



EUROPEAN COMMISSION

DIRECTORATE-GENERAL FOR ENERGY AND TRANSPORT

Brussels, 12 April 2006

FITTING BLIND-SPOT MIRRORS ON EXISTING TRUCKS

A Consultation Paper

*Presented by the inland transport services
of the Directorate General for Energy and Transport*

The European Commission is seeking views of interested parties on its intention to propose a directive on the retrofitting of mirrors increasing the field of indirect vision (“blind-spot mirrors”) of heavy goods vehicles. Comments are expected **until 19 May 2006** to the address mentioned under point 7 of this paper.

EXECUTIVE SUMMARY

Every year, 400 European citizens lose their lives in accidents with trucks, because the truck driver did not see them, when he or she turned right.

Under a EU-Directive of 2003, new trucks (heavy goods vehicles with a total weight of more than 3.5 tons) will have to be equipped with blind spot mirrors from next year on.

However, the replacement of trucks in Europe is slow. The existing population of heavy good vehicles, today at around 5 million in the European Union, will only be fully replaced in around 16 years, i.e. by 2022 at the earliest. Until then, the danger will continue to exist, even with existing legislation.

If a legal retrofitting obligation enters into force by 2008 for the relevant heavy goods vehicle population in operation since 1998, an extra 1300 lives on European roads can be saved until 2020.

The retrofit concerns almost 4 Million heavy goods vehicles. For the overwhelming majority of this population, costs of retrofit will be between 100 and 150 EUR per truck, i.e. the cost of one stop at the petrol station.

If timely implemented (by 2008), the cost-benefit ratio of the measure is in the order of 1:3.5; for each Euro invested, there is a benefit of 3.5 Euros. In total figures, the benefits are estimated to be around 1.7 billion EUR, while the costs would amount to between 400 and 600 million EUR.

1. INTRODUCTION AND PROBLEM DEFINITION

A large number of accidents are caused by drivers of larger vehicles who are not aware that other road users are very close to or beside their own vehicle. These accidents are often related to a change of direction at crossings, junctions or roundabouts, when drivers fail to detect other road users in the blind spots, which exist in the area immediately around their vehicles.

It is estimated that every year, over 400 people lose their life in the European Union because of these accidents. Most of the victims of such accidents are pedestrians or two-wheelers, a particularly vulnerable category of road users.

The European legislator has been attentive to this problem. In 2003, the European Parliament and the Council adopted Directive 2003/97/EC on the approximation of the laws of the Member States relating to the type-approval of devices for indirect vision and of vehicles equipped with these devices¹. According to this directive, in 2006 new vehicle types and respectively in 2007 new vehicles can only be granted approval by the Member States' authorities if they are equipped with a set of mirrors and other systems of indirect vision fulfilling certain requirements in order to reduce their blind spots. The scope of Directive 2003/97/EC was extended most recently by a Comitology procedure setting in general the weight limit at 3.5 tonnes instead of the previous 7.5 tonnes.²

While this legislation is clearly beneficial, existing trucks are not covered by it. Given the life-time of heavy goods vehicles (HGV), the effect of the new legislation is therefore quite limited for a long period of time. The EU-25 HGV fleet (>3.5 tonnes) comprises almost 5 Mio vehicles. There are slightly over 300,000 new heavy goods vehicle registrations per year within the EU. This means that the HGV fleet will be completely exchanged in about 16 years, i.e. in 2022 at the earliest.

Given this slow replacement rate, the blind spot problem remains relevant for a long period of time, until the vast majority of vehicles still equipped with less performing systems for indirect vision will be withdrawn from circulation after 2020. If nothing is done, the high risk to vulnerable road users of being involved in accidents with HGV due to their lateral blind spots, above all on the passenger's side, is thus bound to continue for many years.

Reacting to this situation, four Member States – Belgium, Denmark, Germany and the Netherlands – have implemented national schemes for the retrofitting of HGV. In addition, these Member States encouraged the Commission to initiate relevant legislation at EU level.

Taking the above into account, the Commission's services are therefore proposing to improve the safety of road users by considering a retrofit of blind spot mirrors to existing vehicles above 3.5 tonnes.

¹ OJ L 25, 29/01/2004, p. 1.

² OJ L 75, 22/03/2005 p. 33. Commission Directive 2005/27/EC of 29 March 2005 amending, for the purposes of its adaptation to technical progress, Directive 2003/97/EC of the European Parliament and of the Council, concerning the approximation of the laws of the Member States relating to the type-approval of devices for indirect vision and of vehicles equipped with these devices.

2. RETROFITTING: CALCULATING COSTS AND BENEFITS

The Commission conducted a study on costs and benefits of retrofitting of existing HGV on the passenger's side with class IV and V mirrors (i.e. exterior wide angle and close proximity mirrors) according to the requirements of Directive 2003/97/EC.³

The study showed that indeed there are clear benefits outweighing the costs of the measure, for requesting retrofitting of mirrors to HGV.

- It estimated that the measure will save about 1200 lives in the period 2008 to 2020 on European roads.
- The cost-benefit ratio of such a measure is estimated at 3.5 for the EU-25. This means that for 1 € spent, there is a societal benefit of 3.5 €.

On the basis of existing data from the study, the Commission services assume an average heavy goods vehicle age of 16 years, a date of entry into force of the directive in 2008 and a Net Present Value (NPV) of 1.7 billion € for this date of entry into force.⁴

The "Net Present Value" is calculated by discounting of a series of future costs/benefits, and summing the discounted amounts and the initial investment. **Table 1** shows the development of net present value depending on the date of entry into force of a retrofitting directive over the coming years. This can be used to determine the age of a vehicle at which the costs of retrofitting exceed the expected benefits. It means that for vehicles older than 10 years the cost for the retrofit exceeds the benefits.

Year of entry into force	NPV in million €
2006	2,056
2007	1,855
2008	1,714
2009	1,529
2010	1,336
2011	1,136
2012	0,93
2013	0,719
2014	0,504
2015	0,286
2016	0,065
2017	-0,158

Table 1: NPV according to entry into force⁵

3. GOALPOSTS FOR A POSSIBLE DIRECTIVE

3.1 *The envisaged truck population - exclusions*

First, regardless of the outcome of cost-benefit analyses, the Commission services propose to exclude any vehicle built before 1990 from the retrofitting proposal. In 1990, Directive 88/321/EEC came into force, requiring for the first time EEC type approved HGV above 7.5 tonnes (N2, N3) to be equipped with class IV (wide angle) and class V (close proximity) mirrors as from 1 October 1990. The Commission assumes that only vehicles type-approved after this date are equipped with class IV and class V mirrors and housings respectively which can be replaced.

³ Jacobs Consultancy, Cost-Benefit Analysis of Blind Spot Mirrors – Final Report, August 2004, http://europa.eu.int/comm/transport/road/publications/projectfiles/mirrors_en.htm

⁴ Jacobs Consulting (2004).

⁵ Data from Jacobs Consulting (2004); own calculation.

As stated above, with a date of entry into force of the directive in 2008, retrofitting HGV built from 1998 on will generate benefits outstripping the costs. Therefore, the envisaged truck population covered by the future Directive should be HGV of more than 3.5 tons and put in circulation from 1998 onwards.

Besides the time-related considerations mentioned above, the following vehicles should be excluded from the measure:

- For technical reasons, HGV over 3.5 tonnes on which the mounting height for the close proximity mirror (class V) is lower than 2.0m according to the provisions of Directive 2003/97/EC.
- Vehicle types that do not have European type approval according to Directive 71/127/EC or subsequent amendments.

The latter exclusion criterion is based on the following reasoning:

The vast majority of HGV's (>90%) circulating on Europe's roads has European type approval.

Although the European type approval scheme before 2003/97/EC was not the only way to type-approve vehicles - a manufacturer could also opt for national type-approval schemes -, European truck manufacturers have in fact opted for European type-approval for their mass-production models.

Vehicle types approved after 1990 (Directive 321/88/EC) are equipped with class IV and class V mirrors. Before, these mirrors were not required in the European type-approval.

The technical approach of the retrofitting directive is based on the fact that the HGV is already fitted with a class IV and a class V mirror. Only if these mirrors exist they can be exchanged at reasonable cost. If no such mirror was foreseen in the original design of the truck, the retrofitting may require substantial changes in the cabin structure which can incur costs in the order of a couple of thousands of Euros. This is not in line with a reasonable retrofitting obligation.

Finally, specialised HGVs having particular constructional features do not have European type approval. They are approved as small series or individually. These vehicles are often the ones which are difficult to retrofit. They would indeed be excluded from the retrofitting obligation.

3.2 Retrofitting according to the requirements for new vehicles

According to the Commission services, it is technically possible to replace mirrors of existing HGV by new mirrors in compliance with the requirements of Directive 2003/97/EC, in many cases even without changing the mirror housings.

For the sake of standardised devices making “human-machine interaction” as easy as possible, the preferred technical solution of a retrofitting directive is based on the technical requirements of Directive 2003/97/EC.

The technical solution for the lateral field of indirect vision described in Directive 2003/97/EC foresees a clearly defined field of vision which has to be covered by a class IV and a class V mirror with a certain maximum curvature. The field of vision covered by the class II mirror does not play a major role in blind spot accidents. Therefore, the proposal shall not contain any requirements for class II mirrors.

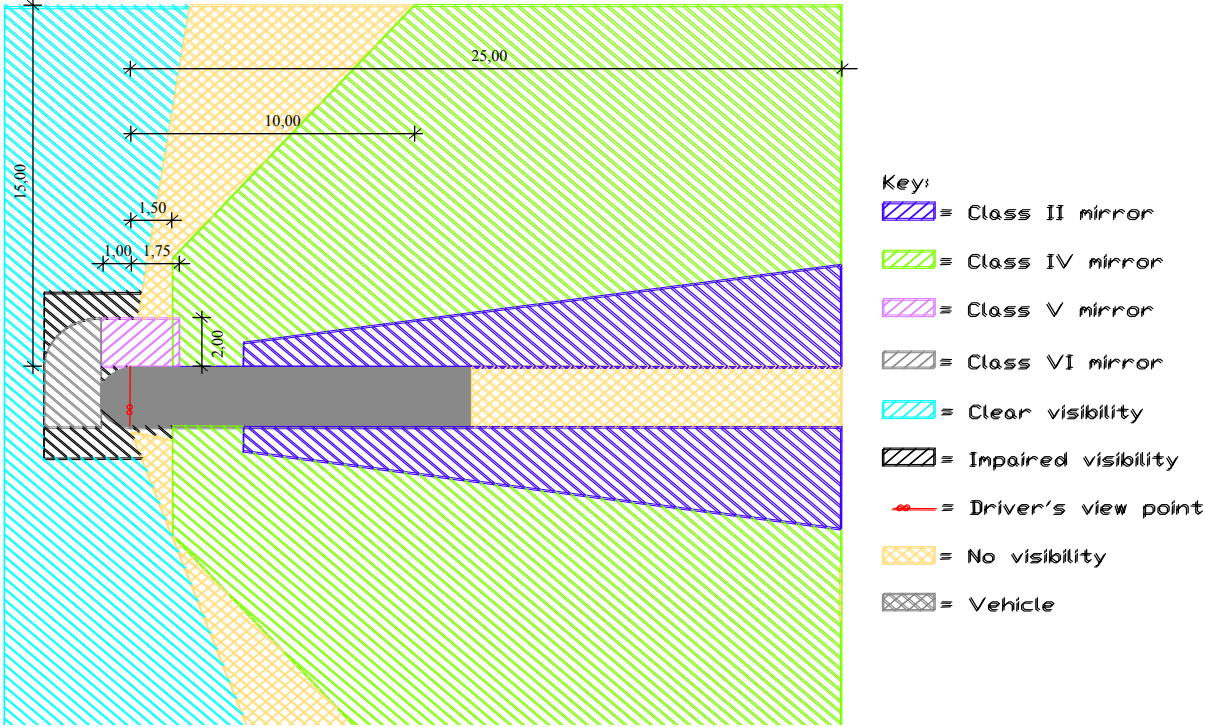


Figure 1: Field of indirect vision according to Directive 2003/97/EC

Directive 2003/97/EC does not foresee an alternative to this combination of class IV and V mirrors in order to cover the lateral field of indirect vision (see **Figure 1**). Alternative solutions for other fields of vision could be radar systems, additional mirrors or camera systems.

Preliminary discussions have been held with major European truck manufacturers on the retrofitting issue. *DaimlerChrysler* and *MAN* have made a voluntary agreement with the German government to offer mirror glasses to their customers, which fulfil all requirements of Directive 2003/97/EC (curvature + field of vision). Changing glasses can be performed also by non-trained staff within 10 minutes, since it is only a matter of clipping the old glasses out and the new glasses in. This applies to some mass models built between 1998 and 2000 and to all mass models built after 2000.

The *Iveco* and the *DAF* cases seem to be similar apart from a limited number of older truck types which have been built until 2001 or 2002.

The market price for a mirror kit for these vehicles is below 150 €, which was the estimated cost in the cost-benefit analysis of the Commission.

For *Scania* and *Volvo* trucks, a mere exchange of mirror glasses is not sufficient because of a different geometry of the mirror housings. For most of their models built until 2006 and 2007 respectively it would be necessary to completely change the mirror housings. Since there are no such kits available on the market yet, it is difficult to estimate the costs for such an operation, but they are certainly much higher than 150 €. Furthermore, this replacement can only be performed by trained staff and requires more time. However, if only the mirror glasses were replaced by new mirror glasses with the maximum curvature permitted by Directive 2003/97/EC, it would be possible to cover between 80% and 99% of the field of indirect vision as described in this directive.

For *Renault* trucks, it is technically not possible to replace only the glasses.

On the basis of the registration statistics of the past four years one can assume that more than 50% of the relevant heavy goods vehicle fleet can be equipped with class IV and V mirrors according to Directive 2003/97/EC.

Another 25% could be equipped with new glasses if the requirements for retrofitting with regard to the field of vision were reduced and the class IV and V mirror field of vision are considered without the overlapping. Such a **reduced field of vision** would cover the area in the near proximity over the entire length of the truck, including the gap between the field of vision of the class IV and the class V mirror of the old Directive 71/127/EEC.

3.3 *Other means of retrofitting*

If there are problems concerning the technical feasibility, and the costs clearly outweigh the benefits in a given case, one should provide for alternative solutions. There might be trucks that have to be equipped with completely different mirrors which require even modifications in the cab structure due to higher wind loads, which would lead to modification costs of several thousand Euros.

There are a number of alternatives to the mirror system of Directive 2003/97/EC, such as radars or camera systems and additional mirrors. Additional mirrors seem to be widespread in the Member States which have implemented retrofitting schemes, in particular in the Netherlands. Radars or camera systems do not play a major role for the lateral field of vision. **Figure 2** shows the retrofitting system with an additional mirror used in the Netherlands.

The additional blind spot mirror may have an advantage, although it was not retained by the Directive 2003/97 as the best solution. This solution could be recommended in cases where the implementation of the standard solution would generate costs that largely outweigh the expected benefits. This would certainly be the case if the installation of mirrors corresponding to Directive 2003/97/EC made changes at the cabin structure necessary.

It should remain with the **technical inspection bodies** of the Member States to decide whether alternative solutions may be applied due to the lack of technical solutions or technical changes which are not proportional to the expected benefit.

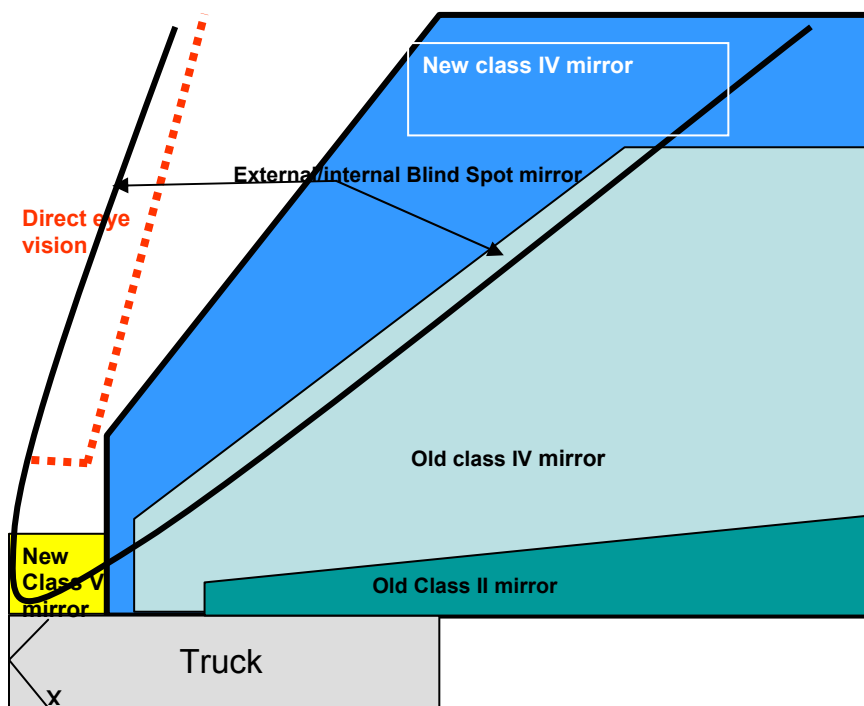


Figure 2: Field of vision of the extra blind spot mirror⁶

4. PROCEDURAL ASPECTS

National legislation may explicitly allow for fitting newer mirrors or mirror housing instead of older ones. This is the case in Germany. Or manufacturers may ask type approval authorities to type-approve existing vehicles with new mirrors according to Directive 2003/97/EC. Some vehicle manufacturers have used this procedure when modifying engine injection software and devices in order to comply with new emission requirements.

Inspection bodies have to make sure that the requirements of a possible retrofitting directive are applied in a proportional and fair manner. Vehicles that cannot be retrofitted with mirrors according to Directive 2003/97/EC and have been fitted with other devices instead have to undergo individual inspections to prove that they cover the required field of vision.

5. “GRANDFATHER” CASES

The Netherlands, Belgium and Denmark have already taken legal measures at national level to increase the lateral field of indirect vision for drivers of heavy goods vehicles in addition to the requirement by European legislation in force. These technical solutions do not or not fully comply with the approach of Directive 2003/97/EC.

However, the result, sufficient coverage of the lateral blind spot, might also be achieved by these solutions. Therefore, the Commission services propose to exempt from the scope of the directive heavy goods vehicles registered in these countries, which have been equipped with systems for indirect vision in compliance with the national schemes before adoption of the directive.

⁶ Schematic diagram provided by BDS and Dobli, two companies selling additional blind spot mirrors.

6. CONCLUSION

In conclusion, the Commission services are proposing the following main feature for a directive on retrofitting blind spot mirrors:

Scope:

Heavy goods vehicles over 3.5 tonnes (i.e. international categories N2 and N3),

- Type-approved according to Directive 71/127/EC or subsequent amendments;
- providing for a mounting height for the close proximity mirror (class V) higher than 2.0m;
- being registered within 10 years prior to the expected entry into force of the directive, i.e. 1998;

Requirements:

1. Standard technical solution

Vehicles which are in the scope of the directive shall fulfil the requirements of Directive 2003/97/EC with regard to the field of indirect vision and the curvature of the class IV and class V mirrors on the passenger side. If there is a class IV mirror on the driver side, this mirror has to be exchanged, too, so that the curvature is the same on both sides

2. Reduced standard technical solution

For a number of truck models it is possible to achieve almost 100% of the field of vision prescribed in Directive 2003/97/EC through replacing existing glasses by new glasses respecting the maximum curvature without touching the mirror housings. Replacing the complete mirror housing would lead to much higher costs. Therefore, it makes sense to allow for a reduced field of vision for the retrofitting exercise, as described on page 5 (see also **Figure 3**).

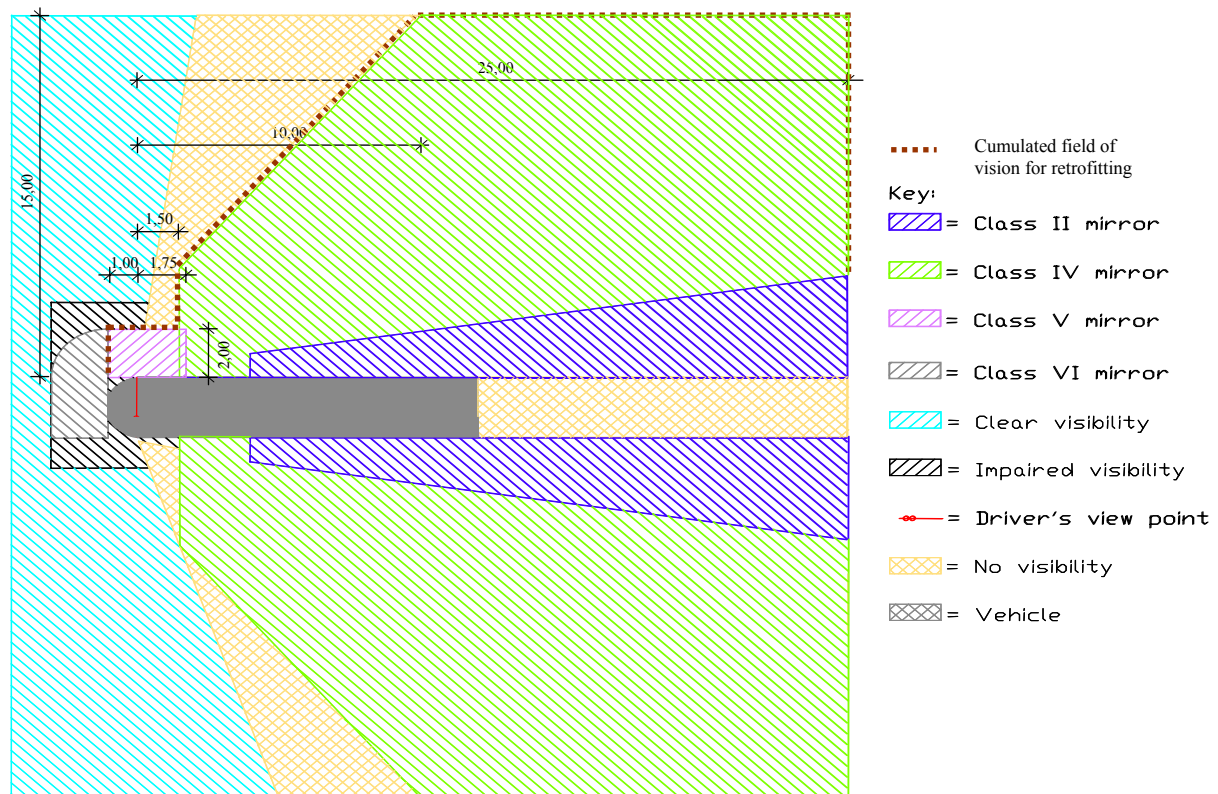


Figure 3: Cumulated "reduced" field of vision, class IV+ class V without overlapping

3. Exceptional solutions

There are heavy goods vehicles which cannot achieve the field of vision required by Directive 2003/97/EC or the reduced field of vision as described above through a mere exchange of existing mirror glasses. These vehicles may be fitted with other devices to achieve at least the reduced field of vision. Technical inspection bodies may approve such systems on an individual basis by a visibility test, e.g. with a test person walking through a marked area according to the required field of vision.

Exemptions shall be given for countries having already introduced effective retrofitting schemes before the date of the adoption.

7. CALL FOR COMMENTS

Interested parties are asked to comment on the approach outlined above. The Commission's services would especially welcome answers to the following question:

1. Do the benefits of retrofitting existing trucks built in or after 1998 outweigh the costs?
2. Is the approach, including the discussion of alternative solutions, the correct one?
3. The Commission would be particularly interested in the manufacturers' views on the limitation of the scope of a retrofitting obligation to vehicles having European type-approval. Furthermore, it is interested in the percentage of HGV's which would be excluded from a retrofitting directive on the basis of this exclusion criterion
4. Do you have any other comments or questions?

Comments should be sent to **not later than 19 May 2006** to the following address:

European Commission
Directorate General for Energy and Transport
Road Safety Unit
"Blind Spot"
E-mail: TREN-E3-CONSULTATION@cec.eu.int
Fax: (322) 296 5196

The Commission will publish the comments received.
