



POSITION PAPER

Driving and Vision

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Summary

ECOO¹ believes that member states should use the opportunity presented by their implementation of the latest EU directives on driving licences to scrap the so called 'number/licence plate test' of drivers' vision (and any other unscientific assessments of drivers' vision) and replace it with an appropriate Snellen-based assessment, similar to that used in Finland, Germany and Ireland. This assessment should be completed by all applicants for a provisional driving licence to ensure that their vision is adequate to learn to drive. Moreover, since drivers cannot be expected to assess their vision against the detailed and technical standards of the directives as their vision changes over time, ECOO recommends that Group 1 drivers should undergo a screening of their vision when renewing their licence in accordance with the EU directive, including an assessment of their visual fields.

The systems for checking drivers' vision in many Member States have been in place since the 1930s. Many of these systems are outdated, and they lack a solid scientific basis. This position paper sets out a series of recommendations for successful implementation of the EU directive, by which EU member states could ensure that all drivers comply with the required visual standards when applying for a driving licence or its renewal.

A new system of driver vision screening would allow all EU member states to build on other initiatives to improve road safety, such as introducing seat belts, banning the use of hand-held mobile phones, and lowering the drink-driving limit. This is an opportunity for EU member states and the European Commission to use that momentum to continue to improve the record of road safety.

Introduction

The EU's Directives 2006/126/EC² and 2009/113/EC³ must be implemented by all EU member states by January 2013. However, as a first step, all EU member states are required to notify the Commission as to how they will comply with the Directive by January 2011.

Annex III of Directive 2009/113/EC sets out a clear standard for visual acuity and visual fields that must be achieved by Group 1 drivers (Annex III 6.1) and Group 2 drivers (Annex III 6.4). The standard is based on the EU Eyesight Working Group's Report of 2005 on 'New Standards for the Visual Functions of Drivers'⁴. The working group made extensive recommendations on the variety of parameters of visual

¹ The member organisations within the European Council of Optometry and Optics (ECOO) represent approximately 75,000 optometrists, opticians and optical retail outlets in 30 countries of Europe.

² DIRECTIVE 2006/126/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 December 2006 on driving licences

³ COMMISSION DIRECTIVE 2009/113/EC of 25 August 2009 amending Directive 2006/126/EC of the European Parliament and of the Council on driving licences

⁴ 'New Standards for the Visual Function of Drivers' (May 2005)

http://ec.europa.eu/transport/road_safety/behavior/doc/new_standards_final_version_en.pdf

function that are important for safe driving. Its recommendations were based on an extensive examination of scientific evidence, reasoning, common sense and practical experience.

The recommendations below derive from the successful system for screening of Group 2 (drivers of large goods vehicles and passenger carrying vehicles) which ECOO expects to function effectively, and is based on the German, Irish and Finnish models for all drivers.

Visual Requirements for Drivers under Annex III EC Directive 2006/126/EC⁵

Annex III EC Directive 2006/126/EC as amended by 2009/113/EC sets out the minimum standards of physical and mental fitness for driving. These minimum standards will need to be met by all Group 1 drivers when applying for a first licence or its renewal. Renewals under the 2006 Directive will be every ten years for Group 1 drivers (or a maximum of fifteen years). "All applicants for a driving licence shall undergo an appropriate investigation to ensure that they have adequate visual acuity for driving power-driven vehicles. Where there is reason to doubt that the applicant's vision is adequate, he shall be examined by a competent medical authority (Annex III 6.0)".

Group 1 (Annex III 6.1 and 6.2) drivers require adequate visual acuity and visual fields for driving power-driven vehicles; and they should be investigated appropriately when applying for a licence and on renewal. Directive 2009/113/EC defines a minimum visual acuity of 0.5 (6/12) binocular with corrective lenses if necessary. There is a clearly stated recommendation for a visual field of at least 120 degrees; and the extension should be at least 50 degrees to the right and 50 degrees to the left and 20 degrees up and down. No defects should be present within a radius of the central 20 degrees (Annex III 6.1).

Group 1 drivers with total functional loss of sight in one eye or who use only one eye must have this condition of monocular vision assessed by a competent medical authority. Monocular drivers must have a visual acuity of at least 0.5 (6/12) with corrective lenses if necessary, and a field of vision in that eye equivalent to the requirement in paragraph 6.1. A competent medical authority must certify that monocular vision has existed for a sufficiently long time to allow adaptation and that the field requirements are met (Annex III 6.2).

Group 2 (Annex III 6.4) drivers require visual acuity of at least 0.8 (6/7.5) in the better eye and 0.1 (6/60) in the worse eye, with corrective lenses if necessary. If corrective lenses are needed to attain values of 0.8 and 0.1 the minimum acuity must be achieved either by correction by means of glasses with a power not exceeding plus or minus 8 dioptries or with the aid of contact lenses. This correction must be well tolerated. The horizontal visual field should be at least 160 degrees, the extension should be at least 70 degrees left and right and 30 degrees up and down. No defects should be present within a radius of the central 30 degrees. Driving licences shall not be issued to or renewed for applicants or drivers suffering from impaired contrast sensitivity or from diplopia. Group two drivers require this assessment every five years on renewal of their licence (all from Annex III 6.4).

The visual requirements contained within the Directives place a clearly stated obligation on Group 1 drivers to have a binocular visual acuity, with corrective lenses if necessary, of 0.5 (or 6/12), when applying for a driving licence or for its renewal. Moreover there is a recommendation for a visual field of minimum size, as outlined above. This system places a heavy emphasis on Group 1 drivers knowing and understanding a technical and detailed minimum visual standard, and having the capacity to assess whether they meet this standard. ECOO considers this emphasis on self-reporting of problems to be problematic, as explained below.

⁵ All references below from Annex III EC Directive 2006/126/EC as amended by 2009/113/EC

Systems of driver vision screening (in use before Directive 2006/126/EC) across Europe

Across the EU there is a range of current systems of driver vision screening for Group 1 drivers in operation. The following section outlines those Member States that operate the best systems and those that ECOO believes do not operate systems that are in line with an 'appropriate investigation' of visual acuity.

Prior to the adoption of Directive 2006/126/EC as amended by 2009/113/EC, the most scientific and appropriate systems were in place in Finland, followed by Germany and Ireland. The systems in use in these countries use an appropriate system of screening visual acuity and visual fields that is directly comparable with the stated requirements. This assessment is performed by a competent authority that understands not only the minimum visual standards, but can also discuss potential reasons for failing.

In **Finland**, Group 1 drivers are required to attend for driver vision screening when applying for a provisional licence, at the age of 45, and again at the age of 70. Driver vision screening in Finland, which is a sub-set of a sight test or eye examination, requires that visual acuity and visual fields are assessed against a minimum standard required to issue a driving licence. This assessment is done by a competent medical authority (usually an optometrist or doctor). Having met the minimum visual requirements, a report is completed by the competent medical authority and that report is submitted with the applicant's forms to renew the licence. If the applicant does not pass driver vision screening, they attend for a sight test or eye examination which could result in new spectacles or contact lenses, or should the examiner uncover an underlying eye disease or condition, a referral to have this investigated and treated as appropriate.

In **Germany**, Group 1 drivers are required to attend for driver vision screening performed by a competent authority when applying for a provisional licence. Driver vision screening, again a sub-set of a sight test or eye examination, requires that visual acuity be assessed under carefully controlled conditions and using specific equipment in order to standardise the results. The price of this assessment is set by the German government at €6.43. Should the driver pass this assessment, a report is completed and submitted to the licensing authority, as in Finland. If the applicant does not pass driver vision screening, they then attend for a sight test or eye examination as in Finland.

In **Ireland**, Group 1 applicants for a provisional licence must attend for driver vision screening to assess visual acuity and visual fields. This assessment, again a sub-set of an eye examination, is performed by an optometrist or medical doctor, and having successfully completed screening, a report is completed by the examiner and handed to the applicant to submit to the licensing authority. Similarly, if the applicant does not pass screening, he or she attends for a sight test or eye examination, as in Finland or Germany. The price of driver vision screening in Ireland is market-determined, usually costing between €10 and €15. Over the age of 70, Group 1 drivers must undergo an assessment of their medical fitness to drive, which includes an assessment of vision to ensure they still have adequate visual acuity and visual fields to drive safely. Having passed this assessment, a licence is then issued for a maximum of three years. This assessment is repeated at the next licence renewal.

Driver vision screening in the three countries above is performed using tried and tested scientific assessments under appropriate environmental conditions, and the assessment is recorded on file and repeatable.

By contrast, many EU member states (including **France**, the **UK** and the **Netherlands**) are reliant on an outdated test to screen drivers' vision which involves reading the licence plate at approximately 20 metres distance when the applicant sits the practical driving test. ECOO considers this assessment to be unfair, unscientific and inappropriate to assess an applicant's visual acuity, which is detailed in the following section.

Problems with the licence plate test and reliance on self-reporting

The current system of driver vision screening in several EU member states (including France, the UK and the Netherlands) is based on reading a number plate at a specified distance, when the applicant sits his or her driving test. This system is inadequate for several reasons:

Inadequacies of the licence plate test

- The test to read the number plate is not scientifically based and does not reflect today's knowledge of vision and how vision affects driving. The test is not standardised nor validated, thus the results are not repeatable or consistent. This makes the test an inappropriate method of determining whether a person has adequate vision for driving.
- The number plate test can be affected by environmental conditions. People can fail the test in different lighting or weather conditions. In unfavourable conditions, individuals may fail the test, even though their vision would fulfil the requirements. In favourable conditions others may pass, even though their vision would not fulfil the requirements and they would probably benefit from wearing glasses or contact lenses while driving.
- A number of scientific publications have questioned the accuracy and reliability of the number plate test. Charman (1997) calculated from angular subtense that the number plate test was in fact equivalent to a Snellen acuity of approximately 6/15 i.e. below the 6/12 standard⁶. Other publications have found the number plate test to be inconsistent with Snellen acuity, results were variable and unlikely to be repeatable^{7,8}.
- The current reliance on the licence plate test and self-reporting has been in place since the 1930s and has not been updated since, to reflect increased numbers on the roads or developments in road safety standards and clinical technology.

Problems with self reporting of visual problems

No EU member state currently repeats driver vision screening at each renewal of driving licences (with the partial exception of Finland at age 45 and 70, and Ireland over the age of 70). Some including the UK ask for self-declaration that the applicant is still medically fit to drive, over the age of 70.

Annex III 6.1 places an obligation on all applicants for a driving licence or for the renewal of such a licence to have a binocular visual acuity, with corrective lenses if necessary, of at least 0.5 using both eyes together. In addition to this, there is a clearly stated recommendation for horizontal, vertical and central visual fields. ECOO is concerned that, in the absence of driver vision screening on renewal of driving licences in the vast majority of Member States, the onus is entirely on the applicant to understand this detailed and technical minimum visual requirement for fitness to drive. In addition, the applicant must be capable of assessing whether or not they meet this minimum visual requirement. On the other hand, they must notify the national licensing authority, if they happen to be aware that they do not meet the visual standard. ECOO considers this onus on the applicant (on renewal of their licence) to be highly problematic for the following reasons.

- Many drivers do not notice a gradual change in their vision (whether visual acuity or visual field), and are therefore unaware that they fall below the required standard. Common conditions such as glaucoma can cause asymptomatic loss of vision in their early stages. The National Institute for Clinical Excellence (UK) report on Glaucoma (2009) states that 'individuals with early to moderate chronic glaucoma are mostly asymptomatic and unaware of any damage to their field of

⁶ Charman WN (1997) Vision and driving – a literature review and commentary. *Ophthalmic and Physiological Optics*, 17 371-391

⁷ Kiel AW, Butler T, Alwitary A, (2003) Visual acuity and legal visual requirements to drive a passenger vehicle. *Eye*, 17 579-582

⁸ Currie Z, Bhan A, Pepper I, (2000) Reliability of Snellen charts for testing visual acuity for driving: prospective study and postal questionnaire. *BMJ* 321, 990-992

vision. Once vision loss becomes apparent up to 90% of optic nerve fibres may have been irrecoverably damaged.⁹

- Self-reporting is reliant on all Group 1 drivers knowing the required standard (surveys indicate that the vast majority do not), self-assessing against it and realising they do not meet it, and being aware that it is a criminal offence not to notify the licensing authority if they have a problem with their vision.
- Although lack of knowledge is not a defence in a court of law, there have been studies which show a widespread lack of awareness about the current visual standards and the legal implications of driving with poor vision.
- Recent reports have shown that there is reluctance amongst drivers to admit that they do not meet the standards. The Royal Automobile Club Foundation published a report in April 2010 which stated that (in the UK) “when first applying for a driving licence individuals are required to state their medical conditions. All drivers must inform the national licensing authority of any change in their health, although the evidence is that motorists do not tend to contact the authorities with this information. This is because motorists either have a lack of knowledge about how or when to provide the update or because many fear the impact it might have on their ability to hold a licence.”

For all of these reasons, the current system of driver screening in Member States cannot claim to be sufficient to meet the harmonised European standards for drivers’ vision under the Directives.

ECOO believes that, given these problems with relying on self-reporting, the Finnish system comes closest to meeting all requirements under the Directives, although it could be improved by performing driver vision screening on Group 1 drivers at each renewal. Vision can and does change with aging, and drivers are not well placed to assess their vision against a detailed and technical standard.

Evidence base for driver vision screening

Road accidents are by their nature multi-causal; so that several elements (weather, road position, speed, vision, tiredness, road layout etc) all interplay to cause accidents. An accident occurs when a series of individual causes combine at a specific point in time at a specific location. ECOO proposes that improving driver vision screening for all drivers would improve road safety by screening a causative factor (poor vision), in so far as is possible and in a proportionate manner (on renewal).

Vision is by far the most important source of perceptual information when driving, as over 90% of the sensory input to the brain when driving comes from vision¹⁰. There is substantial evidence that links poor vision to impaired driver performance, though the evidence is less clear cut to determine a simple linear causality that links poor vision with individual accidents. However, the EU’s Eyesight Working Group, the Council of Ministers and the European Parliament all considered that a clear minimum standard for visual acuity and visual fields for all drivers was necessary in the Directives.

It is helpful to draw an analogy with crime. Crimes also have numerous causes (unemployment, social exclusion, poor education, psychology, and opportunity at a given point in time) that interact to cause crime but a difficulty arises in directly linking one cause to the final outcome of any individual robbery for example. EU member states do not use this lack of a simple linear relationship or clear cut evidence to avoid moving ahead to deal with the causes of crime in order to deliver a safer society.

Under ECOO’s recommendations (as outlined below), one of the multiple causes of accidents would be appropriately screened and better understood. We would expect that by implementing this model for

⁹ NICE Report (2009) ‘*Glaucoma: Diagnosis and Management of Chronic Open Angle Glaucoma and Ocular Hypertension*’

¹⁰ As reported by the Royal College of Ophthalmologists (1999) in ‘Vision Standards for Driving’, available online at <http://www.rcophth.ac.uk/docs/publications/DrivingStandards.pdf>

driver vision screening, fewer serious and minor accidents could be expected, all other things being equal.

There is substantial evidence to support the use of a visual acuity cut-off point and visual field standard for awarding a driving licence^{11,12}. It is also evident that the use of accident statistics has considerable limitation in evaluating the relationship between a particular test of visual function and safety to drive. However, evaluations of driver performance under simulated visual impairment (refractive blur and cataract) have found significantly degraded driver performance under night-time conditions¹³. In addition, age and pathology are important factors in progressive loss of visual function and should also be borne in mind when assessing standards¹⁴. There is a duty on legislators to protect the public, whilst balancing the individual's right to drive¹⁵.

The Finnish Institute of Occupational Health and the Optical Information Center looked at the incidence of visual acuity below 6/12 and visual field loss in the driving population¹⁶. 0.8% of drivers in the sample had visual acuity less than 0.5 (6/12) and a further 3.8% had visual acuity 0.5 to 0.63 (6/12 to 6/9.5) (all subjects were screened in Finland). With increasing age, more drivers had impaired visual acuity. Visual field loss was manifest in 0.9% of drivers aged 25-44; 1.8% of drivers aged 45-69; and 6.3% of the drivers 70 years and older. Impaired visual acuity (below 6/12) and visual field loss were found to be more common among older drivers. Overall, 2.9% of drivers did not reach the visual requirements for driving, with older drivers more likely to fall below the requirements. A study in France has found that up to 12% of all drivers do not meet the standards as outlined in the Directives¹⁷.

Despite having the most developed and scientifically based system of driver vision screening, there are still individual drivers that do not meet the standard that are driving on the roads in Finland. ECOO believes that this is an issue that should cause great concern to Member States and the European Commission. Implementation of the Directives presents an opportunity to improve the system of driver vision screening in all Member States. ECOO thus makes the following specific recommendations to improve this situation.

Recommendations for successful implementation under Directives

- Vision requires careful consideration as it stands out as singularly important when driving.
- As vision is one causative factor that can lead to an accident, there should be a more appropriate system to screen vision when applying for a provisional licence and on renewal of all driving licences.
- Vision is one causative factor that is easily controlled with an inexpensive and widely available assessment of visual acuity and visual fields.
- The licence plate test is outdated and has no scientific basis; therefore it is not an appropriate investigation to ensure that drivers have adequate visual acuity of 0.5 (or 6/12).
- The licence plate test should be replaced with an appropriate Snellen based assessment similar to that used in Finland, Germany and Ireland, conducted by an a competent authority that properly understands this assessment, and the impact on drivers that fail.

¹¹ International Council of Ophthalmology (2006) Visual Standards – Vision Requirements for Driving Safety prepared for the 30th World Ophthalmology Congress 2006

¹² Bowers A, Peli E, Elgin J, McGwin G Jr, Owsley C (2005) On road driving with moderate visual field loss. *Optom. & Vis. Sci.* 82 657-667

¹³ Wood J, Chaparro A, Carberry T, Chu, B S (2010) Effect of Simulated Visual Impairment on Night-time Driving Performance. *Optom. & Vis. Sci.* 87 370-386

¹⁴ Taylor SP (2002) Vision and the older Driver. *CE Optometry*, 5 49-53

¹⁵ International Council of Ophthalmology (2006) Visual Standards – Vision Requirements for Driving Safety prepared for the 30th World Ophthalmology Congress 2006

¹⁶ Personal communication from the Finnish Institute of Occupational Health

¹⁷ Personal communication from ASNAV (Association Nationale pour l'Amélioration de la Vue)

- Drivers cannot be expected to self-assess their vision against a detailed and technical standard, and to self-report a problem of which they may not be aware.
- Driver vision screening should be conducted on renewal of Group 1 licences to ensure that all drivers meet the visual requirements from the Directives. This should include an assessment of visual fields, especially among older drivers.
- Having completed driver vision screening, a report should be issued and submitted to the national licensing authority when applying for a provisional licence and when renewing such a licence.

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