each vehicle, close to either the relevant lighting units or on the manufacturers plate, in such a way that all the lighting units concerned can be unambiguously identified.*
- 6.20.6.1.2. *The downward inclination of the horizontal part of the "cut-off" of the basic passing beam shall remain between the limits indicated in paragraph 6.2.6.1.2. of this Regulation under all the static loading conditions of the vehicle of annex 5 of this Regulation;*
- 6.20.6.1.2.1. *in case the basic passing beam is generated by several beams from different lighting units, the provisions according to paragraph 6.20.6.1.2. above apply to each said beam's "cut-off" (if any), which is designed to project into the angular zone, as indicated under item 9.4.1. of the communication form conforming to the model in annex 1 to Regulation No. xxx.*
- 6.20.6.1.3. **passing beam levelling device**
The provisions of paragraph 6.2.6.2.2. above are not applicable.
- 6.20.6.2. **Horizontal orientation:**

1/ *In case of additional "two symmetrically placed lighting units" the horizontal distance may be 200 mm (C in the figure).*

For each lighting unit the kink of the elbow of the cut-off line, if any, when projected on the screen, shall coincide with the vertical line through the reference axis of said lighting unit. A tolerance of 0.5 degrees to that side which is the side of the traffic direction shall be allowed. Other lighting units shall be adjusted according to the applicant's specification, as defined according to annex 11 of Regulation No. xxx.

6.20.6.3. *Measuring procedure:*

After adjustment of the initial setting of beam orientation, the vertical inclination of the passing beam or, when applicable, the downward inclinations of all the different lighting units that provide or contribute to the cut-off(s) according to paragraph 6.20.6.1.2.1. above of the basic passing beam, shall be verified for all loading conditions of the vehicle in accordance with the specifications in paragraphs 6.2.6.3.1. and 6.2.6.3.2. of this Regulation.

6.20.7. *Electrical connections*

6.20.7.1. *Main beam lighting (if provided by the AFS)*

- (a) The lighting units for the main-beam may be activated either simultaneously or in pairs. For changing over from the dipped-beam to the main-beam at least one pair of lighting units for the main-beam shall be activated. For changing over from the main-beam to the dipped-beam all lighting units for the main-beam shall be deactivated simultaneously.
- (b) The dipped-beams may remain switched on at the same time as the main-beams.
- (c) Where four concealable lighting units are fitted their raised position must prevent the simultaneous operation of any additional headlamps fitted, if these are intended to provide light signals consisting of intermittent illumination at short intervals (see paragraph 5.12.) in daylight.
- (d) Where, for the purpose of adjusting the beam orientation, the AFS cannot set itself automatically in the neutral state, means shall be provided to set the AFS to its neutral state.

6.20.7.2. *Passing beam lighting*

- (a) The control for changing over to the dipped-beam must switch off all main-beam headlamps or de-activate all AFS lighting units for the main-beam simultaneously.
- (b) The dipped-beam may remain switched on at the same time as the main-beams.
- (c) In the case of lighting units for the dipped-beam being equipped with gas discharge light sources, the gas-discharge light sources shall remain switched on during the main-beam operation.
- (d) It shall always be possible for the driver to manually switch the AFS from any of the passing beam modes to the basic passing beam (neutral state?) and to manually return it to automatic AFS operation.
- (e) Where, for the purpose of adjusting the beam orientation according to paragraph 6.20.6. above, the AFS cannot set itself automatically in the neutral state, means shall be provided to set the AFS to its neutral state. Concerning the bending mode(s): the vehicle's steering wheel may be regarded to be the respective mean according to paragraph 6.20.7.3. above, provided that the reproducibility of the horizontal adjustment does not exceed [0.2 deg]; this shall be verified by the Technical Service responsible for the Type Approval tests.

6.20.7.3. *Switching ON and OFF the lighting functions may be automatic, however subject to the requirements for "Electrical connection" in paragraphs 5.11. and 5.12. of this Regulation.*

6.20.7.4. *Automatic operation of the AFS lighting functions and modes*

The changes within and between the provided modes of the AFS lighting functions as specified below, shall be performed automatically, without any possibility of intervention by the driver, with exception of the provisions set out in paragraphs ~~6.20.7.3.~~ 6.20.7.1.(d), 6.20.7.2.(d) and (e) and 6.20.7.5. of this Regulation.

[These automatic changes shall be such that no discomfort, neither for the driver nor for other road users, is caused.] The following conditions apply for the activation of the modes of the passing beam and, where applicable, of the main-beam.

6.20.7.4.1. *The class C mode(s) of the passing beam shall be activated if no mode of another passing beam class is activated.*

6.20.7.4.2. *The class V mode(s) of the passing beam shall not operate unless one or more of the following conditions is/are automatically detected (V-signal applies):*

- (a) roads in built-up areas and the vehicle's speed not exceeding 80 km/h;
- (b) roads equipped with a fixed road illumination, and the vehicle's speed not exceeding 80 km/h;
- (c) a road surface luminance of 1 cd/m² and/or a horizontal road illumination of 10 lx being exceeded continuously;
- (d) the vehicle's speed not exceeding 50 km/h.

6.20.7.4.3. *proposal A*

The class E mode(s) of the passing beam shall not operate unless one or more of the following conditions is/are automatically detected (E-signal applies):

- (a) the vehicle's speed is not less than [100] km/h, and,
 - (b) the road characteristics correspond to motorway conditions 2/ .;
- this condition shall be deemed to be satisfied if a continuous evaluation of one or more sets of information data is provided that can indicate motorway conditions, (e.g. the vehicle's speed being essentially steady together with steering parameters, or, the width and the course of the road lanes as indicated by means of optical detection).
- (c) There is a sufficient lateral separation to oncoming traffic.

6.20.7.4.3. *proposal B*

The class E mode(s) of the passing beam shall not operate unless one or more of the following conditions is/are automatically detected (E-signal applies):

- (a) the vehicle's speed is not less than [100] km/h, and
- (b) a continuous evaluation of two or more sets of information indicates a roadway designed for higher speed and having separated carriageways for the two directions of traffic, e.g.
 - (i) the vehicle's speed being essentially steady,

2/ Such conditions can be found in Chapter I, Article 1 of the Convention on Road Traffic (Vienna Agreement, 1968)

- (ii) minimal steering parameters,
 - (iii) the width of the road lane,
 - (iv) the course of the road lanes,
 - (v) oncoming traffic detection.
- 6.20.7.4.4. The class *W*-mode(s) of the passing beam shall not operate unless the following conditions are automatically detected (*W*-signal applies):
- (a) the front fog lamps, if any, are switched OFF, and
 - (b) at least one of the following conditions is met:
 - (i) the wetness of the road has been detected automatically,
 - (ii) the windshield wiper is switched ON and its continuous or automatically controlled operation has occurred for a period of at least 2 minutes.
- 6.20.7.4.5. **Provisionally agreed Text**
A mode of a class *C*, *V*, *E*, or *W* passing beam shall not be modified to become a bending mode of said class (*T*-signal applies in combination with the signal of said passing beam class according to paragraphs 6.20.7.4.1. through 6.20.7.4.4. above) unless at least one of the following characteristics (or equivalent indications) are evaluated:
- (a) the angle of lock of the steering;
 - (b) the trajectory of the centre of gravity of the vehicle.
- In addition the following provisions apply:
- (a) one or more lighting units may be additionally energized only when the horizontal radius of curvature of the trajectory of the centre of gravity of the vehicle is 500 m or less;
 - (b) a horizontal movement of the asymmetric cut-off sideways from the longitudinal axis of the vehicle, if any, is allowed only when the vehicle is in forward motion ^{3/} and shall be such that the longitudinal vertical plane through the kink of the elbow of the cut-off does not intersect the line of the trajectory of the centre of gravity of the vehicle at distances from the front of the vehicle which are larger than 100 times the mounting height of the respective lighting unit.
- 6.20.7.5. [Concerning the "traffic change mode" according to the provisions of paragraph 5.4.1. of Regulation No.xxx, if any: where the AFS cannot set itself automatically into the corresponding correct state, means shall be provided which allow the driver to activate the "traffic change mode"; these means shall be designed so, that it can be operated only when the vehicle is not in normal condition of use; the state being activated shall be indicated in clearly legible and indelible manner [with the letters "R/D" for the position for right-hand traffic and the letters "L/G" for the position for left-hand traffic].]
- 6.20.8. **Tell-tale:**
- 6.20.8.1. The provisions of paragraphs 6.1.8. (for the main-beam headlamp) and 6.2.8. (for the dipped-beam headlamp) of this Regulation apply to the respective parts of an AFS.
- 6.20.8.2. [A tell-tale (visual or auditory, or any equivalent signal) shall be provided, to be activated whenever a failure signal is received, in accordance with paragraph 5.9.1. of Regulation No. xxx.]
- 6.20.8.3. [In addition, a tell-tale (visual or auditory, or any equivalent signal) shall be provided to indicate that the driver has set the system into a state according to the paragraph 5.4.1. of R. xxx (TRANS/WP.29/GRE/2002/18/ Rev.1).
- 6.20.9. **Other requirements**
- 6.20.9.1. Lighting units which, according to the provisions of paragraphs 6.20.6.1.2., 6.20.6.1.2.1. and 6.20.6.1.3. of this Regulation, need to be installed with an automatic levelling device, shall only be permitted in conjunction with the installation of headlamp cleaning device(s) according to Regulation No. 45 ^{4/}.
- 6.20.9.2. **Verification of compliance with AFS automatic operating requirements**
[Compliance with the requirements indicated in paragraphs 6.20.9.2.1. through 6.20.9.2.2. below, shall be demonstrated by the manufacturer with [brief] descriptions or by other means acceptable to the Authority responsible for type approval. At the discretion of the technical service responsible for the type approval tests, practical testing may be carried out:
- 6.20.9.2.1. the AFS control signals correspondence to the description required in paragraph 3.2.6. of this Regulation and with the respective AFS control signals and to the, if any, that were applied / specified for type approval of the AFS as listed in the AFS type approval documents;
 - 6.20.9.2.2. type and value of the relevant environmental conditions of use for which the transitions between the AFS lighting modes according to paragraph 6.20.7.4. of this Regulation have been designed and verified by tests, including, if applicable, information such as threshold hysteresis and/or delay values specified; where a specification requires a dynamic test, verification on the basis of the Applicants documentation of such testing shall be sufficient;]
- 6.20.9.3. The aggregate maximum intensity of the lighting units that can be energized simultaneously to provide the main-beam lighting or its modes, if any, shall not exceed 225 000 cd, which corresponds to a reference value of 75. This maximum intensity shall be obtained by adding together the individual reference marks indicated on the several installation units that are simultaneously used to provide the main-beam.
- 6.20.9.4. Means for a 'traffic change mode' according to the provisions of paragraph 5.4.1. of Regulation No. xxx, if any, shall be explained in the owner's handbook."

^{3/} This provision does not apply for passing beam lighting when bend lighting is produced for a right turn in right hand traffic (left turn in left-hand traffic).

^{4/} Contracting Parties to the respective Regulations can still prohibit the use of mechanical cleaning systems when headlamps with plastic lenses, marked 'PL', are installed.