

VISUAL STANDARDS FOR DRIVING IN EUROPE

A CONSENSUS PAPER
JANUARY 2017

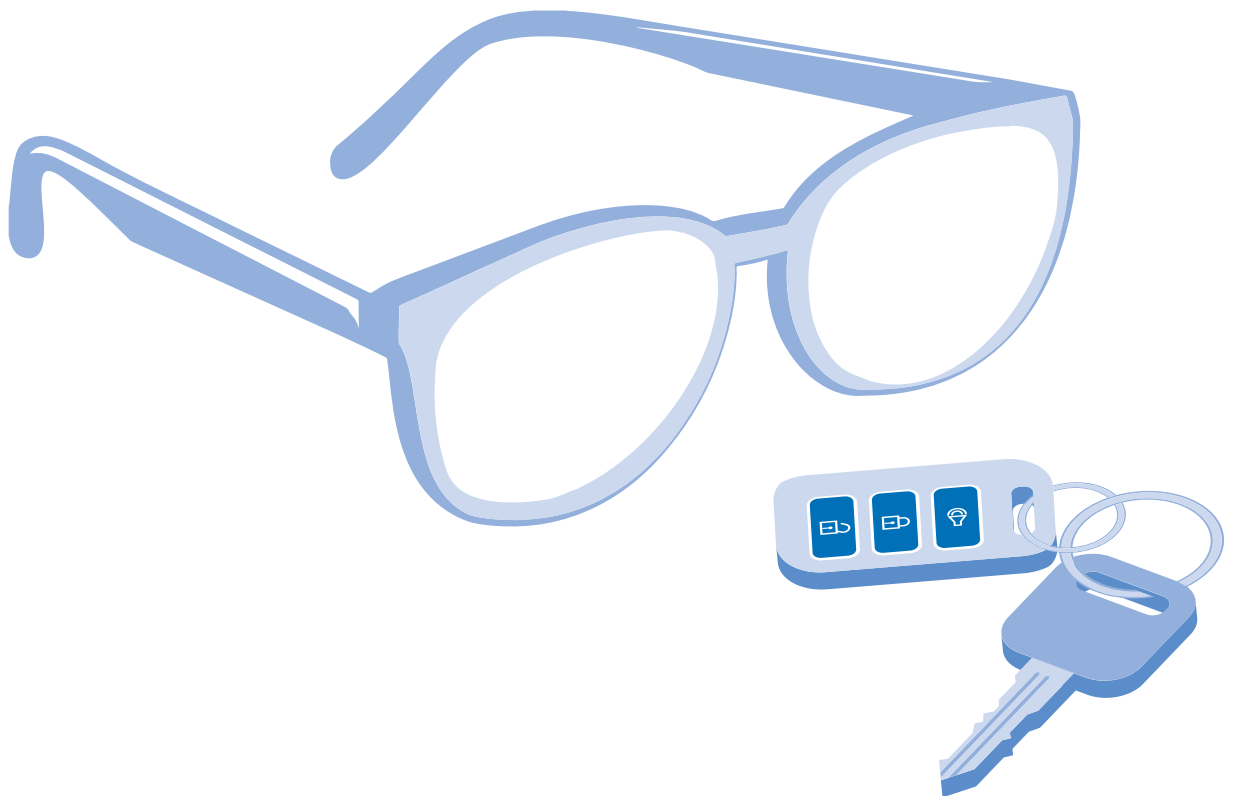


European
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EXECUTIVE SUMMARY

This paper is a consensus of opinion from the eye care sector across Europe in regard to driving and visual standards. This is timely in 2017 as the European Commission (EC) is establishing a work stream to examine how the Medical Annex of Directive 2009/113/EC on driving licences has been implemented in Member States. While this exercise is welcome to endeavour to harmonise this across Europe, this document highlights the lack of uniformity in how visual standards are applied. It also summarises considerable differences in the application of these standards in European countries.

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INTRODUCTION:

Driving a vehicle is a key means by which individuals maintain independence and mobility. There are over 440 million people who hold a driving licence in Europe (60% of the European population).¹ Policymakers have a responsibility to provide a framework or legislation to enable safe driving conditions for both drivers and other citizens. Eye care clinicians need to be able to counsel patients about the visual criteria for driving, and correct and maximise vision for driving. The EC Directives on driving licenses (EC Directives 2006/126/EC and 2009/113/EC)² have been updated in recent years and member countries were required to align national standards to the directive by 2013. In the Medical Annex of the 2009 directive, minimum visual standards are stated to ensure drivers meet a safe visual standard for driving. These standards were agreed by consensus with the overarching purpose of standardising visual requirements for drivers across Europe. However, member countries have different systems and protocols in place to screen drivers' vision both for acquisition and renewal of driving licences, and thus we are still some way from harmony in the application of driving standards across Europe. A recent Cochrane review also noted that current vision screening regulations vary from country to country.³ This paper summarises national systems and demonstrates that there is continuing discrepancy in visual standards for driving across member states.

The visual standards in the directive are summarized in Annex 1, and consist of two criteria for Group 1 drivers (cars and motorcycles) and Group 2 drivers (heavy goods vehicles and buses). Given that the majority of individuals in the general public will have Group 1 licenses, this report will largely concentrate on the standards for Group 1 drivers.

VISUAL STANDARDS AND THEIR INTERPRETATION:

Key visual measures for fitness to drive are visual acuity and the extent of field of vision. However, other criteria including contrast and glare sensitivity, twilight vision and diplopia are also stated in the Medical Annex of the 2009 EC directive.

For Group 1 drivers, the visual acuity standard is binocular vision of at least 0.5 decimal (0.3 logMAR, 6/12 Snellen equivalent) and a visual field extending to 120 degrees in the horizontal meridian.

For Group 2 drivers, the visual acuity standard is binocular vision of at least 0.8 decimal (0.1 logMAR, 6/7.5 Snellen equivalent) in the better eye, with a VA of at least 0.1 decimal in the other eye (1.0 logMAR, 6/60 Snellen equivalent), and a visual field extending to 160 degrees in the horizontal meridian.

The role of eye care professionals is to correct and manage visual function to maximise vision, to measure aspects of vision, and to counsel and advise drivers on their visual function for driving. The measurement of visual acuity is a core and established measure of visual function, but like any psychophysical technique, it is subjective in nature and can therefore be variable. While the descriptions above appear to give a clear indication of the expected minimum visual standard, there are differences in the tests used and how such a standard is applied. For example, the number-plate test is still used in some countries as a proxy for a visual acuity measure, and recent work by Latham et al.⁴ highlights the

inconsistency with of the potential dual standard of meeting the EC requirements of 0.3logMAR and then UK national requirements of the number-plate test in the UK.

Measurement of visual fields typically involves specialist instrumentation to determine extent of visual fields. For Group 1 drivers, many countries rely on self-report of 'normal' visual fields and do not formally test this unless there is a medical indication to do so.

While the inclusion of contrast sensitivity in the directive is welcome and useful to highlight, there is no explanation as to what would be deemed 'normal' contrast sensitivity. The same is true of glare and twilight vision. There are several significant barriers to setting such thresholds, the main one being the lack of information in the literature to provide an evidence base for preparing such a guideline. An EU working group set up to provide advice in preparing the 2009 Directive⁵ called for further study and investigation in this area. While this ambiguity remains, it is difficult for member countries to determine how assessment of twilight vision, contrast and glare sensitivity should be implemented. This has meant many countries do not request any assessment of this, while others, such as Ireland, have included it in their national legislation.

Table 1 summarises the variance in assessment of visual function for Group 1 drivers across Europe including member and non-member states at the time of acquisition of a licence.

Table 1. Summary of what kind of visual function measures are conducted at time of licence acquisition.

COUNTRY	National Visual standards	Visual assessment at time of licence acquisition: what test(s) are conducted?			
	Group 1 (Decimal VA)	VA, Visual Fields and additional measures	VA and Visual Fields only	VA only	Licence plate self-test
Austria	0.5 Binocular	✓			
Belgium	0.5 Binocular	✓ Twilight Vision			
Bulgaria	0.8 Binocular	✓ Colour Vision			
Croatia	0.5 Binocular		✓		
Cyprus	0.5 Binocular				✓
Czech Republic	0.7 binocular 1.0 Monocular	✓			
Denmark	0.5 Binocular		✓		
Estonia	0.5 Binocular		✓		
Finland	0.5 Binocular		✓		
France	0.5 Binocular				✓
Germany	0.5 Binocular 0.7 Monocular			✓	
Greece	Sum of VA in each eye ≥ 1.0			✓	
Hungary	0.5 Binocular	✓		✓	
Ireland	0.5 Binocular	✓			
Italy	1.0 Binocular (Minimum 0.2 monocular)	✓		✓	
Latvia	0.5 Binocular		✓		
Malta	0.5 Binocular			✓	
The Netherlands	0.5 Binocular				✓
Norway*	0.5 Binocular				✓
Poland	0.5 Binocular		✓		
Portugal	0.5 Binocular	✓			
Serbia*	0.5 Binocular	✓			
Slovakia	Assume 0.5 Binocular		✓		
Slovenia	Assume 0.5 Binocular			✓	
Spain	0.5 Binocular	✓			
Sweden	0.5 Binocular		✓		
Switzerland*	0.63 Binocular		✓		
Turkey*	1.0 Binocular, monocular not less than 0.1	✓			
United Kingdom	0.5 Binocular				✓

*non-EU member states



The EC directive states that a ‘competent medical authority’ should assess vision for driving. This is interpreted differently in member countries, with some limited to medical doctors, others eye care specialists, and others have technicians employed in government offices for driver licencing.

In some countries, such as Spain, individuals are present for a medical check-up at the time

of driving licence acquisition. This assessment includes a range of tests including vision. In others, such as the UK, the responsibility lies with the individual to self-report visual status and medical conditions.

Table 2 details the professionals that are typically permitted to undertake visual assessments for driving. Again, this varies across member countries of Europe.

Table 2. Summary of which professional is responsible for undertaking the visual assessment at the time of driving licence acquisition across member countries.

COUNTRY	Person undertaking initial assessment for acquisition of driving licence				
	Medical doctor	Ophthalmologist	Optometrist/ optician	Any of these	Driving test employee
Austria		✓	✓		
Belgium		✓			
Bulgaria	✓	✓			
Croatia		✓			
Cyprus					✓
Czech Republic	✓				
Denmark	✓	✓			
Estonia				✓	
Finland	✓	✓			
France	✓	✓			
Germany		✓	✓		
Greece		✓			
Hungary		✓			
Ireland				✓	
Italy	✓				
Latvia		✓			
Malta	✓				
The Netherlands					✓
Norway*					✓
Poland	✓				
Portugal	✓				
Serbia*		✓			
Slovakia	✓				
Slovenia	✓				
Spain		✓			
Sweden				✓	✓
Switzerland*		✓	✓		
Turkey*	✓	✓			
United Kingdom					✓

*non-EU member states

RISK OF IMPAIRED VISION AND DRIVING

Despite the fact that driving is a visual task, there is a paucity of direct evidence correlating the effect of reduced vision on driving performance and safety.⁶ While policymakers may try to base evidence on studies that analyse road traffic accidents and impaired vision, evidence suggests it is inadvisable to use self-reporting of crash involvements in calculating road traffic accident involvement.⁷ Additionally, there is no requirement for vision to be measured by the police authorities at the time of a crash in most EU countries, and the cause of accidents are often multifactorial in origin and difficult to disentangle.

Older people have an increased incidence of vision problems. One of the most common age-related ocular conditions that gives rise to visual impairment is cataract.⁸ In its early stages, cataract results in reduced contrast sensitivity, even before visual acuity is affected.⁹ A body of research has simulated driving on closed circuit conditions and these studies have revealed that reduced contrast significantly affects driving performance^{10,11} and mild-to-moderate cataract impacts on hazard perception and driving ability.^{12,13} However, while older drivers are more likely to have medical and visual problems that may affect their ability to drive, they are under-represented in accidents due to their self-limiting behaviours such as avoiding driving at night.¹⁴

A large-scale study published in the *New England Journal of Medicine* showed that where drivers were provided with detailed information on 'medical fitness to drive' during routine examinations, there was a consequent drop in road traffic accidents and fatalities.¹⁵

Eye care clinicians want to be in a position to be able to contribute to driver awareness of the importance of good vision, but also try to maximise visual function to keep drivers 'on the road' as much as possible. Balancing the risk and conse-

quences of poor vision and driving with the right to drive is a sensitive and complex issue. Driving a vehicle is an important part of maintaining normal, independent life and it is recognised that the loss of the right to drive can lead to an increased risk of depression in older people.¹⁶

Legislation allows for countries to introduce restricted licencing which allows drivers to hold a licence in limited circumstances, which may be applicable when there is an eye condition that may affect driving (e.g. cataract, macular degeneration). Examples of these restrictions include:

- Driving in the daytime only.
- Driving within a perimeter of 10km from their home.

Restrictive licencing has been shown to be an effective mechanism for increasing driver safety without unduly impacting driver mobility. It has significant potential to have a positive impact on the ability of those with medical conditions to drive safely.¹⁷

While it is established that there is an increased risk of visual problems for older drivers, there is currently no requirement for visual assessment on renewal of a driving licence in the EC directive 2009. Table 3 notes the variance in visual assessments throughout the life of the driving licence across European countries. A number of countries still place the responsibility of the individual to self-report any issues and place the onus for visual assessment with the driver themselves. However, as many visual conditions are asymptomatic and produce a gradual loss or change of vision, it is difficult for the driver to accurately evaluate this. Indeed, recently Levecq et al.¹⁸ found that of 810 drivers over 60 years of age, 10% did not meet the visual standard for driving.

Table 3. Profile of licence renewal visual requirements across European countries.

COUNTRY	Visual assessment through life of licence?						
	Every 10 years?	Description of requirements when older					No requirement
		40's	50's	60's	70's	80's	
Austria							✗
Belgium							✗
Bulgaria	✓						
Croatia						At 80+ years; 2-yearly	
Cyprus					At 70 years		
Czech Republic							✗
Denmark					At 70 years At 74+ years; 2-yearly		
Estonia	✓			At 65+ years; 5-yearly			
Finland		At 45 years			At 70+ years; 5-yearly		
France							✗
Germany							✗
Greece				At 65+ years			
Hungary	✓	At 40+ years; 5-yearly		At 60+ years; 3-yearly	At 70+ years; 2-yearly		✗
Ireland					At 70+ years; 3-yearly		
Italy	✓		At 50+ years; 5-yearly		At 70+ years; 3-yearly	At 80+ years- 2-yearly	
Latvia	✓		At 50+ years; 5-yearly	At 65+ years; 3-yearly			
Malta					At 70+ years		
The Netherlands					At 75+ years; 5-yearly		
Norway*							
Poland					At 75 years		
Portugal				At 60 years			
Serbia*				At 60 years			
Slovakia					At 70+ years; 1-yearly		
Slovenia						At 80 years	
Spain	✓			At 65+ years; 5-yearly			
Sweden							✗
Switzerland*					At 70 years		
Turkey*	✓		At 50+ years; 5-yearly	At 65+ years; 3-yearly			
United Kingdom							✗

*non-EU member states



In considering public awareness of visual standards for driving, a 2014 survey carried out by UK road safety charity BRAKE19 found overwhelming agreement (87%) that drivers should be required to produce evidence of recent sight tests when renewing licences. This survey further found that of 46% of drivers who reported that they needed corrective glasses or contact lenses for driving, 12% admitted to driving without them in the past

12 months. Of the 54% who reported no need for corrective glasses or contact lenses for driving, one in three (33%) reported that they had not had an eye test in the past two years. Finally, one in five (19%) drivers reported delaying visiting an optician after noticing problems with their vision, for a variety of reasons. This work highlights the reality of visual standards awareness and implementation among the general public.



CONCLUSIONS

This report presents a current summary of practice as to how visual standards are implemented for driving across European countries:

- It is clear that there are still many discrepancies across EU countries in the implementation of the Medical Annex of Directive 2009/113/EC on driving licences with regard to visual standards for driving.
- There is currently an urgent need to consider the meaning of the other aspects of visual function, i.e. contrast sensitivity and twilight vision, on driving performance and safety if the current Directive is to be implemented appropriately.
- There are still significant gaps in the scientific literature about the influence of vision on driving, and a need for more research and evidence to ensure policymakers are making informed decisions.
- Policymakers and other stakeholders should come together to explore how best to raise public awareness of visual standards for driving.

CALL TO ACTION

- **Advocate for the requirement of assessment of visual standards upon renewal of driving licence in Medical Annex of the EC directive**
- **Standardise the visual acuity assessment method to ensure consistency in application of visual standards for driving**
- **Engage with member states to recognise that the licence plate test is not a measure of visual acuity**
- **Ensure assessment is carried out by an eye care professional**
- **Promote effective assessment of vision, visual fields, contrast sensitivity and twilight vision, clarify what such tests comprises to avoid discrepancy across member states**
- **Encourage more research in effective assessment tools for measurement of visual functions**
- **Advocate for increased public awareness of fitness to drive**



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Appendix 1

Directive 2009/113/EC which amends Directive 2006/126/EC regarding driving licences and updating the medical fitness to drive criteria.

“EYESIGHT

6. 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/she shall be examined by a competent medical authority. At this examination attention shall be paid, in particular, to the following: visual acuity, field of vision, twilight vision, glare and contrast sensitivity, diplopia and other visual functions that can compromise safe driving.

For group 1 drivers, licensing may be considered in “exceptional cases” where the visual field standard or visual acuity standard cannot be met; in such cases the driver should undergo examination by a competent medical authority to demonstrate that there is no other impairment of visual function, including glare, contrast sensitivity and twilight vision. The driver or applicant should also be subject to a positive practical test conducted by a competent authority.

Group 1:

6.1. Applicants for a driving licence or for the renewal of such a licence shall have a binocular visual acuity, with corrective lenses if necessary, of at least 0,5 when using both eyes together. Moreover, the horizontal visual field should be at least 120 degrees, the extension should be at least 50 degrees left and right and 20 degrees up and down. No defects should be present within a radius of the central 20 degrees. When a progressive eye disease is detected or declared, driving licences may be issued or renewed subject to the applicant undergoing regular examination by a competent medical authority.

6.2. Applicants for a driving licence, or for the renewal of such a licence, who have total functional loss of vision in one eye or who use only one eye (e.g. in the case of diplopia) must have a visual acuity of at least 0,5, with corrective lenses if necessary. The competent medical authority must certify that this condition of monocular vision has existed for a sufficiently long time to allow adaptation and that the field of vision in this eye meets the requirement laid down in paragraph 6.1.

6.3. After any recently developed diplopia or after the loss of vision in one eye, there should be an appropriate adaptation period (for example, six months), during which driving is not allowed. After this period, driving is only allowed following a favourable opinion from vision and driving experts.

Group 2:

6.4. Applicants for a driving licence or for the renewal of such a licence shall have a visual acuity, with corrective lenses if necessary, of at least 0,8 in the better eye and at least 0,1 in the worse eye. If corrective lenses are used to attain the values of 0,8 and 0,1, the minimum acuity (0,8 and 0,1) must be achieved either by correction by means of glasses with a power not exceeding plus eight dioptres, or with the aid of contact lenses. The correction must be well tolerated.

Moreover, the horizontal visual field with both eyes 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. After a substantial loss of vision in one eye, there should be an appropriate adaptation period (for example six months) during which the subject is not allowed to drive. After this period, driving is only allowed after a favourable opinion from vision and driving experts.”

Glossary of terms

Binocular vision:

this is vision that results from the combined input from the two eyes. Humans have two eyes spaced horizontally apart. The brain receives information from both eyes and integrates this to form an enhanced '3-D picture' of our visual world. 3-D vision is called depth perception or stereopsis. Having binocular vision also provides a wide field of vision. Binocular vision problems could include eyestrain, headaches and double vision. Not having binocular vision (i.e. monocular vision) means a lesser field of vision on the right or left side.

Field of vision:

this is the amount of visual environment the eyes are aware of at any one time, i.e. our peripheral or side vision. With both eyes, one can typically see 180 degrees horizontally and also have a large angular view below and above the line of sight.

Glare sensitivity:

light is fundamental for vision, but some light sources and environments can lead to glare. This can be a barrier to comfortable vision. There are some conditions where individuals may become more susceptible or sensitive to glare.

Twilight vision:

this is the ability to see in low light (e.g. moonlight) viewing conditions. The technical term for this is scotopic vision.

Visual acuity:

this is a measure of how well someone can see. The person may need to wear spectacles (or contact lenses) to see well, so sometimes the term corrected visual acuity may be used. It is typically measured by a person reading letters of decreasing size from a chart. The letters correspond to different levels of acuity. There are standardised test designs for measuring visual acuity and it forms a core measure of describing someone's vision. It comprises one of the main criteria that define, internationally, visual "fitness" for driving a vehicle, and visual "readiness" for many occupations, such as for aircraft pilots.

Visual Impairment:

This is a reduction in visual acuity and/or field of vision, usually due to a disease or problem with the eye(s) which cannot be corrected by spectacles or contact lenses. The term visual impairment is used to describe someone having sight loss. The World Health Organisation has definitions for visual impairment, and define a visual acuity of worse than 6/18 (0.5logMAR, decimal 0.3) as moderate visual impairment.