

**KARLSRUHE TEST RESULTS  
AND THE SPACE FOR LEVEELLING COMPROMISE**

## KARLSRUHE TEST SUMMARY

Vehicle	1L	1R	2L	2R	3L	3R	4L	4R	5L	5R
Load condition										
1	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Back to 1	-0,03%	-0,11%	-0,08%	-0,09%	-0,19%	0,02%	-0,07%	-0,12%	0,01%	0,00%
2	-0,31%	-0,31%	-0,40%	-0,32%	-1,07%	-0,99%	0,29%	0,20%	-0,04%	-0,06%
3	-0,32%	-0,32%	-0,45%	-0,24%	-1,19%	-1,08%	0,41%	0,29%	0,01%	0,11%
4	-0,31%	-0,34%	0,48%	0,81%	-0,40%	-0,14%	0,36%	0,31%	0,05%	0,18%

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## CONCLUSIONS

- AUTOMATIC LEVELLING SYSTEM CAN CONTROL LEVELLING BETTER THAN POSSIBLE TO MEASURE (0.1 %)
- EXISTING LEVELLING SYSTEMS WITHOUT SPECIAL PREPARATION CAN CONTROL LEVELLING IN PROPOSED RANGE ( $\pm 0.2$  %)
- PROPER SYSTEM CALIBRATION SHOULD SIGNIFICANTLY NARROW THE REAL RANGE OF CUT-OFF INCLINATIONS



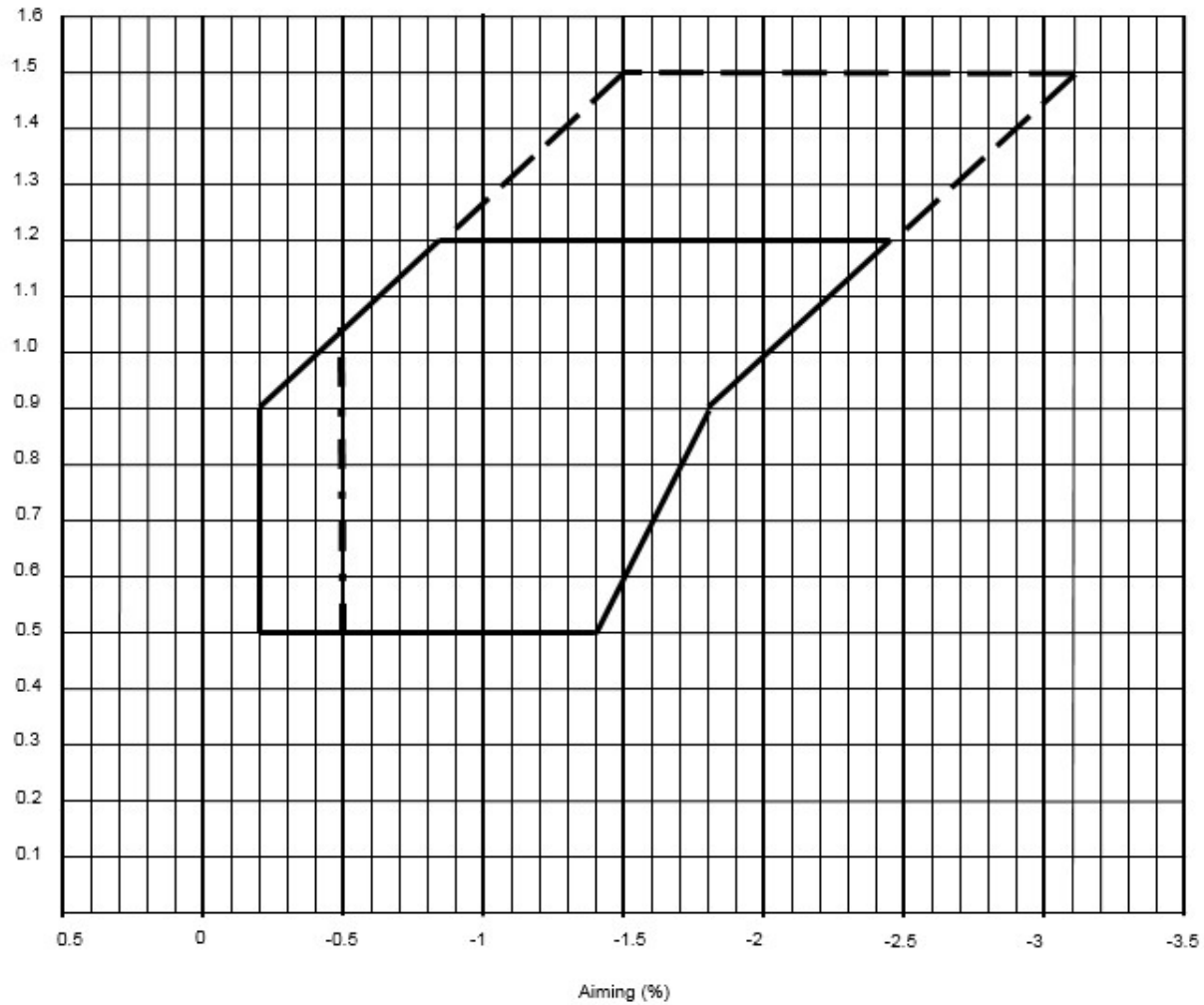
## BOX COMPROMISE

WHAT CAN BE ACCEPTED BY CP ?

- INITIAL AIM
  - **NEED TO BE FIXED IN REGARD TO HEIGHT** IF THE „BOX” IS DEFINED IN SEPARATION FROM THE LAWS OF PHYSICS
  - **CAN BE FREE INSIDE THE BOX** WHEN BOX TRULY CONTROL ROAD ILLUMINATION AND GLARE
- „BOX” BOUNDARIES
  - FROM ROAD ILLUMINATION SIDE
  - FROM GLARE SIDE

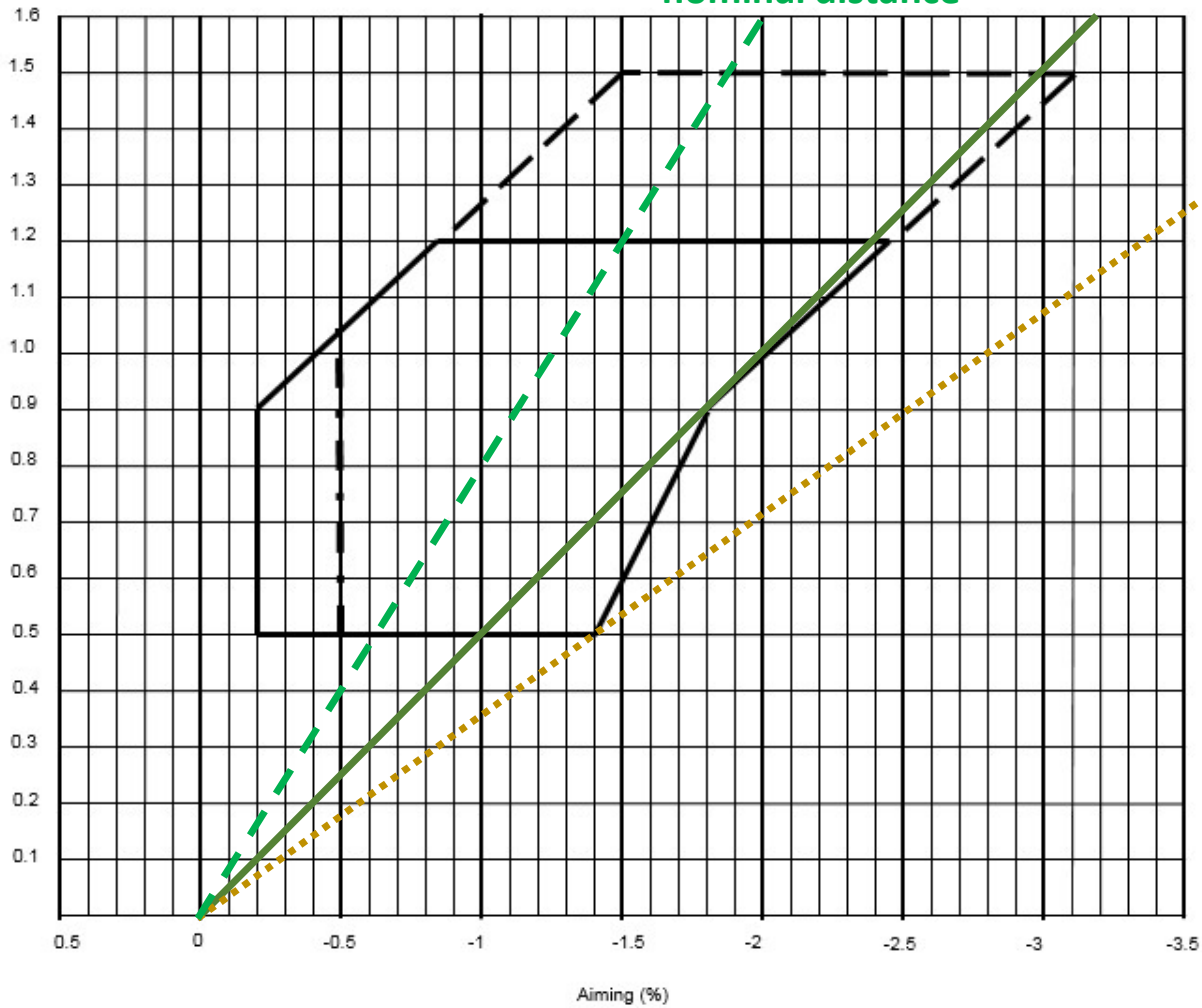
## RATIONALES FOR „BOX” BOUNDARIES AND SPACE FOR A COMPROMISE

Headlamp mounting height (m)

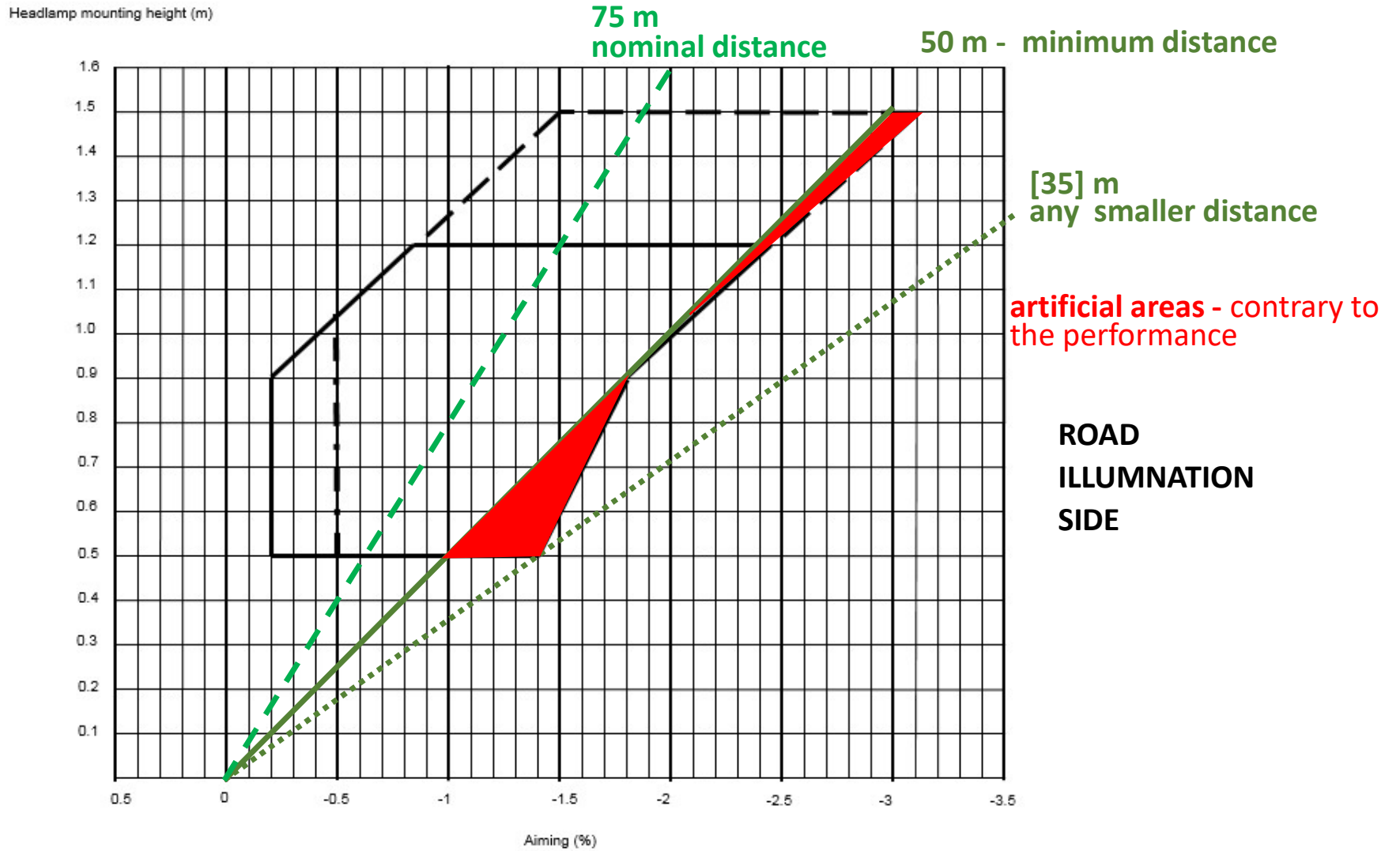


# SPACE FOR A COMPROMISE – ROAD ILLUMINATION

Headlamp mounting height (m)

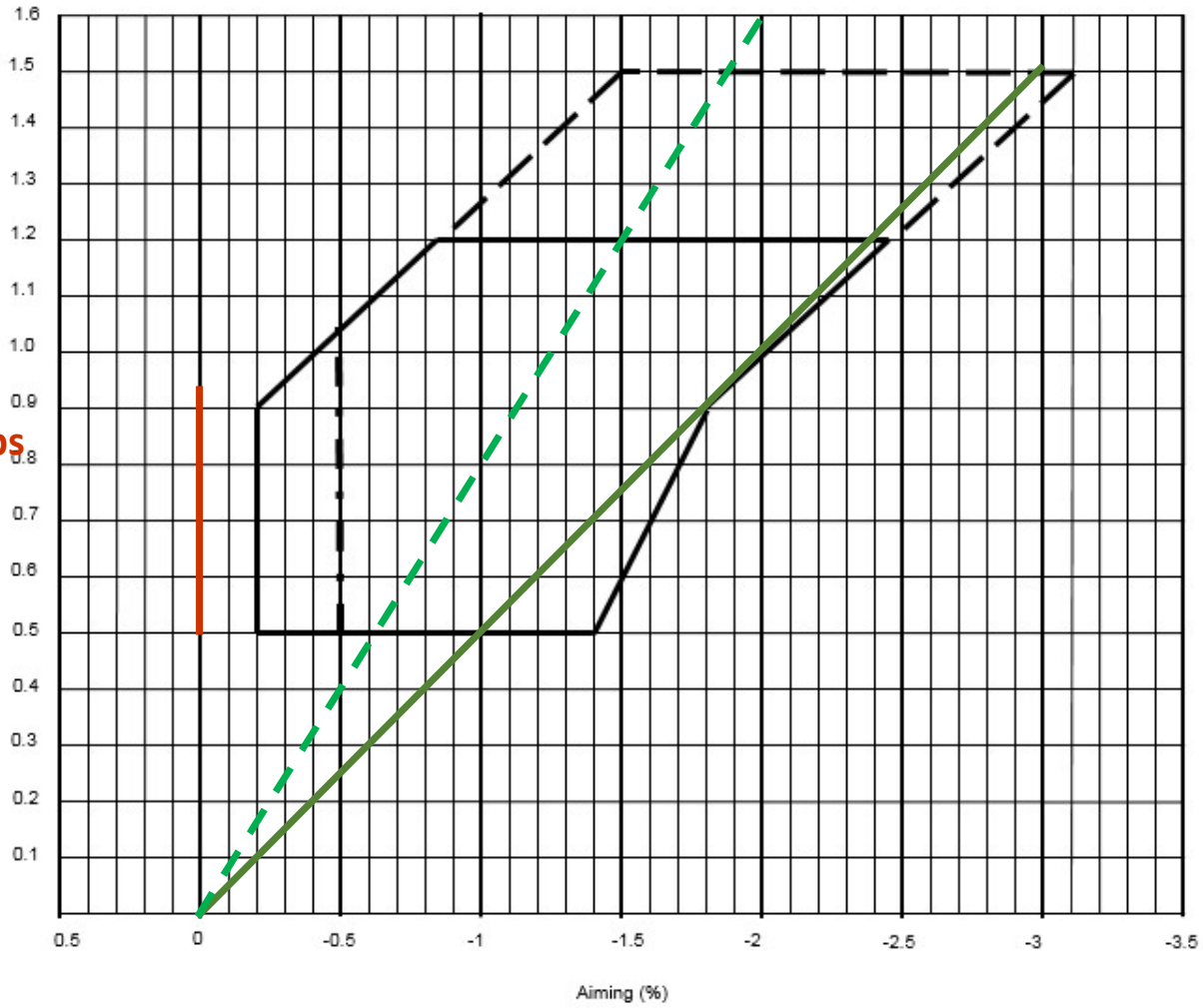


# SPACE FOR A COMPROMISE – ROAD ILLUMINATION



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Headlamp mounting height (m)



**GLARE SIDE**

for low mounted headlamps  
cut-off under horizon

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Headlamp mounting height (m)

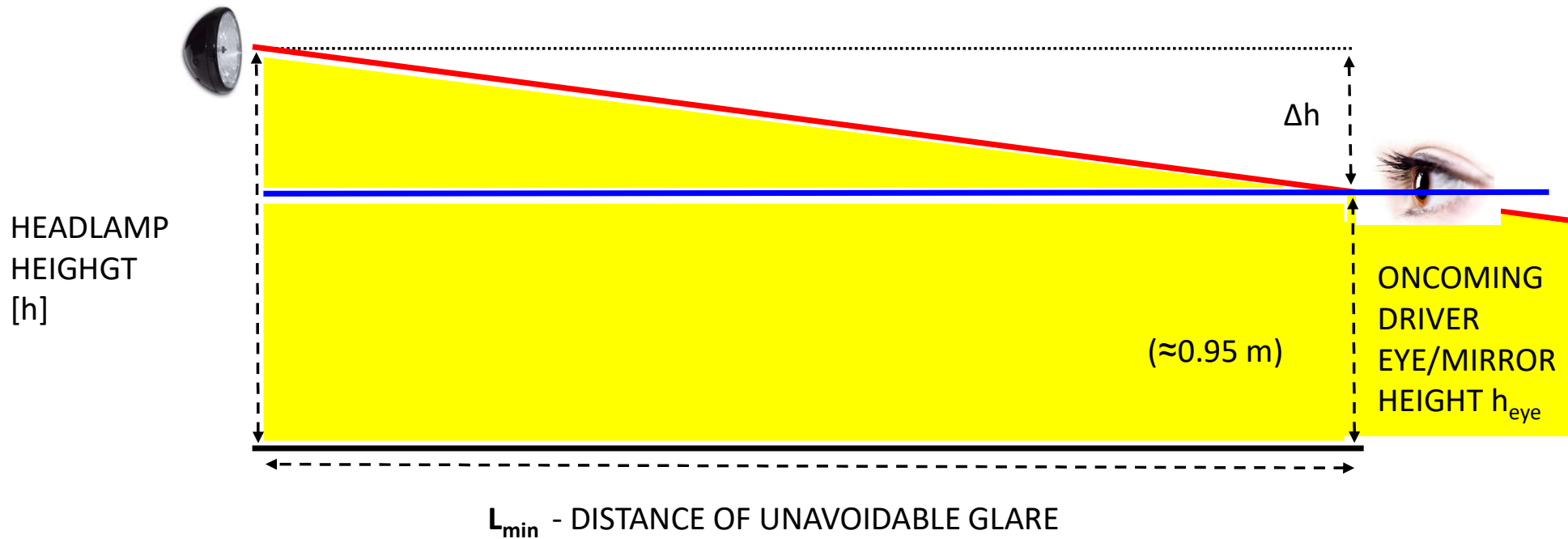


**GLARE SIDE**

for low mounted headlamps  
cut-off under horizon

safety margin -0.5%

„GLARE LINE” CALCULATION for high mounted headlamps (VGL-08-14 Rev. 1)



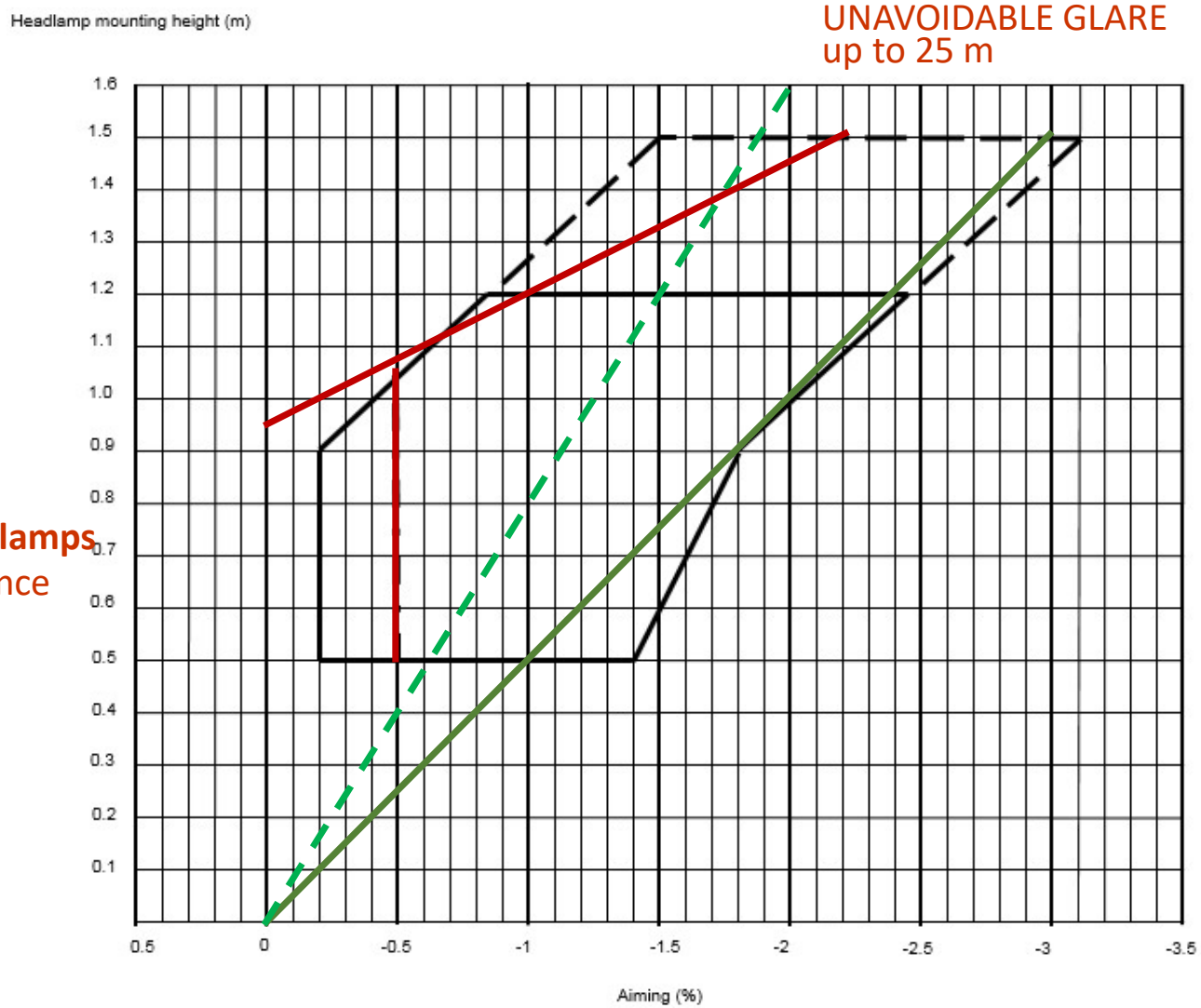
FORMULA:  $I = \Delta h / L_{min}$

I - cut-off inclination

$\Delta h$  - headlamp optical axis height over minimum eye-height

$L_{min}$  - maximum distance beyond the vehicle where glare is accepted (25 m)

# SPACE FOR A COMPROMISE – ROAD ILLUMINATION



**GLARE SIDE**

**UNAVOIDABLE GLARE  
up to 25 m**

**for high mounted headlamps  
unavoidable glare distance**



# SPACE FOR A COMPROMISE – ROAD ILLUMINATION

Headlamp mounting height (m)

UNAVOIDABLE GLARE  
up to 25 m

GLARE SIDE

for high mounted headlamps  
unavoidable glare distance



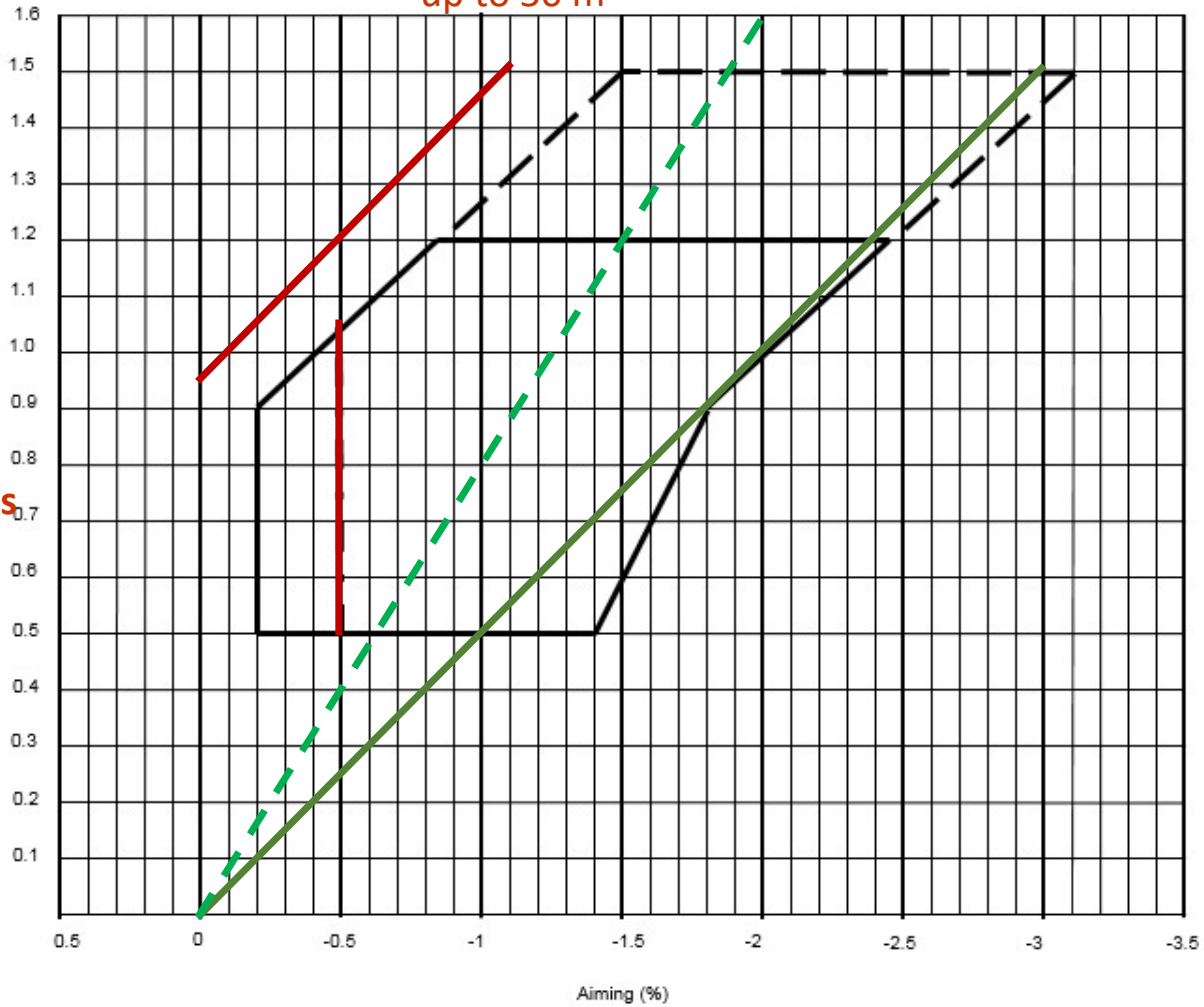
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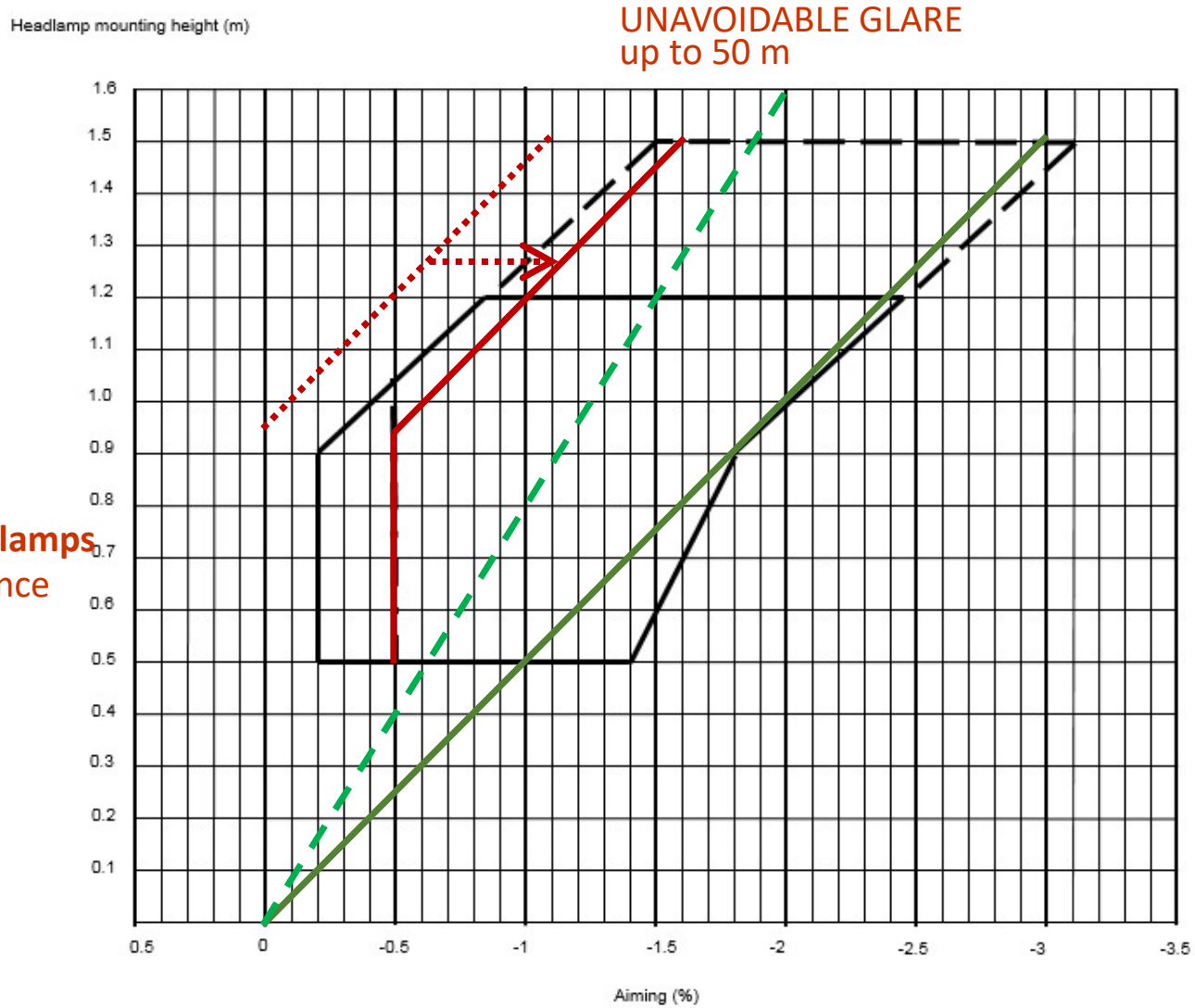
UNAVOIDABLE GLARE  
up to 50 m

GLARE SIDE

for high mounted headlamps  
unavoidable glare distance



# SPACE FOR A COMPROMISE – ROAD ILLUMINATION



**GLARE SIDE**

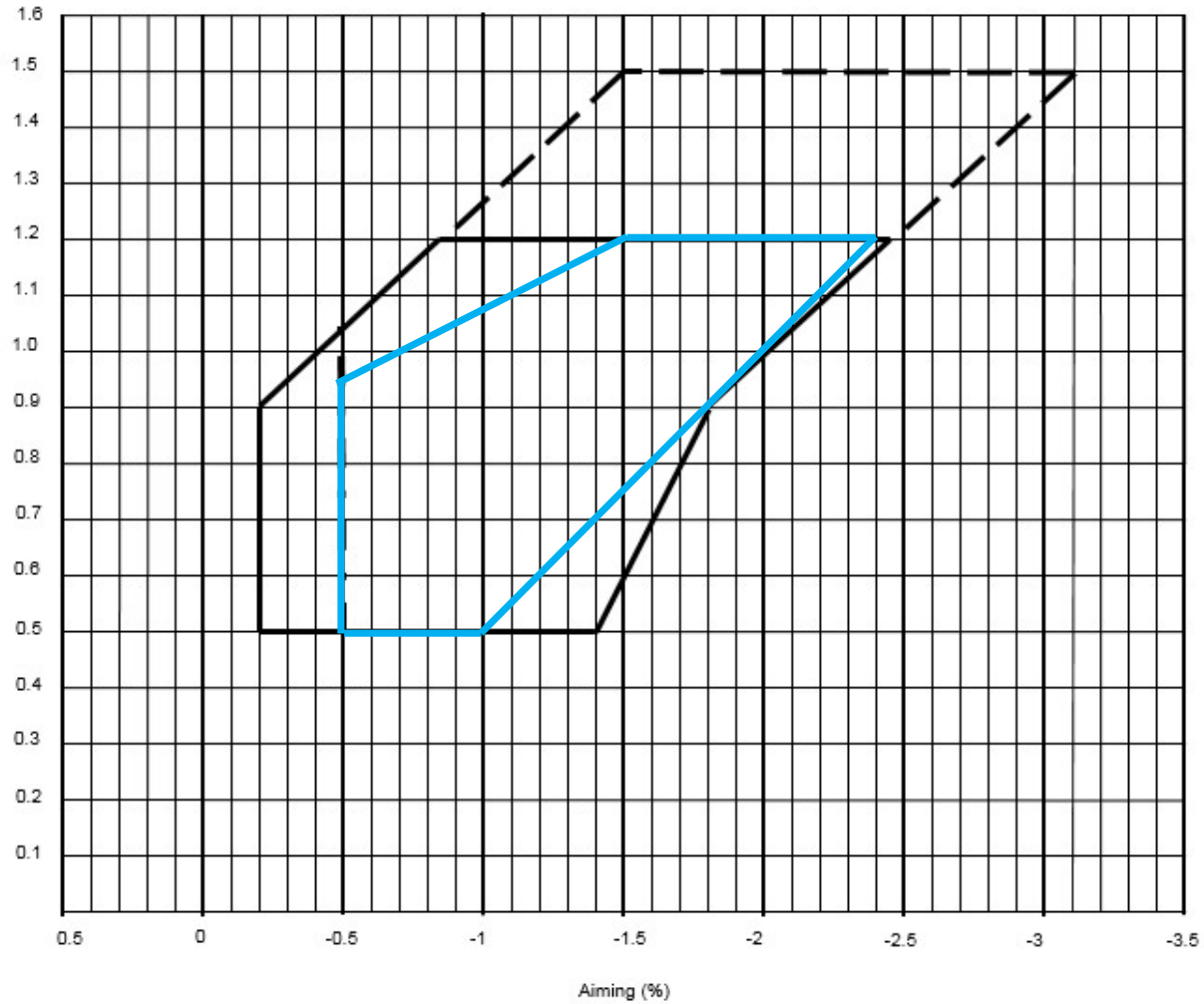
**UNAVOIDABLE GLARE  
up to 50 m**

**for high mounted headlamps  
unavoidable glare distance  
safety margin**

## OPTIMAL BOX

SPACE FOR LEVELLING FROM 0.5% TO 1.3% depending on mounting height

Headlamp mounting height (m)



## SPACE FOR COMPROMISE IF REALLY NEEDED?

Headlamp mounting height (m)

